

**KNOWLEDGE, PERCEPTION, ILLNESS-RELATED EXPERIENCES  
AND TREATMENT COMPLIANCE AMONG DIABETES MELLITUS  
PATIENTS IN SELECTED HOSPITALS IN IBADAN,  
OYO STATE, NIGERIA**

**BY**

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## **DEDICATION**

To God, the Almighty for his abundance grace and mercy. Also to the memory of my late father MR AMOS OLATINWO TONADE. May the lord grant his soul eternal rest, Amen.

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## ABSTRACT

Diabetes Mellitus (DM) is a chronic disease of public health importance in Nigeria. However patients' knowledge, perceptions, practices and experiences relating to DM seems not to have been sufficiently investigated. This study was therefore designed to determine DM-related knowledge, perception, illness-related experiences and treatment compliance among diabetics in selected hospitals in Ibadan.

The study was a cross-sectional survey involving systematic random sample of 600 out of 2,115 diabetes patients receiving treatment at the following purposively selected health care facilities: University College Hospital, Ring-Road State Hospital and Oluyoro Catholic Hospital. The semi-structured questionnaire used for data collection included 45-point knowledge and 32-point perception scales, questions on socio-demographic characteristics, illness-related experiences and treatment compliance. Knowledge scores of 1- 20, 21 - 35 and 36 - 45 were considered poor, fair and good respectively. Perception scores of  $\leq 16$  and  $\geq 17$  points were categorized as negative and positive respectively. Descriptive statistics, Chi-square test and t-test were used for data analysis at  $p < 0.05$ .

Mean age of the respondents was  $63.9 \pm 8.6$  years, 75.3% were married and 62.7% were females. Respondents' sources of information about DM included doctor (41.0%), radio (29.3%) and friends (27.3%). Mean knowledge score was  $36.6 \pm 5.8$ . Respondents with poor, fair, and good knowledge were 2.5%, 32.5%, and 65.0% respectively. Majority (87.8%) were aware that diabetics could take most food substances in small amounts. Respondents' mean perception score was  $21.8 \pm 4.8$ . The positive perceptions included views that DM cannot be cured (69.2%) and Physical Exercise (PE) can be used to control DM (90.0%) while negative perceptions included views that it is the best types of food health care providers tell diabetics not to eat (68.7%), and too much time is wasted in the clinic (75.8%). Respondents with overall negative and positive perceptions were 6.0% and 94.0% respectively. Perceived diabetic-related symptoms experienced within three months preceding the study included: cramps (72.0%), excessive hunger (73.8%), profuse sweating (75.5%) and severe thirst (77.8%). None of the respondents complied with all the DM recommended treatment practices. Non-compliance

related practices among the respondents' included: failure to go to the hospital for regular checkup (51.5%), failure to take drugs as a result of forgetfulness (50.2%) and excessive consumption of food which ought to be taken in small quantities (43.8%). A major challenge faced by the diabetics was high cost of drugs as stated by the respondents (69.0%). There was no significant difference in respondents' mean scores by sex (male= $36.6 \pm 5.6$ ; female =  $36.5 \pm 6.0$ ). Similarly, there was no significant association between perception that DM could be controlled by PE and respondents' age.

Knowledge of majority of respondents was high and many had appropriate perceptions needed to cope with the disease. However, inadequate compliance with various measures for managing the disease constitutes a concern which could be addressed by patient education and social support.

**Keywords:** Diabetes mellitus knowledge, Treatment compliance, Diabetes-related challenges, Diabetes- related perceptions

**Word count:** 472

## **CERTIFICATION**

I certify that this work was carried out by OYELAMI Funmilola Ikeoluwapo in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria.

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## LIST OF ABBREVIATIONS

<b>ADA</b>	American Diabetes Association
<b>ADAACE</b>	American Diabetes association and the American Association of Clinical Endocrinologist
<b>CDC</b>	Centers for Disease Control and Prevention
<b>CVA</b>	Cerebral Vascular Accidents
<b>DM</b>	Diabetes mellitus
<b>DFU</b>	Diabetic foot ulcers
<b>HBA1C</b>	Glycosylated haemoglobin
<b>HBM</b>	Health belief model
<b>HIV</b>	Human Immuno-deficiency virus
<b>HLA</b>	Human Leukocyte Antigen
<b>IDF</b>	International diabetes federation
<b>IGT</b>	Impaired Glucose Tolerance
<b>IV</b>	Intravenous
<b>LADA</b>	Latent Autoimmune Diabetes of Adults
<b>LGA</b>	Local Government Area
<b>NCPIE</b>	National Council on Patient and Education
<b>PRECEDE</b>	Predisposing reinforcing and enabling constructs in education/ecological diagnosis and evaluation
<b>OHA</b>	Oral Hypoglycemic Agent
<b>T2DM</b>	Type 2 diabetes mellitus
<b>UKPDS</b>	United Kingdom Prospective Diabetes Study
<b>UNAIDS</b>	Joint United Nations Program on HIV/AIDS
<b>UK</b>	United Kingdom
<b>UKPDS</b>	United Kingdom Prospective Diabetes Study
<b>US</b>	United State of America
<b>WHO</b>	World Health Organization

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Diabetes mellitus which is now an emerging public health problem of the 21st century, threatens to overwhelm the healthcare system in the near future (Alberti, 2001). Sadly, majority of the people with diabetes in developing countries are within the productive age range of 45–64 years and persons within this age range are expected to drive the economic engines of their countries in order to achieve the development goals (Diabetes Atlas, 2009). Besides their reduced productivity, diabetes further imposes a high economic burden in terms of healthcare expenditure, lost productivity, and foregone economic growth (Diabetes Atlas, 2009).

Diabetes is a serious condition for the individual and society. The disease is most common among the elderly (that is above 70years) of age in many populations; prevalence rates are however significantly rising among productive age in populations in the developing world (Freedman, 2004). The alarming increase in the prevalence of the disease is attributed to a number of factors including population ageing, unhealthy diet, overweight and sedentary lifestyle. The disease often results from high blood glucose levels which is brought about by defects in insulin secretion, insulin action, or both. There are two types of diabetes. These are the types 1 and 2 diabetes (Dobson, 2003). Type 1 diabetes develops due to a diminish production of insulin while type 2 diabetes is due to resistance to its effects. Both types however lead to hyperglycemia (Dobson, 2003).

According to Beran and Yudkin (2006), the increasing number of people with type-2 diabetes which accounts for 90 per cent of all cases of diabetes is a worldwide concern and has become one of the major causes of premature illness and death. World Health Organization has speculated that the number of adults with diabetes in the world will rise from 135 million in 1995 to 380 million in the year 2025 (Beran and Yudkin, 2006). The major proportion of this numerical increase will occur in developing countries (WHO, 2008). In developing countries, with special reference to sub-Saharan Africa type-2

diabetes mellitus appears to be fuelled by rapid cultural changes, aging populations, dietary changes, decreased physical activity and other unhealthy lifestyles, all of which are associated with the adoption of western value and urbanization (Levitt; 2008, Mennen and Mbanya, 2000). According to World Health Organization, there are 1.71 million People living with diabetes in Nigeria while in 2011 the International Diabetes Federation (IDF) said 3million Nigerians are living with coping diabetes and this figure is projected to reach 4.84 million by the year 2030 (WHO, 2009).

Diabetes is one of the chronic illnesses for which self-management plays a central role in care. Self management is an evolutionary process of development of knowledge or awareness by learning to service with the complex nature of the diabetes in a social context (Cooper, Booth, Gill, 2003). The vast majority of day to day care in diabetes is handled by patients and families. There are seven essential self care behaviours in people with diabetes which predict good outcomes. These are healthy eating, being physically active, monitoring of blood sugar, compliant with medications, good problem solving-skills, healthy coping skills and risk reduction behaviours. Diabetes self care activities are behaviours undertaken by people with or at risk of in order to successfully manage the disease on their own. (Okolie, 2010). Until there is a cure for diabetes, these therapeutic or care practices must be sustained for a lifetime (Schechter and Walker, 2002).

Evidence from across sub-Saharan Africa suggests that diabetes is under-diagnosed. For example, in a Cameroon based study (Mbanya and Sobngwi, 2000) 60 per cent of diabetic cases were undiagnosed. The equivalent figure was 70 per cent in Ghana (Amoah, 2002) and over 80 per cent in Tanzania (Aspray, Mugusi, and Rashid, 2000). The prognosis of diabetes in sub-Saharan Africa is reported to be poor and so is the quality of care (Neuhann, Water-Neuhann, Lyaruu and Msuya, 2002). The observed reasons for these trends are poor clinic accessibility and drug availability, high costs of treatment and care, inadequate supplies of trained staff and equipment, as well as the use of alternative health care providers, such as traditional healers and/or herbalists (Beran and Yudkin 2006). Trado medicine is also effective to some people. Furthermore, poor patient education on the management of diabetes including self-monitoring and control of glycaemia, non-adherence to treatment regimen, together with unhelpful health-related beliefs or perception on the



management of this disease have been reported to contribute to poor diabetes care and treatment outcomes (Dagogo-Jack, 2006; Kiawi, Edwards, Shu, Unwin, Kamadjeu and Mbanya, 2006). In order to design a biopsychosocial and educational intervention aimed at assisting people coping with diabetes baseline information about them is needed. These include patients' knowledge, perceptions and attitude to the disease, compliance-related factors and the illness-related experiences which patients endure. This study is designed to explore these groups of behavioural antecedent factors.

## **1.2 Statement of the problem**

Diabetes mellitus is considered to be one of the most psychologically and behaviorally demanding of the chronic diseases (Delamater, 2007). It requires frequent self-care and radical lifestyle modifications, which principally include dietary modifications (Morisky, 2009). What mandated me to conduct this study was the demise of my father who died of diabetes mellitus some years ago when compliance to treatment as to the management of the disease had no meaning to the family. It has just occurred to me that diabetes is the disease that affects the survival, growth, and development of human beings. Diabetes in Africa is rapidly on the increase, especially in Nigeria among urban communities.

According to Adefemi 2005, it has been estimated that the number of people with diabetes in Nigeria is presently over 1.5 million. This is an indication that, the disease is spreading widely and silently in the country. By the year 2030 it is estimated that developing nations will account for over 80% of the global increase of patients with diabetes. In Nigeria the expenditure simply cannot be matched. This rapid growth means that people with diabetes are likely to suffer the most; and unfortunately the healthcare sector will unjustly buckle under the financial strain. Presently, 336million people worldwide have Type 2 diabetes. By 2030, more than 555 million will be affected, 70 of this increase is expected to occur in developing countries like Nigeria and this is a cause for concern. Fifty percent of those affected are not yet diagnosed. Every 10 seconds two persons develop diabetes and every 10 seconds one person dies from diabetes (Mark Anumah Medical Mission).

The reason can be attributed principally to the nature of food consumed and lifestyles adopted (Sobnigwe, Mauvies, Vernix, Mbaya 2008) have said that, 'the prevalence of diabetes mellitus and other non-communicable diseases is on the rise in African communities due to drastic lifestyle changes and accompanying urbanization and westernization.' Due to a lack of proper awareness and education, diabetes sufferers are particularly prone to complications and increased mortality. This is true also of the Nigerian situation (Kolawole, Abodunde, Ikem, Fabiyi 2009) have commented that, 'food exchanges, home blood sugar monitoring and other modern therapies that are routinely employed in the care of diabetics in the developed world are only for a privileged few in a developing nation like Nigeria.' Sound information on levels of health and illness in a specific geographic location is essential for an acceptable quality of patient care, primary care research and recruitment of health professionals to that location.

In a situation where diabetic patients visit clinics regularly and their blood glucose levels still remain high despite the treatment they receive is a problem that calls for attention. In Nigeria, non-compliance to drugs and diets by diabetic patients has remained a major setback in the management of diabetes. There is need for diabetic patients to stay away from some habits that can trigger their blood sugar resulting to complications that may even lead to death.

The reasons for poor glycemic control among Nigerian diabetic patients are multi-factorial. Financial constraint is a key factor as most patients have to pay out-of-pocket for their drugs and for blood glucose tests, and at a price which has been found to be much higher than the cost of these drugs in other parts of the world (The diabetes declaration and strategy for Africa 2006). In Nigeria a substantial portion of health care costs (74.5%) is borne by the patient, as the government provided only 25.5% of health care expenditure in 2009 according to a WHO report. The WHO report estimates that 90.2% of Nigerians live below the poverty level of \$2 per day. Thus, accessing health care is a challenge for people living with diabetes in Nigeria. (Ofoegbu 2009) This difficulty is evident by reports showing a high prevalence of complications due to diabetes (Richard , Paul, James, Danie 2010). Patients' non compliance to therapy is an important factor. Culturally, Nigerians are averse to accepting that a disease is incurable and requires life-long

management. They continue searching for permanent cure, a process that often results in poor control. (Akinkugbe 2009)

Coker and Fasanmade (2010) documented that poor glycaemic control in their study amongst persons with diabetes in Lagos, Nigeria include poor health seeking behaviour of our people, low level of literacy, poverty, poor compliance with follow up visits and medications amongst others. Many people in Nigeria also make use of alternative medicines like roots and herbs in treating their ailments. A noncompliant diabetic patient may not check his/her blood glucose levels regularly and may take medication incorrectly or not at all. He/she may fail to lose weight, stop smoking or exercise. His/her diet may contain too much fat and too many carbohydrates to control blood glucose levels, and he not visits his doctor for regular check-ups. Diabetics who are noncompliant do not realize or accept that proper self-care will have a positive effect in the long-term. As a result, they are in danger of developing complications that affect the eyes, kidneys, heart, nerves, feet and more (Gallagher,Viscoli and Horwitz, 2003). Over time, uncontrolled diabetes will lead to permanent damage of these areas as well as stroke, heart disease and blindness. Diabetes awareness needs to be at the forefront of governmental discussions to protect the future of countries like Nigeria.

Some reports have indicated in the resent times that diabetes is on the high side among the Nigerian youths. There is paucity of information or no concrete data to support this (BanKi-Moon, 2009).

### **1.3 Justification for the study**

Compliance to medical advice for a condition like diabetes is tasking. The difficulty of dietary compliance, complexity of some medication regimens fear of taking insulin injections and fear of hypoglycemia and weight gain are all factors that can adversely influence patient's ability to comply to treatment as it was observed during the study. Studies have emphasized the importance of achieving optimal glucose control through strict compliance to medications and diets in order to minimize serious long-term complications (Mason, Matsuyama and Jue, 1995; Blanca and Ernesto 2001). It is important to design education and health promotion strategies aimed of improving glycemic control in patients with diabetes. This cannot be done without awareness of the experiences of diabetics and the behavior-related factors which influence their compliance with the recommended health actions. The findings of this study will therefore constitute baseline information for the design of effective self-care strategies, social support and patient education for diabetic patients especially in clinical settings.

### **1.4 Research Questions**

1. What is the level of knowledge of the diabetes patients on diabetes mellitus?
2. What is the attitude of diabetes patients towards compliances with diabetes mellitus?
3. What are the diabetic patients' perceptions relating to diabetes mellitus?
4. What are the respondents' illness experiences relating to non-compliance in the management of diabetes mellitus?
5. What are the factors which influence respondents' to diabetes management?

### **1.5 Broad objectives.**

The broad objective of the study was to determine knowledge, perception, illness-related experiences and treatment compliance among diabetes mellitus patients in selected hospitals in Ibadan, Oyo state, Nigeria.

### **1. 5.1 Specific Objectives**

The specific objectives of the study were to:

1. Assess respondents' knowledge of diabetes mellitus;
2. Determine respondents' attitudes related to diabetes mellitus,
3. Determine respondents' perception relating to the management of diabetes mellitus;
4. Identify respondents' illness-related experiences relating to non-compliance in management of diabetes mellitus.
5. Identify factors which influence respondents' to diabetes management?

### **1.6 Test of Hypothesis**

1. There is no significant association between respondents' level of education and knowledge of diabetes mellitus.
2. There is no significant association between knowledge of respondents and perception of management of diabetes mellitus.
3. There is no significant association between respondents' level of education and perception of management of diabetes mellitus.

### **1.7 Operational definition of terms.**

**1.7.1 Diabetes mellitus** is a group of metabolic diseases in which there are high blood sugar levels due to the inability of the pancreas to produce enough insulin or the cells of the body not responding properly to the insulin produced. There are three main types of diabetes mellitus: Type 1, type 2 and gestational diabetes.

**1.7.2 Diabetic patient:** It refers to an individual who has been coping with diabetes.

**1.7.3 Compliance** is defined as the practice of obeying rules or requests made by people in authority or doing what is required of them to do. Within the concept of this study it means adhering to all the drug and non-drug therapies prescribed by a doctor .e.g compliance to drugs, diet and physical exercise.

**1.7.4 Knowledge** is information and understanding about a subject which a person has, or which all people have which can be objectively assessed as correct or incorrect. It is not mere ‘awareness’

**1.7.5 Perception** is the different views that the patient coping with diabetes has with the management of the disease.

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## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1. Conceptual Clarification

Diabetes mellitus is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because body cells do not respond to the insulin that is produced (Shoback, 2011).

All types of diabetes negatively affect the body's ability to maintain a relatively constant level of sugar in the blood (Mayo, 2010). The hormone whose abnormality leads to the disease is known as insulin, which is secreted by the pancreas in the islet of langerhans; it is the insulin that facilitates the uptake of sugar from the blood cells of the body. Logically, if the pancreas is not able to produce insulin or if the insulin is not able to function properly then the body is not able to maintain a constant blood sugar level, which is harmful to the body (Mayo, 2010). There is an increasing prevalence of diabetes mellitus worldwide (WHO, 2009). Two major concerns are that much of the increase in diabetes disease condition will occur in developing countries, due to ageing, unhealthy diets, obesity and sedentary lifestyles (WHO, 2009).

According to WHO (2009) those most frequently affected in developing countries are those in the productive years of their lives, aged between 35 and 64 years. The number of deaths attributed annually to diabetes is around 3.2 million worldwide and the disease has become one of the major causes of premature illness and death in most countries, majorly through the increase risk of cardiovascular disease (Freedman. 2004). Diabetes mellitus may present with characteristic symptoms such as thirst, polyuria, blurring of vision, and weights (International Diabetes Federation, 2000). Diabetes is a major non communicable disease and could be life threatening if not well managed and also the most common cause of non-traumatic amputation of the lower limb (WHO, 2009). Diabetic foot disease is due to changes in blood vessels and nerves i.e peripheral neuropathy with risk of foot ulcers which often lead to ulceration and subsequent limb amputation (Freedman, 2004). Diabetes is considered to be one of the most psychologically and behaviourally demanding of the chronic diseases (Ciechanowski, Katon, Russo and Walker, 2001). Studies have

emphasized the importance of achieving optimal glucose control through strict adherence to medications in order to minimize serious long term complications (Blanca et al., 2001; Ciechanowski et al., 2001; Barnes et al., 2004). Each diabetic complications affect patients' quality of life, increase morbidity, mortality and economic cost to society (Blanca et al, 2001; Ciechanowski et al., 2001).

## **2.2. Epidemiology and Burden of Diabetes**

The World Diabetes Day 2013 campaign marks the fifth year focus on “Diabetes Education and Prevention” and it is expected to link up for action to the protection of health of the future generation so as to make this world a safer place for all. For the purpose of record and learning the World Diabetes Day [WDD] was introduced in the year 1991 by IDF and World Health Organization in response to the growing concern about the escalating health threat diabetes pose. November 14 is the date of birth of Fredrick Banting who along with Charles Best invented insulin for the treatment of diabetes patient's way back in 1922.

Diabetes mellitus is one of non-communicable diseases (NCDs) which by definition is non-infectious and non-transmissible among people. The World Health Organization (WHO) reports NCDs to be by far the leading cause of death in the world, representing over 60% of all deaths.

Diabetes is the sixth leading cause of death worldwide (CDC, 2002). The number of diabetes cases worldwide has increased significantly in the last decade (Zeck and McIntyre, 2008). Thus it is now regarded as a global epidemic and more than 230 million people worldwide are living with the disease (Silinik, 2007).

It has been noted that in the United States, more than 13.8 million Americans have diabetes (Silinik, 2007). In Australia, chronic diseases like diabetes now contribute to over 70% of the disease burden, and this is expected to increase to 80% by 2020 (Jordan and Osborne, 2006). China with its huge population has about 30 million diabetic adults, while India which also a larger population has 35.5 million (Jordan and Osborne, 2006). It has been estimated that the number of adults with diabetes in the world will rise from 135 million in 1995 to 380 million in the year 2025. (Beran and Yudkin, 2006). According to King., Aubert and Herman (1998) there would be a 42% increase from 51-72 million in the



developed countries and a 170% increase from 84-228 million in the developing countries in the year 2025, >75% of people with diabetes will reside in developing countries, as compared with 62% in 1995.

It has been noted also that one in twenty adult deaths in developing countries is diabetes related (Gojka, Nigel, Bennet, Mathers, Tuomilehto, and Satyajit, 2005). At the beginning of the last century, DM was considered a rare medical condition in Africa but there is now evidence to demonstrate an increasing incidence and prevalence of diabetes in African populations (Kengne, Amoah, and Mbanya, 2005). Traditional rural communities still have low prevalence of 1-2% while 1-13% or more adults in urban communities have diabetes (Sobngwi, Maurvais-Jarvis, and Mbanya, 2007, Kolawole, Adegbenro, Ayoola, and Opebiyi, 2005).

The IDF also noted that over 371 million people have diabetes and half do not know they have it with China topping the list of ten countries with the highest number of people 92.3 million between the ages of 20-79 years. China is closely followed by India with 63 million diabetics, United States with 24.1 million, Brazil with 13.4 million, Russia federation with 12.7 million, Mexico with 10.6 million diabetics. The other countries are: Indonesia with 7.6 million diabetics, Egypt 7.5 million diabetics, Japan 7.1 million diabetics and Pakistan with 6.6 million people with diabetes.

A country-by-country summary table by IDF for 2012 showed that 3,165.31 million Nigerians between the ages of 20 and 79 have diabetes while 2,532.25 million Nigerians living with the condition are on aware that undiagnosed. It also that the country loss 88,681 persons in 2012 due to diabetes related illnesses and has a 4.83% comparative prevalence according to the World Health Organization [WHO] standard. The IDF diabetes atlas also noted that half of people who died from diabetes are under the age of 60: 4.8 million people died and \$471 billion were spent due to diabetes in 2012; and the number of people with diabetes is increasing in every country. Indeed, while the HIV epidemic has captured the world's attention, recent data indicated that the global mortality due to diabetes and HIV are similar (Roglic, Unwi, Bennett, 2005). Unlike HIV, the trends for a rise in diabetes prevalence are clear, globally and regionally (Roglic et al 2005). Several studies such as

Abubakari and Bhopal (2008) conducted in Sub-Saharan Africa demonstrated low prevalence was still evident in rural and urban Eastern and Western Africa when standardized WHO criteria for the diagnosis of diabetes were applied. In contrast, moderate prevalence were reported from South African studies undertaken in different cities and one peri-urban area (4–8%) (Levitt,2008). These differences could be largely ascribed to considerably higher rates of obesity in the South African population compared with other countries in the region. There has been a clear demonstration that the prevalence of diabetes is rising in Sub-Saharan Africa. In Tanzania and Cameroun, the only two countries where repeated local surveys have been undertaken using similar methodology, the prevalence has increased six- to 10-fold within a 10-year period (Aspray, Mugusi, and Rashid, 2000).

Diabetes and its complications impose significant economic consequences on individuals, families, health systems and countries (WHO, 2009). It is associated with reduced life expectancy, significant morbidity and diminished quality of life. The overall risk of premature death is twice as high among individuals with diabetes as for those without diabetes (WHO, 2008). The threat of DM is growing; the number of people, families and communities affected is increasing. This growing threat is an under-appreciated cause of poverty and hinders the economic development of many countries (WHO, 2009).

Diabetes takes a staggering toll on the people in Nigeria and the economic burden is heavy (Popoola, 2005). Recent research on common causes of inpatient hospitalizations in Nigeria showed that out of 1,327 patients admitted to the medical wards, DM related admissions constituted 15% of the entire medical admissions and the case fatality rate was 16% (Ogbera, Chinenye, Onyekwere. and Fasanmade 2007).

The most common reasons for the admissions were hyperglycaemic emergencies (40%) and hypertension (21%) (Ogbera et al. 2007). The most common causes of deaths were hyperglycemic emergencies (46%) and Diabetic Foot Ulcers (DFU) (30%). Diabetic foot ulcers and Cerebral Vascular Accidents (CVA) commonly known as stroke had the highest case fatality rates of 28% and 25%, respectively (Ogbera et al, 2007). Okoro (2002)

showed that diabetes care among patients in the Teaching Hospitals in Nigeria was less than optimal and recommended improvements in the areas of foot and eye examinations.

### **2.3 Prevalence of diabetes mellitus**

The prevalence of DM varies among populations due to differences in genetic susceptibility (Mar, 2001) and social risk factors such as change in diet, obesity, physical inactivity and, possibly, factors relating to intrauterine development. “World Health Organization, (2009)” Diabetes mellitus needs to be treated by a holistic approach through dietary adjustment, exercise, medication (if needed), and education and self-care measures (Mar 2001). Diabetes is a chronic disease which is characterized by high levels of blood glucose, (hyperglycaemia) (WHO, 2008). This situation gives rise to risk of tiny blood vessel damage (retinopathy, nephropathy and neuropathy) (WHO, 2008).

The study by Nadir, William, Adil, Hajer Geed and Randa ( 2011) in Qatari showed that the overall prevalence of DM among the adult population has been estimated to be as high as 17%, and a high proportion of pre-diabetes in Qatari adults predicts an increase the prevalence of DM in the next few years (Bener,2009).The results also showed no evidence of association between knowledge, attitude, and practice with the level of educational attainment. The data generated in that study provided an insight into important aspects of the knowledge, attitude and practices relating to diabetes in this cohort of diabetic patients.

It was suggested that general knowledge about treatments and risk factors for the disease correlate with compliance to lifestyle changes and with drug therapy; hence the ability to attain treatment goals (Alm-Roijer, 20011).This agrees with the notion that patients’ belief about their self-efficacy to perform specific actions to promote their health is affected by the knowledge and skills that they attain and that subsequently influence their compliance to treatment plans (Abula and Worku, 2000).

Farmer and colleagues (2006) advocated that knowledge remains an important prerequisite to good compliance with medical therapy. A study in Saudi Arabia reported low levels of knowledge, attitude and compliance with medications among Saudi female patients with Type 2 Diabetes Mellitus (T2DM), suggesting a need for sustained active patient education, support and evaluation to increase patient involvement and self-reliance in the

management of diabetes. It is disturbing to note that the vast majority of participants were unaware of the ideal blood glucose control target levels and many were unable to name a single complication associated with diabetes. This lack of information and understanding of potential risks is worrying, and indicates participants' obliviousness to the gravity of their condition. This may be partially explained by the fact that diabetes, being almost asymptomatic, does not interfere with their daily routine and patients generally tend to ignore the condition until the disease is advanced (Brown, 2002, Kar 2003). Understanding the disease state appears to play a role in compliance, as does the presence of social support system. For example not understanding the nature and consequences of diabetes, as well as lack of family support correlated with poor compliance (Lawson, Lyne, Harvey and Bundy, 2005) in particular, patients who felt that their family understood their disease were more likely to be compliant than patients who did not have strong supports at home (Lawson, 2005). Many patients also do not understand their diabetes treatment. Health education given to many patients about the potential adverse effect associated with oral antihyperglycemic agents may correlate with improved compliance (Lawson et al 2005) suggested that patients who were adequately informed of the adverse effect of diabetes had greater compliance and persistence than patients who were not well informed.

#### **2.4. Nigeria and strategy for reducing non communicable diseases**

Diabetes mellitus and related Non-communicable diseases (NCDs) are increasing in prevalence in Nigeria; their complications pose an immense public health burden. Diabetes is highly correlated to risk factors such as unhealthy diet, physical inactivity, obesity, alcohol intake and smoking. There is a need for our health decision-makers at all levels to develop strategies and interventions to halt the growing trend and burden of Diabetes through effective health care (Ogbera, Chinenye, Onyekwere , Fasanmade 2007).

Nigeria is the most populous country in Africa with about 400 ethnic groups and languages (The society and its Environment, 2007) about 51.6% of its populace living in rural areas (World Bank report published in 2012). Nigeria bears a double burden of disease, although still battling with the scourge of communicable diseases, is now saddled with life style related non-communicable diseases (NCDs) that accompany industrialization and

urbanization. NCDs are chronic diseases that are typically non-contagious or non-infectious in nature, causing long term debilitation and disability if not prevented or controlled. Major NCDs in Nigeria include diabetes mellitus, cancers, sickle cell disease, asthma, mental health disorders, road traffic injuries/violence, and oral health disorders. Others include cardiovascular diseases such as hypertension, coronary heart disease, stroke and attendant chronic renal diseases.

It is in recognition of the nature, magnitude and severity of these problems and challenges posed by NCDs that the Federal Ministry of Health (FMOH) established the NCD Control Programme in 1988 to serve as the arrowhead of the response to NCDs in Nigeria (FMOH Working Document on Non-communicable Diseases in Nigeria 2011). The strategic thrust of the NCD control programme is to generate reliable and information base for the establishment of a national NCD Policy and Strategic Plan of Action to guide prevention for all care especially diabetes.

### **2.5. Strategies for improving diabetes care**

Following the Alma Ata declaration of 1978 on the appropriateness of ‘primary healthcare’ as the key to the provision of ‘health for all by the year 2000’, in August 1987, the federal government of Nigeria launched its Primary Health Care (PHC) plan, which was intended to be the cornerstone of health policy. The PHC is a very useful means of disseminating information in Nigeria as well as achieving health-related goals. Thus the PHC can be expanded to include diabetes prevention. Many of the educational posters on diabetes in the country are written in English, focus on diabetes care, and could be found mainly in secondary and tertiary care centres. Educational posters on diabetes prevention in English, and at least the three other major languages (Hausa, Igbo, and Yoruba) should be available in all primary health centres and private hospitals across the country, as well as the secondary and tertiary care levels.

Incorporation of community health workers into the care of persons with chronic NCDs, such as asthma, hypertension, and diabetes, has been shown to be beneficial. (Postma ,Karr, Kieckhefer 2009). In Nigeria, community health workers could be trained to penetrate the community with appropriate information on diabetes awareness and prevention.

Furthermore, community leaders and leaders of organized groups such as market women, drivers, etc. could help mobilize their members for diabetes awareness campaigns.

The mass media can positively change health behaviour. (Norris, Chowdhury, Van Le, et al 2006) therefore, in addition to the above, the print and electronic media should be explored to reach out to the populace at large with special emphasis on T2DM prevention. However, the quality of the information being passed to the public should be screened by important bodies such as the Diabetes Association of Nigeria (DAN) and the Endocrinology and Metabolism Society of Nigeria. Hitherto, diabetes awareness campaigns in the print and electronic media were limited to the celebration of World Diabetes Day, but it should be a regular event if the impact is to be widely felt across the nation. (Nigeria Champion Newspaper Online. *World Diabetes Day*).

The availability of the global system for mobile communication has revolutionized information dissemination in Nigeria. Wireless messages are useful in the management of chronic illnesses, they also serve as a powerful preventive and behaviour modification tool. (Patrick, Raab, Adams, et al 2009). Thus, if the health ministry or non-governmental organisation (NGO) partner with the telecommunication companies, millions of Nigerians, especially the urban dwellers, who are more likely to indulge in unhealthy lifestyles, can be reached simultaneously with important messages on diabetes prevention. However, the majority of rural dwellers in Nigeria (who constitute about 80% of the population and of whom about 90% are illiterate) do not have access to newer information technology resources and are thus cut off from the global scene. The primary healthcare system is still the most appropriate option in this setting since rural dwellers have previously shown a positive response to the services of information agents such as agricultural extension workers and rural health workers. (Patrick, Raab, Adams, et al 2009).

The aforementioned strategies are useful if there is an unwavering commitment by the appropriate authorities. However, it is unfortunate that (according to the 2009 International Diabetes Federation report), there are no data to suggest a national diabetes programme in Nigeria. There is a high unemployment rate in the country, where poor income, lower rate of education, and physical complications adversely affect the quality of life of patients with

T2DM.20 The management of diabetes and its complications is very expensive, and not affordable by many sufferers in developing countries such as Nigeria. For example, the current minimum wage for civil servants is US\$113 (18 000.00 Nigerian Naira) per month. (Okoro, 2002). However, haemodialysis for a patient with renal failure costs about US\$ 400 per week, excluding the cost of medications, transportation, and laboratory investigations. While sufferers of AIDS and TB receive medications and do some laboratory tests free, there are no subsidies for diabetes care. (Alebiosu, Familoni , Ogunsemi ,et al. 2009). This underscores the need for aggressive preventive measures against the development of diabetes on the one hand, and its complications on the other hand.

The positive impact of diabetes education on glycaemic control and other aspects of diabetes care is well known. Training in diabetes care is one aspect that virtually all of sub-Saharan Africa lacks. It has been shown that the lack of proper training of health professionals in diabetes care accounts for the high non-compliance rates and serious complications. The knowledge of diabetes and hypertension care among healthcare professionals in Nigeria is poor, especially those at the primary and secondary care level. (Keers , Groen, Sluiter, Bouma , Links 2005). The knowledge of diabetes care is expected to be worse among patients living with diabetes. The dearth of diabetes educators is a major limiting factor against education of patients in Nigeria. Thus, the clinician also doubles as the diabetes educator, and sometimes as the dietician. Fortunately, it has been shown that other healthcare givers can also educate the patient with attendant positive results. (Duke, Colagiuri, Colagiuri 2009). This means that nurses, laboratory scientists, pharmacists, etc. can also play a valuable role in educating patients with diabetes.

However, as stated earlier, there is need to train the care givers in order to ensure that appropriate and uniform information is being disseminated. At the same time efforts should be made to produce certified diabetes educators in the country.

Both individual and group education have a positive impact on blood glucose control in the short term. (Alebiosu, Familoni , Ogunsemi ,et al. 2009). In Nigeria, the Diabetes Association of Nigeria organises regular group sessions where patients with diabetes are

educated on various aspects of diabetes care, and this has been shown to positively influence glycaemic outcomes. These activities are however restricted to some tertiary and secondary centres, which care for less than half of the diabetic patients in Nigeria. There is a need to strengthen diabetes club activities, at the primary care level and in the public and private sectors, for the impact of education to be felt nationally. Besides, the education given should be culturally acceptable for it to achieve its intended goals. (Norris, Engelgau Venkat Narayan, 2001).

## **2.6 Global strategy for the prevention of Non-communicable Diseases**

World Health Organization (WHO) is also responding with measures that lessen the risk factors that are associated with non-communicable diseases this includes the following:

Strategy on diet, physical activity and health aims to promote and protect health by enabling communities to reduce disease and death rates related to unhealthy diet and physical inactivity.

Development and adoption of internationally agreed standards and norms for the diagnosis and treatment of diabetes, its complications and risk factors;

Promoting and contributing to the surveillance of diabetes, its complications and mortality, and its risk factors;

Contributing to building capacity for prevention and control of diabetes;

Raising awareness about the importance of diabetes as a global public health problem;

Acting as an advocate for the prevention and control of diabetes in vulnerable populations

(WHO: Facts Sheets to the Ministerial Technical Working Group on the United Nations High Level meeting on NCDs) 2011

## **2.7 Governments and policy makers at local, National, Regional and Global levels**

Governments and policy makers at the local, National, Regional and Global level are to put in place National plans for diabetes as recommended by UN Resolution 61/225 on diabetes



2006. Implement recommendations for government in the WHO 2008- 2013 Action Plan for the Global Strategy for the prevention and control of Non-communicable Disease. The WHO Global Strategy on Diet, Physical Activity & Health 2004 & become a signatory to implement the framework Diabetes control. Engage in UN High level Summit on NCDs in September 2011 & implement outcomes.

## **2.8 Non-governmental organizations**

Non-governmental organizations are to do the followings:-

- Establish a Diabetes unit at WHO Headquarters, an UN Special Ambassador on Diabetes in every WHO region & at UN Headquarters & High level UN Thematic working group on diabetes & related NCDs.
- Make diabetes & related NCDs central to global health & developmental goals & target that succeed the millennium development Goals (MGDs) 2015
- Support the implementation of recommendation in UN resolutions
- Establish a prequalification Scheme for insulin and other drugs to ensure quality and reduce cost. (WHO 2008-2013 ACTION Plan for Global Strategy for the prevention & control of Non-communicable Disease WHO Geneva 2004).

## **2.9 Donor countries and philanthropic institutions**

Donor countries and philanthropic institutions are to:

- Provide funding to low and middle- income countries for diabetes & related NCDs,
- Align aid to recipient country priorities which for many will include diabetes.
- Support integration of diabetes & other NCDs into health system strengthening.
- Work with the private sector, civil society & governments to support innovation in diabetes medicines & technologies.
- Support & be advocates for people with diabetes so they will not struggle alone.
- Collect the evidence to raise the political priority of diabetes
- Support and disseminate policy research & best practice in diabetes.
- Save lives through humanitarian programmes for diabetes.

- Convene & mobilise the global diabetes community. (Nugent, Feigl 2009)

## **2.10. Causes of Diabetes Mellitus**

The main underlying causes of the disease are genetic and environmental factors. The environmental factors encompass urbanization and industrialization and changes in lifestyle from a traditional healthy and active life to a modern, sedentary, stressful life and over-consumption of energy-dense foods (Sattar, Preiss, Murray and Welsh 2010).

### **2.10.1 Environmental and external factors**

In many instances, diabetes mellitus can originate from outside the body rather than from within (Sattar et al, 2010). Some of the more obvious of these extrinsic factors which can trigger off the occurrence of DM, such as use of steroids and other drugs that can alter the hormonal balance as the amount of insulin production is affected.

Infections can also cause DM (Sattar et al 2010). Some microorganisms can infect the pancreas and adversely affect its functioning. The insulin dependent DM or the diabetes mellitus type 1 is believed to be caused, among others due to the infection of the Cocksackle virus (this is one of the groups of enterovirus that may give rise to a variety of illness including meningitis and myocarditis) on the pancrease (Sattar et al, 2010).

### **2.10.2. Hereditary Factors**

Diabetes mellitus has a very strong hereditary connection (Sattar et al 2010). People who have the Human Leukocyte Antigen (HLA) in their blood, which is transmitted from parents, have a higher likelihood of developing DM type1. It is seen that the disease is more common in people who have a relative suffering from diabetes (Rother, 2007).

## **2.11. Signs and symptoms of Diabetes Mellitus**

Symptoms of Diabetes mellitus include polyuria, polydipsia, weight loss, sometimes with polyphagia and blurred vision. Impairment of growth and susceptibility to certain infections may also accompany chronic hyperglycemia.

## **2.12. Typologies of diabetes mellitus**

Type 1 diabetes mellitus, type 2 diabetes mellitus and gestational diabetes mellitus.

2.12.1 Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency (Rother 2007). This type of diabetes can be further classified as immune-mediated or idiopathic. The immune-mediated DM type 1 is the one which results from a cellular mediated autoimmune destruction of the beta cells of the pancreas. On the other hand the idiopathic DM type 1 refers to forms of the disease that have no known etiologies. There is no known preventive measure against type 1 diabetes, which causes approximately 10% of DM cases in North America and Europe.

Type 1 diabetes affects both children and adults (Teuscher, 2007). But was traditionally termed "juvenile diabetes" because majority of these diabetes cases were in children (Teuscher, 2007) "Brittle" diabetes, also known as unstable diabetes or labile diabetes is a term that was traditionally used to describe dramatic and recurrent swings in glucose levels, often occurring for no apparent reason in insulin-dependent diabetes (Teuscher, 2007). This term, however, has no biologic basis and should not be used (WHO, 2006). There are many reasons for type 1 diabetes to be accompanied by irregular and unpredictable hyperglycemias, frequently with ketosis, and sometimes serious hypoglycemias, including an impaired counterregulatory response to hypoglycemia, occult infection, gastroparesis (which leads to erratic absorption of dietary carbohydrates) and endocrinopathies (e.g., Addison's disease). (Cooke and Plotnick 2008). These phenomena are believed to occur no more frequently in 1% to 2% of persons with type 1 diabetes (Lambert and Bingley.2002).

### *2.12.2. Type 2 Diabetes Mellitus*

The increasing number of people with type-2 diabetes is a worldwide concern (Beran and Yudkin, 2006). There is a growing incidence of type 2 diabetes which accounts for about 90% (Lambert and Bingley 2002). Type 2 diabetes mellitus is due to insulin resistance or reduced insulin sensitivity, combined with relatively reduced, and sometimes absolute, insulin secretion. The defective responsiveness of body tissues to insulin almost certainly involves the insulin receptor in cell membranes. However, the specific defects are not known (Vinik 2007). In the early stage of type 2 diabetes, the predominant abnormality is

reduced insulin sensitivity, characterized by elevated levels of insulin in the blood. At this stage hyperglycemia can be reversed by a variety of measures and medications that improve insulin sensitivity or reduce glucose production by the liver. As the disease progresses, the impairment of insulin secretion worsens, and therapeutic replacement of insulin often becomes necessary (Motala, Pirie, Gouws, Amod and Omar 2003). Most people with diabetes have type 2 (Freedman, 2004) and many of them have no symptoms and are only diagnosed after many years of onset. Many people with type 2 diabetes are not aware that they have this life-threatening condition. (Freedman, 2004)

There are numerous theories as to the exact cause and pathological mechanism in type 2 diabetes (Motala, Omar and Pirie 2003). Central obesity (fat concentrated around the waist in relation to abdominal organs, but not subcutaneous fat) is known to predispose individuals to insulin resistance (Motala, Pirie, Gouws, Amod and Omar 2003). Abdominal fat usually secretes group of hormones called adipokines that may possibly impair glucose tolerance. Obesity is found in approximately 55% of patients diagnosed with type 2 diabetes (Motala, Pirie, Gouws and Omar 2003).

### **2.12.3. Gestational Diabetes Mellitus**

Gestational Diabetes Mellitus (GDM) occurs when pregnant women without a previous diagnosis of diabetes develop a high blood glucose level. It may precede development of type 2 DM (Lambert and Bingley, 2002). This also resembles type 2 diabetes in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. Gestational diabetes occurs in about 2%–5% of all pregnancies and may improve or disappear after delivery (Rother, 2007). Gestational diabetes can be treated, but requires careful medical supervision throughout the pregnancy. About 20%–50% of gestational diabetes can damage the health of the fetus or mother. Complications that could result from gestational diabetes mellitus include macrosomia (high birth weight), congenital cardiac and central nervous system anomalies and skeletal muscle malformations. Affected women may develop type 2 diabetes later in life (Rother, 2007)

Increased fetal insulin may inhibit fetal surfactant production and cause respiratory distress syndrome. Hyperbilirubinemia may result from red blood cell destruction. In severe cases, perinatal death may occur, most commonly as a result of poor placental perfusion due to vascular impairment (Lawrence, 2008). Labor induction may be indicated with decreased

placental function. A Caesarean section may be performed if there is marked fetal distress or an increased risk of injury associated with macrosomia, such as shoulder dystocia (Lawrence, Contreras, Chen and Sacks 2008). A study conducted in the U.S. 2008 has showed that the number of American women entering pregnancy with pre-existing diabetes is increasing. In fact, the rate of diabetes in expectant mothers has more than doubled in the past six years (Lawrence, 2008). This is particularly problematic as diabetes raises the risk of complications during pregnancy, as well as increasing the potential for the children of diabetic mothers to become diabetic in the future (Lawrence, 2008).

### **2.13. Treatment for Diabetes Mellitus**

The standard care of Type 1 DM includes multiple daily injections of insulin, monitoring of blood glucose through finger prick and digital glucometer (Vinik, 2007). Treatment emphasis is now also placed on lifestyle adjustments (diet and exercise) though these cannot reverse the progress of the disease. According to Vinik (2008) apart from the common subcutaneous injections, it is also possible to deliver insulin by a pump, which allows continuous infusion of insulin 24 hours a day at present levels, and the ability to program doses (a bolus) of insulin as needed at meal times. Type 1 treatment must be continued indefinitely in essentially all cases. Treatment should not impair normal activities. There must be sufficient training for the patient, awareness, appropriate care, discipline in testing and dosing of insulin. However, treatment may look burdensome for patients, insulin is replaced in a non-physiological manner, and this approach is therefore far from ideal (He and Wharrad, 2007).

The average glucose level for the type 1 patient should be as close to normal (80–120 mg/dl, 4–6 mmol/l) as is safely possible. According to He and Wharrad (2007), some physicians suggest up to 140–150 mg/dl (7–7.5 mmol/l) for those having trouble with lower values, such as frequent hypoglycemic events. Values above 400 mg/dl (20 mmol/l) are sometimes accompanied by discomfort and frequent urination leading to dehydration. Values above 600 mg/dl (30 mmol/l) usually require medical treatment and may lead to coma. However, low levels of blood glucose, called hypoglycemia, may lead to

unconsciousness and same must be treated immediately, via emergency high-glucose gel placed in the patient's mouth or an injection of glucagon (Lambert and Bingley, 2002).

Hypoglycemia could be treated by restoring the blood glucose level to normal by the ingestion or administration of dextrose or carbohydrate foods. In more severe circumstances it is managed by injection or infusion of glucagon (El-Shrief, 2006). Recurrent episodes of hypoglycemia may be prevented by reversing or removing the underlying cause and by increasing the frequency of meals, it can also be addressed with medications like diazoxide, octreotide, or glucocorticoids, or by surgical removal of much of the pancreas (El-Shrief,2006). There may be need for one or more medicines to help the body make more insulin or to use insulin better (Kolawale, Adegbenro, Ayoola and Opebiyi, 2005).

Other common modifications for type 2 diabetes is the consumption of fruits and vegetables (Dongowski, Huth, and Gehbardt, 2003). Most patients with type-2 diabetes require therapy by oral agents and sometimes insulin during the course of the disease.

Oral antidiabetic agents used to treat type-2 diabetes are;

Insulin secretagogues (stimulators of insulin secretion by  $\beta$ -cells): sulphonylureas (glibenclamide, gliclazide, glipizide, glimepiride) and non-sulphonylureas insulin secretagogues (repaglinide, nateglinide), insulin sensitizers (increase insulin sensitivity), biguanides (metformin) and thiazolidinediones (rosiglitazone, pioglitazone), inhibitors of carbohydrate absorption ( $\alpha$ -glucosidase inhibitors, acarbose and miglitol). When starting treatment of type-2 diabetic patients, the aim is to achieve treatment goals for glycaemic control (Kolawale, Adegbenro, Ayoola and Opebiyi, 2005). One of the current treatments suggests that METFORMIN is the most widely prescribed anti-diabetic drug in the world. It is the first-line of drugs for the treatment of type two diabetes, particularly in over-weight people and those with normal kidney function.

Dietary fibers helps to slow the release of sugar into the bloodstream, thus helping to keep the blood sugar levels normal. Diets that are high in fiber may be able to help in the management of diabetes (Dongowski, et al 2003). Wearing of medical identification always

to let health professionals know in an emergency that one has diabetes (Siminerio 2008). Most importantly, glucocorticoids, enhance liver glucose output and increase insulin resistance. The use of antipsychotic drugs, both new and old, has been associated with an increase incidence of weight gain and type 2 diabetes (Siminerio, 2008). The mechanisms involved are still however poorly understood and the effects on insulin resistance and insulin secretion are not well documented.

#### **2.14 Recognition/screening for Diabetes Mellitus.**

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following; Fasting plasma glucose level  $\geq 7.0$  mmol/l (126 mg/dl) Plasma glucose  $\geq 11.1$  mmol/l (200 mg/dL) two hours after a 75 g oral glucose load as in a glucose tolerance test, symptoms of hyperglycemia and casual plasma glucose  $\geq 11.1$  mmol/l (200 mg/dl), glycated hemoglobin (Hb A1C)  $\geq 6.5\%$ . (Saydah , Miret , Sung , Varas ,Gause and Brancati 2001). A positive result, in the absence of unequivocal hyperglycemia, should be confirmed by a repeat of any of the above result on a different day. It is preferable to measure a fasting glucose level because of the ease of measurement and the considerable time commitment of formal glucose tolerance testing, which takes two hours to complete and offers no prognostic advantage over the fasting test. (Saydah, Miret, 2001). According to the current definition, two fasting glucose measurements above 126 mg/dl (7.0 mmol/l) is used for diagnostic for diabetes mellitus. People with fasting glucose levels from 110 to 125 mg/dl (6.1to 6.9 mmol/l) are considered to have impaired fasting glucose (Santaguida, Balion, Hunt, Morrison, Gerstein, Raina, Booke and Yazdi 2008). Patients with plasma glucose at or above 140 mg/dL (7.8 mmol/L), but not over 200 mg/dL (11.1 mmol/L), two hours after a 75 g oral glucose load are considered to have impaired glucose tolerance. Of these two prediabetic states, the latter in particular is a major risk factor for progression to full-blown diabetes mellitus, as well as cardiovascular disease (Santaguida and Balion 2008). Glycated hemoglobin is better than fasting glucose for determining risks of cardiovascular disease and death from any cause (Selvin, Steffes, Zhu, Matsushita, Wagenknecht ,Pankow, Coresh, Brancati 2010).

According to Amos, McCarty and Zimmer (2006) diabetes screening is recommended for many people at various stages of life. The screening test varies according to circumstances and local policy, and may be a random blood glucose test, a fasting blood glucose test, a blood glucose test two hours after 75 g of glucose, or an even more formal glucose tolerance test. According to Amos et al, (2006) many healthcare providers recommend universal screening for adults age 40 and above. Early screening is typically recommended for those with risk factors such as obesity, family history of diabetes, high-risk ethnicity. The major symptoms of diabetes are polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased fluid intake), blurred vision, lethargy and changes in energy metabolism and increased appetite (Cooke, 2008). Symptoms may develop quite rapidly (weeks or months) in type 1 diabetes, particularly in children. However, in type 2 diabetes symptoms usually develop much more slowly and may be subtle or completely absent (Cooke, 2008).

Many medical conditions are associated with diabetes. Some of the medical conditions high blood pressure, elevated cholesterol levels, coronary artery disease, past gestational diabetes, polycystic ovary syndrome, chronic pancreatitis, fatty liver, The risk of diabetes is higher with chronic use of several medications, including high-dose glucocorticoids, some chemotherapy agents (especially L-asparagines'), as well as some of the antipsychotics and mood stabilizers. People with a confirmed diagnosis of diabetes are tested routinely for complications. This includes yearly urine testing for microalbuminuria and examination of the retina of the eye for retinopathy. In the UK, systematic screening for diabetic retinopathy, which can be effectively treated if detected at an early stage, has helped reduce visual impairment in people with diabetes since its implementation (Cooke, 2008).

### **2.15. Drug and Non Drug Management of type 1 Diabetes Mellitus**

Diabetes mellitus cannot be cured except in very specific situations (Orchard, Raskin and Zinman, (2005). Management concentrates on keeping blood sugar levels as close to normal ("euglycemia") as possible, without causing hypoglycemia (Orchard, Raskin et al 2005). Type 1 diabetes is typically treated with insulin. This can usually be accomplished with diet, exercise, and use of appropriate medications (insulin in the case of type 1 diabetes). Patient education, understanding and participation is vital in the management of



DM since the complications of diabetes are far less common and less severe in people who have well-managed blood sugar levels (Orchard, Raskin and Zinman, 2005). The goal of treatment is an HbA1C level of 6.5%, but should not be lower than that, and may be set higher. Attention is also paid to other health problems that may accelerate the deleterious effects of diabetes. These include smoking, elevated cholesterol levels, obesity, high blood pressure, and lack of regular exercise (WHO, 2006). Patient education, dietetic support and sensible exercise have both short-term and long-term blood glucose levels within acceptable bounds. According to Dler, Stratton, Neil, Yudkin, Matthews, Cull, Wright, Turner and Holman (2000) given the associated higher risks of cardiovascular disease, lifestyle modifications are recommended for the control of blood pressure.

#### **2.16. Drug and Non Drug Management of type 2 Diabetes Mellitus**

Oral medications is generally recommended as a first line treatment for type 2 diabetes, as there is good evidence that it decreases mortality (Ripsin, Kang and Urban, 2009). Type 2 diabetes mellitus is a chronic condition which is largely preventable and manageable but difficult to cure. This can usually be with close dietary management, exercise and use of appropriate medications. Routine use of aspirin, however, has not been found to improve outcomes in uncomplicated diabetes (Ripsin, Kang and Urban, 2009). Aspirin could be useful in diabetic management, to prevent heart attack. (Ripsin, Kang, et al 2009).

When insulin is used in type 2 diabetes, a long-acting formulation is usually added initially, while continuing oral medications (Pignone, Alberts, Colwell, Cushman, Inzucchi, Mukherjee, Rosenson, Williams, Wilson and Kirkman; 2010). One of the countries that are using the general practitioner system, such as the United Kingdom, care may take place mainly outside hospitals, with hospital-based, specialist care are used only in case of complications, difficult blood sugar control, or research projects (Pignone, Alberts, Colwell 2000). In other circumstances, general practitioners and specialists may be considered in the management of patient in a team approach. In addition other categories of healthcare providers such as optometrists, podiatrists/chiropractors, dietitians, physiotherapists, nursing specialists (e.g. diabetic specialist nurses), nurse practitioners, or certified diabetes educators, may jointly provide multidisciplinary expertise. Home telehealth support can be an effective management technique for diabetes (Pignone, Alberts, Colwell 2000).

The term hypoglycemia literally means "low sugar blood level". It can produce a variety of symptoms and *affect* the principal problem arising from inadequate supply of glucose to the brain, which can cause impairment of function (neuroglycopenia) (Stedman, Thomas et al 2005). The effects can range from mild dysphoria to more serious issues such as seizures, unconsciousness, and (rarely) permanent brain damage or even death (Cryer and Philip, 2001). Hypoglycemia is less common in non-diabetic persons, but can occur at any age (Cryer and Philip 2001).

The causes of hypoglycemia in non-diabetic people often include excessive insulin production in the body (hyperinsulinemia), inborn metabolic disorder, medications and poisons, alcohol abuse, hormone deficiencies, prolonged starvation and organ failure. (Cryer and Philip 2001). The treatment of diabetes induced hypoglycemia involves immediately raising the blood sugar to normal through the ingestion of carbohydrates, determining the cause, and taking measures to hopefully prevent future episodes. (Cryer, Axelrod, Grossman, Heller, Montori and Seaquist, 2009) However, this treatment is not optimal in other forms such as reactive hypoglycemia, where rapid carbohydrate ingestion may lead to a further hypoglycemic episode. Blood glucose can be raised to normal within minutes by taking (or receiving) 10-20 grams of carbohydrate (Cryer, Axelrod, Grossman, Heller, Montori, Seaquist, 2009).

Blood glucose can be taken as food or drink if the person is conscious and able to swallow. This amount of carbohydrate is contained in about 3-4 ounces (100-120 ml) of orange, apple, or grape juice although fruit juices contain a higher proportion of fructose which is more slowly metabolized than pure dextrose (Cryer, Axelrod, Grossman, Heller, Montori, Seaquist 2009) alternatively, about 4-5 ounces (120-150 ml) of regular (non-diet) soda may also work, as will about one slice of bread, about 4 crackers, or about 1 serving of most starchy foods. Starch is quickly digested to glucose (unless the person is taking acarbose), but adding fat or protein retards digestion.

Symptoms of consciousness should begin to improve within 5 minutes, though full recovery may take 10–20 minutes. Overfeeding does not speed recovery; it can simply lead to hyperglycemia afterwards (Cryer, et al 2009). If a person is suffering from such severe

effects of hypoglycemia that they cannot recover from should not be given anything by mouth, medical personnel such as paramedics, or in-hospital personnel can establish intravenous (IV) access and give intravenous dextrose, concentrations varying depending on age (infants are given 2 ml/kg dextrose 10%, children are given dextrose 25%, and adults are given dextrose 50%). Care must be taken in giving these solutions because they can cause skin necrosis if the IV is infiltrated, sclerosis of veins, and many other fluid and electrolyte disturbances if administered incorrectly. If intravenous access cannot be established, the patient can be given 1 to 2 milligrams of glucagon in an intramuscular injection.

One situation where starch may be less effective than glucose or sucrose is when a person is taking acarbose. Since acarbose and other alpha-glucosidase inhibitors prevents starch and other sugars from being broken down into monosaccharides that can be absorbed by the body, patients taking these medications should consume monosaccharide-containing foods such as glucose tablets, honey, or juice to reverse hypoglycemia. (Cryer, Axelrod, Grossman, Heller, Montori, Seaquist, 2009).

Hyperglycemia or high blood sugar is a condition in which an excessive amount of glucose circulates in the blood plasma (Roglic and Unwin, 2010). This is generally a glucose level higher than (200 mg/dl). But symptoms may not start to become noticeable until even higher values such as 250–300 mg/dl or 15–20 mmol/l (Roglic and Unwin 2010). The following symptoms may be associated with acute or chronic hyperglycemia, with the first three composing the classic hyperglycemic triad, Polyphagia ( frequent hunger, especially pronounced hunger), Polydipsia (frequent thirst, especially excessive thirst), Polyuria – (frequent urination), blurred vision, fatigue (sleepiness), weight loss, poor wound healing (cuts, scrapes, etc.), dry mouth, dry or itchy skin, tingling in feet or heels, erectile dysfunction, recurrent infections, external ear infections (swimmer's ear), cardiac arrhythmia, stupor, coma, seizures. (Cryer, Axelrod, Grossman, Heller, Montori and Seaquist, 2009). Treatment of hyperglycemia requires treatment of diabetes. Acute hyperglycemia can be treated by direct administration of insulin in most cases. Severe hyperglycemia can be treated with oral hypoglycemic therapy and lifestyle modification (Ron,Walls,John. Ratey, Robert. Simon and 2009).

### **2.17. Complications of Diabetes Mellitus**

There are several complications of DM. These include hypoglycemia, hyperglycemia and several other physical consequences. Hypoglycemia or low blood sugar is an abnormally diminished content of glucose in the blood (Stedman, Thomas and Lathrop, 2005). Also diabetic eye disease, nephropathy, neuropathy and peripheral vascular disease are common in patients with type-2 diabetes. Moreover, type-2 diabetes is a major risk factor for cardiovascular disease. Two landmark studies, the diabetes control and complications Trial (Blanca, Blanca, and Ernesto. 2001) and the United Kingdom Prospective Diabetes Study (UKPDS) (Ciechanowski et al., 2001) have clearly established that tight blood glucose control in both Type-1 and Type-2 diabetes can decrease the risk of developing secondary microvascular complications. It is to be noted that both type 1 and type 2 diabetes ultimately lead to high blood sugar levels. Over a long period of time, hyperglycemia damages the retina of the eyes. (Santaguida, Balion, Hunt, Morrison, Gerstein, Raina, Booker and Yazdi.2008) the blood vessels of the kidneys, the nerves, and other blood vessels. Damage to the retina from diabetes is a leading cause of blindness. Diabetes-induced retina damage (diabetic retinopathy). Diabetes always affects kidneys leading to (diabetic nephropathy).

Diabetes is a leading cause of kidney failure. Any damage to the nerves from diabetes (diabetic neuropathy) is a serious condition. It leads to foot wounds and ulcers, which frequently lead to foot and leg amputations. There may be damage to the nerves in the autonomic nervous system which can lead to paralysis of the stomach (gastroparesis), chronic diarrhea, and an inability to control heart rate and blood pressure during postural changes. Diabetes accelerates atherosclerosis, (the formation of fatty plaques inside the arteries), which can lead to blockages or a clot (thrombus). Such changes can then lead to heart attack, stroke, and decreased circulation in the arms and legs (Santaguida et. al 2008). Diabetes predisposes people to elevated blood pressure, high levels of cholesterol and triglycerides. These condition both independently and together collectively with hyperglycemia increase the risk of heart disease, kidney disease, and other blood vessel

complications ((Santaguida, Balion, Hunt, Morrison, Gerstein, Raina, Booker and Yazdi.2008).

**2.18 Glycemic control** is referring to the typical levels of blood sugar (glucose) in a person with diabetes mellitus (Adams, 2008). In a study carried out in a rural district in KwaZulu-Natal, acceptable glycaemic control (defined as HbA1c < 2% above normal population range) was found in only 16% of patients (Rotchford, Rotchford, 2002). Similarly a study carried out among patients attending a peri-urban community clinic with predominantly black patients revealed that good glycaemic control (HbA1c < 7%) was achieved in only 20% of patients (Erasmus, Blanco Blanco, Okesina, Gqweta and Matsha 2001). In Black African patients at the primary care level in the Western Cape, acceptable glycaemic control (defined as HbA1c < 2% above normal population range) was found in 49% of patients. Studies from other countries also showed poor levels of glycaemic control. A study in Jordan estimated that the proportion of Type 2 diabetic patients who did not achieve good glycaemic control was 65.1% (Khattab, Khader, Al-Khawaldeh, Ajlouni, 2009). In Kuwait, 66.7% of the studied population had an HbA1c  $\geq 8\%$  (Al-Sultan, Al-and Zanki.2005). In Trinidad 85% of patients had HbA1c >7% (Fox, Gerber, Bolinder, Chen and Kumar.2005) and in the UK, 69% had HbA1c >7.5%.

Glycaemic control appears to be a worldwide problem (Fox et al 2005). The determinants of the quality of glycaemic control and diabetes care are multiple and complex with inputs and interactions at the patient, health care provider and the health facility level (Khattab and Khader, 2009). Several patient characteristics were found to be associated with good glycaemic control. Patients with a shorter duration of diabetes, those who were male Black African, unemployed and treated with oral medication alone were more likely to have good glycaemic control. Several challenges which can directly affect comprehensive care could include high volumes of patients encountered with minimal consultation time to ensure quality of care, lack of working equipment, lack of access to dieticians during clinic times, shortage of diabetic diaries and difficulties in obtaining blood test results. Some of the challenges reported suggest that there is a need to improve the management of the healthcare facilities (Khattab, Khader, 2009).

According to Levitt (2008) drug costs for diabetes are beyond the reach of many particularly those requiring insulin. Therefore, many people have difficulty meeting the demands of their illness resulting in poor outcome. The results of the research performed in the clinics of the Palestinian MOH shown that 6.5% of the patients with chronic diabetes mellitus and hypertension who attended the clinics belong to the noncompliance category, 51.4% belong to the poor/partial compliance category, and 42.1% belong to the good compliance category. The data show that 6.2% of the tested samples were illiterate patients and approximately 6.5% of the patients do not know the clinical purpose of their medications. The study showed that illiterate patients have the least compliance score suggesting that there is a strong correlation between non-compliance and illiteracy and drug education on the other. The results suggested that compliance is affected by age and education but not by place of residence or gender. The age factor is obvious. With increasing age, the degree of compliance decreases for several reasons. For example, most of the elderly have memory problems related to age or due to dementia or Alzheimer's disease. Furthermore, most elderly patients have vision and hearing problems that might increase the potential of mistakes in taking medications. Another problem with elderly is that most of them have several diseases and take several drugs at the same time which might be confusing to most elderly patient. These general characteristics are common among elderly in most societies and that is why similar findings were made by in other countries by these researchers (Polonsky, Fisher, Dowe and Edelman 2003).

The effect of the education factor on the degree of compliance was not surprising. More educated people tend to appreciate and understand the consequences of non-compliance. Thus the degree of compliance increases with increasing level of education among patients. Illiterate patients cannot read or distinguish their medications which increase the risk of errors and noncompliance. Illiteracy might negatively affect patients' medical knowledge (Girerd, Hanon, Anagnostopoulos, Ciupek, Mourad, Consoli, 2001). A comparison between hypertensive and diabetic patients shows that diabetic patients have better compliance than hypertensive patients. The degree of general compliance among patients with hypertension was (36.6%), while the degree of general compliance among diabetic patients is (41.7%). This difference among the two types of diseases may be attributed to

the nature of the disease. For example, hypertension is asymptomatic disease while diabetes is not. In addition, hypertensive patients tend to be elderly while diabetic patients are usually younger (83% of diabetic patients in the tested sample were above 40 years old, while 99% of hypertensive patients were above 40 years old. (Girerd, Hanon, Anagnostopoulos, Ciupek, Mourad, Consoli, 2001 ).

The concept of detection and management of diabetes mellitus at a primary health care center is strongly justified and widely practiced in Saudi Arabia (Kalyango, Owino and Nambuya ,2008). However, the control of diabetes is crucially dependent on the diabetic patient's compliance with medical advice. According to Sweileh, Aker, Hamooz (2005) in their study, measuring the compliance of diabetic patients is a complex issue. The study explored therapeutic compliance and the factors contributing to the non-compliance of diabetic patients in the region of Saudi Arabia. Non-compliance with medication was higher in the study than the earlier finding in Uganda (Kalyango et al 2008), Palestine, (Sweileh , Aker, Hamooz . 2005) Hong Kong (Lee and Leung 2004), Mexico, Hernández-Ronquillo, Téllez-Zenteno, Garduño-Espinosa, González-Acevez.2003) and Saudi Arabia, According to the study conducted in India by Kalyango and Owino (2005) it was found that 65% of the diabetic patients were compliant. However, in the Uganda study, the median duration of diabetes was four years (range one month to 38 years); in the Palestine study non-compliance was divided in two categories (51.4% poor compliance and 6.5% non-compliance).

There was a significant rural-urban differential in the non-compliance rate among the diabetic patients in the study. The same finding was documented in the Palestine study where the non-compliance among urban diabetic patients was higher than among the rural patients (Sweileh, Aker and Hamooz 2005). This difference may be due to various lifestyles. Urban residents tend to be more sedentary with relatively poor dietary habits as compared to the rural population. Irregularity of follow-up was an important factor in non-compliance in this study. The most important causes of non-compliance with clinic appointment are usually the non -availability of transport and forgetfulness (Hernández-Ronquillo, Téllez-Zenteno et al 2003). It is worth mentioning here that the rural as well as the urban areas of the Al Hasa region lack good transport facilities. Besides, owing to

socio-cultural factors females cannot go out on their own to a health care center. Patient physician relationship is another important factor affecting patients' compliance. According to Lawson, Lyne, Harvey, Bundy (2005) compliance was fairly high among those patients who had adequate information on the dose, duration of action, and side effects of the anti-diabetic medicines. Those patients that did not get adequate information on what to do in the event of their missing a dose, or if they experienced any side effects of the medicine were more non-compliant. Those patients who agreed that the physician completely understood their health problem when they saw them on the day of appointment were also more compliant. Numerous researches involving various diseases have evaluated the effect of the patient-physician relationship on patients' compliance, and have found it to be another strong factor in favour of patient compliance (Kim, Sunwoo, Lee, Lee, Park, Shin *et al* 2002.) Compliance to treatment advice was good when the physicians were supportive, supplied vital information, and listened patiently to patients (Lawson et al 2005).

The increased rate of therapeutic non-compliance in the study resulting from the multi-drug regimen (Metformin + Sulfonylurea) and insulin injection was consistent with the previous study, which found that only 13% of the diabetic patients who were on Metformin + Sulfonylurea comply to the regimen, as compared to those on a single drug regimen with Metformin (31%) (Donnan, MacDonald Morris 2002). Non-adherence to insulin therapy in the study could be attributed to a wrong technique in injecting insulin or unavailability of someone at home to administer the injection (Khan,Lateef ,Khamseen,,Al- Aithan,Khan and Ibrahim 2010).

In a recent year review article, Serrano-Gil and Jacob suggested that there is a knowledge, attitude and practice gap in Type 2 Diabetes Mellitus (T2DM) management, and that although there is theoretical knowledge of how the condition should be managed, the attitude of patients and healthcare professionals influence the practicalities of implementing lifestyle changes for patients living from day to day with the condition (Serrano-Gil and Jacob 2010).

A study carried out in South Africa by Mehtas,Bhagwanjee, Kubheka, Penchaliah and Jadwat (2005) suggests that there has been significant emphasis for all optometrists to



become competent in the diagnosis and management of ocular manifestations of systemic conditions such as diabetes and hypertension). Although over half of respondents reported being advised by the diagnosing clinician about the need for regular eye examinations, a significant proportion of subjects reported not been advised about the need for regular eye examinations. This may be due to oversight or negligence on the part of the clinicians or patients. The results of this study showed that diabetic subjects had adequate knowledge with regards to the types of DM and the influence of heredity and lifestyle as potential risk factors for the development of DM. Additionally, the majority of the respondents were knowledgeable of the important risk factors for complications of the disease. The greater knowledge in the present study is good, as standard care and management of DM require that patients be aware of the type of DM they have, as well as being adequately informed of potential risk factors for the development of its complications (Mahajerin, Fras ,Vanhecke and Ledesma, 2008).

There is evidence that people with type 1 or type 2 diabetes on insulin are more adherent to self-monitoring of blood glucose and this finding was supported in the study. However, the observation that over three quarters of the study population did not perform self-monitoring or exercise regularly is noteworthy, and sends a worrying message to diabetes health care providers and educators. Self-monitoring, exercise and weight reduction programmes should be included as part of any diabetes education package. (Ruggiero 2007).The study provides further evidence that there is a lack of information available to people with diabetes, with a large proportion never receiving any diabetes education at all.

### **2.19. Factors associated with compliance with management of DM**

The factors associated with compliance with the management of DM are categorized and reviewed for convenience as follows; socio-cultural; medical-related factors; knowledge including health literacy related factors; health system related factors; psychological factors; practices and lifestyles as well as ways of promoting compliance and theoretical frameworks. Race as a factor causing non-compliance has been studied fairly widely in the USA and European countries and sixteen studies on this factor were retrieved. Caucasians are believed to have good compliance according to some studies (Thomas, Sargent , Michels 2001) Yu ( 2005) while African-Americans, Hispanics and other minorities were found to have comparatively poor compliance (Benner, Glynn and Mogun, 2002). However, a plausible explanation for this may be due to patient's lower socio-economic status and language barriers of the minority races in the study countries. Hence, due to these confounding variables, ethnicity may not be a true predictive factor of poorer compliance.

In a gender study conducted in Saudi Arabia by Ataur Khan, Zaki Al-Abdul Lateef 2011 females were significantly more compliant. This was true of other researchers conducted in various parts of the world (Ibrahim , Attia , Sallam , Fetohy ,Sewi 2011). However, some studies have suggested the contrary, indicating that males were more compliant (Kalyango, Owino, Nambuya 2008). In addition, there are a few studies which found no relationship between gender and non-compliance (Spikmans, Brug, Doven and Kruiuzenga, 2003). This difference may be due to geographical variation in their education, and social factors. This is consistent with another literature review on compliance in seniors that concluded that gender has not been found to influence compliance (Vic, Maxwell and Hogan 2004). Gender may not be a good predictor of non-compliance because of the inconsistent conclusions.

Several studies found that patients with higher educational level might have higher compliance (Okuno, 2001; Ghods and Nasrollahzadeh 2003; Yavuz 2004), while some studies found no association (Spikmans, 2003; Kaona, Tuba, Siziya 2004; Stilley Stilley, Sereika, Muldoon, 2004; Wai, Wong ,Ng 2005). The effect of educational level on non-

compliance was equivocal after reviewing thirteen articles which focused on the impact of educational level as they used different criteria for “higher” and “lower” education. Intuitively, it may be expected that patients with higher educational level should have better knowledge about the disease and therapy and therefore be more compliant. However, DiMatteo found that even highly educated patients may not understand their conditions or believe in the benefits of being compliant to their medication regimen. Other researchers showed that patients with lower education level have better compliance (Senior, Marteau, Weinman 2004). A UK study group found that patients without formal educational qualifications had better compliance with cholesterol-lowering medication (Senior, et al 2004). Patients with lower educational level might have more trust in physicians’ advice. From these results, it seems that educational level may not be a good predictor of therapeutic compliance.

In the Palestine study, females were significantly more compliant. The study found higher educational levels of patients to be significantly associated with a higher compliance rate of the patients (Spikmans, Brug et al 2003).

Marital status might influence patients’ compliance with medication positively (Cooper et al 2005). The help and support from a spouse could be the reason why married patients were more compliant to medication than single patients. However, marital status was not found to be related to patient’s compliance in some studies (Ghods and Nasrollahzadeh 2003; Spikmans 2003; Kaonal 2004; Wild, 2004; Yavuz 2004). This disparity might be due to the fact that the recent studies investigated the effect of marital status in disease conditions which were different from those evaluated in the older studies, with the impact being masked by the disease factor.

Family relationships play an important role in diabetes management. Studies have shown that low levels of conflict, high levels of cohesion and organization, and good communication patterns are associated with better regimen compliance (Delamater, 2001). Greater levels of social support, particularly diabetes-related support from spouses and other family members are associated with better regimen compliance (Glasgow Toobert

2000). Social support also serves to buffer the adverse effect of stress on diabetes management (Glasgow Toobert 2000).

According to Mull (2001) people who are on insulin had higher mean beliefs scores compared to those who are on oral hypoglycemic drugs or diet alone. The mean practices scores were significantly higher with longer duration of diabetes, for those on insulin therapies and in people attending the specialist consulting clinics. Higher education level, white-collar workers, those with type 1 diabetes, people on insulin treatment and people attending the consultant clinics. The concept of insulin use indicating gravity of illness and becoming dependent on the drug has been documented in the Vietnamese population (Mull, 2001). Many of the participants in that study also considered insulin use to be indicative of reaching the last stage of disease. The belief that insulin is an addictive drug is based on the fact that insulin needs to be taken daily and the person cannot do without it. The study has also highlighted certain beliefs and misconceptions prevalent among people with diabetes that are based on such belief systems. Most common among these are the nutrition-related beliefs, thereby identifying the need to provide education and counseling regarding diet. For example, there is a strong belief that a person with diabetes should not eat root vegetables as they are generally considered to be sweet. Another common perception in Pakistan is that there is no restriction on the amount of bread taken if it is prepared from gram flour (chickpea flour), indicating the need for understanding the concept of total calorie requirements.

Compliance with drug treatment can also be directly affected by the individual's health beliefs, social and medical concerns and denial of their illness [Abula, Worku 2001]. Patient beliefs on the medication-taking behavior of diabetic patients concluded that the belief such as possible weight gain and changes to daily routine were the principal factors which led to poor compliance.

## **2.20. Medication Related Factors Influencing Management of Diabetes.**

Health literacy means patients are able to read, understand, remember medication instructions, and act on health information (Vlasnik 2005). Patients with low health literacy

were reported to be less compliant with their therapy (Nichols-English and Poirier 2000). On the contrary, patients who can read and understand drug labels were found to be more likely to have good compliance (Butterworth, 2004). Thus, using written instructions and pictograms on medicine labels has proven to be effective in improving patient's compliance. Health care providers often believe that patients with diabetes do not follow medication and other self-care recommendations due to a lack of self-discipline, limited intelligence, or an unreasonably fearless attitude towards the consequences of diabetes (Polonsky, Fisher, Dowe and Edelman, 2003).

Patients are most likely to comply with medication recommendations when they can recognize that the medication is helping. Unfortunately, few patients can feel the benefits of important diabetes medications, especially those that lower blood pressure and cholesterol levels. Patients may sometimes notice immediate positive benefits when blood glucose levels are lowered (eg, reduced fatigue or improved sleep quality), but many patients do not feel these changes, and some may become aware of only negative consequences (eg, hypoglycemia). The absence of any perceived evidence that a medication is working makes it essential that patients understand and appreciate the drug's "invisible" benefits. Compliance is also impaired when significant side effects occur. (Polonsky , Fisher , Dowe , Edelman, 2003).

Cost is a crucial issue in patient's compliance especially for patients with chronic disease as the treatment period could be life-long (Elli 2004; Ponnusankar 2004). Healthcare expenditure could be a large portion of living expenses for patients suffering from chronic disease. Cost and income are two interrelated factors. Healthcare cost should not be a big burden if the patient has a relatively high income or health insurance. A number of studies found that patients who had no insurance cover (Kaplan 2004; Choi-Kwon 2005), or who had low income (Berghofer 2002; Benner 2002; Ghods and Nasrollahzadeh 2003; Hernandez-Ronquillo 2003; Mishra 2005) were more likely to be non-compliant to treatment. However, even for patients with health insurance, health expenses could still be a problem. More than one in ten seniors in the USA reported using less of their required medications because of cost.

Nevertheless, in other cases, income was not related to compliance level (Patal and Taylor 2002; Stilley 2004; Wai 2005). In Singapore, a study on chronic hepatitis B surveillance found that monthly income was not related to patient's compliance with regular surveillance (Wai 2005). This discrepancy might be due to different healthcare systems in different countries. Healthcare personnel should be aware of patient's economic situation and help them use medication more cost-effectively. Medication compliance is likely to be impaired when patients are not certain on how medications are to be used (i.e. "I'm supposed to take my pills at dinner on an empty stomach, but what if my stomach isn't that empty right before dinner?"). This may be due to problems with "health literacy," where the patient is unable to understand, and thus follow, the provider's specific recommendations (Schillinger, Grumbach and Piette, 2002). Such confusion may also result when providers do not explain their recommendations clearly, if at all. This may be the reason why Oral Hypoglycemic Agent (OHA) compliance is better in patients who rated their communication with their health care provider as "good." (Ciechanowski, Katon, Russo and Walker, 2001).

The out-of-pocket costs of medications have a profound impact on compliance, especially for the elderly and the poor (Mojtabai and Olfson, 2003) patients typically cope with economic hardship by not having prescriptions filled, taking a smaller dose, or buying a cheaper over-the-counter product that is presumed to have a similar effect. Sadly, recent data suggest that patients only rarely discuss this issue with their health care providers, feeling that the cost issue is not their doctors' problem (Schafheutle, Hassell, Noyce and Weiss, 2002). Making sure patients understand the drug dosing regimen could also improve compliance (Osterberg and Blaschke 2005). To make sure patients remember what was taught, written instructions work better than verbal ones, as patients often forget physician's advice and statements easily (Vlasnik and Aliotta.2005). Diabetes management and treatment is expensive. Many people who have diabetes need help paying for their care. According to the American Diabetes Association (ADA), the average cost of health care for a person with diabetes is £13,741 a year – more than twice the cost of health care for a person without diabetes. While some people, especially in the poor rural setting in Nigeria find it very difficult to avoid medication cost, most of the health ministries in the

federation despite their free health programs and missions are often reluctant to distribute medicines of chronic diseases. In the University College Hospital, rotary club are yet to be involved in the humanitarian assistance.

### **2.21. Knowledge Factors Influencing Management of Diabetes**

The result of the study carried out at Karashi hospital in Pakistan by Rafique, Azam and White (2006), showed that the mean diabetes knowledge score was significantly lower in females compared to males.. Those with a type 1 diabetes, people on insulin treatment and people attending the consultant clinics (Jabbar, 2001). The scores were also higher in males, people with white-collar jobs and those with type1 diabetes. The mean beliefs scores also decreased significantly with increasing age, while with increasing educational levels the scores increased (illiterate to graduate and above). Very limited literature exists on the knowledge, beliefs and practices of people with diabetes in Pakistan. A study looking only at knowledge among diabetes patients in Karachi found significant deficits in the study population (Jabbar 2001). The results of the study suggested that not only knowledge, but also the beliefs and practices of diabetes patients were less than satisfactory.

Patient's knowledge about their disease and treatment is not always adequate. Some patients lack understanding of the role their therapies play in the treatment (Ponnusankar, Surulivelrajan, Anandamoorthy, 2004) others lack knowledge about the disease and consequences of poor compliance (Alm-Roijer stagmo2004; Gascon,Sanchez-Ortuno, 2004); or lack understanding of the value of clinic visits (Lawson,Lyne, Harvey, 2005). Some patients thought the need for medication was intermittent, so they stopped the drug to see whether medication was still needed (Vic, Maxwell, Hogan, 2004; Bender and Bender 2005). For these reasons, patient education is very important to enhance compliance. Counseling about medications is very useful in improving patient's compliance (Ponnusankar 2004). Healthcare providers should give patients enough education about the treatment and disease (Seo and Min 2005).

However, education is not always "the more the better". An "inverted U" relationship between knowledge and compliance existed in adolescents. Adolescent patients who knew

very little about their therapies and illness were poor compliers, while patients who were adequately educated about their disease and drug regimens were good compliers; but patients who knew the life-long consequences might show poor compliance (Ponnusankar, 2004). Nevertheless, there is no report of similar observations in other age groups. In addition, patients' detailed knowledge of the disease was not always effective. In Hong Kong, researchers could not find any association between diabetes knowledge and compliance. They suggested that there was a gap between what the patients were taught and what they were actually doing (Ponnusankar, 2004). In addition, (Okuno, 2001) found that educating the patients about their disease state and general comprehension of medications would increase their active participation in treatment. The emphasis of education is as illustrated by the following statement; from Mark Anumah Medical Mission (MAMM) reads "Let us not wait for the time bomb to explode in our midst. Let us change behavior now. Avoid convenience foods. Avoid consumption of refined sugars. Be physically active. Don't consume more calories than you burn out each day. Maintain the right weight. Take a step for diabetes today"

## **2.22. Health System Related Factors Influencing Management of Diabetes Mellitus**

The main factor identified relating to healthcare systems include availability and accessibility Lack of accessibility to healthcare (Ponnusankar 2004) long waiting time for clinic visits (Balkrishnan 2003; Moore 2004; Lawson 2005; Wai 2005), difficulty in getting prescriptions filled (Vlasnik, 2005), and unhappy or unsatisfied clinic visits (Spikmans 2003; Gascon 2004; Lawson, 2005) that all contribute to poor compliance. Study conducted by Spikmans 2003; Gascon 2004 et al further supported by another study showed that patient's satisfaction with clinic visits is most likely to improve their compliance with the treatment. In addition to obtaining support from health care team members, the quality of the patient-doctor relationship is a very important determinant of regimen adherence. Research has demonstrated that patients who are satisfied with their relationship with their health care providers have better compliance to diabetes regimens (Ciechanowski , Katon and Russo, 2001).

Research has generally shown that lower regimen adherence can be expected when a health



condition is chronic, when the course of symptoms varies or when symptoms are not apparent, when a regimen is more complex, and when a treatment regimen requires lifestyle changes (Vlasnik, 2005). Patients expecting poor health status are more motivated to be compliant with treatment if they consider the medication to be effective.

A study suggested that white collar patients have poor compliance because they have other priorities (Vermeire, Hearnshaw, Van and Royen, 2001). Patients may not be able to take time off work for treatment; as a result, their rate of compliance could be threatened (Lawson et al 2005; Neal et al 2005). Therefore, a shorter traveling time between residence and healthcare facilities could enhance patient's compliance (Gonzalez et al 2005). Housewives with tuberculosis were more compliant to therapy in an observational study in Malaysia (Ghods and asrollahzadeh 2003). This may be because housewives can adapt well to clinic appointment times and treatment.

Therapy-related factors identified include: route of administration, treatment complexity, and duration of treatment period, medication side effects, degree of behavioral change required, taste of medication and requirement for drug storage can influence compliance (Wild 2004).

Medications with a convenient way of administration (eg, oral medication) are likely to make patients compliant. Studies in asthma patients compared compliance between oral and inhaled asthma medications, and found patients had better compliance with oral medication. (Bender and Bender 2005) Likewise, difficulty in using inhalers contributes to non-compliance in patients with asthma and also applied to diabetes management (Bender and Bender 2005).

Complex treatment is believed to threaten the patient's compliance. However, compliance does not seem to correlate with the number of drugs prescribed (Iihara ,2004), but the number of dosing times every day of all prescribed medications (Claxton, 2001). The rate of compliance decreased as the number of daily doses increased. This is illustrated by one study where compliance was assessed by pill counts and self-reports that showed that non-compliance increased with an increase in the frequency of prescribed dosing: 20% for once daily; 30% for twice daily; 60% for three times a day; and 70% for four times daily

(Boccuzzi, Wogen , Fox, Sung, Shah, Kim, 2004) for example, Oral Hypoglycemic Agents ( OHAs) compliance dropped from 79% for once-daily medications to 38% for medications taken 3 times a day. In addition, when patients are taking multiple OHAs, compliance levels fall (Boccuzzi , Wogen , Fox, Sung,Shah and Kim, 2004). Even when Oral Hypoglycemic Agents (OHAs) are taken only once daily, problems may arise. Overconsumption of once-daily OHAs has been shown to occur in as many as one-third of patients' (Boccuzzi and,Wogen 2001). Treatment complexity issues are especially important for elderly patients, who may have difficulty with memory or concentration. Acute illnesses are associated with higher compliance than chronic illnesses. (Gascon 2004).

In addition, longer duration of the disease may adversely affect compliance. Similarly, a longer duration of treatment period might also compromise patient's compliance (Ghods and Nasrollahzadeh 2003; Dhanireddy 2005). In one trial that compared 6-month and 9-month treatment of tuberculosis, compliance rates were 60% and 50% for the two regimens, respectively. In another study comparing preventive regimens of 3, 6 and 12 months, compliance rates were 87%, 78% and 68% for the three regimens, respectively; (Dhanireddy 2005). However, some studies about chronic diseases found that longer duration of the disease resulted in good compliance (Sabaté 2003), and newly diagnosed patients had poor compliance (Iskedjian, 2002).This may indicate that compliance is improved because patient's attitude of denying the disease is reduced and they accepted treatment after years of suffering from the disease.

Side effects threaten patient's compliance (Ponnusankar 2004; O'Donoghue 2004). In a German study, the second most common reason for non-compliance with antihypertensive therapy was adverse effects; (Kiortsis 2000). The effect of side effects on compliance may be explained in terms of physical discomfort, skepticism about the efficacy of the medication, and decreasing the trust in physicians.

Some articles evaluated the effect of the patient-prescriber relationship to patient's compliance. From these articles it could be concluded that patient-prescriber relationship is another strong factor which affects patients' compliance Kiortsis 2000; Okuno 2001; Kim

2002; Gonzalez 2005). A healthy relationship is based on patients' trust in prescribers and empathy from the prescribers. Studies have found that compliance is good when doctors are emotionally supportive, giving reassurance or respect, and treating patients as an equal partner (Lawson 2005). Rubin mentioned some situations that may influence patients' trust in physicians (Rubin 2005). For example, physicians who asked few questions and seldom made eye contact with patients, and patients who found it difficult to understand the physician's language or writing. More importantly, too little time spent with patients was also likely to threaten patient's motivation for maintaining therapy (Gascon 2004).

Poor communication with healthcare providers was also likely to cause a negative effect on patient's compliance (Apter, 2003). Lim and Ngah 2004 showed in their study that non-compliant hypertension patients felt the doctors were lacking concern for their problems. In addition, multiple physicians or healthcare providers prescribing medications might decrease patients' confidence in the prescribed treatment (Vlasnik 2005). These findings demonstrate the need for cooperation between patients and healthcare providers and the importance of good communication. To build a good and healthy relationship between patients and providers, providers should have patients involved in designing their treatment plan (Vlasnik 2005), and give patients a detailed explanation about the disease and treatment (Butterworth 2004; Gascon 2004). Good communication is also very important to help patients understand their condition and therapy (Vlasnik et al 2005).

### **2.23. Psychological Factors Influencing Management of Diabetes Mellitus**

Psychological factors are also linked with regimen compliance. Appropriate health beliefs, such as perceived seriousness of diabetes vulnerability to complications, and the efficacy of treatment, can predict better compliance. Patients comply well when the treatment regimen makes sense to them, when it seems effective, when they believe the benefits exceed the costs, when they feel they have the ability to succeed at the regimen, and when their environment supports regimen-related behaviors. There is no evidence of adherence being associated with any particular personality styles. Psychological problems such as anxiety, depression, and eating disorders have also been linked with worse diabetes management in

both youths and adults with diabetes (Delamater, 2007). Other factors to be included in this category are patient's beliefs; motivation and negative attitude towards therapy were identified as factors to be included in this category.

Forgetfulness is a widely reported factor that causes non-compliance with medication or clinic appointments (Okuno 2001; Hernandez-Ronquillo 2003; Ponnusankar 2004; Wai 2005). A Japanese study in elderly home-care recipients found an interesting association between meal frequency and compliance. Patients having less than 3 meals per day were less compliant than patients having three meals a day. It suggested that meal frequency was an effective tool to remind the patient to take drugs (Okuno 2001). As mentioned in a previous section, written instructions are better than oral advice for reminding patients to take medication. Some studies showed an association between patients' negative attitude towards therapy (eg, depression, anxiety, fears or anger about the illness) and their compliance (Gascon 2004; Iihara 2004;; Stillely 2004; Yu 2005). In one study conducted in patients older than 65 years with coronary artery disease, depression affected compliance markedly (Barnes 2004). There were other studies reporting that for children or adolescents, treatment may make them feel stigmatized (Bender and Bender 2005), or feel pressure because they are not as normal as their friends or classmates (Kaplan, 2004). Therefore, negative attitude towards therapy should be viewed as a strong predictor of poor compliance.

The use of traditional remedies is prevalent in many cultures (Kar, 2003). In the Indian subcontinent, traditional medicines play an important role in diabetes care and a number of plants, herbs and vegetables are used therapeutically (Platel and Srinivasan 2007). Among these, bitter melon (Hawthorne, 2001) is widely used as an alternative therapy for diabetes. (Kar, 2003). In a New Zealand study, Tongan patients may think disease is God's will and uncontrollable; and as a consequence, they perceived less need for medication (Barnes et al 2004). Similarly, in Pakistan, inbred fears and supernatural beliefs were reported to be two major factors affecting patients' compliance with treatment (Spikmans, Brug and Doven, 2003). Patients' beliefs about the causes and meaning of illness, and motivation to follow the therapy were strongly related to their compliance with healthcare;

(Spikmans, Brug and Doven (2003). On the contrary, misconceptions or erroneous beliefs held by patients would contribute to poor compliance. Patient's worries about the treatment, believing that the disease is uncontrollable and religious belief might add to the likelihood that they are not compliant to therapy.

In a review to identify patient's barriers to asthma treatment compliance, it was suggested that if the patients were worried about diminishing effectiveness of medication over time, they were likely to have poor compliance with the therapy (Bender and Bender 2005). In patients with chronic disease, the fear of dependence on the long-term medication might be a negative contributing factor to compliance (Apter, 2003; Bender and Bender 2005). This is sometimes augmented further by cultural beliefs. For example, in Malaysia, some hypertension patients believed long-term use of "Western" medication was "harmful", and they were more confident in herbal or natural remedies (Apter 2003). Patients who had low motivation to change behaviors or take medication are believed to have poor compliance (Hernandez-Ronquillo 2003; Spikmans 2003). In a study done in Malaysia, 85% of hypertension patients cited lack of motivation as the reason for dropping out of treatment. (Yu 2005).

#### **2.24. Health related practices and lifestyles influencing management of diabetes**

Diabetes is a condition that is difficult to treat and expensive to manage (Wild et al., 2004), thus the type of food consumed is a fundamental determinant in the management of the disease. Diet alone constitutes a crucial aspect of the overall management of diabetes which may involve diet alone, diet with oral hypoglycemic drugs or diet with insulin. Diet is individualized depending on age, weight, occupation and many other factors. Dietary guidelines exist for the management of the diabetic population, in order to promote an overall nutritional well being, glycaemic control and prevent or ameliorate diabetes-related complications (WHO, 1999). In diabetic patients, the control of complex carbohydrate and dietary fiber intake will lead to lower serum triglycerides and cholesterol levels (Asif, 2011). The main goal of dietary treatment include; eating of balanced diet, having regular meals, achieve and maintain a desirable body weight, provide adequate nutrition for health and growth.

The results of the dietary and exercise compliance in the study showed that patients were more compliant to dietary directions than instructions on exercise (64.66 vs. 45.33%). However, the rate of compliance to diet was better than in the study done in Alexandria, Egypt, where it was found to be 58.8%. This difference in results may be due to the "easier-to-follow" diet instructions, especially for females who seem to be more sedentary in Saudi Arabia than in Egypt, because of cultural constraints.

Exercise is considered an important part in the treatment of people with diabetes. With appropriate exercise guidelines, people with diabetes can exercise safely to achieve the following reduction of weight, improvement of cardiovascular function, increase in fitness and physical working capacity, improvement of their sense of well being and quality of life, increase insulin sensitivity, improvement of their lipids profile, the duration of exercise should be 20-60 minutes, 3-5 times per week.

Many health professionals would answer that patients with diabetes do not do what they are told. It is common to hear them express frustration and sorrow that their patients just don't follow their diet or exercise plans, that they don't check their blood sugars or even take their medicines. (Anderson, Funnell 2000.) Behavioral scientists have studied the problem of noncompliance (or nonadherence) extensively. They have tried to find the right approach or technique to convince patients to follow medical advice. In talking with both health professionals and people with diabetes, we have come to believe that the traditional approach to the care of diabetes and other chronic diseases may actually promote noncompliance (Funnell, 2000).

To realize the full benefits of medications, patients must take them as prescribed; yet research shows that poor medication compliance is widespread (Polonsky, Fisher, Dowe and Edelman, 2003) and particularly so for diabetes medications. Indeed, there are many different forms of medication noncompliance—including failing to fill the prescription, taking an incorrect dose, taking the medication at the wrong time, skipping one or more doses, and quitting the medication prematurely—and most of the available studies are unable to discriminate among these differences. Today's methods for improving adherence

are generally not very effective. Innovations to help patients follow medication regimens are needed. Pharmacists can play a critical role in this process. To do this effectively, pharmacists must understand factors that affect medication compliance rates. (Polonsky, Fisher, Dowe and Edelman 2003).

Chronic disease care is fundamentally different. It requires a different vision and a redefinition of the patient-physician relationship (Anderson and Funnell, 2000). More than 95% of diabetes care is done by the patient, and health professionals have very little control over how patients manage their illness between office visits. Patients manage their diabetes on a daily basis within the context of the other goals, priorities, health issues, family demands, and other personal concerns that make up their lives; they have the right to set goals and decide how they will manage their illness because they have to carry out those decisions and live with the consequences.

Physician-directed, compliance-oriented care is not an effective approach (Glasgow and Anderson, 2000). Diabetes is a self-managed disease; patients are more than passive recipients of medical expertise. For diabetes care to succeed, patients must be able to make informed decisions about how they will live with their illness (Anderson, Funnell, Butler, Arnold and Feste, 2000). Diabetes care often becomes a struggle although both physicians and patients generally want positive health outcomes and good quality of life. Patients often become frustrated and dissatisfied if they feel that they are being judged and blamed for their inability or unwillingness to achieve medical goals, or if the physician does not consider their goals to be important. Once patients are viewed as collaborators who establish their own goals, the whole concept of compliance becomes irrelevant. When patients work toward their own goals, their motivation is intrinsic. Because true and lasting motivation comes from within, patients are able to make and sustain changes in their behavior using this patient-centered approach. (Anderson and Funnell 2000).

### **2.25. Promoting compliance**

Compliance in healthcare is defined as the extent to which a patient's behavior (in terms of taking medication, executing the lifestyle changes, undergoing medical tests or keeping appointments with the physicians) coincides with the healthcare provider's

recommendations for health and medical advice (Partridge, Avorn, Wang and Winer, 2002). Non-compliant patients are those whose health-seeking or maintenance behaviors lack congruence with the recommendations prescribed by a healthcare provider (Jing, Sklar, Min, Sen, Oh and Chuen, 2008). Patient non-compliance is a serious healthcare concern that poses a great challenge to the successful delivery of healthcare. This is widespread and has been reported from all over the world (Zieger, 2011).

According to a study by the New England Health Care Institute, one-third to one-half of the American patients are non-compliant (Zieger, 2011). Patient non-compliance is not only limited to the failure to take medication, but also the failure to make lifestyle changes, undergo tests or keep appointments with physicians.

The non-compliant patients especially with chronic diseases are more prone to encountering serious difficulties (OtCm, 2011). The rate of non-compliance in patients with chronic diseases in developed countries, on long-term treatment, are on the order of 50% this could be even higher in developing countries (WHO, 2011). One study showed that while diabetic and cardiac patients who take medication correctly have a 7% death rate; for those who are non-compliant, the death rate is 12%. In another study, the rate of non-compliance ranged between 16.7 and 80% among the patients suffering from tuberculosis, hypertension asthma, diabetes, epilepsy, and congestive cardiac failure (Loghman, Adham-2003). A compliance study conducted in Saudi Arabia for those on short-term medication found 67.8% compliance. However, compliance of patients tends to decrease with time being lower in patients on long-term medication than in those on short-term medication. (Abula and Worku 2001). Another study done in Saudi Arabia found an overall 65.8% non-compliance in patients suffering from hypertension. The non-compliance to long-term therapy severely compromises the effectiveness of treatment and adversely affects the patient's condition (Abula and Worku, 2001).

When healthcare providers raise the awareness of the possibility of side effects and related risks to patients and initiate motivational strategies that address these issues, they can directly challenge intentional (intelligent) non-adherence by which patients decrease or omit the prescribed dose in order to minimize side effects (Iyalomhe, 2007). It is also



remarkable that whereas in the developed world prescription is predicated on compelling indications. However, in Nigeria and many other developing countries, antihypertensive prescription is based on the cost (Iyalomhe, 2007). Although, high economic or social status and educational level impacted positively on medication adherence, it was not to a statistically significant level.

All the same, prescribing an effective, inexpensive, once daily or twice daily medication, or using low doses of a two-drug regimen once or twice daily, use of fixed-dose combinations or sustained-release formulations, adjusted to suit the patient's daily routine and life-style as much as possible, will minimize side effects and improve patient adherence considerably (Iyalomhe, 2007). A wide range of theories about the factors that may affect a person's decisions, but a common theme has been that perception of vulnerability to illness and efficacy of therapy may be important determinants of preventive health behaviors. (Weinstein, Sandman, Roberts 2000). Several studies have found that these perceptions are important predictors of compliance with medical regimens for a variety of medical conditions, including diabetes (Weinstein et al 2000). In particular, some studies have found that patient perceptions of the magnitude of risk conferred by a disease or toxic exposure are associated with decisions about treatment or prevention (Harris, Linn, 2005). Despite the importance of perceptions of vulnerability to illness and efficacy of treatment, whether diabetic patients' estimates of risk for complications with various therapies match the risks reported in the literature has not been examined.

If patients underestimate their risk for complications or the efficacy of treatment, this may explain the low compliance with intensive therapy and may suggest an approach for increasing compliance. If patients overestimate the probability of complications or the efficacy of treatment, they may be unnecessarily fearful of complications or feel pressured to adopt intensive therapy; in this case, educating patients might not increase their compliance, but it might improve their subjective well-being (Harris and Linn 2005), Compliance is usually better when the patient has the following beliefs: The patient feels susceptible to the illness or its complication (Spikmans 2003). The patient believes that the illness or its complications could pose severe consequences for his health (Sirey 2001; Loffler 2003). The patient believes that the therapy will be effective or perceives benefits

from the therapy (Apter 2003; Spikmans 2003; Wild 2004; Gonzalez 2005; Seo and Min 2005).

The compliance-based approach maintains the health care professional is an expert and patient should comply and patients should comply accordingly. The empowerment approach is generally more favored today. This theory states that when we give patient all the necessary information, they can make the best decision for themselves based on their own needs, circumstances and expectations. In this regard, patients accept responsibilities and experience their own consequences (Feedman and Watt, 2001). Looking from the perspective of health, healing is brought about by the patient who complies with dos and don'ts of the disease condition; but a time refusal of these instructions may lead to loss to life. There are various diseases on the planet that can be classified into curable and non-curable disease among the incurable but controlled disease is diabetes mellitus (Seo and Min 2005). This is one of the disease where the patient is expected to have total compliance with the regimen of the treatment, but some patients found it difficult to comply based on one factor or the other.

In the study of Donovan and Blake (2003), the concept of compliance is questionable. It was shown to be largely irrelevant to patients each treatment, weighing up the cost of each them. Their perceptions, the personal and social circumstance within which they live are shown to be crucial to their decision making. This apparently irrational act of non-compliance (from the doctor point of view) may be a very rational action when seen from the patients' points of view. The solution to the waste of resources inherent in non-compliance lies not in attempting to increase patient compliance, but in the development of one more open, co-operation on Nurses and Doctor patient relationship. The diabetes patient may be dependent on health Professional for restoration of health when the disease is first diagnosed and during episodes of each illness. As the individual acquires knowledge and skills to make alterations in lifestyle to regulate the hyperglycemia, greater independence may be achieved. Individual with Diabetes Mellitus must alter their lifestyles and health behavior to regulate their blood glucose level if they are to minimize the impact of the disease and that is brought about by compliance (Glasgow and Toobert, 2001).

Patients not complying with their medication regimen are associated with significant adverse clinical outcomes. Patients with diabetes who discontinue therapy have a 2.9 times higher mortality rate (Gallagher, Viscoli, & Horwitz, 2003). Up to 50% of antihypertensive medication failures are due to non compliance (Gallagher et al 2003). One challenge in the management of diabetes is determining how to incorporate our knowledge of the factors affecting compliance into every day practice to improve patient outcomes. In addition, because multiple factors may need to be addressed, intervention aimed at improving compliance will need to use a multifaceted approach involving physicians, nurses, diabetes educators, pharmacists, patients, family, and friends. Fortunately, many approaches have been used successfully to increase the compliance of patients to their diabetes treatment regimens. These measures include improving communication between care providers and patients, implementing educational programs aimed at both physicians and patients, and developing new medications that reduce the complexity of treatment regimens.

The National Council on Patient Information and Education (NCPPIE) is a nonprofit coalition of more than 150 organizations with the common goal of stimulating and improving communication regarding the appropriate use of medicine. The NCPPIE strongly advocate both patients and care givers as a means of improving compliance. To that end, it recommends that health care providers become more proactive about patients education and the involvement of patients in treatment decisions. Asking questions that stimulates dialogue between patients and providers (including questions about compliance) accomplishes two outcomes. First, more information is available to aid patient in making treatment decisions. Second, patients begin to take a more active role in their own treatment. Of note, the development of interdisciplinary compliance education program is also recommended to provide a comprehensive program in patient care. American Diabetes association and the American Association of Clinical Endocrinologists (ADAACE) have developed consensus recommendations for the treatment of patients with type 2 diabetes (American Diabetes Association, 2002). The implementation of these guidelines in clinical practice should be consistent and regularly discussed with patients and care givers to ensure involvement of all pertinent parties. Various health care providers (e.g. diabetes educators, nurse practitioners and pharmacists) can also use this opportunity to provide education and

diabetes related information. Moreover, patients with diabetes who participated in educational outreach program using a nurse care coordinator had increased compliance with the current standards of care, including dietary modifications, performance of self examination/self monitoring of blood glucose concentration, eye examination and lipid testing (Wilson & Bochenski, 2001). Diabetes educators and nurse practitioners can also provide assistance in the implementation of community pharmacy-based diabetes monitoring programs. Providers involved in these programs gather patients data relevant to diabetes treatment at the appoint of dispensing and then make treatment recommendations to both patients and physicians. Members of the health care team should strive to develop a good relationship with patients and should offer assistance with the organizational skills necessary for good compliance.

One way to assist patients is to help them organize their medications around their schedules or vice versa. Although it can be difficult to reduce the number of medications prescribed, it may be possible to reduce the frequency of daily dosing. Patients should be made aware of the various devices (e.g. beepers, watches with alarms & dated or timed pill boxes) designed to remind them to take their medications. Support from other patients who have successfully adjusted to their treatment regimen may also be helpful in this regard. (Vermeire , Hearnshaw, Van and Royen, 2006).

Simplification of complex medication regimen has been shown to be beneficial in the treatment of chronic disease states, including those other than type 2 diabetes. The use of new delivery system and fixed-dose combination therapy are two viable options for improving the treatment of type 2 diabetes. As noted earlier, ones daily dosing and or the need for fewer total tablets were strongly associated with improved compliance (Morris, 2000). There are also factors associated with the health care system that may lead to patient non-compliance. Prolonged waiting times, impersonal service, lack of continuity of care and issues associated with transportation are just some of the issues. (Elliott and Marriott, 2009)

## **2.26. Conceptual framework.**

One theoretical construct have been adapted to guide the design of the study. This is the PRECEDE framework. PRECEDE framework was adopted to provide a clear explanation

of how important variables are linked to capture the concepts being studied. The acronym PRECEDE stands for Predisposing, Reinforcing, Enabling Constructs in Educational Diagnosis and Evaluation (Creedon, 2005). This framework which was developed by (Green, Kreuter, Deeds and Patridge, 1980) helps to unravel the wide spectrum of determinants of a particular health problem and the quality of life associated with it. They propounded that most health problems are behaviorally related and for such problems to be solved, the behavior of the individuals must be modified. It is based on the premise that health/ social problems are determined by multiple factors like epidemiological, behavioural and educational factors.

The PRECEDE conceptual model has four phases: social, epidemiological, behavioural, and educational. The process of social assessment is concerned with investigating issues deemed problematic to particular groups of people. The frequency or rate of these particular problems is examined by investigating their epidemiology which in turn may be affected by human behavior and environment. The concept of behavior is dependent on factors that predispose an individual to engage in a particular behavior (Brieger, 2002). Any behavior exhibited as a response to a direct request or wish of an influencing source may be defined as compliance (Creedon, 2005). The PRECEDE framework outlines the antecedent factors which influence behavior. These factors are categorized as Predisposing, Enabling and Reinforcing factors.

*The predisposing factors* are those antecedents to behavior they provide rational or motivation for the behaviour. These include knowledge, attitude, perception, norms, values and beliefs related to DM which influence diabetic-related behavior. Predisposing factors have the potential for influencing a given health behavior, either by encouraging the behavior to occur or by inhibiting it from occurring.

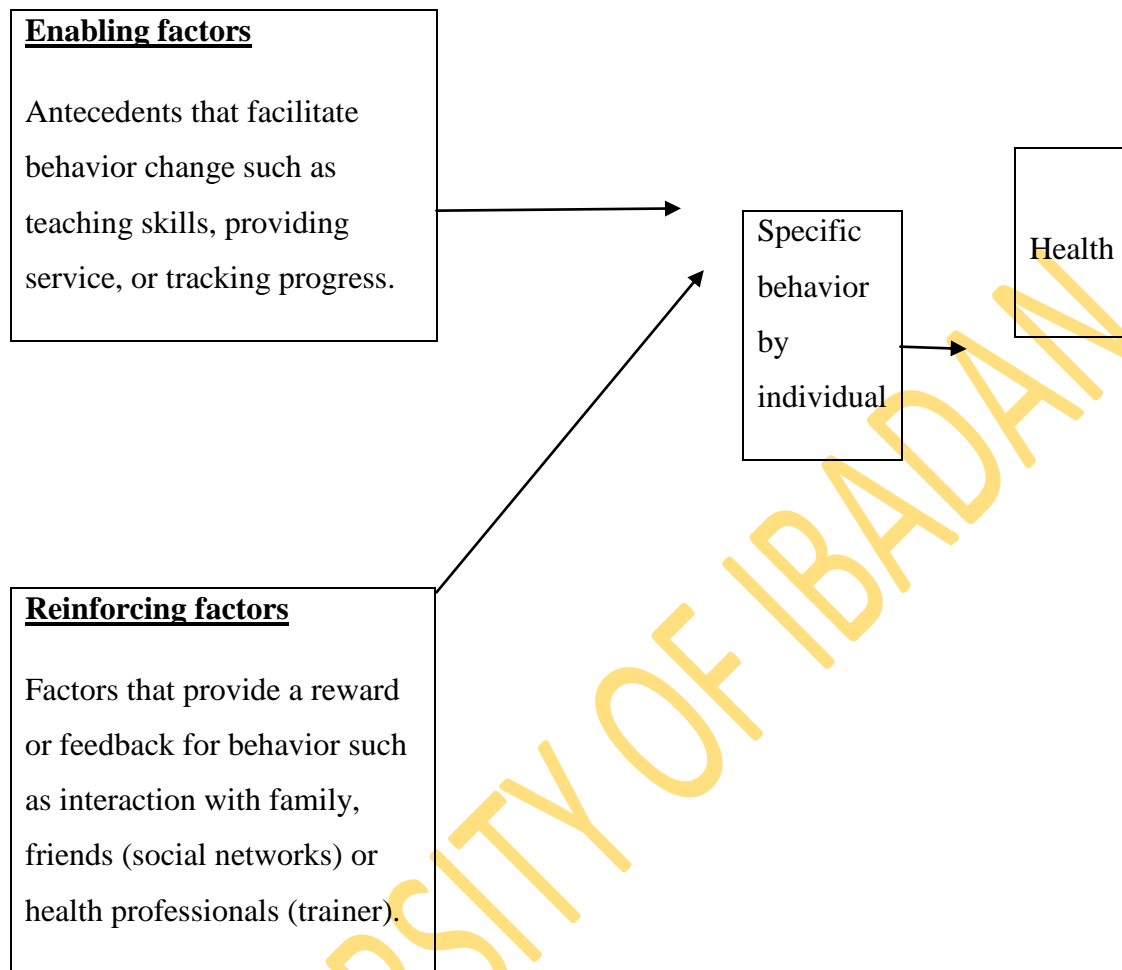
*The enabling factors* are those that are antecedents to behavior and are usually related to resources. These include self care skills, finance/cost, and availability of health services, accessibility and proximity to health services with ease.

*The reinforcing factors* are factors which are subsequent to a behavior that provides continuing reward, or incentives for the behaviour and contributes to its persistence and perpetuation. This includes positive attitude of health care providers, availability of drugs,

continuity of health care, and the attitude of the family members in terms of financial and emotional support. (Breiger, 2002).

PRECEDE framework was used to facilitate the design of the study with specific reference to variables to measure. The framework was used to guide the design of the instrument used for data collection. (See fig 1 for the adoption of the framework to the study of DM.

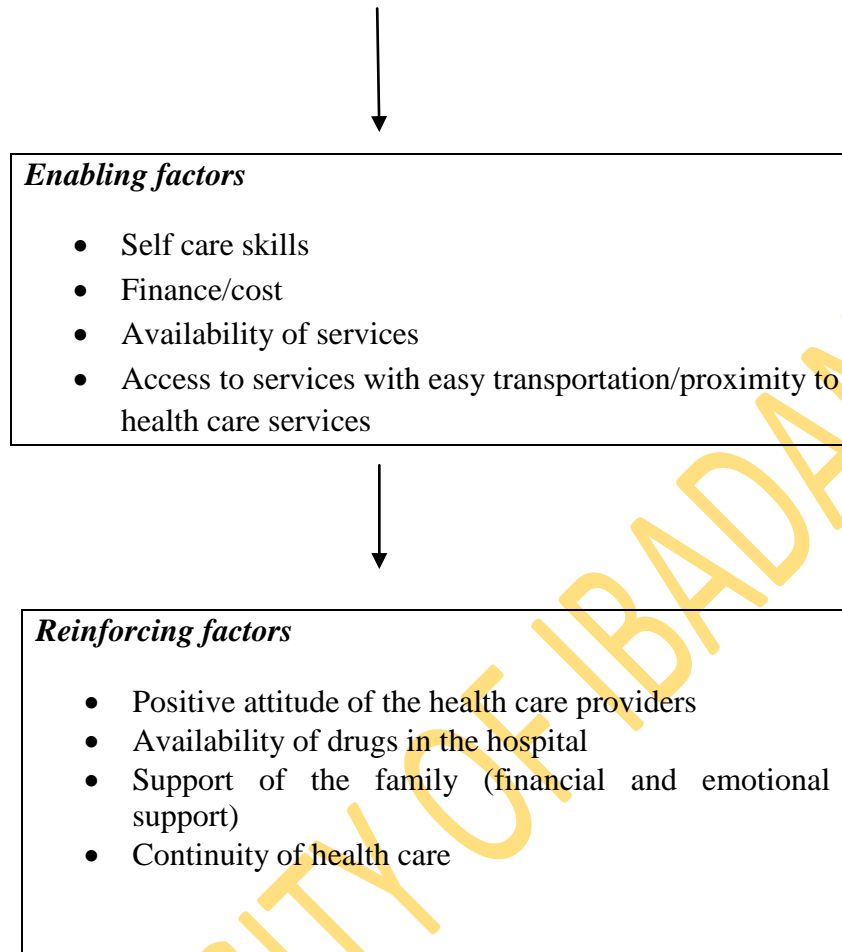
**Predisposing factors**  
Antecedents to behavior, such as knowledge, attitude, beliefs, values and confidence or motivation.



**Fig. 2.1 Precede Model, Green, Kreuter 1980**

***Predisposing factors***

- Knowledge of diabetes related complications and medical problems
- Attitudes toward diabetes, i.e. normal, values and beliefs related to care
- Beliefs about diets that should or not be taken
- Perceptions of diabetes related complications and illnesses.



**Fig. 2.2: Precede model for understanding of compliance in the management of diabetes mellitus**

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1. Study Design and scope**

This study is a descriptive cross-sectional survey among the diabetes patients who attended the diabetic clinic at University College Hospital, Ring Road State Hospital and Oluyoro



Oke Offa Catholic Hospital for treatment. The study is limited in scope to the determination of their knowledge, perception and illness experiences related to diabetes mellitus among patients receiving care at the aforementioned hospitals.

### **3.2. Description of the Study Settings:**

The study settings consist of the following major health care facilities in Ibadan: University College Hospital Oritamefa, Ibadan, Ring-road State Hospital and Oluyoro Oke Offa Catholic Hospital. An overview of the description of these facilities is presented one after the other.

#### University College Hospital

The University College Hospital (UCH) is located at Oritamefa in Ibadan North Local Government Area (LGA) was founded in November, 1952. It is the first teaching hospital in Nigeria. The hospital provides tertiary health care, research and various categories of training programmes. The UCH provides both in-patients and out-patients health care services. There are many clinical departments including the Department of Medicine which runs the diabetic clinic. The diabetic clinic is run mainly every Monday while normal endocrine Clinic is run for new cases of diabetes on Friday. At each Monday clinic the number of patients that visit the clinic ranges from 65 to 70 patients. The monthly diabetes counseling association meeting is held on every last Monday of each month where the health team meets together with the patients to teach them on how to promote their health and prevent any further complications. Endocrinology centre in this institution was established to improve the quality of life for people with diabetes, reduce complications and sufferings related to the diabetes and contribute to the ultimate promotion of health. It only provides tailored diabetes care to patients of all ages and is the only facility for comprehensive and continuous diabetes care.

#### Ring-Road State Hospital

Ring-road State Hospital is located in Ibadan South West LGA along Challenge Area, Ibadan. It is one of the largest Oyo state owned hospitals founded in 1971. The hospital is cited in a serene environment and is established to serve as secondary health care teaching

institution. Its function includes the provision of qualitative and affordable medical care services. The hospital runs various clinics including the diabetic clinic. The diabetic clinic runs once a week every Wednesday. Records of the hospital reveal that the number of diabetic patients seen on every clinic day ranges from 30-50. Altogether about 135 patients were registered for care as at the time of the study. The monthly association meeting holds on the first Wednesday of every month. The meeting provides opportunities for health professionals and patients to exchange ideas on ways of coping with the disease. The health care provider give education related to diabetes process, knowledge and awareness, compliance to medication, diet and nutritional monitoring, foot care, prevention and care of complications, blood glucose monitoring and the technique of self monitoring and injection. Importance of regular hospital check up was also emphasized.

#### Oluyoro Oke –Offa Catholic Hospital

Oluyoro Catholic Hospital is the biggest private hospital in Ibadan founded in May 12, 1959. It is run by the Catholic Arch-dioceses of Ibadan. The hospital is located between Agodi Gate and Agugu area in Ibadan North East LGA. There is another arm of the hospital at Eleta known as St Mary's Catholic Hospital, Ibadan. Oke-offa Catholic Hospital is among the private missionary hospitals with the largest population of diabetic patients in Ibadan.

The diabetic clinic in the hospital runs five days in a week (Monday-Friday) attending to 10-20 patients daily, approximately 50 patients per week and having approximately 155 patients. The monthly diabetic association meeting is conducted every last Monday of each month. During each meeting, doctors, pharmacists, dieticians together with the patients meet to deliberate on how to promote and proffer solutions relating to the management of the condition. The patients are given the opportunity to ask questions. The meeting always lasts for two hours. Recognizing that diabetes is ongoing, yet manageable disease, Mission Hospital provides diabetes education series for patients and their loved ones. The diabetes education is based on improving the knowledge, health and quality of life of individuals with diabetes. Empowering individuals and the community through education on diabetes management and treatment compliance is the key to achieving optimal health.

### **3.3. Study Population**

The study populations were diabetic patients that attended the out-patient diabetic clinic of UCH, Ring-Road State Hospital and Oluyoro Oke –Offa Catholic Hospital within the study period. The target population comprised the registered patients of diverse social/demographic characteristics that were already on diabetes management and were willing to participate in the research.

### Sample size Determination

The sample size was determined using the following Lwanga (1991) sample size formula for calculating sample sizes for studies with low prevalence:

$$\frac{Z^2 p q}{d^2}$$

Where,

Z is standard normal deviation at 5% (Standard value of 1.96)

p is the assumed number of compliance to treatment among the diabetic patients.

q is 41% (Nwankwo, Nadu & Nwankwo, 2010)

d is the level of precision at 5%

$$Z = 1.96$$

$$p = 41\%$$

$$q = 1-p$$

$$d = 5\% \text{ which is the level of precision}$$

$$n = \frac{1.96^2 \times 0.41 \times (100-41)}{5^2}$$

$$= \frac{1.96^2 \times 0.41 \times 59}{25} = 378$$

$$25$$

$$n = 378$$

Allowing for 20% non- response rate

$$n = 478$$

The calculated sample size of 478 was taken as minimum. However in the view of the poor compliance behavior of diabetic patients with the specific reference to appointment keeping. (Shobhana, Begum, Snehalatha and Vijay 2004) and in order to enhance the precision and generalizability of the results, the sample size was increased to 600.

### **3.4. The inclusion criteria**

The inclusion criteria which must be met before a respondent was eligible for study were as follows;

1. History of diagnosis of being diabetic at the hospital where enlisted in the study.
2. Aged 18 years and above.
3. Attendance of the diabetic clinic during the period of the study.
4. Being coherent, healthy enough and willing to participate in the study after giving informed consent.

### **3.5. The exclusion criteria**

The exclusion criteria included patients who were confused or too ill to communicate, those below 18 years of age, newly diagnosed patients (less than one month) and patients who were unwilling to give informed consent to participate in the study.

### **3.6. Sampling technique:**

Research assistants were recruited and trained. Systematic random sampling was used in selecting respondents who chose to participate in the study using the list of males and females in the hospital register who were in the clinic on the day of interview.

### **3.7 Sampling process**

A multistage sampling technique involving three stages was used in selecting respondents for the study.

A review of records was conducted to document the population of the diabetic patients registered at the Outpatient departments in UCH, Ring road and Oluyoro hospitals.

The results of the diagnosis showed that there were about 1825, 135, 155 diabetic patients receiving care at the UCH, Ring road and Oluyoro hospitals respectively.

### **Stage 1**

Proportionate sampling technique was used to select the number of respondents from the UCH (Federal tertiary Institution), Ring-Road State Hospital (State secondary institution) and Oluyoro Catholic Hospital (mission secondary institution).The formula that was adopted was as follows;

$$\frac{\text{Number of diabetes patients}}{\text{Total of diabetes patients in the three institutions}} \times \text{X calculated sample size}$$

The calculations of sample sizes for the three institutions based on the formula were therefore as follow:

$$\text{UCH: } \frac{1,825}{2115} \times 600 = 518$$

$$\text{Ring road Hospital: } \frac{135}{2115} \times 600 = 38$$

$$\text{Oluyoro Catholic Hospital: } \frac{155}{2115} \times 600 = 44$$

## Stage 2

Selection of respondents was gender sensitive in each of the three (3) institutions

The records revealed that ratios of males to females at UCH, Ring road and Oluyoro were 4:6 3:7 and 2:8 respectively. So the proportion of males and females selected in each of the institutions based on the aforementioned ratios were:

### UCH:

$$(i) \text{ Males: } \frac{4}{10} \times 518 = 207$$

$$(ii) \text{ Females: } \frac{6}{10} \times 518 = 311$$

### Ring road State Hospital:

$$(i) \text{ Male: } \frac{3}{10} \times 38 = 11$$

$$(ii) \text{ Females: } \frac{7}{10} \times 38 = 27$$

**Oluyoro Catholic Hospital:**

$$(i) \text{ Males: } \frac{2}{10} \times 44 = 9$$

$$(ii) \text{ Females: } \frac{8}{10} \times 44 = 35$$

**Stage 3**

Systematic random sampling was used in selecting respondents who chose to participate in the study using the list of males and females in the hospital register who were at the clinic on the day of interview as sampling frames.

**3.8 Instruments for data collection**

The questionnaire developed for the study was divided into sections labeled A, B, C, D, E and F. Section A contained questions on the socio-demographic characteristics of respondents while Section B focused on awareness and knowledge about Diabetes Mellitus, Section C contained questions on attitude towards compliance with management of Diabetes Mellitus; Section D was used to document information relating to factors influencing management of Diabetes Mellitus, while Section E included questions on perceptions relating to management of Diabetes Mellitus. Finally Section F focused on experiences relating to non-compliance with the management of Diabetes Mellitus.

Data were collected from May -August, 2011 using interviewer administered questionnaire. The questionnaire comprised close ended, open ended and multiple response questions. The questionnaires were administered on diabetic clinic days of Mondays and Fridays in the morning till the close of work for each of the clinic days. Respondents consented to be interviewed after being duly informed about the study.

**3.9 Validity of the instruments**

*Validity* describes the ability of an instrument to measure what it is expected to measure. In-house pretesting was carried out. The opinion of supervisors and experts in the Department of Health Promotion and Education were sought to ascertain the validity of the instruments. The drafted instrument was also made available to clinicians to review. Research site were surveyed before the method for data collection was designed. Relevant information was documented on the number of diabetic clinic days, number of patients attending each clinic day and the age group attending the clinic.

The instrument was pretested. The questionnaire was pretested among 60 diabetes mellitus patients attending St Mary's Catholic Hospital Eleta, Ibadan. The pretesting was done to ensure the reliability of the questionnaire and to ensure that all the questions were relevant to the study and solicited the desired responses from the respondents. A Cronbach Alpha Model technique was used to determine the reliability of the instrument.

The pretesting was carried out in March 2011, after obtaining oral consent from respondents. The pretested copies of the questionnaires were coded, entered and analyzed using SPSS version 15.0. Some problems were detected during the pretest. For instance 'question 7' (occupation): only civil servant and trading was indicated but later retiree and other occupations were added after pretesting. Similarly, 'question 9' (how long have you been diagnosed of having diabetes was duplicated) and so had to be corrected. Each of these was split to options, entered and analyzed as separate options in the main study.

Four Research Assistants (RAs) were recruited and trained to ensure adequate understanding of the content of the study instruments as well as the data collection process and management. The trained RAs were involved in the pretest. This was done to promote them with practical experiences.

### **3.10. Reliability of the instruments**

Reliability describes the accuracy or precision of a research-measuring instrument. Special care was taken to monitor the quality of data collected through supervision during collection of data. The questionnaires were reviewed for quality and consistency.

### **3.10. Data Collection Process**

The study was carried out from May to August 2011 with the assistance of four trained Research Assistants. The data collection processes are highlighted below:

Identification of each health facility, visits were made to all the heads of health facilities by the researcher in company of the research assistants to intimate them of the study objectives and to obtain permission from them prior to the interview, identification of the eligible respondents and rapport was established in each of the facility, administration of the questionnaire to the respondents was conducted one by one in the clinic. The questionnaire was a self administered one and administration of the questionnaire was done in a flexible manner, review of administered questionnaire for completeness, accuracy and problems noted were resolved immediately after interview before leaving each health facility.

### **3.11. Data Management and Analysis**

The following activities were carried out to ensure good data management and analysis;

The quality of the information collected was checked by the researcher in the field. These entailed reviewing the pattern of responses of each participant as recorded in the questionnaire. Problem discovered during data collection was resolved immediately in the field.

A serial number was assigned to each of the questionnaires for easy identification and recall of any instrument with problems.

Administered questionnaire was edited and coded by the investigator with the use of a coding guide. The data in each questionnaire was entered into a computer for analysis using the Statistical Package for Social Sciences (SPSS).

The data was analyzed using both descriptive and inferential statistics, Chi-square, t-test, ANOVA and logistic regression.



Copies of the questionnaire then stored in a place that is safe from destruction by water or fire and where unauthorized persons would not have access to them. They will be destroyed after the defense of the dissertation.

A 45 point knowledge scale was used to measure the respondents' knowledge. A correct knowledge attracted one point while a wrong knowledge was zero. A score of  $\leq 20$  points, 21-35 points and 36-45 points were considered poor, fair and good knowledge respectively. A total of 10-point attitudinal scale was used to measure respondents' attitudinal disposition. A positive attitude attracted a scale of 1 point while negative attitude was zero. A score of 0 – 4 points and 6 points and above were considered negative and positive attitude respectively.

Perceptions of respondents were determined using a 32-point perception scale. A positive perception attracted a score of 2 points while the score for a negative perception was zero. Scores of  $< 16$  and  $\geq 17$  points were considered negative and positive perceptions respectively.

### **3.12. Ethical considerations**

Ethical approval was sought from University college hospital Ethical Review Committee. The purpose for this was to ensure that the research conformed to accept scientific principles and international ethical guidelines needed for conducting human subjects. Informed consent was sought before the administration of questionnaire on any respondent. The respondents were assured of the confidentiality of their responses and that participation in the study was voluntary. No names of respondents or any identifiers whatsoever was written on questionnaires in order to ensure that it would not be possible to link responses to any of the respondents.

### **3.13. Limitation of study**

Since some of the questions relating to diabetes management are personal and sensitive. Some respondents were not willing to give all the information required by the researcher because of the fear of being penalized or rebuked. Efforts were however made to reduce this problem by assuring them of the confidentiality of all information provided. It is assumed therefore, that all responses were made in honesty.

A number of variables used to measure compliance were inadvertently omitted. This limits the amount of data set that could be used to measure respondents' illnesses relating experiences to diabetes compliance. However some of the issues explored add some values to this understanding

## CHAPTER FOUR

### RESULTS

#### 4.1. Socio-demographic characteristics of the respondents

##### 4.1.1 Age distribution

The respondents' ages ranged from 35 – 92 years with a mean of  $63.9 \pm 8.6$  years, majority (76.5%) were between the ages of 60 to 74 years, (62.7%) were females, 75.3% were married and 23.2% were widowed. More than half (56.7%) of the respondents were Muslims and 42.3% were Christians. Respondents were predominantly Yoruba (88.7%), 36.2% had primary education while 33.3% had no formal education. A large proportion (69.2%) of the respondents was traders while 13.2% were retirees. (See table 4.1 for details).

Figure 4.1 depicts respondents' supplementary sources of income for the management of DM. The sources of income included children (54.0%), husbands (15.5%), family members (9.7%) trading (3.8%), pension (1.7%), asset/properties (1.7%) and wives (0.7%). The types of health care facility in which respondents were diagnosed of DM are shown in table 4.2. Slightly over half (51.7%) of the respondents were diagnosed in a Specialist hospital, while the others were diagnosed in General Hospital (29.5%), Private hospital (18.3%) and Health centre (0.5%).

**Table 4.1: Socio-demographic characteristics of respondents N= 600**

Characteristics	No	%
<b>Age*(in years)</b>		
35-44	10	1.7
45-54	73	12.2
55-64	229	38.2
65-74	230	38.3
75-84	56	9.3
85-94	2	0.3
<b>Sex</b>		
Male	224	37.3
Female	376	62.7
<b>Religion</b>		
Christianity	254	42.3
Islam	340	56.7
Traditional Religion	6	1.0
<b>Marital status</b>		
Single	2	0.3
Married	452	75.3
Widowed	139	23.2
Divorced	7	1.2
<b>Highest level of education</b>		
No formal education	200	33.3
Primary education	217	36.3
Secondary education	124	20.7
OND/NCE	16	2.7
HND/BSC	37	6.2
Postgraduate	6	1.0
<b>Ethnicity</b>		
Hausa	9	1.5
Igbo	58	9.7
Yoruba	528	88.7
Niger Delta	5	0.8
<b>Occupation</b>		
Civil servant	64	10.7
Trading	415	69.2
Retired	79	13.2
Housewife	26	4.3
Driving	4	0.7
Farming	3	0.5
Clergy	7	1.2
Carpentering	1	0.2

lawyer	1	0.2
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\* Mean age = 63.93 ± 8.62 years; Median age; Age range =35-92 years

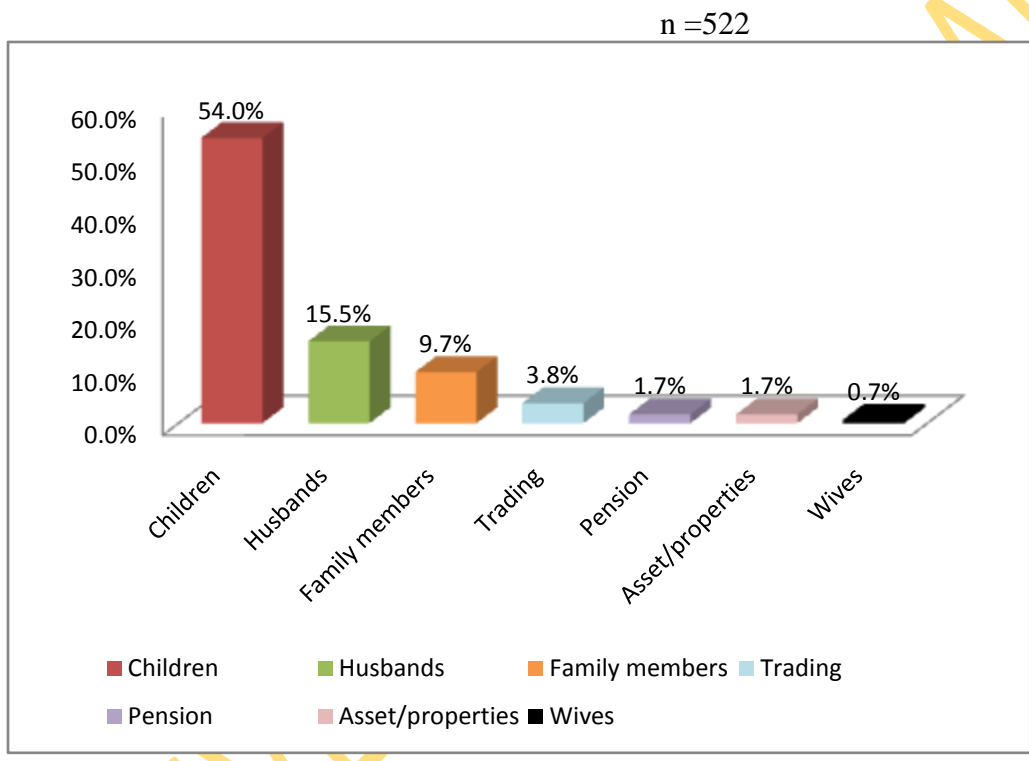


Figure 4.1. Supplementary Sources of income

**Table 4.2: Types of facilities where respondents were diagnosed of diabetes mellitus.**

N =600

<b>Types of facility</b>	<b>No</b>	<b>%</b>
Specialist hospital	310	51.7
General hospital	177	29.5
Private hospital	110	18.3
Health centre	3	0.5

#### **4.2. Respondents' awareness and knowledge of Diabetes Mellitus**

Most (69.2%) of the respondents had heard of DM before being diagnosed and the sources of information included medical doctors (41.0%), Radio (29.3%), Friends (27.3%), Television (14.3%) and Newspaper (10.5%). (Table 4. 3.) The mean knowledge scores of respondents on DM was  $36.5 \pm 5.8$ . The mean knowledge scores for male and female respondents were  $36.6 \pm 5.6$  and  $36.5 \pm 6.0$  respectively ( $p > 0.005$ ). The mean knowledge scores of respondents with no formal, primary, secondary and tertiary education were  $36.1 \pm 6.3$ ,  $37.5 \pm 5.5$ ,  $36.9 \pm 5.2$ , and  $34.0 \pm 5.9$  respectively. ( $p < 0.05$ ). (Table 4.3)

**Table: 4.3: Awareness and sources of information on Diabetes mellitus**

N==600

<b>Ever heard of DM before diagnosed</b>	<b>No</b>	<b>%</b>
Yes	415	69.2
No	185	30.8
<b>*Sources of information on DM *</b>		
Medical doctors	246	41.0
Radio	176	29.3
Friends	164	27.3
Television	86	14.3
Newspaper	63	10.5
Nurse	57	9.5
Books	56	9.3
Relatives	46	7.7
Magazine	24	4.0
Mother	20	3.3
Traditional	19	3.2
Father	16	2.7

\*Multiple responses indicated



### **4.3. Respondents' knowledge on diabetes mellitus**

The table 4.4 shows that 96.7% of the respondents correctly stated that taking too much of sugar, too much alcohol consumption (92.8%), obesity (87.7%), sedentary lifestyle (79.0%), heredity (68.7%), pancreas disorder (68.0%) and old age (52.8) can lead to DM. Some 22.7% of the respondents wrongly stated that malnutrition can lead to DM. (Table 4.4). The proportion of respondents with poor, fair and good knowledge of DM were 2.5%, 32.5% and 65.0% respectively. (Fig.4.2).

Respondents' knowledge relating to the appropriate dietary habit for diabetics is shown in table 4.5. Most (91.8%) of the respondents' correctly stated that diabetics should take special foods while 87.8% said they can take all kinds of food but in small amount. (Table 4.5). Majority of the respondents' correctly mentioned signs and symptoms of DM and these included tiredness (93.7%), frequent urination (93.5%) and excessive thirst (92.2%). (Table 4.6). The test for establishing a case of diabetics correctly mentioned by them included blood sugar test (98.1%) and urine test (62.8%). (Table 4.7)

The correct ways of controlling diabetes mentioned by respondents included regular hospital check-up (98.2%), avoiding consumption of too much carbohydrate (97.3%) and avoidance of sugar consumption (96.7%). (See table 4.8 for details about the correct responses). Respondents' knowledge on health related practices for preventing DM are presented in table 4.9. Respondent's knowledge about health problems that can result from diabetes are contained in table 4.10. Most of the respondents (93.3%) listed hypertension, leg ulcer (90.3%) and coma (88.3%) as possible complications of DM.

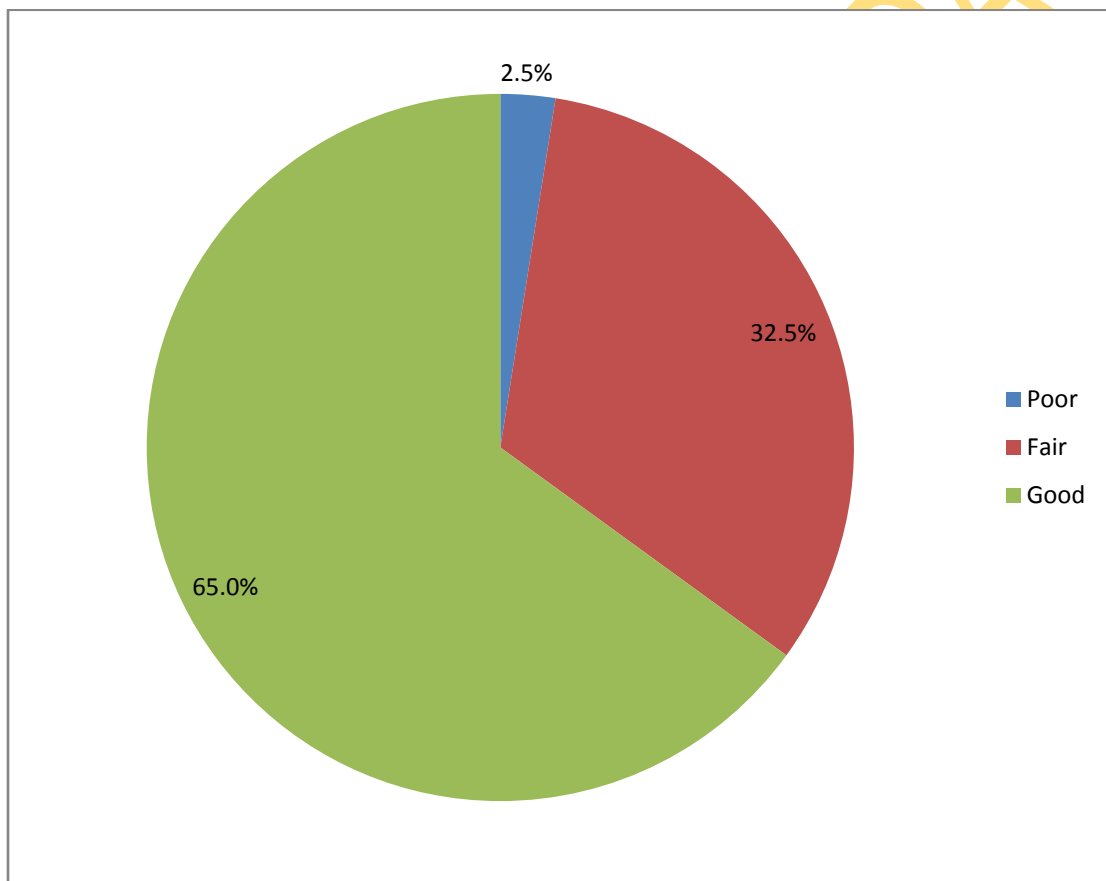
**Table 4.4: Respondents' knowledge about predisposing conditions or factors which can lead to Diabetes mellitus.**

N=600

Condition/factors	Responses		
	Can lead to DM (%)	Cannot lead to DM (%)	Not sure/don't know (%)
Taking too much sugar**	579 (96.5)	3 (0.5)	18 (3.0)
Too much alcohol consumption**	557 (92.8)	3 (0.5)	40 (6.7)
Obesity **	526 (87.7)	24 (4.0)	50 (8.3)
Sedentary lifestyle**	474 (79.0)	29 (4.8)	97 (16.2)
Heredity **	412(68.7)	77(12.8)	111(18.5)
Pancreas disorder**	408(68.0)	14(2.3)	178(29.7)
Old age**	317(52.8)	137(22.8)	146(24.4)
Malnutrition *	136 (22.7)	223 (37.1)	241(40.2)
Supernatural forces*	27 (4.5)	343 (57.2)	230 (38.3)
Curses invoked on someone *	22 (3.7)	339 (56.5)	239 (39.8)

\*\*Can lead to DM

\* Cannot lead to DM



**Figure 4.2. Distribution of respondents with poor, fair and good knowledge relating to Diabetes mellitus.**

**Table 4.5: Respondents' knowledge about the appropriate dietary habits for a Diabetic patient**

<b>Characteristics</b>	<b>Yes (%)</b>	<b>No (%)</b>	<b>Total</b>
A diabetes patient can take all kinds of food in any amount	25(4.2)*	568(95.8)	593
A diabetes patient can take all kinds of food in small amounts	527(88.8)**	66(11.1)	593
A diabetes patient should take only special foods	551(92.9)**	42(7.1)	593
A diabetes patient should always skip or miss meals as a way of controlling the disease	14(2.4)*	579(97.6)	593

\*\* Correct response

**Table 4.6: Respondents' knowledge on signs and symptoms of Diabetes Mellitus**

**N=600**

<b>Signs &amp; symptoms DM</b>	<b>Responses</b>	
	<b>Yes (%)</b>	<b>No (%)</b>
Tiredness	562(93.7)*	38(6.3)
Frequent urination	561(93.5)*	39(6.5)
Excessive thirst	553(92.2)*	47(7.9)
Sign of fainting/collapse	528(88.0)*	72(12.0)
Delay in wound healing	472(78.7)*	128(21.3)

\*Correct response

**Table 4.7: Respondents' knowledge on test for detecting diabetes mellitus.**

**N=600**

Test for detecting DM	Responses	
	Yes (%)	No (%)
Urine examination**	377(62.8)	223(37.2)
Blood sugar test/fasting**	589(98.1)	11 (1.8)
Stool examination*	167(27.8)	443(73.8)
Chest examination*	181(30.2)	419(69.8)

\*\* Correct response

Table 4.8: Respondents' knowledge on ways of controlling diabetes mellitus.

N= 600

Ways of controlling DM	Responses	
	Yes (%)	No (%)
Avoid too much of carbohydrate food.	584(97.3)*	16(2.7)
Avoid sugar consumption.	580(96.7)*	20(3.3)
Not sitting down in a position for too long	569(94.8)*	31(5.2)
Participating in regular exercise	575(95.8)*	25(4.2)
Regular hospital check up	589(98.2)*	11(1.8)
Avoid being overweight	579(96.5)*	21(3.5)

\*Correct responses

**Table 4.9: Respondents' knowledge on health related practices for preventing diabetes mellitus.** **N=600**

<b>Health related practices</b>	<b>Yes (%)</b>	<b>No (%)</b>
Regular physical exercise *	572(95.4)	28(4.7)
Adherence to recommended diet*	586(97.7)	14(2.3)
Checking of blood sugar level every now and then*	581(96.9)	19(3.2)
Checking of urine to monitor sugar level*	564(94.0)	36(6.0)
Avoiding getting too fat*	570(95.0)	30(5.0)
Eye test*	348(58.0)	252(42.0)
Adherence to recommended drug prescription*	578(96.3)	22(3.7)
Avoiding alcohol intake*	578(96.3)	22(3.7)
Going for follow up care as recommended*	589(98.2)	11(1.8)

\*Correct responses..



**Table 4.10: Respondents' knowledge about health complications that can result from diabetes**

N=600

<b>Likely health problems</b>	<b>Yes (%)</b>	<b>No (%)</b>
Hypertension **	560(93.3)	40(6.7)
Leg ulcer**	542(90.3)	58(9.7)
Coma/ unconsciousness**	530(88.3)	70(11.7)
Blindness **	514(85.7)	86(14.3)
Kidney failure**	444(74.0)	156(26.0)
Cancer	50(8.3)	550(91.7)
HIV/AIDS	11(1.8)	589(98.2)

\*\*Correct response

#### **4.4. Respondents' attitude towards compliance with management of Diabetes mellitus**

Majority (94.0%) of the respondents had a positive attitude towards compliance with management of DM. Most (91.5%) of the respondents disagreed with the notion that it was not necessary for people living with DM to do regular physical exercise as exercise will make them breakdown. Many (56.0%) of the respondents were of the belief that special foods should be taken by people with diabetes.

Majority (94.0%) of the respondents disagreed that people living with diabetes should eat all kinds of foods in order to get well and 93.7% disagreed that it is good to use traditional/ alternative medicine to treat diabetes; most (78.0%) disagreed that urine test is not necessary if one takes his drugs regularly.

Majority (91.7%) disagreed with view that routine blood sugar test is not necessary if one takes his or her drugs and eat only recommended foods and only (96.5%) of the respondents disagreed with the view that a diabetic patient can take any amount of alcoholic beverages he/she wants; 3.0% were undecided. Majority of the respondents (93.0%) disagreed with the view that it is not compulsory for one to take his/her diabetic drugs every day. Similarly, majority (95.8%) of the respondents disagreed with the perception that going to the hospital regularly for follow up care is not necessary because one can always buy his/her drugs from pharmacy or chemist shops when they get finished. Very few respondents (1.0%) were of the view that regular blood sugar test is not necessary if one takes the recommended foods and drugs; a majority (96.0%) disagreed while (3.0%) were undecided. (See details in Table 4.11).

**Table 4.11: Respondents' attitude towards compliance with management of diabetes mellitus**

**N= 600**

<b>Attitudinal statement</b>	<b>Agree (%)</b>	<b>Undecided (%)</b>	<b>Disagree (%)</b>
It is not necessary for people living with DM to do regular exercise as exercise will make them breakdown	37(6.2)*	14(2.3)	549(91.5)**
Only special foods should be taken by people with diabetes.	336(56.0)*	11(1.8)	253(42.2)**
People living with diabetes should not eat all kinds of foods to get well.	20(3.3)	16(2.7)	564(94.0)**
Apart from the drugs prescribed at the hospital, it is good to use traditional alternative medicine to treat diabetes.	23(3.8)*	15(2.5)	562(93.7)**
Urine test is not necessary if one takes his drugs regularly	103(17.1)*	29(5.0)	468(78.0)**
Routine blood sugar test is not necessary if one takes his or her drugs and eat only recommended foods.	25(4.2)	25(4.2)	550(91.6)**
A diabetic patient can take any amount of alcohol beverages he/she wants	0(0.0)	18(3.0)	582(97.0)**
It is not compulsory for one to take his/her diabetic drugs every day.	32(5.3)*	10(1.7)	558(93.0)**
Going to the hospital regularly for follow up care is not necessary because one can always buy his /her drugs from pharmacy or chemist shop when they get finished.			

	15(2.5)*	10(1.7)	575(95.8)**
Regular blood sugar test is not necessary if one takes the recommended foods and drugs.	6(1.0)*	18(3.0)	576(96.0)**

The responses are in terms of positive or negative responses.

\*\* Positive response

\*Negative response

#### 4.5. The drugs used by the respondents for managing DM

The drugs claimed to be taken by the respondents were daonil tablets (77.3%), glucophage (83.6%), diabenes (44.8%), tolbutamide (18.4%), damicron (29.8%) and aspirin (27.3%). (Table 4.12). Daonil for instance, all the respondents (77.3%) claimed to take one tablet daily. With reference to glucophage tablet respondents claimed to be taking 1, 2, 3, & 4 tablets daily were (27.1%), (23.3%), (0.3%), (16.0%) respectively. The details of the dosage for the listed drugs are contained in the table.4.12.

Table 4.12: Drugs used by respondents for managing diabetes mellitus

Drugs used and dosage	Yes (%)	No (%)
<b>Daonil tablet (N=295)</b>	228 (77.3)	67(22.7)
Dosage of Daonil.(dly): 1 tablet	228(77.3)	0(0.0)
<b>Glucophage tablet (N=287)</b>	240(83.6)	47(16.4)
Dosage of Glucoph.(dly) 1 tablet	78(27.1)	0(0.0)
2tablets	67(23.3)	0(0.0)
3tablets	1 (0.3)	0(0.0)
4tablets	46(16.0)	0(0.0)
<b>Diabenes tablet (N=250)</b>	112(44.8)	138(55.2)
Dosage of diabene.(dly) 1 tablet	53(21.2)	0(0.0)
2 tablets	25 (10.0)	0(0.0)
4 tablets	1 (0,4)	0(0.0)
<b>Tolbutamide tablet(N=239)</b>	44(18.4)	195(81.6)
Dosage of tolbutamide (dly) 1 tablet	7(2.9)	0(0.0)
2 tablets	5(2.1)	0(0.0)
3tablets	10(4.2)	0(0.0)
4tablets	1(0.4)	0(0.0)
<b>Damicron tablet (N=238)</b>	71(29.8)	167(70.2)
No response on dosage		
<b>Nifedipine tablet (N=49)</b>	49(100.0)	
Dosage of nifedipine(dly)		

1 tablet	42(85.7)	0(0.0)
2 tablet	5(10.2)	0(0.0)
4tablet	2(4.1)	0(0.0)
<b>Aspirin tablet (N=216)</b>	<b>59(27.3)</b>	<b>157(72.7)</b>
Dosage dly		
1tablet	43(19.9)	0(0.0)
2tablets	8 (3.7)	0(0.0)
<b>Insulin injection only (N=92)</b>	<b>7 (7.6)</b>	<b>85(92.4)</b>

Note: dly= daily

#### **4.6. Conditions and practices which have potentials in compromising respondents' compliance with management of Diabetes mellitus**

The conditions and practices which have potentials for compromising respondents' compliance with management of DM are contained in table 4.13a. The conditions/practices which topped the list of factors influencing management of DM was the cost of diabetic drugs (69.0%). Few of the respondents' (10.2%) experienced some problems after taken particular types of foods like fufu, bread and gari. Few of the respondents' were still taking alcoholic beverages while only (0.8%) of them were still smoking.

The adduced reasons for not complying with the management of DM are presented in table 4.13b. Excessive hunger (68.4%) topped the list of the reasons for taking foods respondents were asked to stop taking. Lack of money (45.8%) topped the list of reasons for not going to the clinic for medical checkup. The reasons cited by the majority of the respondents for not participating in the physical exercise were that they were not used to the habit. (Table 4.13a)

**Table 4.13a: Conditions and practices which have potentials in compromising respondents' compliance with management of Diabetes mellitus**

**N=600**

<b>Conditions/practices</b>	<b>Frequency</b>	<b>%</b>
Cost of drug is a problem	414	(69.0)
Experienced problems after taking particular types of food	61	(10.2)
Lack of social support	536	(89.3)
Currently still using alcohol beverages	30	(5.0)
Currently still smoking	5	(0.8)
Ever taken food asked to stop taking	205	(34.2)
Ever failed to go to clinic for check up at appointed time	309	(51.5)
Proportion that failed to comply with prescribed PE since diagnosed	316	(52.7)
Ever forgotten to take recommended drugs: (n=301)	301	(100.0)

**Table 4.13b: Adduced reasons for not complying with management of DM**

<b>Factors and conditions</b>	<b>Frequency</b>	<b>%</b>
Factors which made respondents eat what they have been asked to be abstaining from: (n=240)		
Excessive hunger	161	(67.1)
Ceremony	17	(7.1)
Personal interest in the food	62	(25.8)
Factors which made respondents' not to go for the clinic at appointed time: (n=316)		
No money	145	(45.8)
Sickness	26	(8.3)
Distance to the hospital	48	(15.2)
Travelling	82	(25.9)
Tiredness	15	(4.8)
Reasons for not participating in physical exercise (PE): (n=288)		
Not used to it	196	(68.0)
No time	29	(10.0)
Old age	22	(7.7)
Lack of skill	11	(3.8)
No interest	30	(10.5)
Factors that made respondents' forgot to take drugs: (n=277)		
No money to buy drugs	34	(12.2)

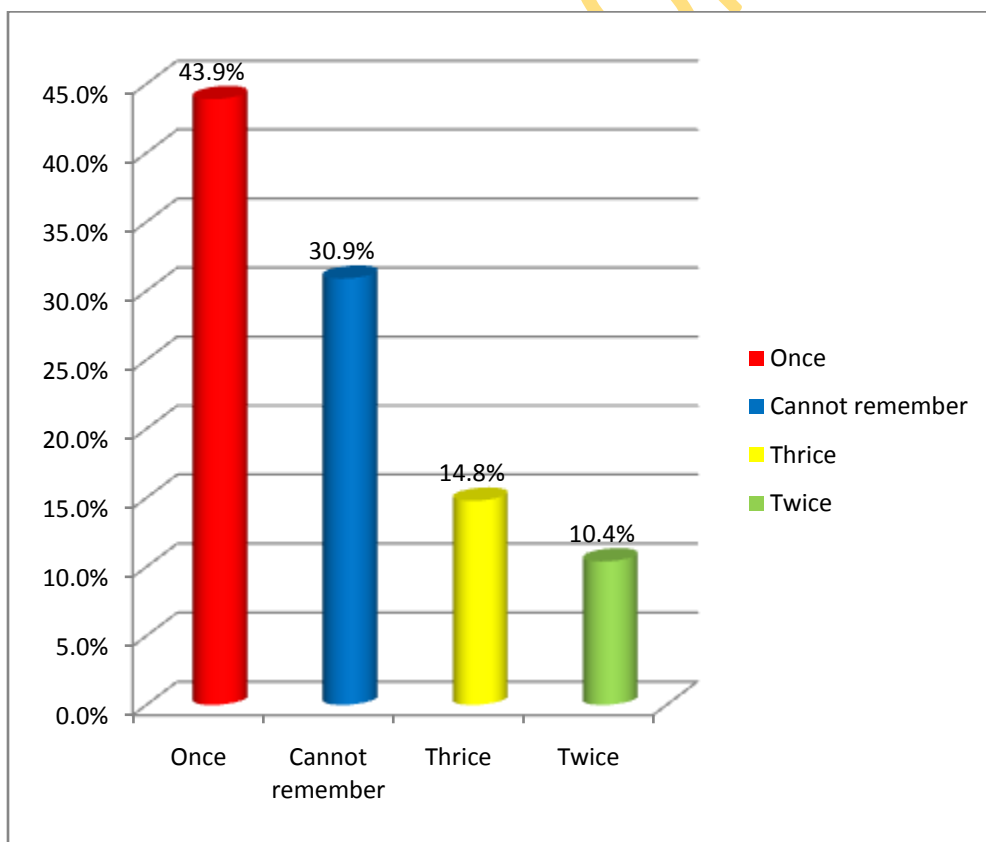


Travelling	48	(17.4)
Forgetfulness	164	(59.3)
Events	15	(5.4)
Drugs not available	16	(5.7)

#### **4.7 Frequency of failing to take recommended drugs**

The frequencies of failure to take recommended drugs due to forgetfulness among the respondents are presented in figure 4.3. A total of (43.9%) failed to take their drugs once. Many (30.9%) of them could not remember the number of times they forgot to take their drugs. (See the fig 4.3 for other details).

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**Figure 4.3 Frequency of failing to take recommended drugs.**

#### **4.8 Respondents' factors influencing management of Diabetes Mellitus**

Table 4. 14 - 4.21 contain the responses of respondents who expressed their inability to take the prescribed drugs as well as sources of funds to purchase drugs, experienced food related problems, nature of social support received and the history of use of alcohol and smoking. The frequency of inability of the respondents to take drugs due to lack of funds are presented in table 4.14. Respondents who failed to take drugs due to lack of funds constituted 23.7%. (Table 4.14) Respondents' sources of funds for buying drugs are presented in table 4.15. Majority (57.3%) of them got funds from their children, 36.0% on their own financial resources while 25.0% depended on their husbands or spouses. (Table 4.15).

The food related problems ever experienced by some respondents are presented in table 4.16 below. The problems were abdominal discomfort (48.8%), stooling (30.8%) and weakness of the body (20.4%). Table 4.17 highlights the nature of social support received by respondents. Monetary support (45.0%) topped the list and this was followed by mention of supply of drugs (37.7%). The other forms of support are contained in the table under reference.

Table 4.18 shows respondents' history of ever use and current use of alcohol. Many (43.2%) of them had ever taken alcohol. A total of 50 respondents were currently users of alcohol and majority (74.0%) of the current alcohol users did so occasionally (Table 4.18). Respondents' history of cigarette or tobacco use is presented in table 4.19. Only 11.0% had ever smoked. A total 34.0% of the respondents' were current smokers. All the current smokers did so occasionally. (Table 4.19)

Respondents' frequency of taking too much food which ought to be taken in small amount is highlighted in table 4.20. Many (42.9%) of the respondents took too much food they ought to be taking in small amount once within the month preceding the study. The frequency of failing to go to the clinic for checkup within the three months preceding the study is highlighted in table 4.21. Some (31.4%) of the respondents failed to go to clinic for checkup twice; 20.6%, failed to go once. (Table 4.21)

**Table 4.14: Frequency of inability to take drugs due to affordability problems/ lack of money**

n =164

Frequency	No	%
Once	47	28.7
Occasionally	39	23.7
Thrice	37	22.6
Twice	35	21.4
Several times	6	3.6

**Table 4 15: Respondents' sources of funds for buying drugs**  
N=600

Sources of funds*	No.	%
Children	344	57.3
Self	216	36.0
Husband	150	25.0
Sibling	101	16.8
Family	44	7.3
Wife	19	3.1

\* There were multiple responses

**Table 4 .16: Food related problems ever experienced by respondents  
n=49**

<b>Food related problems</b>	<b>No</b>	<b>%</b>
Abdominal discomfort	24	48.8
Stooling	15	30.8
Weakness of the body	10	20.4

**Table 4.17: Nature of social support received by respondents**

**N =536**

<b>Nature of support</b>	<b>No</b>	<b>%</b>
Monetary	270	45.0
Supply of drugs	226	37.7
Various forms of support	32	5.3
Home care	8	1.3

**Table 4. 18: Respondents' history of ever use and current use of alcohol**

**N=600**

<b>History of alcoholic use (N= 600)</b>	<b>No</b>	<b>%</b>
Ever used	259	43.2
Never used	341	56.8
<b>Frequency of current use of alcohol N=50</b>		
Sometimes/occasionally	37	74.0
Regularly	13	26.0



**Table 4.19: Respondents' history of cigarette or tobacco smoking**

**N=600**

<b>History of smoking cigarette or tobacco</b>	No	%
Ever smoked	66	11.0
Never smoked	534	89.0
<b>Current pattern of smoking (N=34)</b>		
Sometimes/occasionally	34	51.5

**Table 4.20: Respondents' frequency of taking too much food which ought to be taken in small amount within the last one month**

**n=200**

<b>Frequency</b>	<b>No</b>	<b>%</b>
Once	113	56.5
Occasionally	31	15.5
Twice	24	12.0
Thrice	21	10.5
Cannot remember	11	5.5

**Table 4.21: Frequency of failing to go to clinic for check up within the 3 months preceding the study**

**n =316**

<b>Frequency</b>	<b>No</b>	<b>%</b>
Twice	99	31.4
Once	65	20.6
Can't remember	62	19.7
Thrice	57	18.0
Occasionally	21	6.6
Four times	12	3.7

#### **4.9 Physical exercises participated in by respondents**

The types of physical exercise participated in by respondents are presented in table 4.22. Strolling topped (66.8%), the list of all PE participated in by respondents. Some (10.5%) indulged in football. (See table 4.22 for details). Frequency of participating in P.E within one week preceding the study is shown in table 4.23. Respondents who indulged in PE daily were (50.5%); those who did so occasionally were 15.5%. (See table 4.23 for details).

The frequencies of forgetting to take recommended drugs lately are presented in the table 4.24. Respondents who forgot to take recommended drugs once were (43.9%); several respondents (30.9%) could not remember the number of times they forgot to take the drugs recommended for them. Overall 68.9% had forgotten to take their medications within the month preceding the study.

**Table 4. 22: Types of physical exercise participated in by respondents.**

n=364

<b>Types of P.E</b>	<b>No</b>	<b>%</b>
Strolling	243	66.8
Footballing	38	10.5
Jogging	28	7.6
Touch your toes	21	5.7
Press up	19	5.3
Domestic work	15	4.1

**Table 4.23: Frequency of participating in P.E within the week preceding the study**

n=331

<b>Frequency</b>	<b>No</b>	<b>%</b>
Daily	167	50.5
Occasionally	51	15.5
Thrice	41	12.4
Twice	31	9.3
Regularly	25	7.5
Four times	15	4.5
Every other day	1	0.3

**Table 4.24 Frequency of forgetting to take recommended diabetic drugs within month preceding the study**

n=223

No. of times forgot to take drugs	No	%
Once	98	43.9
Can't remember	69	30.9
Thrice	33	14.7
Twice	23	10.3

#### **4.9. Respondents' perception related to management of diabetes mellitus**

The perceived challenges associated with the management of DM are presented in table 4.25. Cost of drugs (51.1%), distance to the clinic (22.0%) and the spending of too much time (18.6%) topped the list. (Table 4.25).

The overall perception score of the respondents was  $21.8 \pm 4.8$ . Most (94.0%) of the respondents had a positive perception score. The mean perception score of male and female respondents were  $36.6 \pm 5.5$  and  $36.5 \pm 5.9$  respectively ( $p > 0.05$ ). Majority (69.2%) of respondents were of the perception that diabetes is a lifelong disease which can be controlled but cannot be cured. The perception of 68.7% of the respondents was that it is usually the best type of food that health care providers said people with diabetes should not eat. The perception of 75.8% was that too much time is wasted in the clinic/hospital for check-up every now and then. The perception of 50.0% of the respondents was that the recommended drugs are too expensive to purchase in the hospital. (Table 4.26).



Perceptions of respondents were determined using a 16-point perception scale. A positive perception attracted a score of 2 points while the score for a negative perception was zero. Scores of  $< 19$  and  $\geq 19$  points were considered negative and positive perceptions respectively.

**Table 4.25: Perceived challenges/problems relating to the management of DM**

N= 600

<b>Challenges /problems relating to DM management</b>	<b>No</b>	<b>%</b>
Cost of drugs	307	51.2
Distance to the clinic	132	22.0
Much time spent in the clinic	112	18.6
Daily swallowing of drugs	65	10.8
No money	59	9.8
Change/ modification of diet	48	8.0

Lack of transport fare to the clinic	12	2.0
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\*Multiple responses included

**Table 4. 26: Respondents perception relating to management of diabetes mellitus  
N=600**

<b>Perceptions</b>	<b>Agree (%)</b>	<b>Not sure (%)</b>	<b>Disagree (%)</b>
Regular exercise cannot help to control diabetes mellitus	25 (4.2)	35 (5.7)	540 (90.0)
Recommended food/diet for people with diabetes is too expensive to prepare everyday	96 (16.0)	11 (1.8)	493 (82.2)
People with diabetes should eat all kinds of food to get well	24 (4.0)	17 (2.8)	559 (93.2)
Using only medicine prescribed at the hospital without sticking to recommended food is enough to control diabetes	22 (3.7)	28 (4.7)	550 (91.7)
Diabetes can be cured completely with western medicine.	41 (6.8)	24 (4.0)	535 (99.2)
Diabetes can be cured completely with traditional medicine	22 (3.7)	32 (5.3)	546 (91.0)
Checking ones urine every time is not feasible	261 (43.5)	39 (6.5)	300 (50.0)

Diabetes can be cured completely through spiritual deliverance	109 (18.2)	200 (33.3)	291 (48.5)
Diabetes is a lifelong disease and can only be controlled but cannot be cured	415 (69.2)	24 (4.0)	161 (26.8)
Strict compliance with recommended drugs alone is necessary to prevent complications of diabetes mellitus	71 (11.8)	36 (6.0)	493 (82.2)
The drugs usually prescribed in the hospital are too expensive to purchase	300 (50.0)	14 (2.3)	286 (47.7)
It is usually the best type of food that health care providers say people with diabetes should not eat	412 (68.7)	21 (3.5)	167 (27.8)
Too much time is wasted in the clinic/hospital for check up every now and then	455 (75.8)	17 (2.8)	128 (21.3)
It is expensive to prepare my food separately from that of my family members	174 (29.0)	30 (5.0)	396 (66.0)
Diabetic drugs cannot be readily available for purchase	64 (10.7)	42 (7.0)	494 (82.3)
Diabetes makes one a big burden or problem in the family	132 (22.0)	24 (4.0)	444 (74.0)

#### **4.10 Personal experiences relating to non-compliance with the management of DM**

The experiences which had implications for compliance with treatment regimen ever encountered included frequent change of medication by health care providers (30.3%); forgetting to take drugs (28.5%) and failure to participate in regular physical exercises (46.5%). (Table 4.27). Very few (6.2%) respondents experienced frequent medication change and failure to take medication due to forgetfulness (11.7%) three months preceding the study. Almost half of the respondents (49.5%) failed to indulge in regular physical exercise three months preceding the study.

**Table 4.27: Respondents' experiences relating to non- compliance with DM management**

**N=600**

<b>Illness- related experiences</b>	<b>Ever encountered</b>		<b>Encountered within 3 months preceding study.</b>	
	<b>Yes (%)</b>	<b>No (%)</b>	<b>Yes (%)</b>	<b>No (%)</b>
Not going for follow up because of the negative attitude of the health staff	53(9.0)	547(91.2)	13(2.2)	587(97.8)
Doctors are too busy to fully listen to complaints	21(3.6)	579(96.5)	14(2.4)	586(97.6)
Medication changed so many times	181(30.3)	419(69.8)	37(6.2)	563(93.8)

Lack of availability of prescribed drugs	34(5.7)	566(94.3)	22(3.7)	578(96.3)
Recommended drugs have side effect	10(1.7)	590(98.3)	3(0.5)	597(99.5)
Forgetting to use drugs as prescribed by the doctor	171(28.5)	429(71.5)	70(11.7)	530(88.3)
Using alternative native medicine apart from the ones prescribed at the hospital	59(9.0)	546(91.0)	13(2.2)	587(97.8)
Inability to stick to food that are recommended by the health care provider	53(8.8)	547(91.2)	32(5.3)	568(94.7)
Failure to participate in regular physical exercise	297(49.5%)	303(50.5)	279(46.5%)	321(53.5%)
Taking too much of food asked to be taken in little quantity.	100(16.7)	500(83.3)	42(7.0)	558(93.0)

#### **4.11. Perceived illness-related experiences/ symptoms which respondents' still experienced since started treatment**

The illness-related symptoms still experienced by respondents since started treatment are presented in table 4.28. The symptoms included severe thirst (81.1%), profuse sweating (79.6%) excessive hunger (78.0%) and cramp (76.9%).

The perceived symptoms experienced by respondents in the three months and one month preceding the study as well as during the month the investigation took place are presented in the table 4. 29. The prevalence rates of severe thirst three months and one month preceding the study were 77.8% and 76.8% respectively. The symptom of severe thirst during the month of the survey was 25.5%. Concerning profuse sweating, 76.3% experienced it during the three months preceding the study while 74.5% had the experience

a month preceding the study. During the month of the study 73.5% experienced profuse sweating. (See table 4.29 for details).

**Table 4. 28: Perceived illness-related experiences/ symptoms which respondents' still experienced after diagnosis** **N=600**

<b>Physical experiences</b>	<b>Yes (%)</b>	<b>No (%)</b>
Cramps	461(76.8)	139(23.1)
Headache	231(38.5)	369(61.5)
Less sleep	217(36.2)	383(63.8)
Profuse sweating	478(79.6)	122(20.3)
Severe thirst	487(81.1)	113(18.9)

Sudden and irregular heart beat	285(47.5)	315(52.5)
Excessive hunger	468(78.0)	132(22.0)

**Table 4. 29: Perceived diabetes related sign/symptoms experienced by respondents' within the three months and one month preceding the study and within the month the study took place**

**N= 600**

Physical experiences	Experienced last three months *		Experienced a month ago *		Experienced this month **	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Cramps	438(73.0)	162(27.0)	408(68.0)	192(32.0)	386(64.3)	214(35.7)
Headache	220(36.7)	380(63.3)	181(30.7)	419(69.8)	150(25.0)	450(75.0)

Less sleep	199(33.2)	401(66.8)	183(30.5)	417(69.5)	138(23.0)	462(77.2)
Profuse sweat	458(76.3)	142(23.7)	447(74.5)	153(25.5)	441(73.5)	159(26.5)
Severe thirst	467(77.8)	133(22.2)	461(76.8)	139(23.2)	447(74.5)	153(25.5)
Sudden and irregular heart beat	315(52.5)	285(47.5)	297(49.5)	303(50.5)	298(49.7)	302(50.3)
Excessive hunger	448(74.6)	151(25.2)	395(65.8)	201(33.5)	399(66.5)	205(34.2)

\*Symptoms/ signs experienced prior to the study

\*\* Experienced signs/ symptoms during the month of the survey.

#### 4.12. Testing of Hypothesis

##### Hypothesis 1

“There is no association between respondents’ level of education and knowledge of diabetes mellitus”

**Table 4.30:** Association between respondents’ level of education and knowledge of diabetes mellitus.



Educational status	Knowledge level			
	Poor	Fair	Good	Total
No Formal Education	7(3.0%)	73 (36.8%)	120 (60.0%)	200(100.0%)
Primary Education	3(1.4%)	60 (27.6%)	154(71.0%)	217(100.0%)
Secondary Education	2(1.6%)	37 (29.8%)	85 (68.5%)	124(100.0%)
Tertiary Education	3(5.1%)	25(42.2%)	31(52.5%)	59 (100.0%)
<b>Total</b>	15 2.5%)	195 (32.5%)	390 (65.0%)	600 (100.0%)

Chi Square ( $X^2$ ) = 12.053

Degree of freedom = 6

P value = 0.61

This suggests that the hypothesis is true and is therefore accepted.

### Hypothesis 2

“There is no association between respondents’ knowledge of diabetes mellitus and perceptions towards management”.

**Table 4.31:** Association between respondents’ knowledge of diabetes and perceptions towards management

	Perception of respondents

<b>Knowledge of diabetes</b>	<b>Negative</b>	<b>Positive</b>	<b>Total</b>
Poor	6(40.0%)	9 (60.0%)	15 (100.0%)
Fair	27 (14.4%)	160 (85.6%)	184 (100.0%)
Good	56(14.4%)	333 (85.5%)	389 (100.0%)
<b>Total</b>	89(15.1%)	502(84.9%)	591 (100.0%)

Chi Square ( $X^2$ )= 7.485

Degree of freedom = 2

P value = 0.24

This suggests that the hypothesis is not true and is therefore rejected. The alternate hypothesis is hereby accepted that level of knowledge is associated with perception towards management, the higher the level of knowledge the better the perception.

### **Hypothesis 3**

“There is no association between respondents’ level of education and perception of diabetes mellitus”

**Table 4.32:** Association between respondents’ level of education and perception of diabetes mellitus

<b>Educational status</b>	<b>Perception of respondents</b>		
	<b>Negative</b>	<b>Positive</b>	<b>Total</b>
No Formal Education	25(13.1%)	172 (86.9%)	198(100.0%)
Primary Education	33(15.5%)	180 (84.5%)	213(100.0%)
Secondary Education	11(9.0%)	111(91.0%)	122 (100.0%)
Tertiary Education	19(32.8%)	39(67.2%)	58(100.0%)
<b>Total</b>	89(15.1%)	502(84.9%)	591(100.0)

Chi Square ( $X^2$ ) = 18.294

Degree of freedom = 3

P value = 0.000

This suggests that the hypothesis is not true and is therefore rejected. The alternate hypothesis is hereby accepted that level of education is associated with perception towards management, the higher the level of education the better the perception.

## **CHAPTER FIVE**

### **DISCUSSION, CONCLUSION AND RECOMMENDATIONS**

This study explored the knowledge, perception, illness-related experiences and treatment compliance among diabetes mellitus patients. It starts with the discussion of the socio-demographic characteristics of the respondents, followed by awareness and knowledge about diabetes mellitus, attitude towards compliance with management of diabetes mellitus,

factors influencing management of diabetes mellitus, perceptions relating to management of diabetes mellitus and experiences relating to non-compliance with the management of diabetes mellitus. The implications of the results for policy and health promotion practices are also discussed in this chapter. The chapter ends with a conclusion and recommendations.

### **5.1 Socio-demographic characteristics**

The mean age of  $63.9 \pm 8.6$  years and the fact that most of the respondents were between the ages of 60 to 74 years show that most of the respondents were in their late adulthood and diabetes is more common among people in the late adulthood (Nguma, 2010). The age characteristics of the respondents is similar to what Nguma, (2010) and Kazeem, Olubunmi, and Bonatson, (2008) noted in their studies.

Majority of the respondents were females this could be because diabetes in women has been linked to an increased risk of a range of diseases including cardiovascular disease, certain cancers, depression and osteoporosis (Mar, 2001). Diabetes Mellitus as a co-morbid condition with any one or combination of these health conditions constitute a great burden. The connection between diabetes and other conditions needs to be examined in more depth to gain a greater understanding of how diabetes impacts on women's health. Majority of respondents were married, and few of them were widowed. This situation could affect diabetes management and trigger of a number of psychological complications. Losing one's spouse causes health changes, such as depression, dismay and loss of the will to live (Guillett, 2004).

Most of the DM patients were adults of predominantly Yoruba origin. This was so because the study was conducted in Ibadan metropolitan city which consist mainly of Yoruba speaking residents. Few of them claimed to have had no formal education. According to Espelt, Borrell and Roskam (2008) diabetes disproportionately affects groups with lower education. The educational status of respondents had some influence on the knowledge of compliance with treatment. Respondents with secondary and tertiary education exhibited better compliance to treatment than those with no formal and primary education. Therefore the content and quality of diabetic education provided in the clinics should be

comprehensive, simple and be appropriate to the level of comprehension of patients of varying level of education.

## **5.2. Awareness and knowledge of DM**

Knowledge is the greatest weapon to fight this disease with (Wild,Roglic ,Green , Sicree, King 2004). Health information given to the public will help them assess their risk of developing the disease; motivate them to seek early and proper treatment. Health education improves the health literacy of persons which plays a significant role in self-care.

The results of this study showed that many of the respondents had a good knowledge of diabetes. This finding is in line with the study by Ngwu (2005) among diabetes patients attending the University of Nigeria Teaching Hospital Enugu where it was noted that majority of the respondents had good knowledge of the disease. The sources of information about diabetes were mostly from the medical doctors according mahajerin, Fras, Vanhecke and Ledesma, 2008 this in their study. Majority of respondents in this study stated correctly some health related factors which can predispose people to diabetes mellitus; these include heredity, obesity, eating of too much sugar-containing food, lack of physical exercise and too much alcohol consumption. The kinds of food a diabetic patient should eat were another knowledge-related issue assessed. The study showed that many patients had good knowledge of appropriate dietary habits for diabetics.

The knowledge of signs and symptoms of diabetes mellitus among the respondents was high; their knowledge of diagnosis test for establishing a case of diabetes was also determined. The test were blood sugar/fasting blood sugar test and urine test. The importance of regular or routine check-up should be stressed. Majority of the respondents were knowledgeable about the ways of preventing diabetic-related complications. These preventive measures included complying with drug treatment, dietary regimen and adapting to simple health and self-care practices needed for preventing health problems like hypertension, leg ulcers, coma (unconsciousness) and visual disturbances or blindness. A previous study conducted elsewhere at University of Nigeria Teaching Hospital Enugu by Badruddia, Halabi, Kuller, Samad (2002) similarly showed that diabetic patients had good knowledge of preventive measures.

According to Simpson (2003) health providers should aim at educating patients on a whole range of issues relating to diabetes mellitus within six to eight months of diagnosis. Public awareness and knowledge about diabetes in sub-Saharan is limited. Consequently, there are many persons who may have the disease without being aware of it. Like any other disease, managing diabetes becomes more difficult when diagnosis is delayed. When this is coupled with limited patient education at the health care facilities particularly on proper drug use, many patients end up facing great problems in complying with their medical regimens and consequently consider the use of alternative care services (Nguma, 2010).

In most diabetic clinics patients are usually provided with patient education in addition to the treatment given. This may have contributed to the good knowledge of the disease among participants in the study as well as those studied by Ngwu.

The nature of patient education provided in the study sites are similar. At the UCH, the DM clinics are run twice in a week i.e Mondays and Fridays within the hours of 8am till 3pm. Each patient comes in with their appointment cards to secure the case note. This is followed by checking of the fasting blood sugar in the mini-laboratory. Health education is given by the senior nursing staff. The education comprises importance of regular hospital check-up, checking of blood sugar level, taking of recommended drugs, regular physical exercise and dietary compliance. Patient's attention is also drawn to importance of avoidance of use of traditional herbs and orthodox medicine. Similarly, a dietician always attends the clinic to teach them on the intake of right proportion of recommended diet. Vital signs are checked as part of the medical consultation. Patients are then referred to the pharmacy to buy the drugs that may be prescribed before they leave for home.

In Oluyoro Catholic Hospital the diabetic clinic runs almost every day except on Fridays. The patients first do their routine investigations like checking of vital signs and fasting blood sugar. A nurse on duty gives them appropriate health education related to their condition. Patients are then referred for medical consultation and finally to the pharmacy. At the end of each month a dietician joins them in the medical team meeting. At the Ring-road state hospital the diabetic clinic is run every Wednesday. Routine investigations,

giving of health talks, individual consultation and the purchase of drugs in the pharmacy like the previous health institutions are done.

Concrete knowledge is tried out in real life and experience teaches, by trial and error, what fits and what does not. Learning how the body reacts to different situations through body-listening becomes the art of the diabetic. Through combining the basic knowledge with real experience, understanding is gained.

### **5.3. Attitude to compliance with diabetes mellitus management**

Overtime patients become highly knowledgeable about the nature of their disease including its management. This may have accounted for their high level of knowledge. It should be noted however that gaps in knowledge still existed among the respondents. In the study, majority of the respondents' demonstrated good positive attitude towards diabetic management/control. A large proportion of the them had positive attitude to the use of physical exercise for instance. Lack of exercise contributes to poor glycaemic control. (Stey, Senekal, Brits, Nel 2000).

Positive attitude to prompt blood glucose monitoring was also noted. Only few of the respondents were interested in seeking for the alternative medicine for the management of diabetes. Some of them thought it was a waste of time going through routine investigations and health talks per clinic visit. While promoting sustenance of the positive attitude, effort should be made to tackle the negative ones.

It has been observed that patients who are satisfied with their relationship with their health care providers have better attitude to compliance to diabetes regimens (Von Korff et al., 1997). A majority of respondents in this study were satisfied with the kind of support and services they receive from health personnel in their clinics. This might have also contributed to the positive attitude to medication and dietary treatment exhibited by many of the respondents.

### **5.4 Perception about compliance with management of diabetes mellitus**

People's perceptions of illness are complex and are influenced by traditional and cultural beliefs and attitudes. 'Simpson (2003)'; argues that it is not just the classification of illness that determines the course of action but also the people's perceptions of its cause.

'Muela et al. (2000)'; have shown that in African societies, disease aetiology is the main element according to which illness are broadly classified. People distinguish between 'normal illness or 'illness of God' as opposed to illness caused by witchcraft and spirits, which is referred to as 'out of order illness' or 'abnormal illness'. 'Normal illnesses or 'illnesses of God' are a natural creation by God and are part of normal human life and suffering.

Patient's understanding and perception of their illnesses is an important factor in ascertaining the level of self-care practiced and compliance to treatment. Educational background and previous knowledge also bridge the gaps of communication between the patient and the clinician. Despite the tremendous success at improving the lives of those living with diabetes with technological breakthrough in biomedical sciences, the management of diabetes lies largely with those with diabetes. It includes practices that must be carried out by the patients themselves. Such practices include eating a healthy diet, performing physical exercise, taking medication as prescribed, monitoring of blood glucose level, regular clinic visits, and managing stress, among other practices (American Diabetes Association, 2002).

However, performing these practices has remained problematic for those living with the condition as it requires behavioral change. and Chinyere, Nandy, and Nwankwo (2010) claimed that most Nigerians with diabetes have suboptimal glycemc control, are hypertensive, have chronic complications of diabetes mellitus, and do not practice self-monitoring of blood glucose. Patients saw diet and inactivity as key risk factors for T2DM and heart disease. Their perception of their own risk tended to be simplistic, focused on family history, diet and exercise, and/or blood test results. The success of these quality improvement efforts depends, in part, on whether or not patients are willing to take the multiple medications that comprise comprehensive diabetes care. Patients' willingness to adopt this care is likely to be determined, in part, by their perceptions of the relative quality-of-life effects of complications and treatments (Chinenye et al. 2012). These



perceptions are also critical for economic evaluations of quality improvement efforts and treatment innovations. We also queried patients about their perceptions of quality of life with comprehensive diabetes care, which we described as the combination of cholesterol-lowering medication, aspirin, intensive blood pressure control, intensive glucose control, diet, and exercise. This combination represented care that was both comprehensive in breadth but also intensive in terms of risk factor goals. We also asked patients about a state we called the comprehensive care with polypill state. This state was identical to the comprehensive diabetes care state except that the number of pills taken per day was reduced by the use of the polypill. Educating patients very early in their disease about the true nature of optimal diabetes care, by incorporating their preferences into treatment decisions, and by acknowledging patient preferences and quality-of-life concerns in public health efforts to improve the quality of diabetes care. Openness between the doctor and the patient during consultations will ultimately lead to clearer understanding, both in terms of the patient's understanding of the disease and treatment options, and in terms of the doctor's understanding of the patient's perceptions. Perception of care was lowest in the domains of privacy and respect for patients' opinion.

There is need to train Primary Health Care providers on improvement of quality of care while emphasizing the need to offer every patient privacy during consultation and treatment regardless of their economic or educational status. The right attitude and should be used while attending to patients. The government at every level should endeavor to put in place adequate facilities for patients' privacy while constructing health care centers. The waiting time to see a doctor has an inverse relationship with the level of satisfaction in the patients interviewed. Those that waited for more than or equal to 15 minutes to see a doctor counted to be a waste of time. Their experiences with the health system will determine their attitude toward health institutions; determine their return visit, compliance with treatment and achievement of better treatment success (Olumide, 2007). Therefore monitoring of patients' experiences of health care can provide organizations with a yard stick against which to measure the quality of their services (Coulter and Ellins, 2006).

## **5.5 Illness-related experiences in the management of diabetes mellitus**

Managing diabetes has been identified as the greatest challenge of living with the disease (Callaghan and Williams, 2004), and the issue of compliance and illnesses experienced has been stated to be a serious task (Price, 2006; Wellard, 2008). It is integrated in study on the lived experiences the patients' encountered day in day out as a result of diabetes illness. The insider perspective in chronic illness research represents patients as analysts of their illness experience, active agents in attaining a desired outcome, and experts in self-care (Thorne and Paterson, 2008). Managing this disease is developed into an 'illness career' where the individual learns to respond to changes in health. The terms 'self-care' (Sigurðardóttir, 2005), 'self-management' (Koch et al., 2004; Kralik et al., 2004) and 'decision making' (Paterson et al., 2001; Thorne et al., 2003) are appearing increasingly in the nursing literature, reflecting a shift in research perspectives towards valuing and recognising the patient's responsibility and autonomous participation in his/her own care. Thorne and Paterson (2008), however, warn against idealizing the chronically-ill person as strong, powerful and competent, thereby ignoring the continuing need many people have for professional expertise, support and help.

Many diabetics complain leg cramps that jerk them wide-awake at night. They are rather confused and don't know how to improve this condition. They feel this pain as a soreness, tiredness and weakness in their muscles. The pain gives discomfort to make their daily activities difficult. Hypoglycemia is the most common complication of insulin treatment, occurring more often as patients try to achieve strict glucose control and approach near-normoglycemia. Symptoms of mild or moderate hypoglycemia include headache, diaphoresis, palpitations, light-headedness, blurred vision, agitation, and confusion. Paterson (2001) presented the Shifting Perspectives Model of Chronic Illness, based on metasynthesis of qualitative research reports about living with chronic illness. It suggests that living with the disease is viewed according to how much illness or wellness is in the foreground of people's experience. 'Perspective' refers to what the person values, believes, expects and feels about the experience, this determines responses to the illness, care-givers, and illness-affected situations.

Achieving 'health within illness' is a newly recognised phenomenon under study (Whittemore and Roy, 2002) which involves, again, integration of physiological and psychosocial aspects of daily life. This transformational experience achieved by some of the diabetics has been described by Paterson et al. (2009). Whittemore and Roy (2002) have developed a theory on the process of adaptation to diabetes, synthesised on the concepts of 'integration', 'self-management' and 'health-within-illness,' along with their nursing theory of chronic illness. The physical and psychological symptoms of hypo- and/or hyperglycaemia could materially affect adherence, because high blood-sugar can cause considerable discomfort: 'part of wanting to comply to the rules is because of the physical discomfort which follows high sugar, like some who said "i become thirsty and itchy, and I smell' (John, who has remained complied for decades, With time, further knowledge is acquired about the body. With time, further knowledge is acquired about the body.

The symptoms of high and low blood-sugar can be very similar and can be misinterpreted, as John has experienced: 'my symptoms are twofold; I get symptoms when my levels are falling and very similar ones, with a subtle difference when I am 11-12. I used to wake up during the night, thinking my sugar was dropping and just grab something to eat, but then I learned to check first, because sometimes it was high". There is just this very small difference. It's similar if I am stressed out, it feels like my sugar's dropping, but when I check, it isn't so. Keeping the disease under control becomes a challenging task, and applies to preventing both hyper- and hypoglycaemia and other related illness experiences. Those who had considerable experience of non- compliance felt that some elements of the treatment regimen threatened their need for independence. The compliant persons had less difficulties fitting the regimen into their life, while the others put tremendous effort into finding a way to build it into daily life, give it priority and believe in its importance. The findings about personal understanding of illness revealed that most people with diabetes experience and understand illness in a natural way, which differs somewhat from a professional's scientific attitude. The patients' understanding of illness in the current situation included experiences of the past and expectations of the future. The individual meaning of diagnosis was separated from the integration of the illness, which is influenced

by the social contextual meanings of illness such as views of responsibility for care and space for the illness in daily life.

### **5.6 Factors which influence respondents' to diabetes management.**

The cost of medication was a major factor influencing respondents' compliance with treatment regimen. This was a major challenge earlier noted by Balkrishnan, (1998) and Ellis Erickson and Stevenson, (2004). Similarly, lack of finance for transportation to clinic and lack of social support were among the constraints faced by some patients which have implications for non-compliance with drug therapy among the target population. Kazeem, Olubunmi, and Bonatson, (2008) made similar observations among their study participants in a tertiary care setting (UCH) in Nigeria. Family relationships play an important role in diabetes management

Diet is the cornerstone of treatment of diabetes mellitus; most patients in this study found this area of self-management difficult. Some respondents violated recommended dietary advice. This practice has grave implications for the health of diabetics. Compliance with drug therapy while failing to comply with recommended dietary guidelines is counterproductive. The practice worsens the health of diabetics as it adversely affects treatment outcome. Similarly, many patients often failed to see their dieticians. This is common in resource poor setting area such as Nigeria. (Abioye-Kuteyi, Ojofeitimi, Ijadunola and Fasanu 2005). It should be acknowledged that it is not easy for people to make dietary changes late in their lives as a result of DM. In order to do this successfully patient education, counseling and sustained social support are needed. Failure to comply with recommended dietary requirement could also be tied to lack of financial resources. There could be lack of money to buy the appropriate food substances.

Some of the respondents forgot to use drugs due to one reason or the other. The previous studies have similarly revealed that forgetfulness is implicated in diabetic patient's failure to take their drugs. (Rubin and Peyrott, 2005; Delameter, 2007; Lo, 1999; Harris, 2001). Perceived diabetic-related symptoms experienced preceding the study included: cramps, excessive hunger, profuse sweating and severe thirst. Similar experiences were noted in a

study conducted by Kazeem et al., (2008). Diabetes mellitus complication can be reduced by adequate education of the diabetic patients about foot care, re-emphasizing the same at subsequent visits at the clinics or in diabetes meetings. The diabetes care team should include a comprehensive examination of the feet at least once a year for all persons with diabetes.

## **5.7 Discussion on hypotheses**

### Hypotheses 1

#### **Association between respondents' level of education and knowledge of diabetes mellitus**

Further analysis on the influence of education on knowledge of DM showed that more respondents with no formal education had a good knowledge of diabetes mellitus compared with their counterpart with primary education and above. This may be attributed to the fact that diabetes patients with no formal education tend to create more time for diabetes education especially during their clinic days/appointment. Probably the diabetes patients on tertiary were unable to give more attention to this disease because of their secular jobs or assignments.

This is totally not in agreement with a similar study in Saudi Arabi by Alaaboudi, Hassali, Shafie, AlRubeaan, Hasan (2014) which revealed a significant relationship between mean diabetes knowledge scores and educational level ( $F=4.606$ ,  $d.f.=3.00$ ,  $p=0.008$ ). The mean knowledge scores increased as the educational level increased; the mean knowledge score of respondents with university level was higher than the primary level of education. The results of another study by Al-Adsani, Moussa , Al-Jasem , Abdella , Al-Hamad (2008) also concluded that the level of diabetes knowledge among Kuwaiti adults with Type 2 Diabetes was poor, especially among those with low educational levels.

### Hypotheses 2

#### **Association between knowledge of respondents' and perceptions of management of diabetes mellitus**

The results of Chi-square analysis showed that respondents' level of knowledge is associated with perception towards management of the disease. More respondents with good knowledge of DM had positive perception toward the disease management. The higher the level of knowledge the better the perception. This is similar to the study by Mohammed, Shafae, Sulaimon, Shirkaih in the Sultanate of Oman (2000) which also revealed that knowledge regarding classic symptoms of diabetes was limited, also based upon the result of survey conducted in a metropolitan city of India Mohan et al 2000 reported that ¼ of the public was unaware of the term diabetes this shows lack of knowledge and shows negative perception on the management, 60% perceived high consumption of dietary sugar as a factor of developing diabetes (Hjelm, Bard, Nyberg, Apelquist (2007). In addition, to education a family history of diabetes also appears to influence ones level of knowledge and perception of diabetes. Individual with a positive family history of diabetes may develop a personal sense of vulnerability which in turn may increase their awareness as well revealed in the study Walter, Emery, Braithwaite Marteau (2004).

Pierce, Ridout, Harding, Keen, Bradley (2000) in their randomized controlled trial found that the family members of individuals with type 2 diabetes underestimate their own risk of developing the disease (Pierce, Ridout et al (2000). The study has demonstrated that significant numbers of Omanis lack the knowledge and perceptions required preventing and coping with the increasing prevalence of diabetes in Oman. This raises optimism that health education could be a powerful tool to develop strategies to fight debilitating and rapidly growing public health problems in Oman.

Hypotheses 3

### **Association between respondents' level of education and perception of management of diabetes mellitus**

This result shows that respondents' level of education is associated with perception towards management of the disease. The respondents with no formal education had a good perception than their counterpart in higher and tertiary level. A 2011 report indicates that 27% of the Portuguese population in the 60-75year old strata is afflicted with diabetes, with

a prevalence of 13% in the 40-59 year old strata and 2% in younger subjects Christian, Wager, Knight (2007). These has other reports emphasized that patient's education level must be considered in the care. It also shown that an important gap at the level of education be filled concerning diabetes, which is known to be successfully carried out through campaigns, namely with regard to risk factors as a recent study in China.

A recent study demonstrated by Zhang, Pang, Wang and Qiao (2012) in China stated that health literacy is positively correlated with the adoption of risk modification behaviours leading to argue that educated and less educated people at risk continues to lack health literacy. It was stated that impact of education on perception is dissimilar highlighting the complexity of the relation.

### **5.8 Implications for health promotion and policy formulation**

The health-care providers' perspective on their patients tends to focus on compliance. It is important for health-care providers to understand their own perspectives as well as those of the patients. Illness experience tends to be viewed as a negative experience by health-care professionals as well as health-care researchers, and it appears that the positive aspect of illness experience, represented by meaning-based coping, has been investigated in the domain of psychology (Folkman and Moskowitz, 2000). Folkman and Moskowitz (2000) stressed the importance of the positive aspect of coping and suggested qualitative studies to include narrative accounts of the positive experience in people under chronic stress.

Although the difficulty associated with self-management tends to be the central focus in clinical settings, inquiring about the existence of positive experiences of diabetes may prompt the patient to reflect on the positive experiences. The act of interviewing patients can itself function as a type of intervention (Wright and Leahey, 2004). Inquiring once about the positive experiences of a disease may not be sufficient.

The results of this study suggest that diabetes education must be tailored to the individual needs and perceived factors influencing compliance with treatment regimen. People coping with diabetes have the responsibility to manage their condition on a day to day basis, communicate with their healthcare provider periodically throughout the year and seek advice when necessary. The finding of this study are needed by health policy makers to

design or provide services in such a way that determines non-compliance with drug and non-drug therapy would be reduced to the barest minimum.

Health promotion education is the important tool in the day to day self management of diabetes mellitus. Encouragement of the patient coping with diabetes on the importance of treatment compliances is crucial, knowing fully well that the disease cannot be cured but can only be controlled. There are many challenges facing people with this chronic disease in developing countries and those factors tend to affect the health outcomes. Many of these factors include social economic status of an individual, non compliance drug therapy and prescription, fake drug, difficulty in modification to diet and nutrition, urbanization, access to good quality health care, inadequate and failing health care system. Fortunately there is evidence that lifestyle modifications like avoiding obesity, smoking and unhealthy diets and education can minimize the risk of diabetes and new treatment can reduce the burden of morbidity and mortality.

Making them know that what, when and how much they eat are all important factors in managing diabetes with the help of dietician. Physical activities is good for their health and improving blood sugar control, decreasing the risk of diabetes and maintain over all good health and weight management, being active boosts brain activity which can help deal with stress and improves mood.

As regards nutrition, they were encouraged to follow a consistent meal plan and schedule. Eat a balanced diet with a variety of foods including fruits, vegetables, whole grains foods, low fat dairy products, lean meat poultry and fish. Also it is important to check feet daily, keep them clean and soft, wear well fitting, breathable shoes and socks, prevent cuts as much as possible and report any changes they observe in their feet to health care provider. Checking of the blood sugar regularly and be sure to follow instructions for frequency and times of day as this can help to identify blood sugar patterns which may be corrected. Health promotion integrates the government, medical care facilities and community resources to collaborate in prevention programme. Educational activities were carried out through multi-channel, on multi-sites to improve awareness of the major risk factors and promote healthy lifestyles. Producing educational materials such as booklets, pamphlets,



posters, video tapes etc Setting November as the strengthening health promotion activities and control diabetes with the World Diabetes Day campaign. Also diabetes campaign entails the following: building awareness among children and young people, access to essential education for everyone, maintaining healthy lifestyle, stopping stigmatization and discrimination among people living with diabetes.

Diabetes education should involve people with diabetes, their families, health care staff and communities. Diabetic education is an important component of diabetes treatment and management. Patients should be encouraged to join diabetes association's or given help in creating one through which continuing diabetes education and counseling can be provided. Social support, a health education strategy is needed to promote compliance with drug and non-drug treatment. Support may come in different forms from the family, health care facilities, communities and the nations. There is the need for advocacy targeted for policy makers at the three tiers of Government in Nigeria to formulate policies relating to the provision of affordable drugs and medical services for diabetic patients.

### **5.9 Health promotion Policy**

Health promotion must see that the major challenge of ignorance is tackled . The problem of ignorance was discovered during teaching patients that once they are educated on what to do, they are motivate to comply to whatever treatment regime we are to give. But when people are completely ignorant, then there is poor compliance to prescribed treatment. Some people don't appreciate that diabetes is a disease that doesn't have a cure. So, they go around in search of cure and fall into wrong hands. For those that come to the hospitals, they take their medications and their blood glucose is back to normal and they stop the medication. This is another ignorance. But if they know and are well informed that this diabetes is a lifelong thing and doesn't have a cure and the drugs they are using is actually helping to keep glucose in a normal level, then they will comply it. Health promotion needs to intensify on the followings;

- Provide the highest quality care for people with diabetes
- Put the person with diabetes at the centre of the management team for their diabetes.

- Advocate for better training, deployment & retention of health workers in diabetes.
- Encourage them to take action to understand diabetes, comply to treatment plans, prevent diabetes-related complications & achieve a healthy lifestyle.
- Support effective patient and professional organisations. Also be a champion for diabetes & challenge discrimination.
- Encourage them to lead a healthy lifestyle. (Nugent, Feigl 2009).

### **5.10. Conclusion**

The study revealed some challenges faced by diabetic patients such as high cost of drugs, polypharmacy, distance to the health care facilities, inadequate financial assistance and limited social support. The patients' knowledge relating to diabetics is fairly high. There are however some gaps which health education could be used to address. The knowledge of the patients cannot be unrelated to the effect of the diabetic education programme in the hospital studies. Sustained education is needed in order to address the identified gaps in knowledge. Most respondents had positive attitude to practices and lifestyles needed to ensure compliance with the management of DM. This is a predisposition which needed to be promoted if compliance is to be sustained among the respondents.

The overall perception of the respondents relating to DM is appropriate, implying with their perceptions have potential for facilitating compliance with management of the disease as adoption of effective coping mechanism. Despite the high knowledge, positive attitude of appropriate perception relating to DM, there were instances of non-compliance with drug and non-drug therapeutic interventions. This development is the aforementioned behavioural antecedent factors (knowledge, attitude and perceptions) in addressing chronic conditions such as DM.

### **5.11. Recommendations**

For healthcare professionals in Nigeria: Provision and enforcement of policy and guidelines for diabetes management for all healthcare professionals and facilities will ensure that every healthcare provider follows the guidelines for diabetes management as recommended

by International Diabetes Federation. In this regard, the health ministry should step up with regulation, surveillance and monitoring of healthcare providers' practices to ensure compliance with diabetes protocols. Also healthcare professionals need to be aware of barriers to diabetes management in order to tailor diabetes care and services to accommodate individual socioeconomic and cultural needs.

Diabetes screening is also advocated during routine hospital visits in order to achieve early diagnosis before complications set in. One of the interventions needed to reduce risks of developing complications of Type 2 diabetes involves frequent patient visits for counseling on nutrition, medication compliance, self blood glucose monitoring and physical activity. Health education efforts should utilize every means available to them such as the media, community groups and religious groups to reach out to the public with health education regarding diabetes prevention, management and care. Provision of age and culturally appropriate diabetes education in the health facilities to diabetes patients will go a long way in enhancing good outcomes. It has been shown that when patients are adequately educated regarding their disease, care and management, positive outcomes are always achieved.

Healthcare professionals should develop a workable plan of referral; follow up care and interdisciplinary collaboration of care with other specialties such as dietitians, ophthalmologists, podiatrists and so on. Adequate diabetes management requires the collaboration of various professionals in the healthcare industry.

For the Nigerian government: There is need for increase in the number of healthcare facilities in all states especially in the rural communities in order to make for easy accessibility to care. Provision of free medical care for all and especially diabetic patients and or subsidy for medications and diabetes supplies will be beneficial and helpful in decreasing the already stressed financial positions of diabetes patients. Most importantly, the provision of health insurance for workers and their families or sliding fees will cushion the burden of diabetes care for families as well as improved healthcare infrastructure in the hospitals and clinics such as medications, functional laboratory and adequately trained staff. Provision of free glucose meters and free glucose testing in the hospitals will be very effective in maintaining blood glucose control. Establishment of diabetes clinics and

centers in the rural communities for easy accessibility and at affordable price where cultural and age appropriate health education will be provided is very essential.

Offering of current and standard education to healthcare workers on diabetes management will empower them to be able to tackle the menace of diabetes. It is very difficult to manage diabetes if the healthcare workers themselves do not know the essential elements of diabetes care. Finally, improvement of the socioeconomic status of the people through employment and commensurable wages for workers, provision of good road network and transportation services and steady supply of electricity will be helpful in improving the quality of life for all people and diabetic patients in particular.

Public enlightenment through the common media in Nigeria is needed to raise people's awareness and knowledge relating to the nature of diabetes mellitus, social support for diabetics and effective ways of controlling diabetes through drug and non-drug therapies.

Pharmaceutical companies should produce IEC materials for diabetes patients on the management of the disease.

Lastly, Patients must be empowered and motivated to join associations. They have to be informed about their rights. Together with the community, they would be able to remove misconceptions, mistrust, and the stigma of diabetes in Sub-Saharan Africa especially in Nigeria. The standard and quality of care being provided for people with diabetes has many limitations, which have to be overcome by a multisectoral approach.

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**APPENDIX 1**

**KNOWLEDGE, PERCEPTION, ILLNESS-RELATED EXPERIENCES AND TREATMENT COMPLIANCE AMONG DIABETES MELLITUS PATIENTS IN SELECTED HOSPITALS IN IBADAN, OYO STATE, NIGERIA**

I am OYELAMI Funmilola I. Of the Department of Health Promotion and Education, University of Ibadan. This questionnaire is designed to find out some information from you that could be used for designing programmes for promoting compliance with management of diabetes mellitus among people living with diabetes. This study knowledge will not expose you to any danger. Data collected from this study will be treated with strict confidentiality. For the avoidance of doubt your name will not be written on this questionnaire. Taking part in this study is voluntary. You are free to withdraw from the study at any time without any repercussions on you. Please feel free to answer the questions as honestly as possible. Do you have any question? Please feel free to ask questions as the interview progresses.

Thank you.

<b><u>For office use only</u></b>
Serial no .....
Hospital/Clinic

**SECTION A :    Socio Demographic Information**

**Instruction:** For most of the questions in this section, please tick (✓) the alternative response(s) you consider appropriate. In some cases, however, simply supply the needed information in the blank spaces provided.

1.    **Age in years as at last birth day:**
2.    **Sex:**            Male             Female

3. **Religion:** (1) Christianity  (2) Islam  (3) Traditional   
Others (specify) \_\_\_\_\_

4. **Marital status:** (1) Single  (2) Married  (3) Widow   
(4) Separated  (5) Divorced   
(6) Cohabiting

5. **Highest level of education:** (1) No formal Education   
(2) Primary education  (3) Secondary Education   
(4) HND/Bachelor  (5) Postgraduate  Others-----

6. **Ethnic group:** (1) Hausa  (2). Igbo  Yoruba   
Others Specify) \_\_\_\_\_

7. **Main Occupation:** (1) Civil servant   
(2) Trading   
(3) Retired   
Other occupation (specify) \_\_\_\_\_

8. **Other supplementary sources(s) of income;** -----

9. (a) How long ago have you been diagnosed of having Diabetes Mellitus? \_\_\_\_\_

(b) When specifically was your diabetic condition diagnosed? \_\_\_\_\_

© In which type of health facility was your diabetic condition diagnosed?(Please tick only one that applies to you)

(a) General hospital  (b) Specialist hospital  (c) Private hospital or   
Clinic (d) Health centre  (e) others   
specify \_\_\_\_\_

10. How long ago have you been visiting Ring road State hospital for the treatment of Diabetes Mellitus? \_\_\_\_\_

**SECTION B: Awareness and Knowledge about Diabetes Mellitus:**

**Instruction:** Please tick (√) the appropriate alternative option to the questions in this section; for some questions simply provide the needed information in the blank spaces provided.

11. **Did you ever hear about Diabetes Mellitus before being diagnosed?**

Yes  No

12. **What were your sources of information about Diabetes Mellitus then?** (You can tick (√) one or more that applies to you from below)

1. Father  2. Mother  3. Medical Doctor  4. Nurse   
5. Magazines

6. Books  7. Radio  8. Television  9. Newspaper   
10. Friend(s)

11. Relative(s)  12. Traditional healer  Others (Specify)

\_\_\_\_\_

13. **Table 1 contains some health related factors. For each indicate by ticking whether it can lead to Diabetes Mellitus or not. Please indicate whether you believe it is true or not? Tick (√) “don’t know” if you are not sure)**

**Table 1**

Health – related factors		Tick (√)		
		Possible effect of factors		
		Can lead to Diabetes Mellitus	Cannot lead to Diabetes Mellitus	Not sure/ don’t know
a	Pancreas disorders			
b	Old age			
c	Heredity;( passed from parents to children)			
d	Obesity- being overweight and fat			
e	Sedentary lifestyle / lack of physical exercise			
f	Eating too much sugar containing foods			
g	Too much alcohol consumption or alcohol abuse			
h	Malnutrition (not eating well)			

i	Supernatural forces/ evil forces			
j	Curses involved by people are not well wishers			

**14 Which of the following statements is true about the appropriate dietary habit for a Diabetic patient? (Please tick the one that is appropriate).**

- (a) A diabetic patient can take all kinds of food in any amount
- (b) A diabetic patient can take all kinds of food but in small amount
- (c) A diabetic patient should only take special foods
- (d) A diabetic patient should always skip or miss meals as a way of controlling the disease

**15 Table 2 contains symptoms a- e. For each tick (✓) yes if it is a sign/symptom of Diabetes Mellitus, "No" if it is not and "don't know" if not sure,**

**Table 2**

Various Ways		Tick (✓)		
		Yes	No	Don't know
a	Excessive thirst			
b	Frequent urination			
c	Tiredness			
d	Sign of fainting/collapsing			
e	Delay in healing of wounds.			

**16 Which of the following tests in table 3 can be used to find out whether someone has Diabetes Mellitus or not? (For each test tick (✓) "Yes" if correct; No" if wrong or "don't know" if you are not sure)**

**Table 3**

Test done for finding out whether someone has diabetes or not	Tick (✓)		
	Yes	No	Don't know

a	Urine examination with urine test stick			
b	Blood Sugar test/ fasting blood sugar test			
c	Stool examination			
d	Chest examination			

**17 For each of the practices in table 4 – state whether it can be used to control Diabetes Mellitus? Do this** By ticking (√) “Yes” if correct; “No” if not correct and “Don’t know” if you are not sure)

**Table 4.**

Ways of controlling diabetes Mellitus		Tick (√)		
		Yes	No	Don't know
a	Avoiding too much of carbohydrate food-yam, rice, eba etc			
b	Avoiding sugar consumption			
c	Not sitting down in one place for a long time.			
d	Participating in regular physical exercise			
e	Regular hospital check-up to know how far one is getting better			
f	Avoiding being overweight			

18. The table 5 below contains a list of practices. For each tick “yes “if it can be used to prevent the complications of Diabetes Mellitus,” No” if it cannot help in preventing the complications of Diabetes Mellitus, If not sure tick “don’t know”

Table 5

Health – related practices		Can prevent diabetes? Tick (√)		
		Yes	No	Don’t know
A	Regular physical exercise			
B	Adherence to recommended diet (food)			
C	checking of blood sugar level every now and then			
D	checking of urine to monitor sugar level every now and then			
E	Avoiding getting too fat			
F	Eye test			
G	Adherence to recommended drug prescription			
H	Avoiding alcohol intake			
I	Go for follow-up care as recommended by health care providers			



19. Table 6 contains list of health problems. For each tick “yes”, if it could result from diabetes mellitus and “No” if it cannot result from Diabetes. If not sure tick “don’t know”

Table 6

Health problems		Tick (√)		
		Can result from Diabetes?		
		Yes	No	Don't know
A	Hypertension may result from diabetes			
B	Coma (Unconsciousness)			
C	Leg ulcers (wounds) that will not heal in time due to the presence of glucose in the blood			
D	Blindness/not seeing clearly			
E	Kidney failure			
F	Cancer (Jejere)			
G	HIV/AIDS			

**SECTION C Attitude towards compliance with management of Diabetes Mellitus**

**20. Instruction:** The table below contains a set of attitudinal statement; for each tick (√) whether you strongly agree (SA), Agree (A), Undecided (U), and Disagree (D) or strongly disagree (SD).

**Table 7**

	<b>Attitudinal statements</b>	<b>A</b>	<b>U</b>	<b>D</b>
a	It is not necessary for people living with diabetes mellitus to do regular physical exercise as exercise will make them breakdown.			
b	It is not only special foods should be taken by people with diabetes			
c	People living with diabetes should eat all kinds of food to get well			
d	Apart from the drugs prescribed at the hospital, it is good to use traditional/alternative medicines to treat diabetes			
e	Urine test is not necessary if one takes his drugs regularly			
f	Routine blood sugar test is not necessary if one takes his or her drugs well and eat only recommended foods			
g	A diabetic patient can take any amount of alcohol beverages he/she wants			
h	It is not compulsory for one to take his /her diabetic drugs everyday			
I	Going to the hospital regularly for follow-up care is not necessary because one can always buy his/her drugs from pharmacy or chemist shops when they get finished.			

h	Regular blood sugar test is not necessary if one takes the recommended foods and drugs			
---	--	--	--	--

21. Which of the drugs in table 8 do you use for managing your diabetic condition?

Table 8

	Drugs used	Tick (√)		Dosage: how do you take the drugs
		Yes	No	
A	Daonil tablet			
B	Glucophage tablet			
C	Diabenes tablet			
D	Tolbutamide			
E	Damicron			
F	Others _____			

**Section; D Factors influencing management of Diabetes Mellitus?**

Tick (√) the appropriate answers

22 Do you consider the cost of diabetic drugs a problem?

Yes  No  if no go to question 25

23 If the cost of buying drugs is a problem, has it ever prevented you from taking

your drugs as prescribed by your doctor?

Yes  No

**24** How many times has cost of diabetic drugs prevented you from taking them as prescribed within the last one month? \_\_\_\_\_ times

**25** What are your various sources of funds for buying your diabetic drugs? (Please think carefully and list them)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**26(a)** Have you ever experienced any problems related to food since you were diagnosed to be having diabetes? Yes  No

**26(b)** If yes what were the problems?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**27(a)** Do you currently experience food related problems? Yes  No

**(b)** If yes what is the nature of the food related problems which you currently experience? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**28** Do you receive any social support for the management of your condition as a diabetic patient?

Yes  No

**29** If yes, what are your sources of support and nature of support which enable you cope well with your diabetic condition? Use table 9 for your answer.

Table 9

Sources of support	Type of support
Family members. (E.g. wife, husband,	

children, brothers, sisters etc).	
Employers.	
Friends.	
Clubs ( Names)	
Others:	

**30** Have you ever taken any alcoholic beverages since you were born? (E.g. beer, wine spirit etc) Yes  No

**31.** Do you still take alcohol beverages no matter how small? Yes  No

**32** If you still take alcoholic beverages no matter how small, how often do you do this? (Tick  $\checkmark$ ) the options as it apply to you from the following:

(a) Regularly\_\_\_\_\_

(b) Sometimes/ occasionally\_\_\_\_\_

(c) Never/ have stopped\_\_\_\_\_

**33** If you still take alcoholic beverages please specify the type of alcoholic beverage and state the amount taken at a sitting using table 10.

**Table 10**

Names of alcoholic beverages taken	Amount taken at a sitting

--	--	--

**34** Have you ever smoked cigarette or any tobacco product? Yes  No

**35** Do you still smoke? Yes  No

**36** If you still smoke, how often do you do this ((Tick  $\surd$ ) one that applies to you from the following)

(a) Regularly \_\_\_\_\_

(b) Sometimes/occasionally \_\_\_\_\_

(c) Never/ have stopped \_\_\_\_\_

**37** If you still smoke how many sticks of cigarettes do you take per week?  
\_\_\_\_\_

**38** Have you ever taken too much of the foods you are asked to be taking in little amount?

Yes  No

**39** How many times did you take too much of the foods you were asked to be taking in small amounts within the last 1 month? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**40** What usually make you take too much of the foods you are supposed to be taking in small amounts? \_\_\_\_\_  
\_\_\_\_\_

**41** Have you ever taken foods or drinks you have been asked to stop taking because of your condition? 1. Yes  2. No

**42(a)** How many times did you take foods/drinks you have been asked to stop taking within the last 1 month? \_\_\_\_\_

**42(b)** What were those foods? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**43** What usually make you eat/drink what you have been asked to be avoiding or abstaining from? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

44 Have you ever failed to go to the hospital/clinic for check-up at the appointed time?  
1, Yes  2. No  no go to question 47

45 How many times did you fail to go to the hospital for follow up care within the last 3 months? \_\_\_\_\_

46 What usually make you fail to go to the hospital for check up?  
\_\_\_\_\_  
\_\_\_\_\_

47 Have you been participating fully in physical exercise since you were diagnosed to be having diabetes? 1. Yes . No

48 If you have not been participating in physical exercises, why is it so?  
\_\_\_\_\_  
\_\_\_\_\_ (After answering this go to question 51)

49 If you have been participating in physical exercise what type of physical exercise do you participate in?  
\_\_\_\_\_  
\_\_\_\_\_

50 How many times did you participate in physical exercises within the last one week?  
\_\_\_\_\_

51 Have you ever forgotten to take the drugs recommended for you?  
1. Yes . No

52 What often make you to forget to take drugs recommended for you?  
\_\_\_\_\_  
\_\_\_\_\_

53(a) How many times did you forget to take your recommended diabetic drugs within the last one month \_\_\_\_\_

53 (b) What prevented you from taking the drugs recommended for you within the last one month? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

54 How often are you unable to take the drugs recommended for you?

1. Always  2. Occasionally  3. Rarely

55 What are your major challenges or problems relating to the management of this diabetes condition which you are having?

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**SECTION E: Perceptions relating to management of Diabetes Mellitus**

56 **Instruction:** Table 11 contains some views/opinions. For each tick (√) whether you “Agree”, or “Disagree with it”; if you are not sure/have no idea, tick (√) “Don’t know”

**Table 11**

Perceptions about compliance with management of Diabetes		Tick (√)		
		Agree	Disagree	Don't know
A	Regular physical exercise cannot help to control diabetes mellitus			
B	The recommended food/diet for people with diabetes is too expensive to prepare everyday			
C	People living with diabetes should eat all kinds of food to get well and stay healthy			
D	Using only medicines prescribed at the hospital without sticking to recommended food is enough to control diabetes			
E	Diabetes can be cured completely with western medicine			
F	Diabetes can be cured completely with traditional medicine.			
G	Checking ones urine every time is not feasible			



H	Diabetes can be cured completely through spiritual deliverance.			
I	Diabetes is a lifelong disease and can only be controlled but cannot be cured.			
J	Strict compliance with recommended drugs alone is necessary to prevent complications of diabetes mellitus			
K	The drugs usually prescribed at the hospital are too expensive to purchase			
L	It is usually the best type of food that health care providers say people with diabetes should not eat			
M	Too much time is wasted in the clinic/hospital for check up every now and then.			
N	It is expensive to prepare my food separately from that of my family members			
O	Diabetic drugs cannot be readily available for purchase			
P	Diabetes makes one a big burden or problem in the family.			

**SECTION F: Experiences relating to non-compliance with the management of diabetes mellitus**

57 Table 12 contains a set of experiences concerns, problems or challenges people with diabetes often face. For each statement tick (√) “Yes” if you have experienced such and “No” if you have not.

	Self –experiences: concerns problems or challenges	Ever experienced		Experienced within last 3 months	
		Yes	No	Yes	No
A	Not going for follow-up care because of the negative attitude of health staff				
B	Doctors are too busy to fully listen to your complaints				
C	Medications changed so many times				
D	Lack of availability of prescribed drugs				
E	Recommended drugs have side effects				

F	Forgetting to use drugs as prescribed by the doctor				
G	Using alternative native medicines apart from the ones prescribed at the hospital				
H	Inability to stick only to food that are recommended by your health care providers				
I	Failure to participate in regular physical exercise				
J	Praying for a cure				
K	Taking too much of food asked to be taken in little quantity				

**Table 12**

58. Which of the following in table 13 have you experienced since you have been diagnosed of diabetes mellitus?

**Table 13**

	<b>Experiences</b>	<b>Yes</b>	<b>No</b>
A	Cramps		
B	Headache		
C	Less sleep		
D	Profuse sweat		
E	Severe thirst		
F	Sudden and irregular heart beat		
G	Excessive hunger		

59. Which of the following in table 14 did you experience in the last three months, last one and this month?

**Table 14**

	Experiences	Experienced last three months		Experienced a month ago		Experienced this month	
		Yes	No	Yes	No	Yes	No
A	Cramps						
B	Headache						
C	Less sleep						
D	Profuse sweat						
E	Severe thirst						
F	Sudden and irregular heart beat						
G	Excessive hunger						

**APPENDIX 1I**



UI/UCH EC Registration Number: NHREC/05/01/2008a

**NOTICE OF FULL APPROVAL AFTER FULL COMMITTEE REVIEW**

*Re: Factors Associated with Patients Compliance with Management of Diabetes Mellitus in Selected Hospitals in Ibadan, Oyo State, Nigeria*

UI/UCH Ethics Committee assigned number: UI/EC/10/0201

Name of Principal Investigator: **Funmilola I. Oyelami**

Address of Principal Investigator: Department of Health Promotion & Education,  
College of Medicine,  
University of Ibadan, Ibadan

Date of receipt of valid application: 10/12/2010

Date of meeting when final determination on ethical approval was made: **17/03/2011**

This is to inform you that the research described in the submitted protocol, the consent forms, and other participant information materials have been reviewed and *given full approval by the UI/UCH Ethics Committee.*

This approval dates from 17/03/2011 to 16/03/2012. If there is delay in starting the research, please inform the UI/UCH Ethics Committee so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. *All informed consent forms used in this study must carry the UI/UCH EC assigned number and duration of UI/UCH EC approval of the study.* It is expected that you submit your annual report as well as an annual request for the project renewal to the UI/UCH EC early in order to obtain renewal of your approval to avoid disruption of your research.

*The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the UI/UCH EC. No changes are permitted in the research without prior approval by the UI/UCH EC except in circumstances outlined in the Code. The UI/UCH EC reserves the right to conduct compliance visit to your research site without previous notification.*

**Dr. J. A. Otagbayo**  
Chairman, Medical Advisory Committee,  
University College Hospital, Ibadan, Nigeria  
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