PREVALENCE, KNOWLEDGE, PERCEPTION AND PRACTICES RELATING TO DIABETES MELLITUS AMONG CIVIL SERVANTS AT THE OYO STATE SECRETARIAT, IBADAN, NIGERIA

BY

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ABSTRACT

Diabetes Mellitus (DM) is a chronic, metabolic disease which constitute a public health challenge in Nigeria with physical inactivity and high consumption of sugar from various sources being some of the associated risk practices. Many Civil Servants (CS) indulge in these modifiable risk practices. Yet, the prevalence of DM and the risky practices among CS that have potential for putting them at risk of DM have not been adequately explored. This study was therefore designed to investigate the prevalence, knowledge, perception and practices relating to DM among CS based at the Oyo State Secretariat, Agodi Ibadan, Nigeria.

This study was a descriptive cross-sectional survey involving the use of a multi-stage sampling technique to recruit 446 CS for interview. A validated semi-structured self-administered questionnaire which contained a 30-point - knowledge scale was used for data collection. Knowledge score ranging from <15, 15 -22 and > 22 were categorised as poor, fair and good respectively. A 16-point perception scale was used to determine respondents' perception of DM. Perception scores ranging from <12 and ≥ 12 were categorised as unfavorable/risky and favorable/ non-risky perception respectively. The anthropometric characteristics of the respondents which included the weight and height were measured to determine their Body mass index. The data were analyzed using descriptive statistics, t-test, ANOVA and Chi-square at $p < 0.05$.

The mean age of the respondents was 41.1±8.3 years and there were equal proportion (50.0%) males and females. Majority (76.0%) of the respondents' were married, 68.8% were Christians and 86.5% were Yoruba. A few of the respondents (7.2%) reported that they were living with DM. Respondents with poor, fair and good knowledge of DM were 39.5%, 44.8% and 15.7%, respectively. Some (46.0%) respondents had non-risky/favorable perception of DM. About one-third (32.1%) of the respondents reportedly took alcoholic drinks. Majority (73.1%) of the respondents had ever taken soft drinks. Several (42.8%) of the respondents had normal weight (18.5-24.9kg/m^2), 39.9% were over-weight (25-29.9kg/m^2), few (11%) were obese (≥30kg/m^2) and very few (6.3%) were under weight (<18.5kg/m^2). There was a significant difference between respondents mean knowledge score and their perception of DM.

The study revealed that the prevalence of diabetes among the respondents was low, also there were several gaps in the knowledge, perception and practices related to DM among respondents' therefore, advocacy and worksite educational interventions are recommended to address these concerns.

Keywords: Diabetes mellitus, Civil servants, Diabetes- related risk practices, Diabetes related perceptions

Word count: 398

DEDICATION

This research work is dedicated to Almighty God for his constant supply of grace that ensured the successful completion of this research. To Him alone be all the Glory.

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CERTIFICATION

I hereby certify that this study was carried out by Oluwatosin Temitope OLA in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria under my supervision.

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LIST OF ACRONYMS

AMI	Acute myocardial infarction
IS	Ischemic stroke
BMI	Body Mass Index
DM	Diabetes Mellitus
GDM	Gestational Diabetes
NCDs	Non-Communicable Diseases
CDCP	Centre for disease control and prevention
CVDs	Cardiovascular Diseases
CDC	Centers for Disease Control and Prevention
EPIC	European Prospective Investigation into Cancer and Nutrition
HMB	Health Belief Model
MDAs	Ministries, Departments and Agencies
ED	Erectile dysfunction
IDF	International Diabetes Federation
IGT	Impaired glucose tolerance
IFG	Impaired fasting glucose
SES	socio-economic status
SPSS	Statistical Package for Social Sciences
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization
NCE	National Certificate of Education
OND	Ordinary National Diploma
HND	Higher National Diploma
BSC	Bachelor of Science
PDG	Postgraduate Diploma
TESCOM	Teaching service commission

OPERATIONAL DEFINITION OF TERMS

Knowledge: This is the 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". It can also be described as facts, information acquired through experience or education. It relates to the theoretical or practical underatanding of a subject.

Prevalence: This is a measurement of all the individuals affected by a disease at a particular time

Perception: The way in which something is regarded, understood or interpreted or viewed.

Risk factor: A risk factor is any attribute, character or exposure that can increase the likelihood of developing a disease or injury**.**

Treatment-seeking behaviour: This entails how people engage with health systems and services in response to an illness.

Diabetes Mellitus (DM): This is a chronic disease associated with abnormal high levels of blood glucose in the blood, due to the inability of the pancrease to produce enough insulin or the body not responding to insulin produced

Favorable perception: Perception that is in line with biomedical word view

Unfavorable perception: Perception that is not in line with biomedical word view

Civil Servants: These are persons employed in the public sector or government on behalf of a government department or agency

CHAPTER ONE

INTRODUCTION

1.1   Background of the study

Diabetes mellitus (DM) is one of the Non-Communicable Diseases (NCDs), which together with cardiovascular diseases, respiratory diseases and cancers constitute the leading cause of mortality in low and middle income countries (WHO 2011). Non-Communicable Diseases including Diabetes are no longer diseases of the rich, the old, and the sedentary alone. More than 50% of NCD deaths occur in people under the age of 70 years and majority of the deaths occur in the worlds' poorest populations (WHO 2018). Moreover, it is increasingly becoming evident that NCDs, including their risk factors, are a reflection of wider social, economic and environmental determinants, rather than simply a result of poor lifestyle 'choices' (WHO 2011).Genetic and environmental factors are the two major factors contributing towards the increase in the number of people living with diabetes worldwide (Wild *et al.,* 2004).

Socio-economic development, technological advancements, changes in lifestyles and behavioral patterns, lead to major health transition which in turn rapidly raise the burden of the NCDs (Iloh *et al.,* 2012). Diabetes Mellitus (DM) is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas. It can also be caused by the ineffectiveness of the insulin produced. This results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves (WHO 2018).

Diabetes is an emerging public health problem worldwide (Shittu *et al*., 2017). About 70–80% of this burden is borne by the developing countries (Whiting *et al.,*2011). The prevalence of DM is increasing globally. The worldwide prevalence was 171 million in the year 2000 and it is estimated to rise to 366 million in 2030. In Nigeria, the prevalence of DM is between 2-7% (Nyenwe*et al.,* 2003; Oyegbade *et al.,* 2007). A systematic review carried out by Ohagwu *et al.,* (2013) in Nigeria revealed that the prevalence of overweight ranged from 20.3% - 35.1%, while the prevalence of obesity ranged from 8.1% - 22.2%.

Nigeria has the largest number of people living with diabetes in Africa, and it is one of the countries with the highest mortality rates related to the disease (Omisore *et al.,*2013). Many Nigerians adopt unhealthy lifestyle including reduced physical activity, excessive intake of calories and sedentary lifestyles, which directly contribute to the problem of obesity and Diabetes (Oyegbade *et., al* 2007).

Sedentary work is defined as a job that demands that the majority of the time be spent in sitting with occasional walking and standing (Jinu *et al.,* 2013). Obesity and sedentary life styles are escalating national and global epidemics of NCDS that warrant increased attention by physicians and other health care professionals. These intricately linked conditions are responsible for an enormous burden of chronic disease, impaired physical function and quality of life (Jinu *et al.,* 2013).

A cross-sectional study conducted among bank employees in Surat, North India showed a high prevalence of Diabetes (Vinod *et al.,* 2012). Several studies have revealed that there is a strong association with sedentarism and the development of obesity and diabetes (Manson *et al.,*2002; Jakes *et al.,*2003; Hu et al 2003). According to Jinu *et al.,(*2013), the association of duration of sitting at the workplace for more than 3 hours and development of diabetes indicates that this particular high risk group should focus on breaking the continuous sitting duration at the workplace and the adoption of adequate physical activity.

Several studies have demonstrated that breaking long sitting hours resulted in the reduction of waist circumference, Body Mass Index (BMI), plasma glucose level, and triglyceride levels, to an improvement in insulin levels, (Healy *et al.,*2008; Dunstan *et al.,*2012; Pronk *et al.,*2012). Thus, promoting leisure time physical activity and taking mobility breaks in between long sitting hours in the workplace should be recommended and encouraged among the high-risk groups. Studies have shown that there is a relationship between the knowledge of DM and certain socio-demographic variables. For example, having a university education, and belonging to a high socio-economic class were found to be associated with higher levels of knowledge of the disease.(Nyenwe *et al.,*2003; Oyegbade et al 2007). A similar association has also been made by Al Shafaee *et al.,* (2008).

Several studies have revealed the clinico-pathological relationship between obesity and NCDs (Basu *et al.,*2013; Ecke *et al.,*2011; Beltran-sanchez *et al.,*2013). This point to the need to prioritise actions targeted at the reduction of obesity in order to reduce the associated burden of NCDs among civil service workers and similar at risk populations.

Most persons with diabetes in developing countries are persons within 35 to 64 age range (WHO 2018). This age range includes a significant segment of the productive work force (WHO 2018). In addition to reduced productivity and declining economic growth, the disease leads to high economic burden in terms of healthcare expenditure (Unwin *et al.,* 2011). There is low level of awareness about the extent of DM among the public. People are also not sufficiently aware of the available interventions for preventing DM and managing the associated complications (Park ,2011). Lack of knowledge of diabetes is common in Nigeria and in most of Africa. ((Moodley *et al.,*2007; Gul,2010; Nwaokoro*et al.,*2014). A study conducted at the Federal Medical Centre, Owerri, Imo State, Nigeria also revealed that 40% of the respondents did not know the cause of diabetes, while a few attributed it to pregnancy and hypertension.

The emergence of Diabetes and other Cardiovascular Diseases (CVDs) as public health concerns is strongly related to the factors which includes the following: aging of the populations, urbanization, and socio-economic changes which favor sedentary habits, obesity, alcohol consumption, and salt intake. (WHO, 2011). Thus, there is a need to pay closer attention to combating obesity and related disorders including diabetes mellitus. Knowledge is the greatest weapon for fighting the disease (Angeles *et al.,* 2005). Health information given to the public will help them assess their risk of developing the disease and motivate those having the disease to seek for early and proper treatment. In addition, health education improves people's awareness about health related issues and this plays a significant role in self- care (Yamaska *et al.,* 2005).

Obesity and sedentary life style are modifiable risk factors associated with the Diabetes; Health education should therefore be stepped up among civil servants on the need to increase their physical activities by having organized regular exercises. In order to design intervention to achieve this adequate information relating to prevalence, knowledge, perception and practices related to Diabetes mellitus among Civil Servants is crucial.

1.2 Statement of problem

Diabetes Mellitus exerts a significant burden on sufferers, and this is expected to increase. Nigeria has the highest number of people with Diabetes with an estimated 3.9 million people (WHO 2013). Almost half of diabetes deaths occur in people under the age of 70 years and it is projected that diabetes deaths will double between 2005 and 2030 (WHO 2008). Studies conducted in Nigeria have indicated that the prevalence of Diabetes ranged from 0.8% to 11% involving both urban and rural populations (Chukwounye *et al.,* 2013; Banwat *et al.,*2012; Wahab *et al.,*2011; Dahiru *et al* 2016).

As a result of modernization and adoption of western lifestyles in Nigeria, the prevalence of DM is on the rise among various group of people including top executives, politicians, academicians, civil servants, farmers, businessmen, teachers, students, pupils, preschool children, and pregnant women" (Chineye.,2015). Promoting physical activity and adequate nutrition which favor consumption of fruits and vegetables will help prevent the occurrence of DM.

Many Civil servants indulge in sedentary life style and adopt eating of unhealthy diet. Therefore, there is an urgent need for more research among them in other to promote healthy eating and regular physical activity aimed at reducing the occurrence of DM.A low level of knowledge about diabetes is common in Nigeria and in most of Africa (Nwaokoro *et al.,* 2014). In Oyo state, there is paucity of information on the level of knowledge, perception and practices relating to DM among state civil servants with special focus to those who work at the state secretariat, Agodi, Ibadan. This development therefore calls for the need to empirically assess these factors among the Civil Servants.

1.3 Justification

Findings from this study have great potential in serving as baseline information for designing educational interventions aimed at preventing and controlling DM among civil servants.
Results will also be useful for the formulation of policies and the provision of health services geared towards the prevention and control of DM among Oyo state civil servants and other categories of civil servants in Nigeria at large.

1.4   Research questions

The research questions framed to guide the study were as follow:

1. What is the prevalence of DM among civil servants at the state secretariat Ibadan?
2. What is the level of knowledge of DM among civil servants at the state secretariat Ibadan?
3. What are the perception relating to DM among civil servants at the state secretariat Ibadan?
4. What are the practices relating to DM among civil servants at the state secretariat Ibadan?
5. What are the treatment seeking behaviors among civil servants at the state secretariat Ibadan?

1.5   Broad objective

The broad objective of this study was to investigate the prevalence, knowledge, perception and practices relating to DM among civil servants at the Oyo state secretariat Ibadan Nigeria.

Specific objectives

The specific objectives were to:

1. Determine the prevalence of DM among civil servants at the State Secretariat Ibadan;
2. Assess the level of knowledge of DM among civil servants at the State Secretariat Ibadan;
3. Determine the perception of DM among civil servants at the State Secretariat Ibadan;
4. Identify the practices relating to DM among civil servants at the State Secretariat Ibadan;
5. Determine the treatment- seeking behavior among the civil servants at the State Secretariat Ibadan

1.6 Research hypotheses

The hypotheses formulated to guide the study were as follow:

H_o1: There is no significant relationship between the age of the civil servants and their knowledge of DM

H_o2: There is no significant relationship between the gender of the civil servants and their knowledge of DM

H_o3: There is no significant relationship between the civil servants' knowledge and their perception of DM

H_o4: There is no significant relationship between gender of the civil servants and their perception of Diabetes

H_o5: There is no significant relationship between gender of the civil servants and their participation in physical activity.

1.7 Study Variables

Independent Variables: These are the socio- demographic characteristics such as age, gender, religion, ethnicity, level of education and marital status of respondents.

Dependent Variables: These are the following: prevalence of diabetes; knowledge of diabetes; perception of diabetes; practices relating to diabetes and treatment-seeking behavior relating to diabetes

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Clarification and Typologies of Diabetes.

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by elevated levels of blood glucose which leads overtime to serious damage to the heart, blood vessels, eyes, Kidneys and nerves (WHO 2011). The disease is a chronic condition caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced (IDF 2008). Diabetes results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves (WHO 2018).

The term diabetes mellitus encompasses a group of disorders which are all marked by a raised blood glucose level (IDF 2008). Diabetes is complex and involves changes in the body's metabolism not only of glucose but also of fat and protein (Iloh *et al.,* 2012).The 3 main types of diabetes are type 1, type 2 and gestational diabetes (GDM) and these accounts for over 95 % of diabetes (IDF 2008). All three forms of diabetes are increasing but the greatest rise is in type 2 diabetes which has now reached epidemic proportions (WHO 2018).

Type 1diabetes is the predominant form of diabetes which affects childhood and adults. It does occur in adulthood but less and the evidence is that the age of onset is decreasing (IDF 2008). It is marked by a deficiency of insulin, the pancreatic hormone needed to control glucose metabolism. In children this form of diabetes is increasing at the rate of 3 % per annum, with a greater rise in those under the age of 6 (Jamison et al., 2010**)**. Type 1Diabetes once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin. Insulin is a hormone needed to allow sugar (glucose) to enter cells to produce energy (Odeigah et al., 2012).The etiology of type 1 diabetes involves the interplay between genetic risk factors, mainly affecting the immune system, and environmental triggers(Mekary et al., 2012). Different factors, including genetics and some viruses, may contribute to type 1diabetes.

Treatment focuses on managing blood sugar levels with insulin, diet and lifestyle to prevent complications. Type 1Diabetes is therefore classified as an auto-immune disease and typically presents over a few weeks with weight loss, lethargy, production of large volumes of urine, dehydration, extreme hunger, increased thirst, irritability and the development of life-threatening derangement of the body's chemistry (acidosis) (Lina et al., 2014). Insulin therapy lowers the elevated glucose levels and corrects the acidosis. It can only be given by injection and is not only lifesaving but is needed life-long. Good control of the disease is essential for reducing the risk of developing blindness, kidney failure, nerve disease as well as cardiovascular diseases such as heart attacks, strokes and amputations (CDC 2016).

Type 2 Diabetes Mellitus also called hyperglycemia is the most common form of diabetes. It is a condition in which cells cannot use blood sugar (glucose) efficiently for energy (Chineye et al., 2015). This happens when the cells become insensitive to insulin and the blood sugar gradually gets too high. When the cells become insulin resistant, it requires more and more insulin to move sugar into the cells, and too much sugar stays in the blood. Over time, if the cells require more and more insulin, the pancreas cannot make enough insulin to keep up and begins to fail (Achigbu et al., 2015). In this form of diabetes the environmental risk factors are linked to changes in the foods eaten (more energy-dense), an increasingly sedentary lifestyle, increases in body weight and probably social factors such as stress, lack of job satisfaction and poverty. These together with multiple genetic risk factors lead to the body becoming resistant to the effectiveness of insulin in lowering blood glucose levels (i.e. insulin resistance) (Gress et al.,2012).

Normal aging contributes to insulin resistance and until relatively recently type 2 diabetes was regarded as a disease of the elderly (Jamison et al., 2010). However, over the past 50 years, type 2 diabetes is occurring in younger and younger age groups and is increasingly being seen in adolescents and even children (Unwin *et al.,*2011). Contributing factors may include genetics, lack of exercise, and being overweight. About 90% of people with diabetes around the world have type 2 DM. It is largely the result of excess body weight and physical inactivity (WHO 2011). The main environmental risk factors for type 2 diabetes are obesity, physical inactivity, and a high-fat diet rich in saturated fatty acids; with low intakes of dietary fiber, whole-grain cereals, and low-glycemic carbohydrates.

The symptoms of type 2 Diabetes Mellitus includes the following ; Fatigue; Frequent urination; Excess thirst; Blurry or cloudy vision; Wounds that won't heal; Tingling or numbness in the feet; Erectile dysfunction (ED)(Kassahun et al., 2015).

There is a kind of DM which is peculiar to pregnancy; it is called Gestational diabetes. It is characterized by high blood sugar that develops during pregnancy and usually disappears after giving birth. It can occur at any stage of pregnancy, but is more common in the second half, It occurs if the body cannot produce enough insulin to meet the extra needs in pregnancy (Langenberg et al., 2011). Gestational diabetes is diabetes diagnosed for the first time during pregnancy. The hormones of pregnancy could cause insulin resistance (Lawrence et al 2008). Women who have had Gestational diabetes have an increased risk (as high as 30-70 %) of subsequently developing type 2 diabetes (WHO 2008). The problems related to gestational diabetes can affect the health of the fetus and the mother. There is a higher risk of abortions, stillbirths, fetal abnormalities and the need for Caesarean Sections. The baby has a greater risk of being born either small for gestational age with a low birth weight or macrosomic, (high birth weight, typically > 4 kg).Gestational diabetes can cause problems for mother and the baby during and after birth. But the risk of these problems happening can be reduced if it is detected and well managed (Nwaokoro et al., 2014).

In 2000, there were approximately 171 million people, worldwide, with diabetes (IDF 2008). The number of people with diabetes is expected to be more than double over the next 25 years, to reach a total of 366 million by 2030, Most of this increase will occur as a result of a 150% rise in developing countries (WHO 2018).These projections of the number of people with diabetes in 2030 take into account the fact that there will be more people in the world (population growth) and that there will be more elderly people (population ageing). According to WHO 2018, people living in cities in developing countries tend to be less physically active and have higher levels of overweight and obesity than people in rural areas. In developing countries it is people in the middle, productive years of their lives who are particularly affected by diabetes. In these countries three-quarters of all people with diabetes are under 65 years old and 25% of all adults with diabetes are younger than 44. In developed countries, more than half of all people with diabetes are older than 65, and only 8% of adults with diabetes are younger than 44 (WHO 2018).

It has been noted that Socioeconomic development, technological advancements, changes in lifestyles and behavioral patterns, lead to major health transition which in turn rapidly raises the burden of the non-communicable diseases whose burden overweight communicable diseases (Iloh *et al.,* 2012).Diabetes epidemic has been attributed to urbanization and environmental transition leading to sedentary behavior and over nutrition. These environmental transformations include work pattern changes from heavy labor to sedentary, increased computerization and mechanization, and improved public transportation accompanied by easy access to fast foods and other energy-dense and nutrient-poor foods (Zimmet *et al.,*2014)).

2.2 Prevalence of Diabetes

There is an increasing prevalence of diabetes worldwide (WHO 2018). Diabetes exerts a great burden on sufferers in sub-Saharan Africa, and it is predicted that this is expected to increase. Over 5 million people suffer from the disease in Africa and the number is expected to skyrocket to 15 million by 2025 (Sanni et al., 2011). With the increasing incidence of diabetes in Africa, diabetic complications are also expected to rise proportionately and both will undoubtedly pose serious health and economic problems (Chinenye et al., 2015).

Diabetes affects many people under the age of 64 years in Africa as compared to the developed world where it affects many people over the age of 64 years (Azevedo et al., 2008). Nigeria has the highest number of people with Diabetes with an estimated 3.9 million sufferers (WHO 2013) Chris et al., (2012) reported that the overall prevalence of diabetes was 10.51% in South Eastern Nigeria. The prevalence of diabetes in South Western Nigeria ranges from 4.76% in Ile-Ife, Osun State to 11.0% in Lagos (Sanni et al., 201 : Odeigah et al., 2012). Shittu et al., 2017 revealed that the overall prevalence of Diabetes among adult in Oke-ogun region of Oyo state Nigeria was 4.6%.

A cross-sectional study conducted among the bank employees in Surat, North India showed a high prevalence of Diabetes (Vinod *et al.,* 2012). Several studies have revealed that there is a strong association with sedentarism and the development of obesity and diabetes (Manson *et al.,*2002; Jakes *et al.,*2003; Hu et al 2003). The association of duration of sitting at the workplace for more than 3 hours and development of diabetes indicate that this particular high risk group should focus on breaking the continuous sitting duration at the workplace and

ought to be encouraged to participate in more physical activity (Jinu *et al.,*2013) . In addition to reduced productivity and declining economic growth, the disease leads to high economic burden in terms of healthcare expenditure (Unwin *et al.,* 2011).

2.3 Risk factors for diabetes

There are several risk factors for DM. Risk factors are conditions that increase the risk of developing a disease (Lee *et al.,*2012).Risk factors for diabetes are either modifiable (including Physical inactivity, Obesity Smoking), or non-modifiable (including Age, Sex, Family History) Modifiable factors are factors in which measures can be taken to change them while non-modifiable are factors in which measures cannot be taken to change them (Chris et al., 2012).

The modifiable factors are numerous; the major ones which include; Dietary pattern, physical inactivity, smoking, Obesity, Socioeconomic status, High blood pressure, and Alcohol use will be reviewed. Dietary pattern techniques have revealed a variety of relationship to diabetes risk (Liese *et al.,* 2009). Studies using exploratory methods to define dietary patterns support the notion that dietary patterns that favor the consumption of fruits, vegetables, whole grains, and vegetable at the expense of red meats, refined grains, and sugared soft drinks reduce the risk of type 2 diabetes (Heidemann *et al.,*2005; Naughton *et al.,*2008; Imamura *et al.,*2009; Liese *et al.,*2009). "Westernized" diets rich in red and processed meats, sugary drinks, and refined grains are related to higher diabetes risk (Grontved et al; 2011; Mekary *et al.,* 2012). Dietary intake has been suspected as a major lifestyle risk factor for type 2 diabetes for a long time, evidence from prospective studies evaluating diet in relation to the incidence of diabetes has vastly accumulated since the 1990s (Ley *et al.,*2007).

The intake of sugar-sweetened beverages may contribute to diabetes risk by altering glucose metabolism when large amounts of rapidly absorbable carbohydrates are consumed and by promoting weight gain by incomplete compensation of liquid calories resulting in increased total caloric intake (Malik *et al.,*2012). Interaction between genetic predisposition and sugar-sweetened beverage intake was investigated in relation to BMI using a genetic predisposition score calculated based on 32 BMI-associated loci. Higher sugar-sweetened beverage intake was associated with more pronounced genetic predisposition to increased BMI and risk for obesity.

The prevalence of leisure-time physical inactivity is increasing rapidly, Sedentary behaviors, including increased screen time, physical inactivity, are a risk factor for type 2 diabetes. A meta-analysis of four prospective cohort studies, including three studies from the United States and one from Germany, have revealed that higher television viewing time was associated with increased risk for type 2 diabetes (Grontved *et al.,*2011).

Moderate to high intensity exercise is well known to have beneficial effects on type 2 diabetes prevention. It has been noted that aerobic exercise (e.g., brisk walking, jogging, running, bicycling, swimming, tennis, squash, and rowing), weight training has been associated with lower risk of developing type 2 diabetes (Grontved *et al.,*2012).

The next risk factor is Smoking. Smoking is a risk factor for type 2 diabetes and the risk of developing diabetes is 30-40% higher for active smokers than non-smokers (CDC, 2014). Tobacco use can increase blood sugar levels and lead to insulin resistance. It has been observed that People who smoke heavily (more than 20 cigarettes a day) have almost double the risk of developing diabetes compared with people who do not smoke (WHO 2008).

As documented in the American Diabetes association's technical review "smoking and Diabetes", a large body of evidence from epidemiology, case- control and cohort studies provides convincing documentation of the casual link between cigarette smoking and health risk including diabetes (Haire*et al.,*2009).

Obesity is a disorder involving excessive body fat that increases the risk of health problems (CDC, 2016).Excessive body fat is the single largest risk factor for type 2 diabetes. The diabetes risk associated with excessive body fat is measured by BMI (the ratio of body weight in kilograms to squared height in meters) and other anthropometric indicators, such as a waist circumference or skinfold thickness. Clinical risk categories for BMI (normal weight 18.5–24.9 kg/m$_2$, overweight 25–29.9 kg/m$_2$, and obesity ≥30 kg/m$_2$) are associated with a stepwise increase in diabetes risk. It should be noted however that diabetes risk increases even within the normal body weight range (Ahlqvist *et al*., 2011).

The socio-economic status (SES) of people plays a major role in the predisposition of people to diabetes. Socioeconomic status may contribute to the development of type 2 diabetes

through processes involving lack of access to health care services, healthy foods, places to exercise, and occupational opportunities, leading to unhealthy lifestyle practices (Brown *et al.,* 2004). Similarly, a study carried out by Krishnan *et al.,*2010) in the Black Women's Health Study, revealed that lower education, household income, and neighborhood SES were associated with increased risk of developing type 2 diabetes.

High blood pressure (hypertension) is a modifiable risk factor for DM. It is estimated that about 25-47% of persons with hypertension have insulin resistance or impaired glucose tolerance (Gress et al., 2012).The relationship of insulin resistance, diabetes and hypertension is complex and interrelated. Untreated patients with essential hypertension have higher fasting and postprandial insulin levels than age- and sex-matched normotensive persons, regardless of body mass; a direct correlation between plasma insulin levels and blood pressure exists. In addition to causing damage to the cardiovascular system, untreated high blood pressure has been linked to the development of diabet es (Richey et al., 2009).

Alcohol use is also a modifiable factor for DM. Too much alcohol may cause chronic inflammation of the pancreas (pancreatitis), which can impair its ability to secrete insulin and potentially lead to diabetes (Arugu et al.,2018). Alcohol consumption by diabetics can worsen blood sugar control in the patients. Long-term alcohol use in well- nourished diabetic patient can result in excessive blood sugar levels. Conversely, long-term alcohol ingestion in diabetic patient who are not adequately nourished can lead to dangerously low blood sugar levels (Omisore et al., 2014).Heavy drinking particularly in diabetics also can cause (ketoacidosis) ,the accumulation of certain acids in the blood that may result in severe health consequences. Alcohol consumption can worsen diabetes-related medical complications, such as disturbances in fat metabolism, nerve damage and eye disease. (Smeltzer *et al*., 2012).

At this juncture, the non-modifiable risk factors for diabetes will be reviewed. They include the following age, sex, family history, early life exposure to diabetes. The prevalence of diabetes increases with age. In most populations, the incidence of type 2 diabetes is low before age 30 years but increases rapidly and continuously with older age (Geiss*et al.,* 2006; Gonzalez *et al.,* 2009). For type 1diabetes there are two peaks for diagnosis of DM..The first is between the ages of 4-7 while the second occurs in children between the ages of 10-14.

There are children that are diagnosed at other ages, however, these two peak ages are more common. Prospective observational studies carried out by the Centre for disease control and prevention (CDCP, 2014) generally reported age to be a strong risk factor, independent of major correlated lifestyle risk factors, including obesity. This is a particular concern at a time when life expectancy is increasing.

Sex, among the socio-demographic factors is a non-modifiable factor for DM. The European Prospective Investigation into Cancer and Nutrition (EPIC) revealed a higher risk of diabetes in men compared with women; this was observed consistently across different European countries (Langenberg *et al.,* 2011). Both biological and psychosocial factors are responsible for sex and gender differences in diabetes risk outcomes (Alessandro *et al.*, 2013).
Psychosocial stress appears to have great impact on women rather than on men. In addition, women have greater increases of cardiovascular risk and stroke mortality than men compared with non-diabetic subjects (Alessandro *et al.*, 2013). Gender differences do exist in the relationship between diabetes and the incidence of cardiovascular diseases. Diabetes associated risk of acute myocardial infarction (AMI) or Ischemic stroke (IS) seems to be greater in women than in men (Perez *et al.*, 2007).

A family history of diabetes has been linked with increased risk for type 2 diabetes (Ahlqvist *et al.,* 2011). Family members often share both genetic and environmental risk factors that contribute to risk for diabetes. The elevated risk of type 2 diabetes is mediated in part, by both genetic and shared environmental components among family members (Tripathi *et al.*, 2006). Anthropometric and lifestyle- related risk factors such as Body mass index, waist circumference and physical inactivity are major risk factors for type 2 diabetes and aggregation of such traits among families accounts for a portion of the excess risk attributable to family history (Haire *et al.*, 2009).With the increased prevalence of obesity at a population level, more women are experiencing metabolic abnormalities during pregnancy, such as gestational diabetes (Getahun *et al.,* 2008).

Children who experienced intrauterine exposure to maternal diabetes are more likely to have large-for-gestational age birth weight, childhood overweight, and impaired glucose tolerance (IGT) in early adulthood. Since obesity and IGT are risk factors for gestational diabetes, these

metabolic abnormalities in young adults likely contribute to the increasing rates of gestational diabetes and, subsequently, type 2 diabetes (Lawrence *et al.,*2008; Reece *et al.,* 2009). Therefore, this vicious cycle may continue to the next generation.

There are metabolic factors associated with risk of type 2 diabetes. These factors include Impaired fasting glucose and impaired glucose tolerance, Beta cell dysfunction, Insulin sensitivity (or insulin resistance)Type 2 diabetes is a progressive disorder that is defined by specific cutoffs of glycemia. Impaired fasting glucose (IFG) and IGT are "prediabetes" states defined by glycemic levels higher than normal but below the actual cutoffs for diagnosis of diabetes (Brown *et al.*, 2014)The American Diabetes Association Clinical Practice Recommendations define IFG as fasting glucose between 100 mg/dL (5.55 mmol/L) and 125 mg/dL (6.94 mmol/L) and IGT as glucose 2 hours after a standard 75 g oral glucose tolerance test (OGTT) between 140 mg/dL (7.77 mmol/L) and 199 mg/dL (11.04 mmol/L).

Beta cells play a role in regulating insulin resistance. Beta cells play a very important role in ensuring that in healthy subjects, concentrations of blood glucose are stable within a relatively normal physiological range. In Obesity, Insulin sensitivity as well as modulation of beta cells decreases (Moodley *et al.*, 2007). Type 2 diabetes is believed to originate from an imbalance between insulin resistance and the capacity of the beta cell to produce insulin in the face of demand. A continued decline in beta cell functioning is one of the main causes leading to type 2 diabetes. (Alessandro *et al.*, 2013).Increased insulin resistance usually precedes the development of type 2 diabetes by many years and is considered as a very early step in the progression towards disease onset. When the body becomes resistant to insulin, It produces more insulin and this build up in the blood thus preventing further flow of glucose to the body cells (kiawi *et a*l., 2006).

2.4 Level of Knowledge relating to diabetes

Diabetes is projected as one of the world's main disablers and killers within the next twenty five years (Achigbu et al., 2015). This is because the healthier conventional lifestyle which involves regular and vigorous physical activity accompanied by sustenance on high fibre whole grain-based diet, rich in vegetables, and fruits have been replaced by over-reliance on motorized transport and consumption of unhealthy diets (IDF 2008, Arugu et al., 2018).

Knowledge and awareness of DM, its risk factors, complications and management are important aspects for better control and better quality of life(wild et al., 2004). In a study by Larsson et al.,(2011) on determinants of diabetes knowledge in a cohort of Nigerian diabetic patients, it was reported that Nigerian diabetics had poor knowledge. A study conducted by Uloma *et al.,* (2014) among civil servants in Anambra State Nigeria revealed that about half of the respondents knew that lack of exercise and obesity were risk factors for developing diabetes and higher income and increased age were associated with better knowledge.

A report from a national population-based survey in Mongolia showed low levels of diabetes-related knowledge among the population (Alessandro *et al.,* 2013). The study showed that up to fifty percent of Mongolian sub-populations, and one in five of the total population, had never heard the term diabetes prior to the survey. This research also highlighted a high level of misunderstanding of the symptomatology and natural progression of diabetes; for example, one-third of Mongolians were unaware that the disease could be prevented through lifestyle changes. Furthermore, the study revealed that a low proportion of Mongolians had received counseling or health education related to diabetes, with lowest access to such services for the urban poor and least educated sub-populations.

A study carried out in Kenya by William *et al.,*(2010) reported a direct relationship between level of education and good knowledge of diabetes among the participants. About 52% of those who had good knowledge had tertiary education, 25% had secondary education, and 14% had primary education while 9% had no formal education. A study conducted in a semi-urban populations of Oman showed that the study subjects' knowledge level regarding diabetes definition, symptoms, and complications were 46.5%, 57.0%, and 55.1%, respectively (Shafaee *et al.,*2012).

A study carried out in Kenya revealed that there was a direct relationship between levels of education and good knowledge on diabetes; but not across genders. In addition, participants with good knowledge of diabetes had good practices (Maina *et al.,* 2010).There is low level of awareness about Diabetes Mellitus among the public, People are also not sufficiently aware of the available interventions for preventing diabetes mellitus and managing complications (Park ,2011). Lack of knowledge about diabetes is common in Nigeria and in most of Africa.

((Moodley *et al.,*2007; Gul,2010; Nwaokoro *et al.,*2014). A study conducted at Federal Medical Centre, Owerri, Imo State, Nigeria also revealed that40% of the respondents did not know the cause of diabetes, while a few attributed it to pregnancy and hypertension. (Achigbu *et al.,*2015). Knowledge is the greatest weapon in the fight against diabetes mellitus. Information can help people assess their risk of diabetes, motivate them to seek proper treatment and care, and inspire them to take charge of their disease (Moodley *et al.,* 2007).

2.5 Perception relating to diabetes

Epidemic of diabetes is accelerating around the world and awareness of this disease remains low (WHO 2018). A study conducted by Achigbu et al., (2015), in the south east Nigeria revealed a low perception regarding causes of Diabetes, 21% of respondents perceived Diabetes as a spiritual attack, while 14% believed it was an inherited disorder. A systematic review carried by Lina *et al.,*(2014) in Lithuania revealed that majority of the participants perceived Diabetes as "disease", "incurable disease" and "inherited disease". The results of this study regarding the awareness of diabetes risk factors by its respondents also support the idea that the perception of the severity of diabetes could be affected by social stigmatization, rather than by accurate public knowledge about this illness.

A study carried out in 2010 in China found that only 12.9% of diabetic patients knew about their condition (Zhang *et al.,* 2013). Research has shown that Low awareness about Diabetes might correspond with the perception people have about it as a disease one should not worry about. Research suggest that risk perception regarding the development of diabetes is rather low among lay people as well as among certain health professionals, and their correlation with the risk of developing diabetes is weak (Walker *et al.,*2007; Weiland *et al.,*2012; Pinelli *et al.,*2012). Similar trends were found while investigating the risk perception about diabetes complications in people already diagnosed with Diabetes. A study by Calvin et.,al(2011) demonstrated low perception regarding diabetes complications among people with type 2 diabetes, which was not in line with their physiologically indicated risk.

Study participants from Cameroon also attributed the greatest importance for causing the type 2 diabetes to excessive sugar consumption, excessive energy intake, physical inactivity or even obesity (Kiawi *et al.,*2006) and this was in contrast to a study conducted by Aljoud and

Taha (2009) which reported that Obesity was recognized as the most important risk factor for developing diabetes.

2.6   Practices relating to Diabetes

Urbanization with adoption of "western lifestyles" has been incriminated in the abandonment of the healthier "traditional lifestyles" by people in developing countries (Dirk *et al.* 2009). The traditional lifestyle is said to be characterized by regular and vigorous physical activity accompanied by subsistence on high fiber, whole grain-based diet rich in vegetables and fruits (Dirk *et al.* 2009). Urban or even "western lifestyles" in rural areas have resulted in overreliance on motorized transport and consumption of unhealthy diets rich in carbohydrates, fats, sugars and salts. These lifestyles have contributed to a rise in levels of obesity and overweight in the population thereby increasing the risk for diabetes (Mehta *et al.,* 2006).

Public service workers/ civil servants constitute an important segment of a nation's workforce and are particularly prone to obesity as a result of sedentary behavior as well as poor dietary practices (Oyerinde *et al.,*2008) . Given the significant role played by the public service workers in the economy of a nation, an increase in obesity among them could affect their cardio metabolic health negatively, reduce productivity and ultimately affect the health and the economy of the nation adversely (Hammond *et al.,*2010).A study carried out in Nigeria by Oyerinde *et al.,*(2008) among civil servants revealed that only 28% of respondents agreed with statements relating to willingness to engage in physical activity, changing eating habits and maintaining "good" body weights. A significant 813 (41%), of the respondents did not indicate any willingness to adopt these healthier lifestyles. 41% of all respondents had good practices while the rest 59% had bad practices in relation to diabetes prevention. 75% of the people interviewed had poor dietary practices, 72% did not participate in regular exercise and over 80% did not monitor their body weights. The International Diabetes Federation revealed that the majority of the people with diabetes in developing countries are within the productive age range of 45 to 64 years. These are the same individuals who are expected to drive the economic engines of these countries in order to achieve the agreed international development goals. Besides their reduced productivity, diabetes further imposes a high economic burden in terms of health care expenditure, lost productivity and foregone economic growth. A study carried out by Kassahun *et al.,*(2017) among non diabetes community members in South East

Ethopia revealed that around 41% of the participants did not check their blood pressure at all, 38.2% consumed fatty foods frequently, and 31.8% did 30±60 minutes' physical activities very frequently. Analysis of the relationship between community knowledge and practices among Kenya participants provided valuable insights into the relationship between knowledge and practices relating to DM. The study by William *et al.,*(2010) further revealed that 50.7% of people with good knowledge of diabetes had good practices as compared to 49.3% of those with poor knowledge who had bad practice. Diabetes is now emerging as an epidemic of the 21st Century. It threatens to overwhelm the health care system in the near future.

Recently compiled data show that approximately 150 million people have diabetes mellitus worldwide, and it is speculated that this number may well double by the year 2025. Much of this increase will according to WHO (2018) occur in developing countries and will be due to population growth, ageing, unhealthy diets, obesity and sedentary lifestyles. By 2025, while most people with diabetes in developed countries will be aged 65 years or more, in developing countries most will be in the 45-64year age bracket and affected in their most productive years. (WHO 2018).

2.7 The burden of diabetes

The burden of diabetes will be revealed with special reference to the associated complications and the economic consequences of the disease. There are several complications associated with diabetes mellitus.

Diabetes increases the risks of dying with cardiovascular diseases (primarily heart diseases and strokes), chance of limb amputation, kidney failure and blindness worldwide (WHO 2004). It exerts a negative pressure in the control of infectious diseases like tuberculosis and HIV. Moreover, DM affects more than 21 million live births (Yamaska *et al.,* 2005).

Diabetes patients are more susceptible to different forms of both short- and long-term complications. The complications include macro vascular diseases (hypertension, hyperlipidemia, heart attacks, coronary artery disease, strokes, cerebral vascular disease, and peripheral vascular disease), micro vascular diseases (retinopathy, nephropathy, and neuropathy) and cancers. The various complications include: Cardiovascular disease, Diabetic neuropathy, Diabetic nephropathy, Diabetic retinopathy and Cancers. Diabetes dramatically increases the risk of various cardiovascular problems, including coronary artery disease with

chest pain (angina), heart attack, stroke and narrowing of arteries (atherosclerosis). Cardiovascular disease is a primary cause of mortality and morbidity in both prediabetes and T2DM (Wild *et al.,* 2004).

Diabetic neuropathy also referred to as Nerve damage is also a complication of DM. Excess sugar in the blood can injure the walls of the tiny blood vessels (capillaries) that nourish the nerves, especially in the legs(Zhang et al., 2012). This can cause tingling, numbness, burning or pain that usually begins at the tips of the toes or fingers and gradually spreads upward. Left untreated, can lead to loss of all sense of feeling in the affected limbs. Damage to the nerves related to digestion can cause problems with nausea, vomiting, diarrhea or constipation. For men, it may lead to erectile dysfunction (Zimmet et al., 2014). Diabetic neuropathy leads to foot ulcers, amputations, non-healing skin wounds, and sexual dysfunction. The neuropathy results in loss of protective sensation in the feet, which leads to callous formation, ulceration and other injury, and may also result in the infection of the skin (e.g. cellulitis) and/or bones of the foot (e.g. osteomyelitis) and gangrene (Vinod *et al.,*2012).

Diabetic nephropathy refers to Kidney damage**.** The kidneys contain millions of tiny blood vessel clusters (glomeruli) that filter waste from the blood. Diabetes can damage this delicate filtering system. Severe damage can lead to kidney failure or irreversible end-stage kidney disease, which may require dialysis or a kidney transplant (Weiland et al., 2012). Diabetic nephropathy is one of the most important micro vascular complications, whose earliest manifestation is the presence of minute amounts of urinary protein (micro albumin) which cannot be detected in routine urinalysis, but is detectable by specific testing. If the detection can be done in the earlier phase, the progression of nephropathy can be prevented (Vinod *et al.,*2011).Diabetic retinopathy refers to Eye damage. Diabetes can damage the blood vessels of the retina, potentially leading to blindness and also increases the risk of other serious vision conditions, such as cataracts and glaucoma (Vinod *et al.,* 2011). The retina is the most vascular region in the body, as it needs high oxygen to convert light into electrical energy in the rods and cones. Chronic hyperglycemia may cause micro vascular damage to the retinal vessels, resulting in edema and/or hemorrhage into the retina or the vitreous humor because of vascular permeability (Smeltzer et al., 2012).

Epidemiologic evidence has demonstrated that diabetes may elevate the risk of cancer such as colorectal cancer, liver cancer, bladder cancer, breast cancer, kidney cancer, which varies depending on the sub sites of specific cancers (Larsson *et al.,*2011). Type 2 DM and cancers usually share many risk factors such as age, obesity, sedentary lifestyle, smoking, higher intake of saturated fats and refined carbohydrates, and some psychology factors. (Giovannucci *et al.,* 2010).

At this juncture, the economic consequences of diabetes will be revealed. Diabetes is a serious illness with multiple complications and premature mortality accounting for at least 10% of total health-care expenditure in many countries (WHO 2018). Most developed economies are already spending 10-12 % of their health-care budgets on diabetes (WHO 2018).Diabetes is often perceived as a disease of affluent countries, it a serious chronic disease that leads to a substantial reduction in life expectancy, decreased quality of life, and increased costs of care. (Achigbu et al., 2015). Diabetes and its complications impose significant economic consequences on individuals, families, health systems and countries (WHO 2011). People living with diabetes and their families feel the impact of diabetes most directly, often through the expenses of diabetes treatment and loss of family income when diabetes interferes with work (Tejas et al.,2015).

In 2014 the International Diabetes Federation's (IDF's) reported that 387 million adults had diabetes worldwide while and 22 million adults the disease in Africa. According to the global Status Report on Non-Communicable Diseases by WHO (2018), diabetes reportedly consumed 11% of worldwide health care budget; the number which is speculated to increase above 592 million in 2035. Majority are progressing towards complications without awareness. Moreover, around 80% of the total numbers at risk of diabetes are living in low- and middle-income countries. The direct health care costs of people with diabetes are generally 2-3 fold greater than for those without diabetes, and 4-8 fold more if diabetes complications are present. Indirect costs of diabetes become increasingly more important in low income countries when costs such as the cost of travel to clinics and loss of earnings have a greater impact on the whole family (Nwaokoro et al., 2014).

2.8   Prevention / Control of Diabetes

Prevention of diabetes and its complications are largely feasible and clearly desirable. To curb this scourge of diabetes, public health interventions are required to prevent diabetes or delay the onset of its complications (Nwaokoro et al., 2014). This will entail intensive lifestyle modification for those at risk of diabetes and aggressive treatment for those with the disease. A high risk approach targeting individual at risk of diabetes and a population or public health approach aimed at reducing the risk factors for diabetes at the community are necessary (Lina et al., 2014).Strategies to prevent this rise can be directed at the individual or more generally at the population optimizing the public health strategies to promote healthy eating and physical activity, school sport and eating programs and tobacco reduction. Prevention of diabetes can be achieved through a variety of strategy including the following: Nutrition intervention, Physical activity intervention, Work site interventions, Health education intervention.

Diabetes and its complications are largely preventable through lifestyle choices which include dietary changes such as eating more fruits and vegetables (Mekary et al., 2012). In order to promote health and facilitate prevention of these diseases. Dietary changes can be achieved through worksite interventions. A study carried out by Block *et al.,* (2008) revealed the success of an intervention in significantly increasing fruit and vegetable consumption and reducing fat intake. Another worksite intervention revealed that participants perceived more social support from their colleagues in eating less fat as compared to those in a comparison group (Eckel *et al.,* 2011). Physical inactivity is a risk factor for many diseases, including heart disease, stroke, non-insulin dependent diabetes mellitus (Larsson et al., 2011). The Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine recommend that adults engage in at least 30 minutes of moderate physical activity on most days and preferably on all days.

Worksites provides access to 65% of the population aged ≥16 years, which makes them optimal settings to implement strategies for reducing the prevalence and burden of overweight and obesity which are primary risk factors for pre-diabetes and diabetes (Tessaro *et al.,*2007). The workplace provides employees access to various channels of communication and social support networks. These existing systems can present an array of opportunities for

environmental and policy change that will encourage healthy dietary practices and increase physical activity both of which are vital to effective diabetes prevention interventions (Pronk et al., 2012).

Diabetes prevention interventions need to involve the use of health education directed at the community and the health care providers. Good knowledge of diabetes amongst care givers is directly related to the quality of care given by health care providers, education of patients, likewise, improves adherence to treatments and leads to favorable treatment outcomes (Tessaro *et al.,*2007). Improving knowledge of the people can improve their attitude towards diabetes and in the long run change their practices to embrace healthier lifestyles such as eating healthy foods, and engaging in physical activity (Gagliardino *et al.,* 2007). Such practices will minimize the risks for diabetes in the general public and delay the onset of complications in those already diabetic.

2.9 The Conceptual Framework (Health Belief Model)

The model adopted to guide this study is the Health Belief Model (HBM). This model was first put together in the United States of America by a group of Social Psychologist at the United States Public health services. It was developed with the aim of providing a guide to health education research and practice (Becker et al., 2008).

The model focuses on individuals' perception of the threat posed by a health problem and what determines whether an action will be initiated relating to its prevention and/or control. According to the model there is a set of perceptions/beliefs or tenets that influences whether an individual will take action to prevent, control or manage a health concern.

The set of beliefs/ perceptions are hereby presented:

Perceived Susceptibility: This is also referred to as perceived vulnerability. It shows an individual's view regarding his or her personal chances of developing a condition.

Perceived Severity: This is also referred to as perceived seriousness. This tenent explains individuals' beliefs relating to the seriousness or the consequences of a specific health condition. This construct addresses how serious a disease is and how vulnerable a person can be to the disease.

Perceived benefits: This involves beliefs relating to individuals perceived advantages of taking recommended actions to reduce the vulnerability / risk or seriousness of a disease.

Perceived Barriers: This construct explains the major obstacles or challenges that prevent the adoption of a healthy life style. The barriers could be related to material and/or psychological cost of taking action to prevent the occurrence of a disease or health related condition. According to the model, for individuals to adopt a healthy behavior, perceived benefit must out-weigh perceived barrier.

Cues to action: These are factors that activate readiness to effect behavioral change among individuals. This ranges from public enlightenment, advertisement in the media, communications with health workers and influence from family members and/or friends,

Self- efficacy: This is the confidence an individual has in his/her ability to engage in activities that will help to reduce predisposition to a disease.

2.91 Application of HBM to the study

Perceived Susceptibility: This construct basically explains individuals' belief about the risk of the complications of diabetes and the progression of the disease. When individuals do not believe that they are at risk of DM and its complications, they tend not to be conscious of the behaviours needed to decrease the burden of the disease.

This construct was used in designing question such as: question 22.1 "*Eating all kinds of food as much as I can cannot make me get diabetes mellitus*": question 22.3: "*Obesity cannot lead to diabetes mellitus*" and perceptions questions related to lifestyle practices such as question 22.4: *Taking a lot of alcohol is not anyway related to the occurrence of diabetes mellitus*

Perceived Severity: This explains individuals' belief about the seriousness of a disease condition and its consequences. This could explain the civil servants view of the seriousness of DM and its potential consequences. How individuals perceive the severity of DM goes a long way in determining how serious they will be in making efforts to take preventive measures in preventing and managing the condition

This construct was used to develop perception questions such as: question 24.1 "*Diabetes mellitus is not an issue one should worry too much about*": question 24.4 "*Diabetes mellitus is not a serious health problem*": question 24.5 "*Diabetes mellitus is not a disease that is expensive to manage*"

Perceived Threats: This is influenced by perceived susceptibility, severity and modifying factors such as gender, family history of DM, age etc. If an individual perceive DM as a serious disease and feels susceptible to it, the individual will see it as a threat that may require urgent attention. For example, a civil servant with family history of DM who have parents who have suffered from complications of DM may see DM has a threat

This construct was used to develop perception questions such as: question 24.2 "*Diabetes mellitus cannot affect one's social life*" and question 24.6 "*Diabetes mellitus cannot kill*"

Perceived Barriers: This construct explains individuals' evaluation of the obstacles that will prevent change in behaviors'. It explains beliefs relating to the material or psychological factors that can prevent one from initiating actions to prevent occurrence of diabetes. It is the civil servants opinion of these material or psychological factors that can discourage or hinder their adoption of a healthy lifestyle that prevents DM.

This construct was used in designing an open ended question which allowed respondents to give diverse answers. Question such as: question 25 "*What in your own Opinion are the barriers to taking measures to Prevent Diabetes mellitus?*"

Perceived benefits: This explains beliefs about what individuals stand to gain if they live a healthy lifestyle. For instance if civil servants belief that regular checking of their blood sugar level will help in early detection of DM and prevent complications of DM, it is very possible that the individuals will adhere to such plan.

This construct was used to develop perception questions relating to lifestyle modification practices which can help reduce the risk of DM. Questions such as: question 23.2 " *Regular physical exercise can be used to make one fit or healthy; it cannot prevent diabetes mellitus*": question 23.5; "*Reducing Alcohol consumption is a means to reducing the possibility of having diabetes mellitus*"

Cues to action: These are external factors that help to initiate the readiness of individuals to change. Factors such as information from media, Diabetes self management education from health workers, friends and families can promote individuals desired behavior to stay healthy.

This construct was used to develop questions addressing some factors or experiences that can activate behavioral change. Question such as: question 27.3: "Have *you ever received advice/ counsel from someone living with diabetes concerning the need to avoid the disease*? " question 27.4: "*Has any health worker told you about Diabetes mellitus?*"

Self- efficacy: This explains the confidence in the ability of the civil servant to engage in activities that will help to reduce predisposition to Diabetes. Self efficacy is facilitated when perceived benefit outweighs perceived barriers.

This construct was used to develop questions which addressed the civil servants level of Confidence and their ability to engage in some activities. Questions such as; question 26.3 "*Doing Blood sugar test at regular intervals*": question 26.1 "*Participating in30 minutes physical exercise for at least 3 times in a week*"

Modifying Factors: This is not one of the six construct of health belief model, but it is an important factor that can influence individual perception. These factors include variables such as marital status, educational level, age, gender and ethnic group. An individual who has a low education level might have poor knowledge of DM because he or she has not be exposed to various sources that could help him/her get information on DM which will enable him/her make an informed decision about his/her health. These factors were used in designing the socio-demographic characteristics of the instrument in this study.

All the questions referred to in this section can be found in the instrument in the appendix I. A diagrammatic presentation of the application of HBM is shown in figure 2.1

Modifying Factors
- Age
- Gender
- Marital status
- Educational level
- Family history of DM

Perceived Benefit
- Prevention of complication of DM
- Good health

Perceived Barrier
- Cost of management of DM,
- Beliefs surrounding risk factors of DM

Perceived Susceptibility:
Perception that one is at high risk of developing complications of DM due to lifestyle practices, genetic determinants etc.

Perceived Severity:
Ones perception or belief that DM is a serious condition and that it can lead to Poor quality of life, reduced life expectancy, Fatal health conditions such as; blindness, Kidney failure etc.

Perceived Threat of DM (High ➞ Low)

Cues to Actions:
- Diabetes self management education
- Awareness through programs on the media health

Likelihood of taking recommended health actions such as: adherence to treatment regimen, making lifestyle modifications (e.g. avoiding alcohol consumption, going for routine medical check-up)

Figure 2.1: The Diagrammatic Application of the Health Belief Model to the study

CHAPTER THREE

METHODOLOGY

3.1 Study design: The study was a descriptive cross- sectional survey. It focused on Civil servants at the state secretariat, Agodi Ibadan.

3.2 Study area: The study was carried out at the Oyo state secretariat, Ibadan. The state secretariat is located in Ibadan North Local Government Area, Oyo state, not too far from the university college hospital. The secretariat is the Administrative Headquarters of the Oyo state Government. There are 37 Government parastatals at the State secretariat. The parastatals are grouped into Ministries, Departments and Agencies (MDAs). The number of civil servants within each parastatal is presented in table 3.1

The primary responsibilities of the civil service include initiating and implementing government policies and executing projects aimed at promoting social, economic and political development. The civil servants in Oyo state Government Secretariat consist of men and women of various socio-demographic characteristics. Most of the civil servants at the state secretariat live in Ibadan metropolis. A civil servant normally retires at the age of 60 years or after 35 years in service.

3.3 Study population: The study population consists of civil servants at the Oyo state secretariat. The population consisted civil servants of both sexes of varying socio-demographic characteristics who work in various Government parastatals located at the state secretariat, Agodi Ibadan

Table 3.1Distribution of Civil servants in the parastatal of the Oyo state secretariat Ibadan

	PARASTATAL AT THE STATE SECRETARIAT	
S/N	MINISTRIES /DEPARTMENTS/AGENCIES (MDAs)	NOS OF WORKERS
1	Office of the Executive Governor	712
2	Office of the head of service	100
3	Ministry of Health	245
4	Ministry of Finance	80
5	Ministry of Local Government and Chieftaincy Matters	40
6	Ministry of Youth and Sport	35
7	Ministry of Environment and Habitat	200
8	Ministry of land, Housing and Physical Planning	529
9	Oyo state Teaching service Commission (TESCOM)	50
10	Ministry of Trade, Investment and Cooperatives	109
11	Oyo state Government printing Press	19
12	Ministry of Information and Culture	99
13	Ministry of Women Affairs, Community development and Poverty alleviation	150
14	Ministry of Education	575
15	Local Government Staff Pension Board	45
16	Oyo state Hospitals Management Board	2486
17	Ministry of Work and Transports	508
18	Ministry of Agriculture, Natural Resources and Rural development.	350
19	Office of the Surveyor General	49
20	Office of the Accountant- General	102
21	Office of the Auditor- General (STATE)	141
22	Office of the Auditor- General (LOCAL)	96
23	Oyo state Road Traffic Management Authority (OYRTMA)	209
24	Oyo state Tree Crops	50
25	Ministry of Justice	127
26	Oyo State planning Commission	52
27	Oyo State House of Assembly	26
28	Civil service Commission	41
29	Oyo State Pensions Board	30
30	Oyo State Agency for Youth Development	68
31	Simeon Adebo Staff Development Centre	80
32	Oyo State Scholarship Board	25
33	Oyo State Board of Internal Revenue	331
34	Water Corporation of Oyo State	700
35	Oyo State Bureau of Statistics	61
36	Meniral Development Agency	50
37	Bureau of Investment Promotion and Public Private Partnership	80
	Total	**8,650**

Source: *Oyo State of Nigeria Book of Estimates, 2017.*

3.4 Sample size:

The minimum sample size required was calculated using the Leslie-Kish formula for estimating sample size for a single proportion. There is death of information relating to the prevalence of DM among civil servants. However, according to Shittu et al., (2017) the prevalence of Diabetes among adults in Oke-Ogun region of Oyo state Nigeria was estimated to be 4.6%

This prevalence was used to calculate the sample size using the formula below

$$N= \frac{Z^2pq}{d^2}$$

Where N is the sample size

P = 4.6%

q = 1 – P

d is the margin of sample error tolerated in percentage (5%being the maximum accepted value)

Z=1.96

P= 4.6%= 0.046, q= 1-p   therefore q= 1-0.046= 0.954

$$n_o= \frac{1.96^2 \times 0.046 \times 0.954}{(0.02)^2}$$

n_o= 421.46   approximately 421

Using the formula adopted from Glenn (1992) for conversion to a finite population

$$n= \frac{n_o}{1+ \frac{(n_o-1)}{N}}$$

$$n= \frac{421}{1+ \frac{(421-1)}{8650}}$$

n= 401.50   Approximately 402

A non-response rate of 10% was added

$$q= \frac{1 \times n}{1-f}$$ where f= 10%   q = 446

The sample size for this study was 446.

3.5 Sampling procedure: The Oyo state Secretariat has a total of 37 parastatal grouped into Ministries, Department and Agencies.

The participants were selected using a multistage sampling technique which took the aforementioned categorization into consideration.

Stage 1: Simple random sampling involving balloting was used to select 25% of the 37 parastatal (i.e. 9.3). This figure was however increased to 10. (See table 3.2 for selected parastatals)

Stage 2: Proportionate sampling was used to determine the number of civil servants to be recruited from each selected parastatal/ ministries. Number of civil servants in each parastatal/ Ministry was determined using the formular below.

No. of civil servants in a parastatal $\times$ sample size (n)

Total no of civil servants in the 10 selected parastatal

For instance, the proportionate sample size selected for study participants from the ministry of health using the above formular was done as follow:

$\dfrac{245}{3243} \times 446 = 33.7$

The 33.7 was approximated to 34.

There are six units in the ministry of health; so the respondents selected across units from the 34 was determined as follows

$\dfrac{34}{6} = 5.6$ (see table 3.2 for details)

This approach was used to select the proportionate size for each of the remaining parastatals.

Stage 3: Stratified sampling technique was used in selecting equal proportion of male and female participants. Therefore 223 male and 223 Female participants constituted the sample size.

Stage 4: Simple random sampling using balloting was used to select respondents across the units in each selected parastatal/ ministries until the required proportion to be selected for each parastatal/Ministry was completed. This process was repeated in all the selected parastatal/ Ministries.

Table 3.2   Sampling of the civil servants in the state secretariat Ibadan

S/N	Selected Parastatal/Ministry	No of units	No of Workers	Proportion to be Selected	No of participants Across each unit
1	Ministry of Health	6	245	$\underline{245}$ ×446 = 33.7 3243 =34	$\underline{34}$= 5.6 6 (minimum of 5)
2	Ministry of Finance	5	80	$\underline{81}$×446 = 11.1 3243 = 11	$\underline{11}$ = 2.2 5 (minimum of 2)
3	Water Corporation of Oyo State	6	700	$\underline{700}$×446 = 96.3 3243 = 96	$\underline{96}$ = 16 6 =16
4	Ministry of land, Housing and Physical Planning	5	529	$\underline{529}$×446 = 72.8 3243 = 73	$\underline{73}$ = 14.6 5 (minimum of 14)
5	Office of the Executive Governor	5	712	$\underline{712}$×446 = 97.9 3243 = 98	$\underline{98}$ = 19.6 5 (minimum of 19)
6	Ministry of Trade, Investment and Cooperatives	8	109	$\underline{109}$×446 = 14.9 3243 = 15	$\underline{15}$ = 1.8 8 (minimum of 1)
7	Office of the Accountant-General	5	102	$\underline{102}$×446 = 14.2 3243 = 14	$\underline{14}$= 2.8 5 (minimum of 2)
8	Oyo state Teaching service Commission (TESCOM)	4	50	$\underline{50}$×446= 6.8 3243 = 7	$\underline{7}$ = 1.8 4 (minimum of 1)
9	Ministry of Education	11	575	$\underline{575}$×446= 79.1 3243 = 79	$\underline{79}$ = 7.2 11 (minimum of 7)
10	Office of the Auditor- General for (STATE)	8	141	$\underline{141}$×446 = 19.4 3243 = 19	$\underline{19}$= 2.3 8 (minimum of 2)
Total	**10**		**3,243**	**446**	

3.6 Inclusion and exclusion criteria

Inclusion criteria

1. State Civil servants based at the state secretariat Agodi Ibadan who volunteer to participate in the study.

Exclusion criteria

Civil servants who were excluded from participating in the study were as follows:

1. Civil servants who were on contract employment with the state
2. Civil servants whose Ministry or Agencies are not located in the secretariat
3. Junior civil servants such as security men and cleaners were excluded

3.7 Method and instrument for data collection

Quantitative data were collected using a validated Self-administered semi-structured questionnaire (see appendix) .The questionnaire was pre-tested among civil servants at the state Secretariat Ilorin, Kwara state.

The questionnaire consisted of questions which are organized into six sections as follow:

1. Section A- Socio-demographic characteristics of the respondents;
2. Section B- Prevalence of Diabetes;
3. Section C- Knowledge of Diabetes ;
4. Section D- Perception of Diabetes;
5. Section E- Practices relating to Diabetes;
6. Section F- Treatment seeking behavior for Diabetes;

3.8 Recruitment of research assistants

Five trained research assistants were recruited and trained on ethics of the research and detailed knowledge of the research process.

The training focused on the objectives and importance of the study, the sampling process, and techniques for administering the study instruments, interviewing skills, and ethical issues that should be taken into consideration during the study.

3.9 Validity of instrument

The validity of the instrument for this study was enhanced through adequate review of relevant literature and this together with the formulated objectives were used to facilitate the design of the instrument. The instrument was reviewed by my supervisor and other academic staff of the department of health promotion and education and other specialist in Diabetes related research and care based at the university college hospital, Ibadan

Reliability of instrument

The reliability of the instrument was ensured through pretesting. The instrument was pretested among a study population in another representative population. The instrument was pretested by administering it to 10%, of the total sample size,(i.e. approximately 47 civil servants) at the state secretariat, Ilorin, Kwara state. The questionnaire was checked for completeness and a serial number was given to each for easy identification and recall. A coding guide was developed and used to enter the data in the questionnaire into the computer and the encoded data were analysed. The Cronbach's alpha co-efficient analysis was used to determine the reliability of the instrument. In this approach, minimum level of reliability is 0.5; the reliability increases as it approaches 1.The Crohbach Alpha result obtained in this study was 0.70 which indicates it was very reliable.

3.10 Data collection process

Permission was obtained from heads of the different parastatal / Ministry prior to the commencement of the study, Useful information about the state secretariat was obtained from the various parastatal / Ministries at the state secretariat.Each unit in all the 10 selected parastatal were visited. The heads of the units in the selected parastatal were visited and permission to conduct the study was obtained from them.

Simple random sampling was used to select participants who were willing to participate across units in the various parastatal. For instance in the state ministry of health with 6 units there were 34 eligible respondents to be recruited. Each respondent who was willing to participate was asked to pick a rolled ballot paper from a box which contained papers on which yes or no was written. Only respondents who picked yes were recruited in the study. The balloting process was done unit by unit until the proportion of respondents to be recruited from the parastatal was complete. This process was repeated across all the remaining units of the selected parastatal.

The administration of the questionnaire was done among 446 respondents in the various units of the 10 selected parastatal at the state secretariat during the official hour from 8am-4pm. The anthropometric characteristics of most the respondents were taken before administering the questionnaires to them. A few of the respondents opted to have their anthropometric measurements taken after the administration of the questionnaire.

The anthropometric measurement made were height which was measured with the use of a height metre, and weight measured with the use of a weighing scale. The anthropometric measurements were recorded at the appropriate places on each of the respondents' questionnaires. Consent of the participants was sought before administration of the questionnaire to them, in addition, the purpose and nature of the study was explained to them. The questionnaire was administered to the civil servants with the help of the trained research assistants and retrieved immediately from the respondents after completion and reviewed for completeness. Attention of respondents were drawn to any case of omission or incomplete response in the questionnaire. Data collection was carried out for three weeks.

3.11   Data management and analyses

Copies of the questionnaires were collated and edited by the researcher with the help of research assistants. The copies of the questionnaires were serially numbered for control and recall purposes and the data collected were checked for completeness and accuracy. The responses in each questionnaire were hand-coded by the researcher with the aid of a coding guide. Data entry and analysis were facilitated by Statistical Package for Social Sciences (SPSS) version 21. The data were analyzed using descriptive statistics (frequency, percentages, mean, median, mode etc). Independent sample t-test and F-test (ANOVA) , Chi square analysis were the inferential statistics used. A p-value of less than 0.05 was considered to be statistically significant

A 30-point knowledge scale was used to facilitate the assessment of respondents' knowledge. The knowledge of respondents was determined and their knowledge scores categorized as poor, fair or good. Scores of 0 -<50 percentile (i.e. 0 -<15points) were grouped as poor; scores of 50 -<75 percentile (i.e. 15 -<23 points) were grouped as fair while 75 percentile and above (i.e. Scores of 23 –30 points) were grouped as good knowledge. A 16- point perception scale was used to assess perception. Perception scores were categorized as favorable (non-risky) or unfavorable (risky). Scores of 0 –<75percentile (i.e. 0-<12 points) were categorized unfavorable and 75percentile and above (12 –16 points) was grouped as favorable. The respondents' anthropometric characteristics or measurements such as the weight (kg) and height (m) were also determined and this was used to measure respondents BMI. The calculated BMI (kg/ m^2) were then categorized. Their BMI scores were categorized as

follows: under weight (<18.5), Normal weight (18.5-24.9), Over weight (25-29.9) and Obese (30 and above) (Ahlqvist *et al*., 2011). .The data are presented in tables and charts in chapter 4

3.12 Ethical consideration

The study followed ethical principles guiding the use of human participants in research. Ethical approval was sought from Oyo state ethical review board. Informed consent was also obtained from all research participants. Participation in the study was made voluntary and informed consent was obtained from each participant involved in the study.

a. Confidentiality of data:

Serial numbers and not names of participants were written on each copy of the questionnaire to ensure confidentiality. The respondents were assured that their responses would be kept confidential and the questionnaires would be kept safe

b. Beneficence to Participants:

The findings of the study would be forwarded to relevant stake-holders at the state secretariat as well as the ministries of health with a view to formulating policies relating to prevention of Diabetes Mellitus among civil servants.

c. Non-maleficence (non-harmful) to Participants

The study was non-invasive and did not involve resources which physically harm the participants. Participants were however informed that there were some questions which they might find uncomfortable to answer as the questions might be related to their privacy

d. Right to decline/withdrawal from the study without loss of benefits

The participants were assured that they were free to decide not to participate or withdraw from participation at any point of the study. In addition they were informed that they would not suffer any consequences if they chose not to participate.

3.13 Limitation: A limitation to this study was that the study participants were very busy at their various offices during the period of the study. In-order to address this challenge, the data collection process was made flexible. An arrangement was made to administer the questionnaire to each participant when he/she was less busy. In addition, the benefit of the study to the participants were stated. This study gave the participants the opportunity to know their vital anthropometric measurements and this provided the motivation to participate in the study.

CHAPTER FOUR

RESULTS

4.1 Socio-demographic characteristics of respondents

The results of the respondents' socio-demographic characteristics are presented in this subsection. Table 4.1 presents the age, gender, religion, ethnicity, marital status, level of education and parastatal of affiliation of the 446 civil servants that participated in the study. There were 50% males and 50% females. The study was designed to ensure equal distribution of respondents by sex. The respondents' ages ranged from 26-59 with a mean of 41.1 ± 8.3. Young adults aged <30 were 9.0%, respondents aged 40-49 years (41.9%) constituted the majority.

Majority (76%) of the respondents' were married and 68.8% were Christians. Respondents with first degree (39.2%) topped the list followed by those with OND (26.9%). Majority (86.5%) of the respondents were Yoruba while others were from the following ethnic group: Hausa (5.8%), Igbo (5.2%) and South-south ethnic minorities (2.5%). Respondents were selected proportionately from 10 parastatals at the state secretariat. Those in the Accountant General's office (21.7%) topped the list (See table 4.1 for more details).

4.2 Prevalence of DM and related experiences

Table 4.2 shows the prevalence of DM and related experiences. Most (92.8%) of the respondents reported that they had never been diagnosed of DM. The typologies of DM related experiences ever had includes unintended weight loss (15.7%), excessive thirst (11.9%), and passage of plenty of urine (13%). Slightly less than half (46.9%) of the respondents had ever measured their blood sugar level.

Most (93.9%) of the respondents reported that they had never used any anti-diabetic medications while 62.1%) had not checked their blood sugar level six months preceding the study. Respondents' who checked their blood sugar level four and five months preceding the study were 10.5% and 12.6% respectively. About a quarter (25.1%) of the respondents had immediate relatives who suffered from DM with 36.6% of those relatives being fathers while 21.4% were siblings (See table 4.2 for more details).

Table 4.1: Respondents' Socio- demographic characteristics

Characteristics	No	%
Age (N=446)		
<30	40	9.0
30-39	146	32.7
40-49	187	41.9
50-59	73	16.4
Sex		
Male	223	50
Female	223	50
Religion (N=446)		
Christianity	307	68.8
Islam	135	30.3
Traditional worshipper	4	0.9
Marital Status (N=446)		
Not currently married	107	24
Married	339	76
Highest level of Education (n=445)		
NCE	46	10.3
OND	191	26.9
HND	71	15.9
BSC	175	39.2
PGD	29	6.5
Masters	4	0.9
Ethnic Group (N=446)		
Yoruba	386	86.5
Hausa	26	5.8
Igbo	23	5.2
South-south	11	2.5
Parastatal of affiliation (N=446)		
Ministry of Health	34	7.6
Ministry of Finance	19	4.3
Water cooperation	11	2.5
Ministry of Land, Housing& Planning	96	21.5
Office of executive Governor	73	16.4
Office of accountant General	97	21.7
Ministry of Trade Investment and Cooperation	16	3.6
TESCOM	14	3.1
Ministry of Education	7	1.6
Office of auditor general(state)	79	17.7

*Mean Age = 41.1±8.3   Range= 26-59

*South-south ethic group= 11 (2.5%) consists of Akwa-Ibom 7 (1.6%) and Ibibio 4(0.9%)

Table 4.2: Prevalence of DM and related experiences

Prevalence of DM and related experiences	N	%
Ever been Diagnosed of DM (N=446)		
Yes	32	7.2
No	414	92.8
DM related experiences (N=446)		
Excessive Thirst		
Yes	53	11.9
No	393	88.1
Unintended weight loss		
Yes	70	15.7
No	376	84.3
Passage of Plenty Urine		
Yes	58	13.0
No	388	87.0
Ever measured blood Sugar (N=446)		
Yes	209	46.9
No	236	53.1
Ever used anti-diabetic medication (N=446)		
Yes	27	6.1
No	419	93.9
Checked blood sugar level within 6 months preceding study		
Never checked	227	62.1
March(6 months ago)	22	4.9
April (5 months ago)	56	12.6
May (4 months ago)	47	10.5
June(3 months ago)	8	1.8
July(2 months ago)	15	3.4
August (1 month ago)	21	4.7
Whether immediate relative ever suffered from DM (N=446)		
Yes	112	25.1
No	328	73.5
Don't know	6	1.3
Relationship with relatives who ever had DM(n=112)		
Father	41	36.6
Mother	9	8.0
Siblings	24	21.4
Grandparent	14	12.5
Cousins	18	16.1
Uncle	3	2.7
Aunty	3	2.7

4.3 Awareness and Knowledge of Diabetes Mellitus

Respondents' sources of information on DM are presented in Table 4.3. The three top sources of information on DM were Television (54.7%), Radio (52%) and Friends (51.0%). (See table 4.3 for more details). Figure 4.1 presents the respondents knowledge of the definition or concept of Diabetes mellitus. By far Less than half (41.4%) of the respondents were able to correctly define Diabetes mellitus. The correct definitions were different in wording; the summary of the correct definitions was that DM was a disease characterized by elevated levels of blood glucose

Table 4.4 highlights respondents' knowledge of the possible complications of untreated DM. Majority (62.6%) correctly stated Leg ulcers that would not heal; other responses included Blindness (45.5%) and kidney failure (35.9%). (See table 4.4 for details).The knowledge of respondents relating to the measures for preventing complications of Diabetes mellitus is shown in table 4.5. Majority of the respondents correctly mentioned regular checking of blood sugar level (65.5%), complete avoidance of alcohol intake (64.8%) and regular physical exercise (62.1%), Slightly over half (52.9 %) erroneously mentioned consumption of oil with adequate cholesterol (See table 4.5 for more details).

Table 4.6 highlights respondents' knowledge of the causes or factors that can lead to Diabetes mellitus. The correctly listed causes of Diabetes mellitus that topped the list were too much consumption of sugary substances or drinks (77.4%), too much alcohol consumption (74.7%), heredity (74.0%), excessive consumption of carbohydrate foods (64.6%), lack of physical activity (63.2%), obesity (56.1%) and smoking of tobacco products (54.5%). The wrongly mentioned factors that can lead to DM included the following Consumption of too much fruits (26.0%), eating too much of beef (42.8%) and excessive consumption of vegetables (20.9%) (Details are shown in table 4.6)

The knowledge of respondents on the symptoms of Diabetes mellitus is presented in table 4.7. The symptoms of Diabetes mellitus correctly listed by respondents included frequent and excessive urination (71.1%), delay in healing of wounds (60.1%), weight loss (56.7 %) and excessive thirst (47.6%), (See table 4.7 for more details).Fig. 4.2 depicts the overall knowledge of the respondents on Diabetes mellitus.

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Respondents' mean knowledge score was 15.7 ± 5.3. The proportion of respondents with fair knowledge was 44.8% , a small proportion (39.5 %) had poor knowledge while only 15.7% had good knowledge. (See Figure 4.2 for details).

Table 4.3: Respondents' sources of information on DM

N=446

Sources of Information	Responses	
	Yes (%)	No (%)
Television	244 (54.7)	202 (45.3)
Radio	232 (52.0)	214 (48.0)
Friends	228 (51.1)	218 (48.9)
Doctors /Health Workers/ Nurses	195 (43.7)	251 (56.3)
Parents	186 (41.7)	260 (58.3)
News Papers	178 (39.9)	268 (60.1)
Health Programs	70 (15.7)	376 (84.3)
Commercial Bill Boards	21 (4.7)	425 (95.3)

• Multiple responses
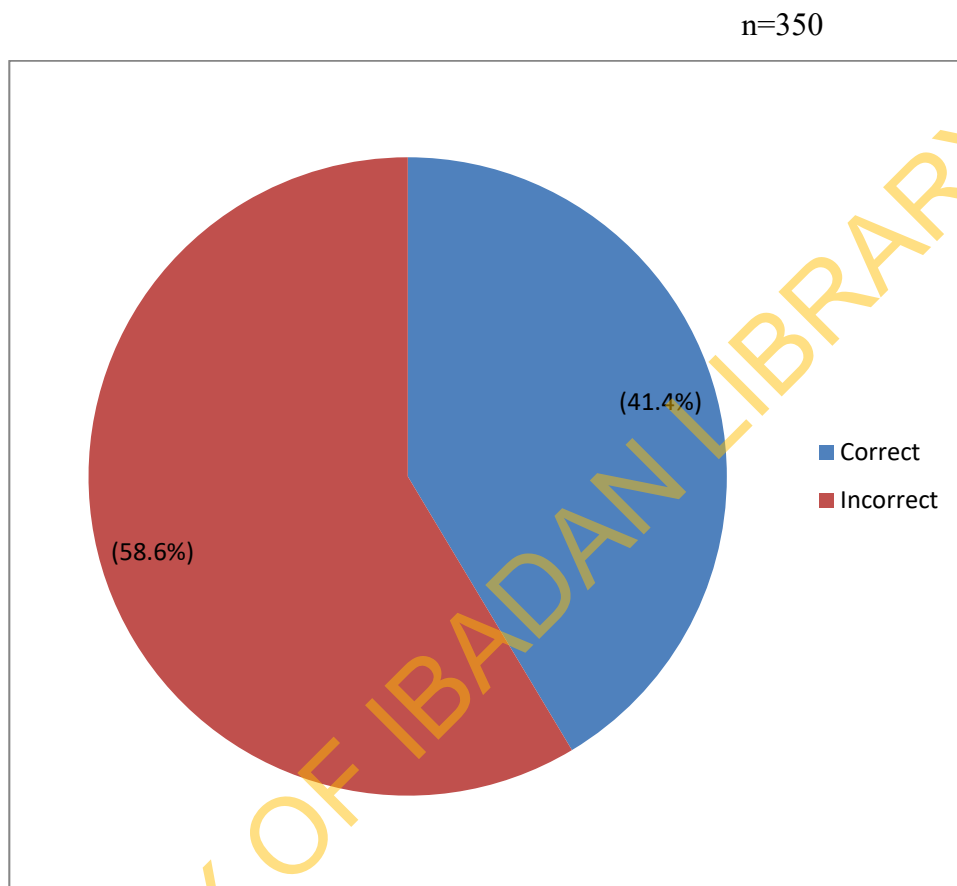
Figure 4.1: Respondents' Knowledge relating to the Concept/ Definition of DM

*Summary of the correct definition was "*DM is a disease characterized by elevated levels of blood glucose*"

Table 4.4: Respondents' Knowledge of the complications of untreated DM

N=446

Complications of untreated DM	Responses		
	True (%)	False (%)	Don't know (%)
Leg ulcers that won't heal	279 (62.6)*	63 (14.1)	104 (23.3)
Blindness	203(45.5) *	96(21.5)	147(33.0)
Kidney failure	160 (35.9) *	130(29.1)	156 (35.0)
Hypertension	158 (35.4) *	108(24.2)	180(40.4)
Stroke	147(33.0) *	97 (21.7)	202 (45.3)

*correct responses

Table 4.5: Respondents' Knowledge of Measures for preventing complications of DM

N=446

| Measures for preventing complications of DM	Responses		
	True (%)	False (%)	Don't know (%)
Regular checking of blood sugar level	292(65.5)*	74(16.6)	80(17.9)
Complete avoidance of alcohol intake	289(64.8) *	62 (13.9)	95(21.3)
Regular physical exercises	277(62.1) *	49(11.0)	120(26.9)
Consumption of oil with adequate cholesterol	236(52.9)	93(20.9)*	117(26.2)
Avoidance of intake of proteinuous foods	145(32.5)	181(40.6) *	120 (26.9)

*correct responses

Table4.6: Respondents' Knowledge of the causes / factors that can lead to DM

Causes of DM/Predisposing factors	Responses		
	True (%)	False (%)	Don't know (%)
Too much consumption of sugary substances or drinks	345 (77.4) *	84 (18.8)	17(3.8)
Too much alcohol consumption	333 (74.7) *	65 (14.6)	48(10.8)
Heredity/Inheritance	330 (74.0) *	62 (13.9)	54 (12.1)
Excessive consumption of Carbohydrate foods	288 (64.6) *	87 (19.5)	71(15.9)
lack of physical exercise or activity	282 (63.2) *	96(21.5)	68 (15.2)
Obesity (i.e. Fatness)	250(56.1) *	77 (17.3)	119 (26.7)
Smoking of Tobacco products e.g. Cigarette	243 (54.5) *	122 (27.4)	81 (18.2)
Eating too much beef	191(42.8)	161(36.1)*	94(21.1)
Consumption of too much fruits	116 (26.0)	227(62.1) *	53(11.9)
Supernatural forces (including witches and wizards	112 (25.1)	232 (52.0) *	102 (22.9)
Excessive consumption of vegetables	93 (20.9)	248 (55.6) *	105 (23.5)
Old Age	88 (19.7) *	231 (51.80	127(28.5)

N=446

*correct responses

Table 4.7: Respondents' Knowledge of Symptoms of DM

N=446

Symptoms of DM	True (%)	False(%)	Don't know (%)
		Responses	
Frequent and excessive Urination	317(71.1) *	12 (2.7)	117(26.2)
Delay in healing of wounds	268 (60.1) *	35 (7.8)	143 (32.1)
Weight Loss	253(56.7) *	69 (15.5)	124 (27.8)
Excessive Thirst	208 (47.6) *	27 (6.1)	211 (47.3)
Headache	155 (34.8) *	108 (24.2)	183 (41.0)
Vomiting of blood	137(30.7)	98(22.0)*	211 (47.3)

*correct responses

Figure 4.2 Categorisation of respondents Knowledge Scores in points
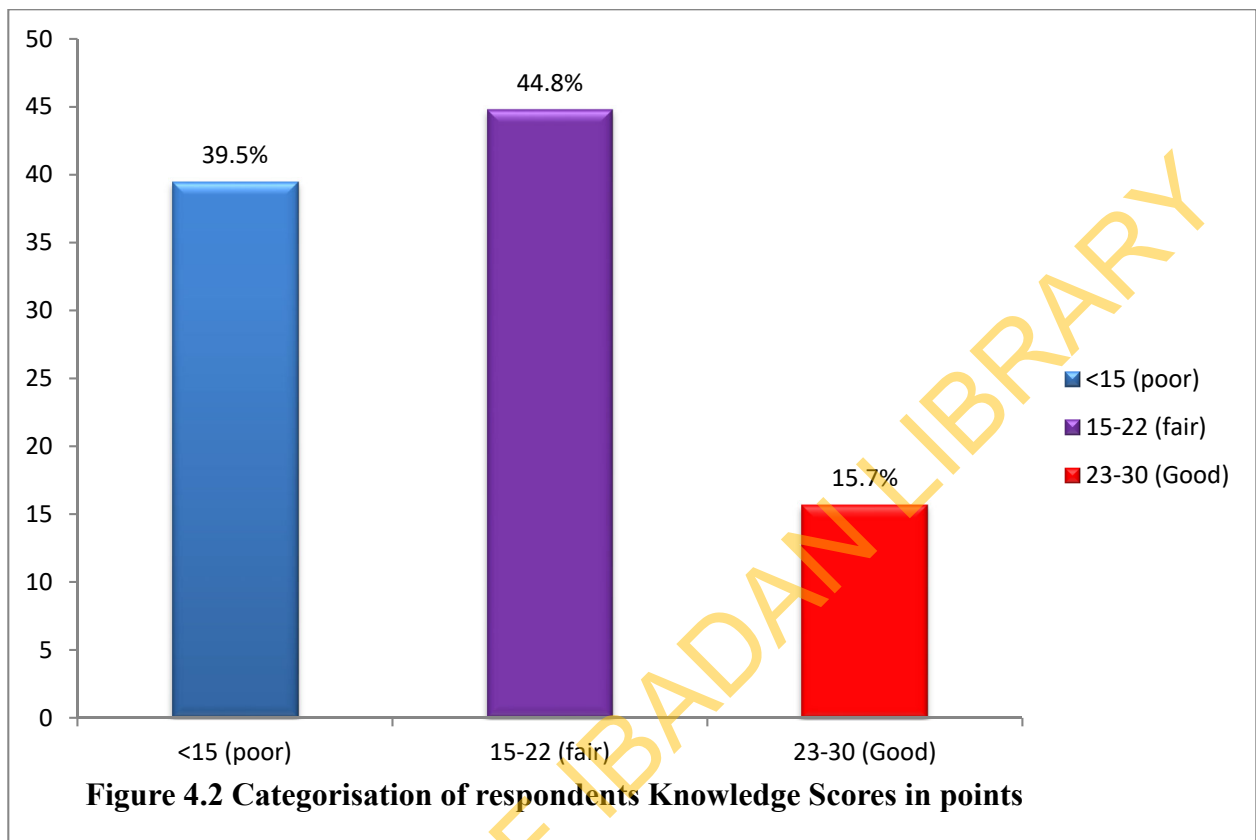
*Mean Knowledge score= 15.7± 5.3

4.4 Perception and Self-efficacy of Respondents Relating to Diabetes mellitus

This sub-section presents respondents' perception relating to Diabetes mellitus: The typologies of perception assessed were as follows; perceive susceptibility to DM; perception related to DM prevention through lifestyle modification; perceived seriousness of DM; perceived barriers to DM prevention, perceived confidence in the ability to engage in some activities (self-efficacy); perception related to factors that activate readiness to initiate behavioral change (cues of action).

Respondents' perceived susceptibility to DM is highlighted in Table 4.8. The table also indicates perceptions that are in line with the biomedical world view. Majority (76%) of the respondents did not share the view that DM is a disease for old people. The perception of 67.5% of the respondents was of the perception that taking a lot of alcohol is not in any way related to the occurrence of DM. About two-third of the respondents (65.9%) perceived eating all kinds of food as much they could can make them get DM. Majority (65.9%) did not share the view that DM is caused by supernatural forces.

The respondents' perception related to DM prevention through lifestyle modification is presented in the table 4.9. Majority (68.8%) of them were opposed to the view that increasing intake of sugar containing foods cannot lead to diabetes mellitus because sugar is needed by the body for energy. The perception of 64.1% of the respondents was that regular physical exercise cannot prevent DM, but can make one fit or healthy. Majority (64.6%) was of the view that eating fruits and vegetables regularly can help prevent the occurrence of diabetes. Slightly over half (50.2%) of the respondents did not share the view that reduction of starchy foods only make one hungry but cannot prevent Diabetes (See details in table 4.9).

Table 4.10 shows respondents' perceptions relating to the seriousness of DM. The views of majority of the respondents were in line with the biomedical world view. Majority (73.8%) of the respondents were of the view that Diabetes mellitus is a disease that is expensive to manage. Majority (72.2%) were also of the view that Diabetes mellitus is a disease that cannot be cured once and for all while 69.3% were of the belief that Diabetes mellitus can kill. Majority (63.7%) of the respondents was of the view that DM is a serious health problem which can affect one's social life (Details are contained in table 4.10).

Respondents' perception relating to the barriers to DM Prevention is shown in table 4.11. Financial problem (29.8%) topped the list of the perceived barriers to the prevention of DM.

This is followed closely by lack of awareness (29.4%) and uncontrolled food intake (27.4%).

Figure. 4.3 shows the categorization of the respondent's perception relating to Diabetes mellitus. Respondents' overall mean perception score was 10.9 ± 9.0. The proportion of respondents with risky perception was 54.0 %. (See figure 4.2 for details)

The respondents' self-efficacy related to DM control measures is presented in the table 4.13. Slightly above half (52%) were very confident that they can participate in a 30 minutes physical exercise for at least 3 times in a week. Other activities respondents were very confident in participating in the following; regular consumption of fruit and vegetables (44.4%), doing blood sugar test at regular intervals (43.3%), reduction in consumption of fatty foods (41%), reduction in consumption of alcohol (39.9%) and reduction in consumption of carbohydrate foods (35.7%). The mean self-efficacy score was 9.5 ± 9.0 (See details in table 4.12).

Potential Cues to action among respondents are highlighted in table 4.13. Slightly more than half (52.0%) had heard of DM on social media while about 37.0% have had health education by a health worker on DM. A few (29.8%) of the respondents were aware of persons with DM while only 18.6% had ever received advice/ counsel from someone living with diabetes concerning the need to avoid the disease. Cues that had ever made respondents to take preventive measures against DM are presented in table 4.14. These cues included the following: hearing about DM on mass media (31.2%); awareness of persons with DM (24%); experiences shared by Diabetic patients (14.3%) and advice/ counsel from someone living with diabetes concerning the need to avoid the disease (11.2%) (See details in table 4.14).

Table 4.8: Respondents Perceived susceptibility to DM   N=446

Perceived susceptibility to DM	Responses		
	Agree (%)	Disagree (%)	Undecided (%)
Eating all kinds of food as much as I can cannot make me get DM	93(20.9)	294 (65.9) *	59 (13.2)
Diabetes mellitus is a disease for old people	53 (11.9)	339 (76.0) *	54 (12.1)
Obesity cannot lead to DM	108 (24.2)	187 (41.9) *	151 (33.9)
Taking a lot of alcohol is not anyway related to the occurrence of DM	52 (11.7)	301(67.5) *	93 (20.9)
Diabetes mellitus is caused by supernatural forces (e.g. Witches& Wizards).	68 (15.2)	294 (65.9) *	84 (18.8)

*Perception in line with biomedical world view

Table 4.9: Respondents' Perception relating to DM prevention through Lifestyle Modification

N=446

Perception related to DM prevention through Lifestyle Modification	Responses		
	Agree (%)	Disagree (%)	Undecided (%)
Increasing intake of sugar containing foods cannot lead to diabetes mellitus because sugar is needed by the body for energy	111(24.9)	307 (68.8)*	28 (6.3)
Regular physical exercise can be used to make one fit or healthy; it cannot prevent diabetes mellitus	106 (23.8)	286 (64.10) *	54 (12.1)
Reduction of starchy foods only makes one hungry, It cannot prevent Diabetes	130 (29.1)	224 (50.2)*	92 (20.6)
Eating fruits and vegetables regularly can help prevent the occurrence of diabetes	288 (64.6) *	99 (22.2)	59 (13.20
Reducing alcohol consumption is a means of reducing the possibility of having diabetes mellitus	108 (24.2) *	187 (41.9)	151 (33.9)

* Perception in line with biomedical world view

Table 4.10: Respondents' Perception relating to seriousness of DM

N=446

Perception relating to seriousness of DM	Responses		
	Agree (%)	Disagree (%)	Undecided (%)
Diabetes mellitus is not an issue one should worry too much about	104 (23.3)	276 (61.9) *	66 (14.8)
Diabetes mellitus cannot affect one's social life	95 (21.3)	284 (63.7) *	67 (15.0)
Diabetes mellitus is a disease that can be cured once and for all	56 (12.6)	322 (72.2) *	68 (15.2)
Diabetes mellitus is not a serious health problem	69 (15.5)	284 (63.7) *	93 (20.9)
Diabetes mellitus is not a disease that is expensive to manage	59 (13.2)	329 (73.8) *	58 (13.0)
Diabetes mellitus cannot kill	83 (18.6)	309 (69.3) *	54 (12.1)

* Perception in line with biomedical world view

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Table 4.11: Respondents' Perception relating to Barriers to DM Prevention

N=446

Barriers to DM Prevention	Responses Yes (%)	No (%)
lack of knowledge	115 (25.8)	331 (74.2)
Poor awareness	131 (29.4)	315 (70.6)
Expensive medical care	41 (9.2)	405 (90.8)
financial problem	133 (29.8)	313 (70.2)
uncontrolled food intake	122(27.4)	324 (72.6)
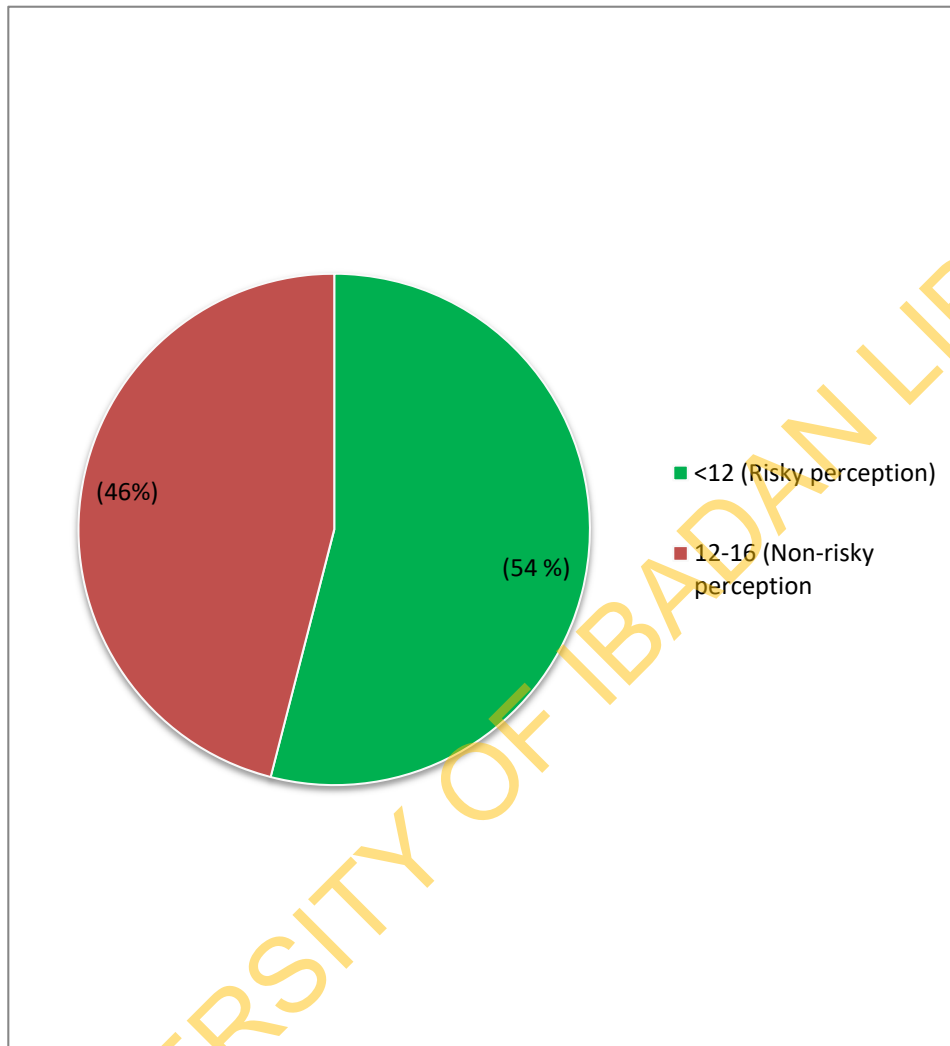
Figure 4.3: Categories of perception relating to DM among respondents
***Mean perception score= 10.9±9**

Table 4.12: Respondents' Self Efficacy relating to DM control measures

N=446

Activity related to DM control measures	Levels of Self Efficacy *		
	Very Confident (%)	A bit Confident (%)	Not Confident at all (%)
Participating in 30 minutes physical exercise for at least 3 times in a week	232 (52.0)	160 (35.9)	54 (12.1)
Reduction in Consumption of carbohydrate Foods	159 (35.7)	241 (54.0)	46 (10.3)
Doing Blood sugar Test at regular intervals	193 (43.3)	177 (39.7)	76 (17)
Regular Blood Pressure measurement	142 (31.8)	252 (56.5)	52 (11.7)
Reduction in consumption of Fatty foods	183 (41.0)	176 (39.5)	87 (19.5)
Reduction in consumption of Alcohol	178 (39.9)	202 (45.3)	66 (14.8)
Regular Measurement of Body Weigh	109 (24.4)	246 (55.2)	91 (20.4)
Regular consumption of fruit and vegetables	198 (44.4)	15.1)	47(10.5)

*Mean Self Efficacy score = 9.5 ± 9 (based on a 0-2 point scale as follows very confident= 2points; a bit confident=1; not confident at all = 0)

Table 4.13: Potential Cues to action among respondents

	N=446	
	Responses	
Potential Cues to action +	Yes (%)	No (%)
Awareness of persons with DM	133 (29.8)	313 (70.2)
Experiences shared by Diabetic patients	97 (21.7)	349 (78.3)
Ever received advice/ counsel from someone living with diabetes concerning the need to avoid the disease	83 (18.6)	363 (81.4)
Health education by a health worker on DM	165 (37.0)	281 (63.0)
Ever heard about diabetes from the mass media (eg newspaper, News, magazines, radio, Television, Posters)	232 (52.0)	214 (48.0)

+ Awareness of persons with DM, experiences/advice shared by them, health education and public enlightenment relating to DM

Table 4.14: Cues that have ever made respondents to take preventive measure against DM

<div align="right">N=446</div>

Cues that have ever made respondents to take preventive measure	Responses	
	Yes (%)	No (%)
Awareness of persons with DM	107 (24)	339 (76)
Experiences shared by Diabetic patients	64 (14.3)	382 (85.7)
Ever received advice/ counsel from someone living with diabetes concerning the need to avoid the disease	50 (11.2)	396 (88.8)
Health education by a health worker on DM	48 (10.8)	398 (89.2)
Ever heard about diabetes from the mass media (eg newspaper, News, magazines, radio, Television, Posters)	139 (31.2)	307 (68.8)

4.5 Practices relating to Diabetes Mellitus

Table 4.15 shows respondents' practices or lifestyles relating to DM. Almost all the respondents (98.0%) had never smoked cigarettes or taken any tobacco products in their life time; however, majority (88.9%) of those who have ever taken any tobacco products did not take it daily. About one-third (32.1%) of the respondents take alcoholic drinks; 79.7% of them take it once a day. Beer (60.0%) was the alcoholic drink respondents enjoyed taking followed by wine (30.0%), spirit (22%) and palm-wine (22%) (See table 4.15 for more details).

Soft drinks ever taken by respondents are highlighted in table 4.16. Majority (73.1%) of the respondents had taken soft drinks in their lifetime. The type of soft drinks taken by respondents that topped the list was *Maltina* (52.8%). Others included *Coke* (50.3%), *Fanta* (36.5%), *Seven up* (12.9%) and *Mirinda* (12.6%) (See table 4.16 for more details). Table 4.17 highlights the number of bottles of soft drinks taken per day by respondents. Majority (71.4%) of them reportedly take two bottles of *seven* up in a day, about two third (63.4%) takes two bottles of *mirinda* a day while half takes two bottles of *coke* daily (See table 4.17 for more details).

Table 4.18 depicts respondents' participation in physical exercise. Majority (87.7%) of the respondents had practiced physical exercise so as to promote their health ; slightly above half (50.9%) of the respondents participate in physical exercise once in a week. Over two-third (68.5%) of the respondents spends about 30 – 60 minutes on carrying out physical exercise on each occasion. Less than half (41%) reported that they walk for at least 10-30 minutes 2 days in a week while 21.3% does that for 3days (See table 4.18 for more details).

Table 4.20 shows respondents' anthropometric characteristics or measurements and the categorization of BMI scores. The mean weight was 70.6 ± 13.6 kg; the mean height was 1.68 ± 0.07m while the mean BMI score was 25.6 ± 8.4. Less than half (42.8%) of the respondents had a normal weight while 39.9% were over-weight. Few (11%) were obese and very few (6.3%) were under weight (See table 4.20 for more details).

Treatment seeking behavior among respondents with DM is shown in table 4.21. Majority (84.4%) of the respondents with DM were on medication for diabetes. All the respondents avoid sugar intake to keep the condition in check. Slightly above half (53.1%) take herbs while only a few (9.4%) engage in physical exercises to keep the condition in check (See table

4.21 for more details). Figure. 4.4 depicts places from where respondents seek help for their diabetic condition. Almost half (46.9%) seek for help in General hospital, 34.4% makes use of private hospital while 15.6% visits medical laboratories (See fig. 4.4 for more details).

Table 4.15: Respondents' Practices or lifestyles relating to DM

Practices/ life styles relating to DM	N	%
Ever smoked cigarettes or taken any tobacco products **(N=446)**		
Yes	9	2
No	437	98
Currently smoke any tobacco products such as cigarettes, cigars or pipes **(n=9)**		
Yes, daily	1	11.1
Yes, but not daily	8	88.9
Whether taken any type of alcoholic drink **(N=446)**		
Yes	143	32.1
No	303	67.9
Number of times Alcoholic drink is taken per day **(n=143)**		
Once	114	79.7
Twice	24	16.8
More than 2 times	5	3.5
Type of alcoholic drinks enjoyed taking **(n=143)**		
Beer	60	42.0
Wine	30	21.0
Spirit	22	15.3
palm-wine	22	15.3
Ogogoro	9	6.4

Table 4.16: Soft Drink ever taken by respondents and types

Soft Drinks	Yes (%)	No (%)
Ever taken any type of soft drink **(N=446)**	326(73.1)	120 (26.9)
*Type of soft drinks taken***(n=326)***		
Maltina	172 (52.8)	154 (47.2)
Coke	164 (50.3)	162(49.7)
Fanta	119 (36.5)	207(63.5)
Seven up	42 (12.9)	284(87.1)
Mirinda	41 (12.6)	285(87.4)

*Multiple responses

Table 4.17: Number of bottles of Soft Drinks taken per day by respondents

Bottles of Soft Drinks taken per day	N	%
Coke (n= 164)		
1 bottle	82	50.0
2 bottles	82	50.0
Fanta(n=119)		
1 bottle	69	58.0
2 bottles	50	42.0
Maltina(n=172)		
1 bottle	89	51.7
2 bottles	83	48.3
Seven up (n=42)		
1 bottle	12	28.6
2 bottles	30	71.4
Mirinda(n=41)		
1 bottle	15	36.6
2 bottles	26	63.4

Table 4.18: Respondents' pattern of participation in physical exercise

Participation in Physical Exercise	N	%
Ever participated in physical exercise to promote health(N=446)		
Yes	391	87.7
No	55	12.3
Number of times participated in exercise in a week to promote health(n=391)		
Once	199	50.9
Twice	124	31.7
More than twice	68	17.4
*Amount of time spent on carrying out physical exercise on each occasion (in minutes) (n=391) ***		
<30	118	30.2
30-60	268	68.5
>60	5	1.3
Number of days walk for at least 10-30 minutes at a time per week **(N=446)**		
1 day	28	6.3
2 days	183	41.0
3 days	95	21.3
4 days	59	13.2
5 days	57	12.8
6 days	1	0.2
7 days	23	5.2
Average time spent **sitting for a long time without walking around on a typical day at work (N=446)****		
10-30 minutes	93	20.9
31-60 minutes	159	35.7
61-120 minutes	59	13.2
121-180 minutes	61	13.7
>180 minutes	74	16.6

Table 4.19: Respondents Anthropometric Characteristics and categorization by BMI

N=446

Anthropometric Characteristics	Mean Value
Weight (kg)	70.6$\pm$ 13.6
Height (m)	1.68$\pm$ 0.07
BMI (calculated in kg/m^2)	25.55$\pm$ 8.4
BMI Categorization	N (%)
under weight (<18.5)	28 (6.3)
normal weight (18.5-24.9)	191 (42.8)
over weight (25-29.9)	178 (39.9)
Obese (30 and above)	49 (11.0)

+(Ahlqvist *et al.*, 2011)

Table 4.20: Treatment seeking behavior among Respondents with DM

n=32

Treatment seeking behavior	N	%
Whether on medication for Diabetes		
Yes+	27	84.4
No	5	15.6
Other things done to keep Diabetic condition in check		
physical exercise		
Yes+	3	9.4
No	29	90.6
taking of herbs		
Yes*	17	53.1
No	15	46.9
Taking Bitter leaf		
Yes*	1	3.1
No	31	96.9
Prayers		
Yes*	22	68.8
No	10	31.2
Avoiding sugar intake	32	100

- Actions not scientifically proven to be effective or helpful
+ Effective actions/behaviours

67
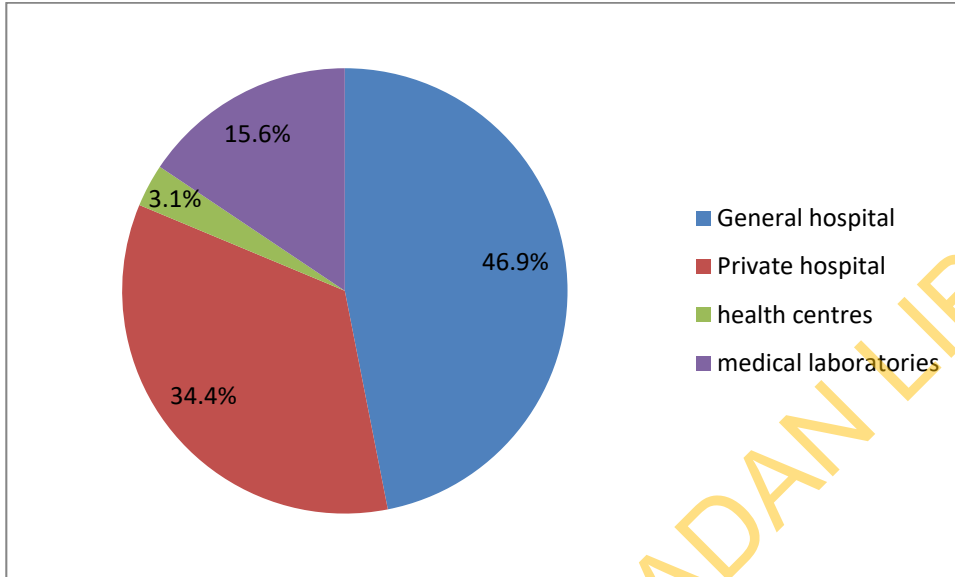
Figure 4.4: Places from where respondents seek help for Diabetic condition.

4.6 Comparisons of Respondent's Knowledge Scores

Table 4.22 summarizes the comparison of respondents' knowledge by socio - demographic characteristics. The results show a statistically significant difference (<0.005) in the mean knowledge scores of respondents by age with those aged <30 having the highest mean knowledge score of 17.9±4.5 and those aged 40-49 and 50-59 having mean knowledge score of 15.73±5.2 and 16.2±4.8 respectively. A statistically significant difference (<0.005) was also reported based on respondents' marital status with those never married having the highest mean knowledge score of 17.38±5.4. A statistically significant difference (<0.005) was also reported for ethnic group with those from the Hausa tribe having the highest mean knowledge score of 23.2±3.4.

The comparison of respondents' mean knowledge score by perception is shown in table 4.23. The mean knowledge score obtained by respondents with unfavorable perception was 14.9±5.3. The mean knowledge score obtained by those with favorable perception was 16.4±5.2. The difference in the mean scores was statistically significant. (See table 4.23 for details).

The comparison of respondents mean knowledge scores by underweight, Normal weight, overweight and obese is shown in table 4.24. The respondents who were obese had a mean knowledge score of 17.5±5.0; this was followed by those who were underweight (16.4±4.6). The mean knowledge score of respondents with normal weight was compared with those with pathological weight conditions (i.e. underweight + overweight + obese), the mean scores of those with normal weight and those with pathological weight conditions were 15.43±5.9 and 15.81±4.8 respectively with no significant difference. (See table 4.24 for details).

Table 4.21: Comparison of Respondents' knowledge by Socio-demographic Characteristics

	No	$\bar{x}$ knowledge score	Std. deviation	Df	F/t –test	P value
Age						
<30	41	17.90	4.532	3	4.738 **	0.003+
30-39	145	14.63	5.510			
40-49	187	15.73	5.249			
50-59	73	16.22	4.762			
Sex						
Male	233	15.65	5.06	1	2.666 *	0.103
Female	233	15.65	5.48			
Religion						
Christianity	307	15.65	5.449	2	0.028 **	0.973
Islam	135	15.62	4.923			
Traditional worshipper	4	16.25	0.500			
Marital Status						
Not currently married++	107	17.38	5.376	1	3.969 *	0.000+
Married	339	15.10	5.117			
Highest level of Education						
NCE	46	15.30	5.769	5	1.290 **	0.260
OND	120	15.73	4.819			
HND	71	14.97	4.922			
BSC	175	15.79	5.043			
PGD	29	17.21	7.428			
Masters	4	14.25	8.057			
Ethnic Group						
Yoruba	386	15.25	5.114	3	16.794**	0.000+
Hausa	26	23.23	3.362			
Igbo	23	14.91	2.644			
South-south	11	13.23	4..105			

*Results are based on t-test analyses

** Results are based on F-test analyses

+ Statistically significant   ++Never married+ Single parents

Table 4.22: Comparison of Respondents' knowledge by perception

Typologies of Perception	No	$\bar{x}$ knowledge Score	Std. deviation	Df	t –test	P value
Unfavorable Perception	241	14.99	5.260	1	2.888	0.004 *
Favorable Perception	205	16.42	5.177			

*Statistically significant

Table 4.23 Comparison of respondents' Mean knowledge by BMI Category

	No	$\bar{x}$ knowledge Score	Std. deviation	Df	F/t-test	P value
Category A :						
*BMI Category by weight**						
Under weight (< 18.5)	28	16.36	4.621	3	2.616	0.051
Normal weight (18.5-24.9)	191	15.43	5.867			
Overweight (25- 29.9)	178	15.26	4.613			
Obese (30 and above)	49	17.49	5.075			
Category B						
*Normal vs. Pathological BMI***						
Normal weight	191	15.51	5.854	1	0.748	0.468
Pathological BMI	255	15.75	4.786			

*=calculated using F-test

**=calculated using t-test

4.7 Comparisons of Respondent's Perception Scores

The comparison of respondents' perception by socio-demographic characteristics is summarized in table 4.25. The result showed a statistically significant difference (0.039) in the perception scores of respondents by age with those aged <30 years having the highest mean perception score of 11.3± 1.8 followed by those aged 30-39 with a mean score of 11.2±2.3. A statistically significant difference (p<0.005) was also reported based on respondents' ethnic group with those from the Hausa tribe having the highest mean perception score 11.8±3.06. The differences in mean perception scores by other socio-demographic parameters are not significant. (See table 4.25 for details).

The comparison of respondents mean perception scores by BMI category (underweight, normal weight, overweight and obese) is shown in table 4.26. The respondents who were obese had a mean perception score of 11.1±2.8, while those who were under weight had a mean score of (10.00±2.7). The result showed that there was a statistically significant difference between their perception and BMI category. The mean perception score of respondents with normal weight was compared with those with pathological weight conditions (i.e. underweight + overweight + obese). The mean score of those with normal weight and those with pathological weight conditions was 11.2±2.5 and 10.7±2.3 respectively The result however showed a statistically significance difference. (See table 4.26 for details).

Table 4.24: Comparison of Respondents' mean perception score by Socio-demographic Characteristics

	No	$\bar{x}$ perception score	Std. deviation	Df	F/t –test	P value
Age						
<30	41	11.29	1.834	3	2.814 **	0.039+
30-39	145	11.19	2.328			
40-49	187	10.53	2.597			
50-59	73	11.16	2.285			
Sex						
Male	233	10.76	2.332	1	1.433*	0.152
Female	233	11.09	2.489			
Religion						
Christianity	307	10.90	2.506	2	0.416 **	0.660
Islam	135	10.94	2.212			
Traditional	4	12.00	2.000			
Marital Status						
Not currently Married++	107	10.75	2.376	1	0.854 *	0.394
Married	339	10.98	2.428			
Highest level of Education						
NCE	46	11.09	2.085	5	3.183**	0.005
OND	120	10.83	2.643			
HND	71	10.46	2.431			
BSC	175	10.86	2.167			
PGD	29	12.59	2.885			
Masters	4	11.50	2.887			
Ethnic Group						
Yoruba	386	10.74	2.368	3	5.479 **	0.000+
Hausa	26	11.77	3.063			
Igbo	23	12.78	1.278			
South-south	11	11.32	2.208			

*Results are based on t-test analyses

** Results are based on F-test analyses

+statistically significant

++ Never married+ Single parents

Table 4.25   Comparison of Respondents' Perception by BMI Category

	No	$\bar{x}$ perception Score	Std. deviation	Df	F-test	P value
Category A						
BMI Category by weight*						
Under weight (< 18.5)	28	10.00	2.722	3	2.811	0.039+
Normal weight (18.5-24.9)	191	11.21	2.473			
Overweight (25- 29.9)	178	10.71	2.134			
Obese (30 and above)	49	11.08	2.805			
Category B						
Normal vs Pathological						
BM **						
Normal weight	191	11.19	2.469	1	2.069	0.039+
Pathological BMI	255	10.72	2.357			

+ Statistically significant

*=calculated using F-test

**=calculated using t-test

4.8 Comparisons of Respondent's Self-efficacy Scores

The comparison of respondents' self-efficacy by socio-demographic characteristics is summarized in table 4.27. The result showed that there was no significant difference ($P>0.005$) in the self-efficacy scores of respondents by sex with the male gender having a mean self-efficacy score of 9.5 ± 3.1 and the female gender with a mean score of 9.6 ± 3.1. The result further showed that the difference in the self-efficacy score by other socio-demographic parameters were not significant (See table 4.27 for details).

The comparison of respondents mean self-efficacy scores by BMI category (underweight, normal weight, overweight and obese) is shown in table 4.28. The respondents who were obese had a mean self-efficacy score of 9.8 ± 2.8, while those who were under weight had a mean score of (9.1 ± 3.0). The result showed that there was no significant difference between their perception and BMI category .The mean perception score of respondents with normal weight was compared with those with pathological weight conditions (i.e. underweight + overweight + obese). The mean score of those with normal weight and those with pathological weight conditions was 9.6 ± 3.1 and 9.5 ± 3.1 respectively with no significance difference between the mean scores (See table 4.28 for details).

Table 4.26: Comparison of Respondents' Self efficacy by Socio-demographic Characteristics

	No	$\bar{x}$ Self efficacy score	Std. deviation	Df	F/t - test	P value
Age						
<30	41	9.00	3.209	3	0.602**	0.614
30-39	145	9.48	2.930			
40-49	187	9.56	3.173			
50-59	73	9.81	3.340			
Sex						
Male	233	9.48	3.141	1	0.273 *	0.785
Female	233	9.56	3.113			
Religion						
Christianity	307	9.59	3.138	2	0.963 **	0.382
Islam	135	9.32				
Traditional	4	11.24				
Marital Status						
Not currently Married++	107	9.30	2.985	1	0.840*	0.402
Married	339	9.59	3.167			
Highest level of Education						
NCE	46	8.74	2.760	5	1.929**	0.075
OND	120	10.07	3.350			
HND	71	9.48	2.912			
BSC	175	9.30	3.010			
PGD	29	10.28	3.565			
Masters	4	7.50	2.887			
Ethnic Group						
Yoruba	386	9.55	3.079	3	0.887 **	0.472
Hausa	26	9.85	3.552			
Igbo	23	8.43	3.314			
South-south	11	9.77	3.353			

*Results are based on t-test analyses

** Results are based on F-test analyses

++ Never married+ Single parents

Table 4.27: Comparison of Respondents' Self efficacy by BMI Category

	No	$\bar{x}$ Self-efficacy Score	Std. deviation	Df	F-test	P value
Category A						
BMI Category by weight*						
Under weight (< 18.5)	28	9.11	3.023	3	0.356	0.785
Normal weight (18.5-24.9)	191	9.60	3.166			
Overweight (25- 29.9)	178	9.43	3.190			
Obese (30 and above)	49	9.78	2.808			
Category B						
Normal vs. Pathological BMI**						
Normal weight	191	9.60	3.144	1	0.479	0.778
Pathological BMI	255	9.46	3.113			

*=calculated using F-test

**=calculated using t-test

4.9 Test of Formulated Hypotheses

Hypothesis 1

Table 4.29 shows the result of the testing of the null hypothesis which states that "there is no significant association between respondents' knowledge and their age". Slightly less than half (49.3%) of respondents aged 50-59 years had fair knowledge of DM while 19.5 % of respondent's aged <30 years had poor Knowledge. The result showed that there was a significant association between knowledge of respondents on DM and their age. (X^2= 23.034, df = 6, p-value = 0.001). The null hypothesis (Ho) is rejected.

Hypothesis 2

The result of the testing of the null hypothesis which states that "there is no significant association between respondents' knowledge and their gender" is presented in table 4.30. Slightly less than half (49.3%) of the male respondents and (40.4%) of the female respondents had a good knowledge of DM. The result shows that there is no statistically significant association between knowledge and gender of respondents'. (X^2= 3.628, df = 2, p-value = 0.163). The null hypothesis (Ho) is therefore not rejected

Hypothesis 3

Table 4.31 shows the result of the testing of the null hypothesis which states that "there is no significant association between respondent's knowledge and their perception of DM". More than half (54.5%) of respondents with a fair knowledge of DM had an unfavourable perception of DM; also over half (58.6) of the respondents with good knowledge had a favourable perception of DM. The result shows that there is no statistically significant association between knowledge and perception of respondents'. (X^2= 5.924, df = 2, p-value = 0.052). The null hypothesis (Ho) is therefore not rejected.

Hypothesis 4

The result of the testing of the null hypothesis which states that "there is no significant association between respondents' perception and their gender" is presented in table 4.32. Less than half (42.2%) of the male and 49.8% of the female respondents had a favourable perception of DM. The result shows that there is no statistically significant association between Perception and gender of respondents'. (X^2= 2.609, df = 1, p-value = 0.064). The null hypothesis (Ho) is therefore not rejected.

Hypothesis 5

Table 4.34 shows the result of the testing of the null hypothesis which states that "there is no significant association between respondents' gender and participation in physical activity". Most (90.1%) of the male and 85.2% of the female respondents had ever participated in physical activity. The result shows that there is no statistically significant association between respondents gender and participation in physical activity'. (X^2= 2.509, df = 1, p-value = 0.075). The null hypothesis (Ho) is therefore not rejected.

Table 4.28: **Association between respondents' knowledge and their age**

Age Group	Knowledge Group			Chi square	Df	P- value
	Poor (%)	Fair (%)	God (%)			
<30	8 (19.5)	24 (58.5)	9 (22.0)	23.034	6	0.001
30-39	78 (53.8)	48 (33.1)	19 (13.1)			
40-49	67 (35.8)	92 (49.2)	28 (15.0)			
50-59	23 (31.5)	36 (49.3)	14 (19.2)			

(p<0.05)

.

Table 4.29: Association between respondents' knowledge and their gender

Gender	Knowledge Group			Chi square	Df	P- value
	Poor (%)	Fair (%)	Good (%)			
Male	81 (36.3)	110 (49.3)	32 (14.3)	3.628	2	0.163
Female	95 (42.6)	90 (40.4)	38 (17.0)			

(p<0.05)

Table 4.30: Association between respondent's knowledge and their perception of DM

Category of Knowledge	Perception Category		Chi square	Df	P- value
	Unfavorable	Favorable			
Poor (<15)	103 (58.5)	73 (41.5)	5.924	2	0.052
Fair (15- <23)	109 (54.5)	91 (45.5)			
God (23-30)	29 (41.4)	41 (58.6)			

(p<0.05)

Table 4.31: Association between respondents' perception and their gender

Gender	Perception Category		Chi square	Df	P- value
	Unfavorable	Favorable			
Male	129 (57.8)	94 (42.2)	2.609	1	0.064
Female	112 (50.2)	111 (49.8)			

(p<0.05)

Table 4.32: **Association between respondents' gender and participation in physical activity**

Gender	Ever participated in physical activity		Chi square	Df	P- value
	Yes (%)	No (%)			
Male	201 (90.1)	22 (9.9)	2.509	1	0.075
Female	190 (85.2)	33 (14.8)			

(p<0.05)

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The overall goal of this study was to determine the prevalence, knowledge, perception and practices relating to DM among civil servants at the state secretariat, Agodi Ibadan. This chapter is organized into the following sub-sections: socio-demographic characteristics; respondent knowledge; prevalence of DM among the respondents,; perception of respondents and practice of respondents towards diabetes mellitus. Other sub-sections are the implications of the findings for health promotion and education, conclusion and recommendations.

5.1 Socio-Demographic characteristics of the Civil Servants The mean age of the civil servants in this study was 41.1 ± 8.3, while their ages ranged between 26-59. This implies that the study participants constituted an adult population. A similar age range was reported in a study conducted by Agu *et al*., (2015) among civil servants in Onitsha. The gender distribution of the 446 respondents revealed that there were 50% males and 50% females; this is so because the study was purposefully designed to ensure equal distribution of male and female respondents. This approach is similar to what Arugu & Maduka (2018) did among 462 adults' participants in Niger Delta region of Nigeria. Majority (76.0%) were married, this is similar with the study done by Agu *et al*., (2015) which showed that 87.4% of the respondents were married. A large proportion of the respondents were Yoruba. This could be attributed to the fact that Oyo state is one of the Yoruba speaking states in South western region of the country.

In the process of designing and implementing educational programmes relating to DM, socio-demographic characteristics such as age, gender, and level of education, marital status revealed in this study should be used as a guide in the selection of educational methods, strategies and educational aids .

5.2   Prevalence of DM among respondents

The prevalence of DM is on the increase in Nigeria and this may be associated with lifestyle changes that lead to overweight and obesity (WHO 2018). In this study, the proportion of participants who reported that they were having DM was 7.2%. The finding from this study was lesser than the 11.0% reported among adults in Lagos by the Federal Ministry of Health and Social Services (2014). A study carried out by Shittu et al., (2017) among adults in Oke-ogun region of Oyo state Nigeria revealed a 4.6% prevalence of DM. This is understandable given the contributions of lifestyle modifications such as reduced physical activity, excessive intake of calories and sedentary lifestyles among this study population (the civil servants). The prevalence of DM will most likely be higher in urban areas compared to rural areas. The implication of this is that there is a need to promote physical activity and adequate nutrition which favor consumption of fruits and vegetables which are known to help in preventing the occurrence of DM among the study population.

A quarter (25.1%) of the respondents had immediate relatives who suffered from DM. This result was similar to the results of the study done among the civil servants in Onitsha by Agu *et al*., (2015) where 28.0% of their respondents had family history of DM. It is to be noted that family members often share genetic and environmental factors that can contribute to risk for DM. A family history of diabetes has been linked with increased risk for type 2diabetes (Ahlqvist *et al.,* 2011).

This study revealed that most of the respondents had never checked their blood sugar level. This is similar to a study carried out by Kassahun and Mekonen (2017) among community members of Bale zone in South East Ethiopia which revealed that most of the respondents had never checked their blood sugar level. Early detection of diseases is needed for the timely management of the disease. In addition Early detection and treatment reduce the complications of DM (WHO 2010).Studies have shown that many people with undiagnosed DM already have complications such as chronic kidney disease, heart failure, retinopathy and neuropathy (Hammond et al.,2010: Chukwuonye et al., 2013: Chineye et al., 2015).

5.3. Knowledge of DM among respondents

This study revealed that there are several gaps in respondents' knowledge relating to diabetes mellitus. For instance, less than half (41.4%) of the respondents were able to correctly define Diabetes mellitus as *"a disease characterized by elevated levels of blood glucose"*. Far less than half of the respondents knew that blindness, kidney failure, hypertension and stroke, were as a result of untreated Diabetes mellitus. This is a gap in knowledge which needs to be bridged because untreated diabetes mellitus can lead to severe complications which can eventually lead to death.

Majority of the respondents in the study were conversant with the causes or factors that can lead to diabetes mellitus. Many respondents were of the opinion for instance that diabetes mellitus could be caused by too much consumption of sugary substances or drinks and excessive consumption of carbohydrate foods. The result of this study supported the results of previous studies conducted in Nigeria which showed that most of the respondents had the knowledge that DM is a sugar related disease (Okoli et al., 2009; Odili et al., 2011: Arugu et al., 2018).

This study indicates that majority of the respondents reported that complete avoidance of alcohol, regular physical exercises and regular checking of blood sugar are measures for preventing complications of D.M. In addition to the fact that the respondents in this study are literates, the study participants are in an urban area with increased use of modern technologies and devices for accessing heath information. This study revealed the media to be the highest source of Information on DM. This might have influenced the respondents' knowledge of the disease.

Respondents had fair knowledge on the symptoms of diabetes mellitus. Less than half believed that excessive thirst (wanting to drink water all the time) was a symptom of DM while slightly above half of the respondents knew that delay in healing of wound could be a symptom of DM. This is different from what was found by Achigbu et al., (2015) among Outpatients at the endocrinology Clinic of the Federal Medical Centre, Owerri, Imo State, Nigeria. Achigbu et al., (2015) noted that respondents had a good knowledge of symptoms of DM. The noted difference between the findings of these studies could be the difference in the settings where they were conducted. Clinic based health talks could have a great influence on

the knowledge of the respondents. This indicates that awareness of DM needs to be created across all settings- work place, school, and religious settings.

5.4   Perception towards DM among respondents

This study revealed that more than half of the respondents did not share the view that DM is a disease for old people. This is similar to what was reported in a study by Albargawi, Snethen and Gannass, (2016) among persons with type 2 DM in Saudi Arabia which showed that most of the respondents reported a high perceived susceptibility to DM. This implies that perception of vulnerability to DM will encourage people to live a healthy lifestyle thereby reducing their risk of diabetes.

The findings of this study reveal that there are several risky perceptions relating to seriousness of diabetes mellitus. For instance almost one-quarter of the respondents were of the view that diabetes mellitus is not an issue one should worry about and that diabetes cannot affect ones social life. This reflects a gap in knowledge which needs to be bridged because inappropriate perception of the seriousness of DM will hinder adoption of healthy lifestyle which can help prevent DM. The results suggest the need for sensitisation and creation of awareness regarding the seriousness of DM so as to reach out to people who indulge in lifestyle that predispose them to DM without knowing the adverse effect of their actions.

There was a statistically significant association between age and perception of respondents (P value=0.039). This could be ascribed to the fact that the participants are constituting an adult segment of the working population who have various experiences, levels of exposures and information which could greatly influence their perception.

5.5   Practices relating to DM among respondents

Majority of respondents had never smoked cigarettes or tobacco products. Also, most of the respondents do not involve in the consumption of alcoholic drinks. This is encouraging as abstinence from smoking and rational use of alcohol are among the effective ways of reducing the prevalence of DM (Meyer et al.2000; Sanni et al, 2011)

In this study slightly above half (50.9%) of the respondents participated in physical exercise once in a week .and two-third (68.5%) spends about 30 – 60 minutes on carrying out physic al

exercise on each occasion. It has been observed that inactivity promotes the development of type 2 DM (Chukwuonye et., al 2013). This indicated that the high risk group (those who do not indulge in appropriate physical exercise should be encouraged to participate in physical exercise at least 3 times a week for at least 30 minutes as recommended by WHO (2011).

The high proportion of overweight and obesity in this study is consistent with reports from various population sub-groups of the Nigeria population as described by Arugu et al. (2018) and Banwat et al. (2015) in Jos. The high incidence of overweight and obesity is worrisome due to the reported links with liver fat accumulation and associated metabolic syndrome which could increase the existing burden of disease on the Nigerian health system ((Jinu *et al.,*2013). Studies have shown that overweight and obesity can reduce productivity at work including absenteeism, decreased efficiency and premature mortality (Hammond and Levine, 2010; Pronk et al.,2012)

This study presented the treatment seeking behaviours of respondents who reported they were living with DM. Slightly above half of the respondents (53.1%) thought that herbs could cure diabetes. It should be noted that herbs used in the treatment of DM have not been found to be therapeutically effective and safe through rigorous scientific investigations. The implication of this is that the use of herbs might affect adherence to recommended orthodox treatment a situation that can compromise the health of DM patients.

5.6 The health promotion and education implications of the study

This study reveals the need for health promotion and education programmes aimed at addressing respondents gaps in knowledge misconceptions and risky practices relating to DM. Health promotion and education intervention can help in promoting behaviours relating to the early detection and management of diabetes mellitus. Health education is any planned combination of learning experiences designed to predispose, enable and reinforce voluntary actions, conducive to health in individuals, groups or communities (Green and Kreuter, 1991). Health promotion is the process of enabling people to increase control over their health and its determinant through the combination of educational environmental supports for actions and conditions of living conducive to health (Tessaro et al., 2007). Public enlightenment is a useful health education strategy which has the potential for reaching a large number of people,

It can be used to create awareness relating to DM and influence perceptions and practices as well as foster political will for action (Whitting et al., 2011).The media with special reference to Television and radio and health workers were the most common sources of assessing information about Diabetes Mellitus among the respondents. Therefore, appropriate public enlightenment programs conducted by the staff clinic in collaboration with the state ministry of health can be used to deliver DM related messages targeted at the civil servants. Behavioral change communication materials should carry messages specially designed to take into consideration the socio-demographic characteristics of the study population. It is important that Health Promotion platforms mentioned above should be used to increase the level of education/awareness of the populace.

This study revealed high incidences of overweight and obesity among the civil servants. There is a need to promote physical activity and other interventions that can be used to address these challenges. Policy intervention and intersectoral collaborations can be used to promote practices aimed at preventing DM among civil servants. For instance, the State Ministry of health can collaborate with the Ministry of Youth and Sport and the staff clinic at the secretariat to promote physical activity among civil servants. The United states Center for Disease Control and Prevention (CDC) and the American College of Sports Medicine have recommended that adults should engage in at least 30 minutes of moderate physical activity on most days and preferably on all days. The worksite can be an effective location for increasing physical activity levels among employees.

5.7   Conclusion

It can be deduced from the study that the reported prevalence of diabetes reported among the study participants was low and this may be due to the fact that some cases were not reported. It is to be noted that the study did not involve checking the blood sugar level of respondents. Rather reported diagnosed cases were documented from participants. Only a few of the respondents had good knowledge of Diabetes Mellitus. The results indicated that the respondents had a fair knowledge of the causes and symptoms of DM. There are gaps in respondents' knowledge relating to complications of untreated DM and measures for preventing complications of DM. There were major misconceptions of DM with special

reference to respondents' perception of susceptibility and perception relating to seriousness of DM. Several of the respondents were involved in practices that can put them at risk of DM.

5.8   Recommendation

The recommendations based on the findings of the study are as follow:

1. Civil Servants should be encouraged using different strategies to discourage sedentary practices in the office. This entails promotion of the adoption of physical exercises, avoidance of sitting in one place for a long time in the office and taking mobility breaks at work.

2. The various fora for discussions and meetings among the civil servants should incorporate health talks aimed at educating civil servants on DM and other related NCDs. This initiative could be used to address the gaps in knowledge of the civil servants relating to DM

3. Nutrition educational interventions are needed to promote the adoption of healthy eating lifestyle among the civil servants.

4. There should be a policy that encourages the civil servants to check their Blood sugar level (BSL) at regular intervals

5. The health services provided at the staff clinic based at the state secretariat should include routine assessment of BLS and other DM related screening tests.

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APPENDIX 1

QUESTIONNAIRE

PREVALENCE, KNOWLEDGE, PERCEPTION AND PRACTICES RELATING TO DIABETES MELLITUS AMONG CIVIL SERVANTS AT THE STATE SECRETARIAT IBADAN NIGERIA.

Serial Number _____

Dear Respondent,

Good day Ma/Sir I am a postgraduate student of the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan. I am involved in a research which focuses on **"Prevalence, Knowledge, Perception and Practices Relating to Diabetes Mellitus among Civil Servants at the State Secretariat Ibadan Nigeria"**.There are no right or wrong answers to the questions asked or statements made. In many cases, it is your opinion that is needed. Please note that your participation is entirely voluntary. All information gathered as a result of your participation in this study will be treated with utmost confidentiality and will be used sternly for research purposes only.

I have read and understand the consent form and voluntarily agree/disagree to participate in the study by ticking **(√)** in the appropriate box below:

1. Agree ☑ 2. Disagree ☐   Date_____

SECTION A: Socio-Demographic Information

Please tick (√) any of the responses that apply to you in the options provided or complete the blank spaces provided as applicable.

1. Age (in years) as at last birthday_____

2. Sex: 1. Male   2. Female ☐

3. Religion: 1. Christianity ☐ 2. Islam ☐ 3. Traditional ☐

4. Marital Status: 1. Single ☐   2. Married ☐   3.Widowed ☐   4. Divorced ☐

5. Highest Level of Education: 1.No formal Education ☐   2. Primary Education ☐   3 Secondary education ☐   4.NCE ☐ 5.OND ☐ 6.HND ☐ 7.BSC ☐ 8.Pgd ☐ 9.Masters ☐ 10. PhD

6. Ethnic Group: 1. Yoruba ☐ 2. Hausa ☐ 3.Igbo ☐   4. Others (specify) _____

7a. Ministry   _____

Agency   _____

    Department _____

7b.Unit_____

SECTION B: Prevalence of Diabetes Mellitus

8. Does any of your immediate relatives (e.g. father, mother, siblings or Grandparents etc.) ever suffered from diabetes mellitus?   1. Yes ☐ 2. No ☐   3. Don't know ☐

9. Who among your relatives/family ever had diabetes mellitus? **Please indicate the relatives**

a. _____

b._____

c._____

10. Have you ever been diagnosed to have diabetes mellitus? 1. Yes ☐ 2. No ☐

Do you experience any of the following? **Please use the table for your answer. You can tick(√) one or more that applies to you.**   Table 1

S/N	Experiences	Yes	No
11	Excessive thirst (Wanting to drink water all the time)		
12	Progressive and unintended weight loss		
13	Passage of Plenty urine several times during the day and night		

14. Have you ever had your blood sugar level measured in a Laboratory, hospital, Clinic or Health care facility?   1.Yes ☐   2. No ☐

15. When in the last 6 month did you check your blood sugar level?_____

16. Have you ever had to use anti-diabetic medication? 1. Yes ☐   2. No ☐

SECTION C: Knowledge of Diabetes Mellitus

17. What is Diabetes Mellitus?

_____

Table 2 contains a set of statements/terms relating to diabetes mellitus. For each statement, please tick 'True' or 'False'. Tick (√) 'Don't Know' for the responses you are not sure of.
Table 2

S/N	What are the health problems that could result from untreated diabetes mellitus?	True	False	Don't Know
18.1	Leg ulcers that will not heal on time			
18.2	Blindness			
18.3	Kidney failure			
18.4	Stroke			
18.5	Hypertension			

Table 3 contains a set of statements/terms relating to preventing complications associated with diabetes mellitus. For each question, Please tick 'True' or 'False'. Tick (√) 'Don't Know' for the responses you are not sure of.

Table 3

S/N	Measures for preventing complications of diabetes mellitus	True	False	Don't Know
19.1	Regular physical exercises			
19.2	Complete avoidance of alcohol intake			
19.3	Consumption of oil with adequate cholesterol			
19.4	Regular checking of blood sugar level			
19.5	Avoid intake of proteinuous foods			

Table 4.contains a set of statements/terms relating to what can cause Diabetes Mellitus (i.e. Risk Factors) For each statement, please tick whether it is' True' or 'False'. Tick (√) 'Don't Know' for the responses you are not sure of.

S/N	What are the causes or things that can lead todiabetes mellitus? (i.e. risk factors)	Tick (√)		
		True	False	Don't Know
20.1	Obesity (i.e. Fatness)			
20.2	Old Age			
20.3	Heredity/Inheritance			
20.4	Supernatural forces (including witches and wizards			
20.5	Consumption of too much fruits			
20.6	Too much consumption of sugary substances or drinks			
20.7	lack of physical exercise or activity			
20.8	Too much alcohol consumption			
20.9	Smoking of Tobacco products e.g. Cigarette			
20.10	Excessive consumption of Carbohydrate foods			
20.11	Eating too much beef			
20.12	Excessive consumption of vegetables			

Table 5 contains a set of statements/terms relating to the symptoms of Diabetes Mellitus. For each statement, please tick whether it is 'True' or 'False'. Tick (√) 'Don't Know' for the responses you are not sure of.

S/N	Symptoms of diabetes mellitus? (i.e. ways of recognizing diabetes mellitus)	Tick (√)		
		True	False	Don't Know
21.1	Frequent and excessive Urination			
21.2	Excessive Thirst (wanting to drink water all the time i.e.)			
21.3	Vomiting of blood			
21.4	Delay in healing of wounds			
21.5	Headache			
21.6	Weight Loss			

SECTION D   Perception relating to diabetes mellitus

Table 6 contains a set of questions on perception of diabetes mellitus. Please read carefully and tick (√) the statement you "Agree" or "Disagree" with. If you cannot make up your mind tick (√) undecided.

S/N	Perceived susceptibility to Diabetes Mellitus	Tick (√)		
		Agree	Disagree	Undecided
22.1	Eating all kinds of food as much as I can cannot make me get diabetes mellitus			
22.2	Diabetes mellitus is a disease for old people			
22.3	Obesity cannot lead to diabetes mellitus			
22.4	Taking a lot of alcohol is not anyway related to the occurrence of diabetes mellitus			
22.5	Disease mellitus iscaused by supernatural forces(e.g. Witches& Wizards) .			
		Agree	Disagree	Undecided
	Perception related to Diabetes prevention through Lifestyle Modification			
23.1	Increasing intake of sugar containing foods cannot lead to diabetes mellitus because sugar is needed by the body for energy			
23.2	Regular physical exercise can be used to make one fit or healthy; it cannot prevent diabetes mellitus			
23.3	Reduction of starchy foods only makes one hungry, It cannot prevent Diabetes			

23.4	Eating fruits and vegetables regularly can help prevent the occurrence of diabetes			
23.5	Reducing Alcohol consumption is a means to reducing the possibility of having diabetes mellitus			
	Perceived seriousness of Diabetes Mellitus			
24.1	Diabetes mellitus is not an issue one should worry too much about			
24.2	Diabetes mellitus cannot affect one's social life			
24.3	Diabetes mellitus is a disease that can be cured once and for all			
24.4	Diabetes mellitus is not a serious health problem			
24.5	Diabetes mellitus is not a disease that is expensive to manage			
24.6	Diabetes mellitus cannot kill			

25. Perceived Barriers to Diabetes Prevention.

What in your own Opinion are the barriers to taking measures to Prevent Diabetes mellitus?

a_____

b_____

c_____

26. Self- Efficacy (**Perceived Confidence in the ability to engage in some activities**)

Table 7 contains a set of Activities/Tasks. For each tick (√) to indicate your level of Confidence in performing it.

26	Activity/Task	Level of Confidence in Performing Activities tick (√)		
		Very Confident	**A bit Confident**	**Not Confident at all**
26.1	Participating in30 minutes physical exercise for at least 3 times in a week			
26.2	Reduction in Consumption of carbohydrate Foods			
26.3	Doing Blood sugar Test at regular intervals			
26.4	Regular Blood Pressure measurement			
26.5	Reduction in consumption of Fatty foods			
26.6	Reduction in consumption of Alcohol			
26.7	Regular Measurement of Body Weigh			
26.8	Regular consumption of fruit and vegetables			

27 a. Cues to action (Perception ofFactors that activate readiness to behavioral change)

Table 6 contains a list of some factors or experiences. For eachtick (√) yes or No (√) . Also tick (√) yes if the factors has ever made you to take any action to prevent diabetes or tick (√) No if it has never influenced /made you to take any step to prevent the disease from affecting you.

Table 8

27a	Factors /Experiences	Yes	No	Ever made you to take preventive measure against diabetes	
				Yes	No
27.1	Do you know anyone who is having diabetes mellitus?				
27.2	Has anyone with diabetes ever shared his/her experience with you?				
27.3	Have you ever received advice/ counsel from someone living with diabetes concerning the need to avoid the disease?				
27.4	Has any health worker told you about Diabetes mellitus?				
27.5	Have you ever heard about diabetes from the mass media(eg newspaper, News, magazines, radio, Television, Posters)				

27b. what are your sources of information of diabetes mellitus? Please use the table for your answer. You can tick one or more that applies to you in the table.   **Table 9**

27b	Sources of information						
		Yes	No			Yes	No
	1. Doctors /Health Workers/ Nurses				5.Radio		
	2.Parents				6.News Papers		
	3.Friends				7.Health Programs		
	4.Television				8.Commercial Bill Boards		

SECTION E: Practices relating to Diabetes Mellitus

28. The table contains a set of statements/questions on practices or lifestyles. For each tick (√) to indicate whether you indulge in it.

Table 10

S/N	Behavioral and life style issues	Responses
28.1	Have you ever smoked cigarettes or taken any tobacco products?	1. Yes ☐ 2. No ☐
28.2	Do you currently smoke any tobacco product such as cigarettes, cigars or pipes?	1.Yes, daily ☐ 2.Yes, but not daily ☐ 3. No. If No go to Q28.3
28.3	Do you take any type of alcoholic drink? (E.g. Beer, wine, spirit, palm-wine, Ogogoro,) etc.)	1 Yes ☐ 2. No ☐
28.4	If Yes, to Q 28.3above how many times do you take any alcoholic drinks in a week?	1.Once ☐ 2.Twice ☐ 3.more than two times ☐
28.5	Which type of Alcoholic drinks do you enjoy taking	_____

29. The table contains a list of Soft drinks. For each, indicate whether you take it and the number of bottles you take per day on the average

Table 11

29	Soft drinks	Tick(√)		If yes, how many bottles per day				
		Yes	No	1	2	3	4	>5
	1. Coke							
	2. Fanta							
	3. Maltina							
	4. Seven up							
	5. Mirinda							
	6. Juice							

30 a. Table 11 contains a set of statements/relating to physical exercise. For each read and tick (√) as appropriate.

S/N	Physical Exercise	Response . Tick(√)
30.1	Have you ever participated in physical exercise so as to promote your health	1. yes ☐ 2. No ☐
30.2	How many times do you exercise in a week so as to promote your health?	1. Once ☐ 2. Twice ☐ 3. more than two times ☐ 4. No time to exercise ☐
30.3	How many minutes do you spend carrying out exercise on each occasion during the week	_____ Minutes
30.4	During a typical week, how many days do you **walk** for at least 10-30 minutes at a time **in your leisure time**?	1.__ days per weeks 2. Do not walk during leisure time ☐
30.5	In a typical day at work, what is the average time in minutes you spend **sitting for a long time without walking around or doing any physical exercise?**	_____ Minutes

30b.If you do not participate in physical exercise at all or do not exercise regularly, what are the reasons for this. Write your reasons in the spaces provided below

a_____

 b_____

c_____

31. Table 12 contains a set of anthropometric measurements to be determined and recorded by the interviewer for the respondent.

	Anthropometric Measurements	
31.1	Height	_____m
31.2	Weight	_____kg
31.3	Body mass index	_____kg/m2

SECTION F: Treatment seeking behavior for those who have been diagnosed with Diabetes

32. Are you on medication for Diabetes? 1. Yes ☐ 2. No ☐

33. What are the other things you do to keep the condition in check?

a._____ b. _____

34. **The table contains a list of places where care can be sought. For each, indicate whether you go there to seek for care?Table 12**

S/N	**Places Visit for Care**	yes	No			Yes	No
34.1	General Hospitals/Clinics			34.4	Herbalists		
34.2	Private hospitals/Clinics			34.5	Medical Laboratories		
34.3	Health Center's						

Appendix II

Oyo State Ethical Review Committee Approval Letter

TELEGRAMS................   TELEPHONE................

MINISTRY OF HEALTH
DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION
PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. ....
All communications should be addressed to
the Honorable Commissioner quoting
Our Ref. No. AD 13/479/____   17th January, 2019

The Principal Investigator,
Department of Health Promotion and Education,
Faculty of Public Health,
College of Medicine,
University of Ibadan,
Ibadan.

Attention: Ola Oluwatosin

ETHICS APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "prevalence, knowledge, perception and practices relating to diabetes mellitus among civil servants at the state secretariat, Ibadan, Nigeria" has been reviewed by the Oyo State Ethics Review Committee.

2.   The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3.   Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

Wishing you all the best.

Dr. Abbas Gbolahan
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethics Review Committee

APPENDIX III

Letter of Introduction

DEPARTMENT OF HEALTH PROMOTION AND EDUCATION
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Our Ref. HPE/SF.

13th July, 2018

The State Ministry of Health,
Ilorin,
Kwara State.

LETTER OF INTRODUCTION
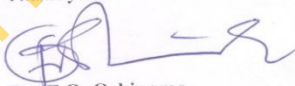
Re: Ola Oluwatosin Temitope
Matric No: 164085

This is to certify that the bearer Ola Oluwatosin T. is an MPH (Health Promotion and Education) student in the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan.

The student intends to carry out a research which focuses on: "**Prevalence, Knowledge, Perception and Practices Relating to Diabetes among Civil Servants at the State Secretariat, Ibadan, Oyo State**". The State Secretariat, Ilorin is the pilot site for the study.

Kindly accord her all necessary assistance she may require.

Thank you.

Dr. F.O. Oshiname
Ag. Head of Department

HEAD
DEPARTMENT OF HEALTH
PROMOTION & EDUCATION
COLLEGE OF MEDICINE
UNIVERSITY OF IBADAN
IBADAN, NIGERIA.

INFORMED CONSENT FORM

Title of the research:

Prevalence, Knowledge, Perception and Practices Relating to Diabetes Mellitus among Civil Servants at the State Secretariat Ibadan Nigeria

Name(s) and affiliation(s) of researcher(s):

This study is being conducted by Ola Oluwatosin Temitope from the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan.

Purpose(s) of research:

The purpose of this study is to investigate the Prevalence, Knowledge, Perception and Practices Relating to Diabetes Mellitus among Civil Servants at the State Secretariat Ibadan Nigeria

Procedure of the research, what shall be required of each participant and approximate total number of participants that would be involved in the research:

A total of 446 participants will be recruited for this study. Each participant will be given a questionnaire asking questions about Prevalence, knowledge, perception and practices to fill; you are required to fill it to the best of your knowledge, the questionnaires will be interviewer-administered. There are no known physical risks to which you will be exposed as a result of your participation in this study.

Expected duration of research and of participant(s)' involvement:

The study will require a maximum of 20 minutes of your time to fill the questionnaire.

Risks:

The study will not involve any risk as it does not involve use of any invasive material

Costs to participants, if any, of joining the research:

The filling of the questionnaire will take a bit of your time. Your participation in this study will cost you nothing.

Benefit(s):

Participants of this research will be given tips on how to prevent Diabetes. This will be in form of health education for participants in various departments where the study is carried out.

Confidentiality:

Information obtained from you will be treated as confidential and will not be used against you in any form. In addition, data analysis and presentation from this study will be aggregate, and will not in any way reveal your identity.

Voluntariness:

Participation in this study is entirely voluntary and you may withdraw from the study at any time

Alternatives to participation:

Not participating in this study will not affect you in any way.

Consequences of participants' decision to withdraw from research and procedure for orderly termination of participation:

You can also choose to withdraw from the research at any time. Please note that some of the information that has been obtained about you before you chose to withdraw may have been modified or used in reports and publications. These cannot be removed anymore. However the researcher promise to make effort in good faith to comply with your choice as much as is practicable.

Statement of person obtaining informed consent:

I have fully explained this research to……………………………….. and have given sufficient information, including risks and benefits to make an informed decision.

DATE…………………….   SIGNATURE……………………………

NAME………………………………………………………………………

Statement of person giving consent:

I have read the description of the research and had it translated into the language I understand. I understand that my participation is voluntary. I know enough about the purpose, methods, risks and benefits of the research to judge that I want to take part in it. I understand that I may

freely stop being part of this study at any time. I have received a copy of this consent form and additional information sheet to keep for myself.

DATE……………………. SIGNATURE……………….

NAME……………………………………………………………………

Detailed contact information including contact address, telephone, fax, email and other contact information of researcher(s), institutional HREC and head of the institution:
This research has been approved by the Oyo State Research Ethical Review Committee and the chairman of this committee can be contacted at Ministry of Health, Secretariat, Ibadan. In addition, if you have any question about your participation in this research, you can contact the principal investigator,

Date _____

Phone _____

Name _____

Signature _____

Name: Ola Oluwatosin Temitope

Department: Health Promotion and Education

Phone: 08161792858

Email: oluwatosinola44@gmail.com

PLEASE KEEP A COPY OF THE SIGNED INFORMED CONSENT

PREVALENCE, KNOWLEDGE, PERCEPTION AND PRACTICES RELATING TO DIABETES MELLITUS AMONG CIVIL SERVANTS AT THE STATE SECRETARIAT IBADAN NIGERIA

A CODING GUIDE

ITEMS	VARIABLES	CODE
	SECTION A: Socio-Demographic Characteristics of Respondents	
Q1a	Respondents ID code	Actual number
Q1b	Age	Actual figure
Q2	Gender: Male	1
	Female	2
	Non response (NR)	9
Q3	Religion: Christianity	1
	Islam	2
	Traditional	3
	NR	9
Q4	Marital Status: Single	1
	Married	2
	WidowedDivorced	3
	NR	4
		9
Q5	Highest level of education: No formal education	1
	Primary Education	2
	Secondary Education	3
	NCE	4
	OND	5
	HND	6
	BSC	7
	PGD	8
	Masters	9
	PhD	10
	NR	11
Q6	Ethnic Group: Yoruba	1
	Hausa	2
	Igbo	3
	Ibibio	4
	Akwa-ibom	5
	NR	9
Q7a	Parastatals:	

	Ministry of Health	1
	Ministry of Finance	2
	Water Corporation of Oyo State	3
	Ministry of land, Housing and Physical Planning Office of the Executive Governor	4
	Office of the Accountant- General	6
	Ministry of Trade, Investment and Cooperatives	7
	Oyo state Teaching service Commission (TESCOM)	8
	Ministry of Education	9
	Office of the Auditor- General for (STATE)	10
	NR	11
	SECTION B: Prevalence of Diabetes Mellitus	
Q8	Whether immediate relatives ever suffered from DM: Yes No Don't Know NR	1 2 3 9
Q9	Relatives/family ever had DM: Father Mother Siblings Grand parents Cousin Uncle Aunty Not applicable NR	1 2 3 4 5 6 7 8 9
Q10	Number of immediate relatives who ever had diabetes that are still alive : NA	Actual figure 8
Q11	Ever been diagnosed to have diabetes mellitus: Yes No NR	1 2 9
Q12	If yes to Q11,How long have you been diagnosed of diabetes of DM NA NR	8 9
Q13s 13.1 13.2 13.3	Illness experienced being encountered Excessive thirst (wanting to drink water all the time) Progressive and unintended weigh loss? Passage of Plenty urine several times during the day and night	(For each) Yes=1 No=2 NR=9

Q14	Ever had your blood sugar level measured		
		Yes	Yes=1
		No	No=2
		NR	9
Q15	When in the last 6 month did you check your blood sugar level		
		Never checked in the last 6 months	1
			2
		March (6 Months ago)	3
		April(5 months ago)	4
		May (4 months ago	5
		June (3 months ago)	6
		July (2 months ago)	7
		August (I month ago)	9
		NR	
Q16	Ever had to use anti-diabetic medications:	Yes	1
		No	2
		NR	9
	SECTION C : KNOWLEDGE OF DIABETES MELLITUS		
Q17	**What is diabetes mellitus** A disease characterized by elevated levels of blood glucose		Correct=1 Incorrect=2 NR=3
Q18	**What are the health problems that can result as a result of untreated DM**		
18.1	Leg ulcers that will not heal on time		(For each)
18.2	Kidney failure		True=1
18.3	Blindness		False= 2
18.4	Stroke		Don't know=3
18.5	Hypertension		NR=9
Q19	**What are the measures for preventing Diabetes complication from occurring**		
19.1	Regular physical exercises		(For each)
19.2	Complete avoidance of alcohol intake		True=1
19.3	Consumption of oil with adequate cholesterol		False= 2
19.4	Regular checking of blood sugar level		Don't know=3
19.5	Avoid intake of proteinuous foods		NR=9
20	**What are the causes or things that can lead to diabetes mellitus:**		
20.1	Obesity (i.e. Fatness)		
20.2	Old Age		(For each)
20.3	Heredity/Inheritance		
20.4	Supernatural forces (including witches and wizards		True=1
20.5	Consumption of too much fruits		False= 2
20.6	Too much consumption of sugary substances or drinks		Don't know=3
20.7	lack of physical exercise or activity		
20.8	Too much alcohol consumption		NR=9
20.9	Smoking of Tobacco products e.g. Cigarette		

20.10	Excessive consumption of Carbohydrate foods	
20.11	Eating too much beef	
20.12	Excessive consumption of vegetables	
21	**Symptoms of diabetes mellitus**	
21.1	Frequent and excessive Urination	(For each)
21.2	Excessive Thirst (wanting to drink water all the time i.e.)	True=1
21.3	Vomiting of blood	False= 2
21.4	Delay in healing of wounds	Don't know=3
21.5	Headache	NR=9
21.6	Weight Loss	
	SECTION D:PERCEPTION RELATING TO DIABETES MELLITUS **Perceived susceptibility to DM**	
22.1	Eating all kinds of food as much as I can cannot make me get diabetes mellitus	
22.2	Diabetes mellitus is a disease for old people	(For each)
22.3	Obesity cannot lead to diabetes mellitus	Agree=1
22.4	Taking a lot of alcohol is not any way related to the occurrence of diabetes Mellitus	Disagree= 2 Undecided=3
22.5	Diabetes mellitus is caused by supernatural forces (e.g. Witches& Wizards) . I cannot get it because I am a child of God	NR=9
	perception related to DM prevention through live style modification	
23.1	Increasing intake of sugar containing foods cannot lead to diabetes mellitus because sugar is needed by the body for energy	(For each) Agree=1
23.2	Reduction of starchy foods only makes one hungry, It cannot prevent Diabetes	Disagree= 2 Undecided=3
23.3	Regular physical exercise can be used to make one fit or healthy; it cannot prevent DM	NR=9
23.4	Eating fruits and vegetables regularly can help prevent the occurrence of diabetes	
23.5	Reducing Alcohol consumption is a means to reducing the possibility of having DM	
	Perceived seriousness of DM	
24.1	DM is not an issue one should worry too much about	(For each)
24.2	DM cannot affect one's social life	Agree=1
24.3	DM is a disease that can be cured once and for all	Disagree= 2
24.4	DM is not a serious health problem	Undecided=3
24.5	DM is not a disease that is expensive to manage	NR=9
24.6	DM cannot kill	
25	**Perceived Barriers to Diabetes Prevention.** Financial Problem Lack of Knowledge	(For each) Yes=1

	Poor awareness Expensive medical care Poor health facilities Un-controlled food intake	No=2 NR=9
26	**Self-Efficacy**	
26.1	Participating in 30 minutes physical exercise for at least 3 times in a week	(For each) Very Confident=1 A bit Confident=2 Not Confident at all=3 NR =9
26.2	Reduction in Consumption of carbohydrate Foods	
26.3	Doing Blood sugar Test at regular intervals	
26.4	Regular Blood Pressure measurement	
26.5	Reduction in consumption of Fatty foods	
26.6	Reduction in consumption of Alcohol	
26.7	Regular Measurement of Body Weigh	
26.8	Regular consumption of fruit and vegetables	
27a(i)	**Cues to action**	
27.1	*Factors/Experiences* Awareness of anyone who is having diabetes mellitus?	(For each) Yes=1 No=2 NR=9
27.2	Awareness of anyone with diabetes ever shared his/her experience with you?	
27.3	Ever received advice/ counsel from someone living with diabetes concerning the need to avoid the disease?	
27.4	Has any health worker told you about Diabetes mellitus?	
27.5	Have you ever heard about diabetes from the mass media(eg newspaper, News, magazines, radio, Television, Posters)	
27a(ii	*Whether ever made you to take preventive measures against DM*	
	Do you know anyone who is having diabetes mellitus?	(For each) Yes=1 No=2 NR =9
	Has anyone with diabetes ever shared his/her experience with you?	
	Have you ever received advice/ counsel from someone living with diabetes concerning the need to avoid the disease?	
	Has any health worker told you about Diabetes mellitus?	
	Have you ever heard about diabetes from the mass media(eg newspaper, News, magazines, radio, Television, Posters)	
27b	**Sources of information on DM**	
	Doctors	(For each) Yes=1 No=2 NR =9
	Parents	
	Friends	
	Television	
	Radio	
	News Paper	
	Health Programs	
	Commercial Bill Boards	
	Posters	
28	**SECTION E : Practices relating to Diabetes Mellitus**	

28.1	Ever smoked cigarettes or taken any tobacco products	For each) Yes=1 No=2 NA=8 NR=9
28.2	Do you currently smoke any tobacco product such as cigarettes, cigars, pipes	Yes, daily=1 Yes, but not daily=2 No=3 NA=8 NR=9
28.3	Do you take any type of alcoholic drink(eg Beer, wine, spirit, palm wine etc)	Yes=1 No=2 NA=8 NR =9
28.4	Number of times you take alcoholic drinks in a week	Once=1 Twice=2 More than 2 times=3 NR =9
28.5	Alcoholic drinks you enjoy taking	
	Beer	For each) Yes=1 No=2 NR=9
	Wine	
	Spirit	
	Palm-wine	
	Traditional drink (Burukutu)	
	Shynap	
29a	Soft drinks taken	
	Coke	(For each) Yes=1 No=2 NR=9
	Fanta	
	Malt	
	Seven up	
	Mirinda	
	Juice	
29b	Number of bottles taken per day	
	Coke	Actual figure
	Fanta	
	Malt	
	Seven up	
	Miranda	
	Juice	
30a	**Physical Exercise**	
30.1	Ever participated in physical exercise to promote health	Yes=1 No=2 NR=9
30.2	Number of times you exercise in a week	Once=1

		Twice=2 More than two times=3 No time to exercise=4 NA=8 NR=9
30.3	Number of minutes you spend carrying out exercise on each occasion during the week	Actual figure NA=8 NR=9
30.4	Number of days you walk for at least 10-30 minutes in your leisure time in a typical week	Actual figure NA=8 NR=9
30.5	In a typical day at work, what is the average time in minutes you spend sitting for a long time without walking around or doing any physical exercise	Actual figure
30b	**What are the reasons for not participating in physical exercise**	
	Non- challant (unworried)	(For each) Yes=1 No=2
	Busy work schedule	
	Exhaustion at work	
	Health issues(Illness)	
	Unavailability of Time	
	Forgetfulness	
		9
	NR	
31	**Anthropometri measurement**	
31.1	Height	Actual figure
31.2	Weight	Actual figure
31.3	BMI Calculated	Actual figure
31.4	BMI/ Weight Category	
	Underweight	1
	Normal weight	2
	Over weight	3
	Obese	4
	No Response	9
32	Are you on medication for your DM condition	Yes=1 No=2 NA=8 NR =9
33	What are the other thing you do to keep the condition in check	

		1.Physical Exercise 2.Taking of herbs 3.Taking Bitter leaf 4.Prayers 5. Avoiding sugar intake	(For each) Yes=1 No=2 NA=8 NR=9
34	**Places visited for care**		
33.1	General Hospital		(For each)
33.2	Private hospital		Yes=1
33.3	Health center's		No=2
33.4	Herbalist		NA=8
33.5	Medical Laboratories		NR =9
35	**Total Knowledge score**		30

36	Category of knowledge score based on percentile
	<50% (Poor)
	                                                          50-74% (Fair)
	                                                          75-100% (Good)
			
			=1
			=2
			=3

37	**Total Perception scores**		16
38	Category of perception score <75% (Unfavorable/risky perception) 75-100 (Favorable/Non risky perception)		 1 2

KNOWLEDGE SCALE/ MARKING GUIDE

S/N	KNOWLEDGE OF DIABETES	Response			Maximum score
1	Definition of Diabetes	A disease characterized by elevated levels of blood glucose			2
		Nature of Response			
2	**Health Problems from Untreated Diabetes**	**True**	**False**	**Don't Know**	
	Leg ulcers that will not heal on time	Correct	Incorrect	Incorrect	1
	Blindness	Correct	Incorrect	Incorrect	1
	Kidney Failure	Correct	Incorrect	Incorrect	1
	Stroke	Correct	Incorrect	Incorrect	1
	Hypertension	Correct	Incorrect	Incorrect	1
					5
3	**Measures for preventing complications of DM**	**True**	**False**	**Don't Know**	
	Regular physical exercise	Correct	Incorrect	Incorrect	1
	Complete avoidance of alcohol intake	Correct	Incorrect	Incorrect	1
	Consumption of oil with adequate cholesterol	Incorrect	Correct	Incorrect	1
	Regular checking of blood sugar level	Correct	Incorrect	Incorrect	1
	Avoid intake of proteinous food	Incorrect	Correct	Incorrect	1
					5
4	**Risk factors for DM**	**True**	**False**	**Don't Know**	
	Obesity	Correct	Incorrect	Incorrect	1
	Old age	Correct	Incorrect	Incorrect	1
	Heredity	Correct	Incorrect	Incorrect	1

		Incorrect	Correct	Incorrect	1
	Supernatural forces	Incorrect	Correct	Incorrect	1
	Consumption of too much of fruits	Incorrect	Correct	Incorrect	1
	Too much consumption of sugary substances	Correct	Incorrect	Incorrect	1
	Lack of physical exercise	Correct	Incorrect	Incorrect	1
	Too much consumption of alcohol	Correct	Incorrect	Incorrect	1
	Smoking of Tobacco products	Correct	Incorrect	Incorrect	1
	Excessive consumption of carbohydrate foods	Correct	Incorrect	Incorrect	1
	Eating too much beef	Incorrect	Correct	Incorrect	1
	Excessive consumption of Vegetables	Incorrect	Correct	Incorrect	1
					12
5	**Symptoms of diabetes mellitus**	**True**	**False**	**Don't Know**	
	Frequent and excessive Urination	Correct	Incorrect	Incorrect	1
	Excessive Thirst	Correct	Incorrect	Incorrect	1
	Vomiting of blood	Incorrect	Correct	Incorrect	1
	Headache	Incorrect	Correct	Incorrect	1
	Delay in wound healing	Correct	Incorrect	Incorrect	1
	Weight loss	Correct	Incorrect	Incorrect	1
					6
		TOTAL MAXIMUM SCORE			30

PERCENTILE %	QUANTITATIVE ASSESSMENT/ EVALUATION	CODE
<50	POOR	1
50-74	FAIR	2
75-100	GOOD	3

PERCEPTION SCALE / MARKING GUIDE

S/N	PERCEPTION RELATING TO DM	Nature of Response			Maximum score
1	**Perceived susceptibility to DM**	**Agree**	**Disagree**	**Undecided**	
	Eating all kinds of food as much as I can cannot make me get diabetes mellitus	Inappropriate	Appropriate	Inappropriate	1
	Diabetes mellitus is a disease for old people alone	Inappropriate	Appropriate	Inappropriate	1
	Obesity cannot lead to diabetes mellitus	Inappropriate	Appropriate	Inappropriate	1
	Taking a lot of alcohol is not any way related to the occurrence of diabetes mellitus	Inappropriate	Appropriate	Inappropriate	1
	Disease mellitus is caused by supernatural forces (e.g. Witches& Wizards) . I cannot get it because I am a child of God	Inappropriate	Appropriate	Inappropriate	1
					5
2	**Perception of DM prevention through Lifestyle Modification**	**Agree**	**Disagree**	**Undecided**	
	Increasing intake of sugar containing foods cannot lead to diabetes mellitus because sugar is needed by the body for energy	Inappropriate	Appropriate	Inappropriate	1
	Regular physical exercise can be used to make one fit or healthy; it cannot prevent diabetes mellitus	Inappropriate	Appropriate	Inappropriate	1
	Reduction of starchy foods only makes one hungry, It cannot prevent Diabetes	Inappropriate	Appropriate	Inappropriate	1
	Eating fruits and vegetables regularly can help prevent the occurrence of diabetes	Appropriate	Inappropriate	Inappropriate	1
	Reducing Alcohol	Appropriate	Inappropriate	Inappropriate	1

	consumption is a means to reducing the possibility of having diabetes mellitus				
					5
3	**Perceived seriousness of Diabetes Mellitus**	**Agree**	**Disagree**	**Undecided**	
	Diabetes mellitus is not an issue one should worry too much about	Inappropriate	Appropriate	Inappropriate	1
	Diabetes mellitus cannot affect one's social life	Inappropriate	Appropriate	Inappropriate	1
	Diabetes mellitus is a disease that can be cured once and for all	Inappropriate	Appropriate	Inappropriate	1
	Diabetes mellitus is not a serious health problem	Inappropriate	Appropriate	Inappropriate	1
	Diabetes mellitus is not a disease that is expensive to manage	Inappropriate	Appropriate	Inappropriate	1
	Diabetes mellitus cannot kill	Inappropriate	Appropriate	Inappropriate	1
					6
		TOTAL MAXIMUM SCORE			16

Operational Definitions

Appropriate: In line with biomedical word view

Inappropriate: Not in line with biomedical word view

PERCENTTILE	QUANTITATIVE ASSESSMENT/ EVALUATION	CODE
<75	Unfavorable/risky perception	1
75 and above	Favorable /Non risky	2