ASSESSMENT OF KNOWLEDGE, PRACTICE AND HINDERANCES TO GLYCEMIC CONTROL AMONG DIABETIC PATIENTS IN A TERTIARY HEALTH CARE INSTITUTION IN BENIN CITY

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IN PARTIAL FULFILLMENT OF THE AWARD OF THE DEGREE OF BACHELOR OF NURSING SCIENCE FACULTY OF NURSING SCIENCES, UNIVERSITY OF BENIN, BENIN CITY.

OCTOBER, 2025

DECLARATION

This is to declare that this research project titled "**ASSESSMENT OF KNOWLEDGE, PRACTICE AND HINDERANCES TO GLYCEMIC CONTROL AMONG DIABETIC PATIENTS IN A TERTIARY HEALTH CARE INSTITUTION IN BENIN CITY, EDO STATE** was carried out by **OJO AYOBAMI ESTHER**and is solely the result of my work except where acknowledged as being derived from other person(s) or resources

MATRICULATION NUMBER:_____

FACULTY: NURSING SCIENCES, UNIVERSITY OF BENIN, EDO STATE

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DATE:_____

CERTIFICATION PAGE

This is to certify that this project was carried by **OJO AYOBAMI ESTHER** with Mat number **BMS2005076** Faculty of Nursing Science, under the supervision of Prof (Mrs.) C.E Omorogbe

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PROF (MRS.) C. E. OMOROGBE **DATE**
Head of Department of
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External Examiner **DATE**

DEDICATION

This work is dedicated to GOD ALMIGHTY who is providing me with the strength to complete my academic journey.

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My sincere and profound gratitude goes to God Almighty for His ever increasing grace and love thus far, you alone deserve my praise.

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ABSTRACT

Effective glycemic control is essential for preventing diabetes-related complications, yet knowledge gaps and practice barriers persist among patients in resource-limited settings. This study examined knowledge, practices, and factors affecting glycemic control among diabetic patients at the University of Benin Teaching Hospital, Benin City, Nigeria. A cross-sectional descriptive study was conducted among 174 adult diabetic patients attending the Consultant Outpatient Department. Data were collected using structured questionnaires and analyzed using descriptive statistics. While 62% demonstrated overall good knowledge, critical deficits emerged in technical understanding: only 16.7% correctly defined glycemic control, 2.9% recognized HbA1c testing, and 26.4% understood appropriate monitoring frequency. Conversely, over 90% correctly identified symptoms, lifestyle modifications, and complications. Self-management practices were generally good (mean 3.37), with high medication adherence (85.6%) and clinic attendance (91.4%), but poor blood glucose monitoring (mean 3.20) and foot care (mean 2.47). Financial barriers emerged as primary impediments: 82.7% found glucometer kits too expensive, 58.6% struggled to afford medications, and 85.7% found monitoring painful. Additionally, 69% perceived cultural foods as incompatible with diabetes control, and 44.9% lacked glucometer use skills.Despite good symptom awareness and medication adherence, critical gaps in technical knowledge and substantial financial barriers limit effective glycemic self-management. Interventions must address both educational deficits in monitoring competence and structural barriers through subsidized supplies, skills training, and culturally adapted dietary counseling.

Keywords: Glycemic control, diabetes mellitus, knowledge, self-management practices,

CHAPTER ONE

INTRODUCTION

1.0 Background of Study

Diabetes mellitus (DM) is a metabolic syndrome which is characterized by hyperglycemia (high blood sugar level) that develops as a result of lack or deficit of insulin secretion or sometimes resistance to its function or both (Asmelash *et al*., 2020). It is associated with abnormalities in carbohydrate, fat, and protein metabolism, which results in chronic complications, including microvascular, macrovascular, and neuropathic disorders. The long-standing effects of hyperglycemia are associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels (Tomic *et al*., 2022).

Diabetes mellitus (DM) has emerged as a global public health worldwide, affecting millions of people and posing significant, economic, social, and healthcare burden (Kotwas *et al*., 2021). Diabetes leads to about 5 million deaths annually because of its associated complications (Dinavari *et al*., 2023). Diabetes is "a pandemic of unprecedented magnitude" now affecting one in 10 adults worldwide (International Diabetes Federation, 2021). The International Diabetes Federation (2021) has released new figures showing that 537 million adults are now living with diabetes worldwide – a rise of 16% (74 million) since the previous estimate in 2019 and projections show that by 2045, 783 million adults will be living with diabetes – or one in eight adults. This would be an increase of 46%, more problem than double the estimated population growth (20%) over the same period. In Nigeria, the prevalence of diabetes mellitus is estimated to be 3.7%, with over 3 million individuals affected (International Diabetes Federation, 2021). Safiri *et al*. (2022) reported that as of

2019, diabetes accounted for an age-standardized disability-adjusted life years (DALY) rate of 801.5 per 100,000 individuals.

The burden of diabetes mostly affects resource-limited countries where screening and access to treatment and care are not readily available (Niguse and Ashagrie, 2022). Asmelash *et al*. (2020) reported that in 2010, 12.1 million people were estimated to be living with diabetes in Africa, and this is projected to increase to 23.9 million by 2030. In Ethiopia, the prevalence of diabetes was 3.5% in 2011, and the extrapolated prevalence in 2013 was 4.36%. It is also known that a large number of people remain undiagnosed, with an estimated number of undiagnosed cases reported to be 1.39 million people in 2013(Asmelash *et al*., 2020). The incidence of DM is increasing at a high rate globally, and approximately 80% of patients with DM reside in low-and middle-income countries (Yahaya *et al*., 2023). Its negative impact is highest in resources-limited countries, where screening and access to care and treatment continue to be challenging for the fragile health systems available in place (Hill-Briggs *et al*., 2021).

Diabetes mellitus is a metabolic disorder of multiple etiologic factors characterized by chronic hyperglycemia with disturbance of carbohydrate metabolism. It can play the vital role in the cause of morbidity and mortality through continued clinical consequences. Diabetes poses a significant threat to global health, economies, and societies thus collective actions through public awareness, early detection, and prevention strategies is crucial to mitigate this growing public menace.

Centre for Disease Control (2024) reported that the target for long-term glycemic control in patients with diabetes is glycated hemoglobin A1c (HbA1c) value of less than 7%. Studies have shown that significant reduction in the mortality and morbidity occurs with the improved glycemic control. This may be due to a reduction in microvascular complications

like low systemic inflammation, by the prevention of immune dysfunction and protection of the endothelium and of the mitochondrial ultrastructure and function (Asmelash *et al*., 2020).

Diabetic complications such as diabetic ketoacidosis, microvascular and macrovascular diabetic complications, and their associated adverse outcomes are intimately related to suboptimal glycemic control in clinical practice. Each 1% reduction in the mean glycated hemoglobin (HbA1c) has been shown to be associated with a reduction in risk of 21% for deaths related to diabetes, 14% for myocardial infarction, and 37% for microvascular complications (Bin-Rakhis *et al*., 2022).

Good glycemic control plays a large role in the management of diabetes mellitus. Glycemic control refers to maintaining an optimal serum glucose concentration in diabetic patients (Bin *et al*., 2022). The primary therapeutic goal in diabetes management is to achieve and sustain optimal glycemic control to prevent both macrovascular and microvascular complications (Azzam *et al*., 2021). For good glycemic control, fasting blood sugar should be maintained between 70mg/dL and 100mg/dL (World Health Organisation, 2023). Among individuals with diabetes, improving glycemic control has been reported to reduce morbidity and increase life expectancy and quality of life. Despite its importance, glycemic control compliance has been found to be low due to multiple factors such as educational level, socioeconomic status, family support as well as knowledge about management of diabetes (Bin-Rakhis *et al*., 2022; Dinavari *et al*., 2023).

In many low- and middle-income countries, including Nigeria, several barriers hinder optimal glycemic control. These include limited access to diabetes care, high treatment costs, lack of awareness, and inadequate healthcare infrastructure (Njonnou *et al*., 2023). Cultural beliefs and misconceptions about diabetes management also contribute to poor adherence to recommended treatment regimens. Moreover, patient-related factors such as psychological

distress, fear of insulin therapy, and dietary non-compliance further complicate efforts to achieve effective glycemic control (Bhaskara *et al*., 2022). Given these challenges, improving glycemic control among diabetic patients requires a multi-faceted approach that integrates patient education, community-based interventions, policy reforms, and enhanced healthcare accessibility. This study, therefore, seeks to assess the knowledge, practices, and barriers to glycemic control among diabetic patients in a tertiary healthcare facility, in Edo State with the aim of identifying gaps and proposing strategies for improved diabetes management.

1.1 Statement of the Problem

Diabetes mellitus is common disease that has shown a tremendous increase in prevalence with a demographic transition in its epidemiology in recent years. Populations previously unaffected or minimally affected by DM are now reporting soaring prevalence figures, which poses a real challenge to health financing by governments and nongovernmental organizations. The latest prevalence figure published by the International Diabetes Federation (IDF) is 425 million persons living with DM worldwide, with nearly 50% of these undiagnosed (Aliyu *et al*., 2023). The developing economies of Africa and Asia contribute a significant fraction of this figure. There is also a rising burden from the complications of DM alongside the ever-increasing prevalence of the disease (Aliyu *et al*., 2023). DM is a significant public health problem of concern globally which contribute to approximately 5million death annually from related complications (Yahaya *et al*., 2023). We now see high rates of DM-related amputations, cerebrovascular disease, heart-related problems, and kidney disease in populations that were not previously known for these challenging health problems.

In Nigeria, the current prevalence of DM among adults aged 20–69 years is reported to be 1.7% It is widely perceived that prevalence figures reported by the IDF grossly under-report the true burden of DM in Nigeria, given that they are derived through the extrapolation of

data from other countries. Various researchers have reported prevalences ranging from 2% to 12% across the country in recent years.

Approximately 37.3 million people in the United States have diabetes, which is about 11% of the population. Type 2 diabetes is the most common form, representing 90% to 95% of all diabetes cases. About 537 million adults across the world have diabetes. Experts predict this number will rise to 643 million by 2030 and 783 million by 2045.

Diabetes mellitus has significant impact on the well-being of affected individual. Individuals with diabetes have been reported to have an increased risk of developing kidney failure, heart attack, stroke, as well as undergoing a lower limb amputation (World Health Organisation, 2024). Poor glycemic control is a major public health issue among individuals with diabetes mellitus and a significant risk factor for the progression of diabetic complications which may markedly increase healthcare cost of the disease and reduce life expectancy and quality of life. Despite increasing global awareness and medical advancements, poor glycemic control remains alarmingly prevalent among patients with type 2 diabetes mellitus (T2DM), particularly in low- and middle-income countries. Recent studies reveal that inadequate knowledge, suboptimal self-care practices, and context-specific barriers such as limited health literacy, cultural beliefs, and healthcare access continue to undermine effective diabetes management.previous studies have reported poor levels of glycemic control among individuals living with diabetes in Nigeria and Africa at large (Onodugo *et al*., 2019; Yosef *et al*., 2021; Alor *et al*., 2023). Maintaining glycemic control is the most effective way to prevent complications associated with diabetes. However, achieving this control remains a significant challenge for individuals living with the condition. Despite numerous research studies highlighting the importance of adhering to dietary guidelines, engaging in physical activity, taking prescribed medications, monitoring blood glucose levels, and practicing proper foot care, many patients struggle with adherence. This low level of compliance

contributes to poor glycemic control and practice of glycemic control may also be influenced by the level of knowledge among those living with diabetes mellitus.

Increased knowledge of patients about diabetes mellitus as well as positive practices will lead to improved glycemic control and better outcome. Studies by Amalash *et al*. (2020) and Bukhsh *et al*. (2020) have reported significant positive correlations between knowledge and practice of glycemic control among individuals with diabetes. However, to the best of the researchers' knowledge, there is a paucity of literature on the knowledge of glycemic control among individuals with diabetes mellitus and how this may influence their practice of glycemic control, as well as the factors that may hinder good glycemic control among these individuals.

1.2 Objective of study

The main objective of this study is to assess the knowledge, practices, and hindrances to glycemic control among diabetes mellitus patients receiving treatment in the Consultant Outpatient Department of a tertiary healthcare facility in Edo State.

Specific Objectives

1. To determine the level of knowledge of diabetic mellitus patients regarding glycemic control in a tertiary health care facility, in Benin city.
2. To assess extent of practices towards glycemic control
3. To ascertain hindrances to good glycemic control among diabetes mellitus patients in a tertiary health care facility, in Benin city.

1.3 Research Questions

1. What is the level of knowledge of diabetic mellitus patients regarding glycemic control in a tertiary health care facility in Benin City?
2. What are the practices of diabetic patients toward glycemic control

3. What are the hindrances to glycemic control among diabetic patients in a tertiary health care facility in Benin City?

1.4 Research Hypothesis

H_o: There is no significant relationship between the level of patient knowledge about diabetes and their practice to achieve optimum glycemic control.

1.5 Significance of the Study

Understanding the knowledge and practices related to glycemic control among patients with diabetes mellitus will help to contribute to positive healthcare outcomes in the following ways.

Contribution to the Nursing Profession

This study will provide evidence-based insight into the knowledge and practices of patients with diabetes, equipping nurses with targeted data to design more effective patient education and counseling interventions. By identifying the specific barriers to glycemic control within a tertiary healthcare setting, it enables nurses to move beyond generic advice and instead deliver context-aware, individualized care. It also supports the nursing profession's shift toward preventive, community-centered care, reinforcing the nurse's role as both an educator and advocate.

Contribution to Health Providers

The study will help healthcare providers with a diagnostic lens into the behavioral and systemic gaps undermining glycemic control. It highlights areas where provider communication, follow-up practices, or treatment plans may be failing. By surfacing common hindrances such as health literacy gaps, cultural misconceptions, or medication access, it prompts clinicians to rethink care delivery models in high-volume tertiary centers and to invest in more interdisciplinary, patient-centered strategies.

Contribution to Society

Uncontrolled diabetes leads to long-term complications that degrade quality of life, increase household healthcare spending, and reduce productivity. This study draws attention to the behavioral and structural factors that perpetuate this burden. By addressing these, the research contributes to a healthier, more informed diabetic population capable of managing their condition more independently which has broader implications for economic stability and family wellbeing in the community.

Contribution to Policy Makers

For policymakers, the findings present actionable data on why current diabetes interventions are underperforming in tertiary institutions. It gives weight to the need for policy adjustments in areas like patient education funding, staffing ratios for diabetic clinics, availability of low-cost glucose monitoring tools, and health literacy campaigns. It also underscores the importance of culturally tailored health communication, pushing for policy frameworks that integrate socio-behavioral factors into national diabetes management strategies.

Contribution to Future Research

This study lays the groundwork for intervention based studies aimed at improving knowledge and self-care behaviors in diabetic populations. It also opens up questions around longitudinal tracking of glycemic control improvements post-education, the role of family and social support systems, and the effectiveness of mobile health tools in urban Nigerian settings. Future research can build on these findings to test and refine locally relevant models of diabetes care that bridge the knowledge-practice gap.

1.6 Scope of the Study

The scope of the study is delimited to the assessment of knowledge, practices and hindrances to glycemic control among diabetes mellitus patients attending consultant out patients department (COPD) in university of Benin teaching hospital, Benin City, Edo state.

1.7 Operational Definition of Terms

Knowledge: this refers to diabetic patients understanding and awareness' of glycemic control, including causes, symptoms, and complications of diabetes and importance of maintaining target blood glucose level.

Practices: this refers to the actual behaviours or actions diabetic patients take in managing their blood glucose levels e.g. dietary habits, physical activity, glucose monitoring routines, and regular follow-up with the health care provider.

Hindrances: this refers to the barriers or obstacles that prevent diabetic patients from effectively managing their blood glucose level.

Glycemic control: this refers to the extent to which diabetic patients maintain their blood glucose level within recommended range.

Diabetic patients: this refers to individuals who have been diagnosed with diabetes mellitus a chronic condition characterized by elevated blood glucose level.

Haemoglobin A1c (HbA1c) test: It is an important blood test that gives a good indication of how well your diabetes is being managed.

CHAPTER TWO

LITERATURE REVIEW

This chapter examined related literature with focus on the conceptual review of diabetes, its global burden, glycemic control, factors influencing glycemic controls and the barriers to glycemic control among patients with diabetes. Primary sources of original research articles, recent case studies and clinical trial reports will be used alongside secondary sources such as reviews, meta-analysis and scholarly textbooks, in this literature review. This approach will be used to highlight the evolution of knowledge in this field. This chapter is structured to feature conceptual review, empirical review, theoretical framework and summary of all literatures reviewed.

2.1 Conceptual Review

2.1.1 Concept of diabetes mellitus

Diabetes mellitus is a metabolic disease characterised by increased blood glucose levels (Sapra & Bhandari, 2023). It results from inability of the body to produce enough insulin or when the body cannot use the insulin produce by the pancreas (insulin resistance) leading to high blood sugar (hyperglycemia), (World Health Organisation (WHO), 2024). Insulin is a hormone released by the pancreas that works as the primary messenger for moving glucose from consumed meals to flow from the bloodstream into the body's cells where it is used for energy (International Diabetes Foundation (IDF), 2022). Diabetes affects the entire system

and causes issues in specific organs such as the eyes, nerves, and kidneys ((WHO, 2024). The mortality rate from diabetes have been on the high side due to the complication that arise from uncontrolled blood sugar like kidney disease and cardiovascular diseases.

2.1.2 Types of Diabetes Mellitus

Diabetes mellitus can be classified based into various types based on the causes

i. Type 1 diabetes: an autoimmune condition in which the immune system attacks the insulin-producing beta cells in the pancreas, leading to an absolute insulin deficiency (IDF, 2022). This form of diabetes is characterized by acute onset usually before the age of 30years, it primarily affects children and young adults, comprising approximately 5-10% of diabetes cases worldwide. This disease is commonly present with genetically susceptible individuals with a specific leucocytes antigen (HLA) allele which account to be about 40% of type1 diabetes occurrences in individual with the gene (Leslie *et al*; 2021). The disease may be triggered in genetically predisposed persons by some environmental factors like infections (rubella virus, influenza B virus, mumps virus) and also certain condition like pregnancy, perinatal conditions, childhood vaccination and dietary factors such as cow's milk and cereal exposure (krischer *et al*, 2022). The occurrence of diabetes type 1 appears to be more frequent in children and slightly more common in men but can affect any age group and the Treatment for Type 1 diabetes requires lifelong insulin therapy to control blood glucose levels (WHO, 2024).

II. Type 2 diabetes: this is characterized by insulin resistance, where the body's cells respond inadequately to insulin, often alongside a progressive decline in insulin production (WHO, 2024). It accounts for about 90-95% of diabetes cases globally and is strongly linked to obesity, sedentary lifestyles, and aging (IDF, 2022). Unlike Type 1, Type 2 diabetes can

often be managed with lifestyle changes, oral medications, and, if necessary, insulin therapy (WHO, 2024).

iii. Gestational Diabetes: Gestational diabetes occurs during pregnancy when hormonal shifts create insulin resistance, leading to elevated blood glucose levels (WHO, 2024). Although it typically resolves after childbirth, gestational diabetes is associated with a higher risk of Type 2 diabetes in the future for both mother and child (IDF, 2022). This type affects about 10-20% of pregnancies globally, with prevalence varying across regions and among different ethnic groups (WHO, 2024).

iv. Other Specific Types: These include monogenic forms of diabetes, such as maturity-onset diabetes of the young (MODY), and diabetes associated with other conditions such as cystic fibrosis or endocrine disorders (Nicholas and Angus, 2023).

Signs and Symptoms of diabetes

Symptoms of diabetes include; persistent feelings of thirst, frequent urination, blurred vision, feelings of fatigue/tiredness, as well as unintentional weight loss. Over time, diabetes can result in damage to blood vessels in the heart, eyes, kidneys and nerves (WHO, 2024).

The International Diabetes Federation in 2021 reported an estimated worldwide prevalence of 537 million. Magliano and Boyko, (2021) reported that 240 million individuals live with undiagnosed diabetes, with nearly half of all adults with diabetes being unaware of their illness. India, China, the USA, Indonesia, Japan, Pakistan, Russia, Brazil, Italy, and Bangladesh are the top 10 nations with the highest prevalence of diabetes in the world (Magliano and Boyko, 2021). By 2030, the global prevalence of diabetes is projected to reach 643 million, (Magliano and Boyko, 2021) with the majority of this increase due to a 150% increase in emerging economies (Laraeni *et al*., 2021). In 2021, the global prevalence of DM consecutively outbreaks North Africa and the Middle East (39.4%), where Qatar (76.1%) seems to be the most affected country among all of them (Magliano and Boyko, 2021).

Despite Africa having the lowest prevalence estimate of 4.5% among IDF Regions, it is projected to experience the most substantial increase in the number of individuals affected by diabetes by the year 2045, with a staggering rise of 129%, resulting in approximately 55 million cases. It is noteworthy that Africa also exhibits the highest proportion of undiagnosed diabetes cases, standing at 53.6% (IDF, 2022). Between 1990 and 2017, the global deaths due to diabetes have been reported to increase by 125.5%, and the global disability adjusted life years (DALYs) was reported to have increased by 116.7% (Lin *et al*., 2020).

2.1.3 Pathophysiology of Diabetes

2.1.3.1 Pathophysiology of Type 1 Diabetes

Type 1 diabetes is an autoimmune condition that leads to the destruction of insulin-producing cells in the pancreas. The development of type 1 DM is described to occur in three stages (Lucier and Mathias, 2024). The first stage is the preclinical stage and it is characterized by immune mediated destruction of β-cells and pancreatic islets, resulting in insulitis. This stage is asymptomatic, with normal fasting glucose level and normal glucose tolerance (Lucier and Mathias, 2024). Stage 2 is characterized dysglycemia which occurs as a result of β-cell dysfunction. While patients at this stage may not present with any symptoms, however, diagnostic assessment may reveal the presence of pancreatic auto-antibodies with impaired fasting glucose (ranging between 100-125 mg/dL), impaired glucose tolerance (2-hour post-75 g glucose load glucose 140-199 mg/dL) or glycated hemoglobin (HbA1c) level of 5.7% to 6.4% (Del Cherico *et al*., 2022; Lucier and Mathias, 2024). The final stage represents the clinical onset of the disease, whereby affected individuals present with symptoms inclusive of hyperglycemia (random glucose ≥200 mg/dL), blood glucose level of at least 200 mg/dL 2 hours after ingesting 75 g of glucose during an oral glucose tolerance test, or HbA1c greater than or equal to 6%. If not treated promptly, type 1 diabetes can result in the development of diabetic ketoacidosis (Del Cherico *et al*., 2022; Lucier and Mathias, 2024).

2.1.3.2 Pathophysiology of Type 2 Diabetes

Type 2 diabetes mellitus (T2DM) results from a malfunction in the feedback loops between insulin action and insulin secretion, which often results in abnormally high blood glucose levels. Development of T2DM is perpetuated by factors such as consumption of high caloric diets which increase blood glucose levels, reduced physical activity as well as mitochondrial dysfunction (Galicia-Garcia *et al*., 2020). T2DM is a condition marked by insulin resistance alongside beta-cell dysfunction. In the early stages, beta cells respond to insulin resistance by increasing insulin secretion to keep glucose level within the normal range (Goyal *et al*., 2023). However, as the disease progresses, beta-cell functionality deteriorates, resulting in an inability to sustain adequate insulin output, thereby causing hyperglycemia (Galicia-Garcia *et al*., 2020; Goyal *et al*., 2023). Obesity or an elevated body fat percentage, predominantly distributed in the abdominal region, is a common feature observed among individuals with T2DM. This central adiposity is reported to promote insulin resistance through a range of inflammatory mechanisms, including the heightened release of free fatty acids (FFA) and disruptions in adipokine regulation (Galicia-Garcia *et al*., 2020; Goyal *et al*., 2023). Furthermore, risk factors such as physical inactivity, a history of gestational diabetes mellitus (GDM), hypertension, and dyslipidemia significantly contribute to the likelihood of developing T2DM (Goyal *et al*., 2023).

2.1.4 Risk Factors of Diabetes

Diabetes is a chronic metabolic condition influenced by a range of risk factors, which can be broadly categorized into modifiable and non-modifiable types. Understanding these risk factors is crucial for effective prevention and management of the disease. Modifiable risk factors are those that individuals can control or alter through lifestyle changes and medical interventions. One of the most significant among these is obesity, particularly abdominal or visceral fat, which plays a key role in the development of insulin resistance and, subsequently,

type 2 diabetes (Yungang Hu *et al*., 2025). Physical inactivity is another major contributor; regular physical activity not only aids in maintaining a healthy weight but also improves the body's sensitivity to insulin (Ojewale, Okoye and Ani, 2021). Di*et al*so plays a critical role—consumption of processed foods, sugars, and unhealthy fats significantly raises the risk of diabetes, whereas a balanced diet rich in fiber, whole grains, and healthy fats serves a protective function (Armstrong *et al*., 2023). Hypertension, or high blood pressure, is frequently associated with type 2 diabetes, as it contributes to insulin resistance and vascular complications (Zemba *et al*., 2023). Similarly, smoking has been linked to increased insulin resistance and a heightened risk of developing the disease (Zemba *et al*., 2023). Another important factor is dyslipidemia, characterized by abnormal lipid levels such as elevated triglycerides and low levels of high-density lipoprotein (HDL) cholesterol, which further increase the likelihood of type 2 diabetes (Goldstein, 2021). On the other hand, non-modifiable risk factors are those beyond an individual's control. Genetics and family history play a significant role; individuals with a familial predisposition are at a higher risk of developing both type 1 and type 2 diabetes (Zemba *et al*., 2023). Age is another contributing factor—while type 1 diabetes can occur at any age, the risk of type 2 diabetes increases notably after the age of 45 (CDC, 2020). Additionally, ethnicity influences susceptibility, with African Americans, Hispanics, Native Americans, and Asian Americans being at a comparatively higher risk of developing type 2 diabetes (Hassan *et al*., 2023). There are also certain hormonal conditions that elevate the risk of diabetes. For instance, women with Polycystic Ovary Syndrome (PCOS) are more prone to insulin resistance, which can lead to type 2 diabetes (Chengshun *et al*., 2022). Furthermore, women who develop gestational diabetes during pregnancy are at an increased risk of progressing to type 2 diabetes later in life (Lake *et al*., 2022). By addressing modifiable factors and closely monitoring those that

are non-modifiable or hormonal in nature, individuals and healthcare providers can work together to reduce the overall burden of diabetes.

2.1.5 Psychological Stress

Chronic stress is thought to contribute to the development of type 2 diabetes through hormonal changes that increase blood sugar levels (Tudpor *et al*., 2021). The prevalence of DM increases in populations whose lifestyles have changed fast from more traditional to more modern forms of living, which are related to an increased risk of developing DM. There is a high correlation between type 2 diabetes and being overweight or obese, as well as growing age, ethnicity, and family history, although the exact causes remain unknown (lovic *et al*., 2021) Polygenic and environmental factors are suspected to contribute to the incidence of type 2 diabetes (Ahmad *et al*., 2022). The risk of developing DM depends on several factors beyond the simple distribution of genes throughout the population. There is an increasing trend in the worldwide prevalence of type 2 DM. The aging of the population, the rise of the middle class, and the spread of urbanization are all factors that contribute to the rise of obesity (Lovic *et al*., 2021). In three of the world's largest groups of countries—North Africa and the Middle East, Latin America and the Caribbean, and Central Europe, Eastern Europe, and Central Asia—high body mass index (BMI) was the leading cause of disability-adjusted life years caused by type 2 diabetes (Magliano and Boyko, 2021). Obesity is the leading cause of Type 2 diabetes, accounting for almost 60% of cases. High BMI (52.2%), dietary foods (25.7%), environmental or occupational stress (19.6%), tobacco usage (12.1%), insufficient physical exercise (7.4%), and alcohol use (1.8%) are also significant factors (Khunti *et al*., 2023). The long-term sequelae of diabetes, such as cardiovascular and kidney disease, which appear to be risk factors for death among hospitalized people, may account for some of the increased likelihood of severe consequences associated with diabetes (Magliano and Boyko, 2021).

2.1.6 Diagnosis and Monitoring of Diabetes

Diabetes mellitus is diagnosed through blood tests that measure blood glucose levels. The most common diagnostic tests include:

1. Fasting Plasma Glucose (FPG): A fasting blood sugar level of 126 mg/dL (7.0 mmol/L) or higher on two separate occasions is indicative of diabetes.

2. Oral Glucose Tolerance Test (OGTT): A blood glucose level of 200 mg/dL (11.1 mmol/L) or higher two hours after ingesting a glucose solution confirms diabetes.

3. Hemoglobin A1c Test: An A1c level of 6.5% or higher indicates diabetes. This test reflects the average blood sugar levels over the past 2-3 months.

Diagnosis of T1DM usually involves a combination of detailed clinical history, as well as evaluation of serum glucose levels (Sapra and Bahrandi, 2023). The diagnostic threshold for diagnosis of T1DM involves fasting glucose levels exceeding 126 mg/dL, random glucose levels above 200 mg/dL, or an hemoglobin A1c (HbA1c) level greater than 6.5%. The presence of autoantibodies, such as those against glutamic acid decarboxylase (GAD) or insulin, can further support the diagnosis and indicate autoimmune activity (Sapra and Bhandari, 2023). T2DM is often diagnosed via a combination of fasting glucose and HbA1c tests. When these results are inconclusive or borderline, an oral glucose tolerance test (OGTT) may be condu cted to assess fasting glucose levels and the serum response following a standardized glucose load. Prediabetes, which frequently precedes the development of T2DM, is indicated by fasting blood glucose levels between 100 and 125 mg/dL or a 2-hour post-OGTT glucose concentration between 140 and 199 mg/dL (Sapra and Bhandari, 2023).

According to the American Diabetes Association (ADA), diabetes can be diagnosed using any of the following criteria: an HbA1c level of 6.5% or higher; a fasting plasma glucose level of 126 mg/dL (7.0 mmol/L) or greater, after at least 8 hours of fasting; a 2-hour plasma glucose level of 200 mg/dL (11.1 mmol/L) or higher during a 75-g OGTT; or a random

plasma glucose reading of 200 mg/dL (11.1 mmol/L) or higher in individuals presenting with classic hyperglycemic symptoms such as polyuria, polydipsia, polyphagia, and unintentional weight loss, or in cases of hyperglycemic crisis. The ADA recommends routine screening for adults starting at age 45, regardless of risk factors (ElSayed *et al*., 2023).

2.1.7 Clinical Manifestations of Diabetes

Diabetes mellitus often develops insidiously and may initially present without noticeable symptoms. However, as the condition progresses, certain clinical manifestations may emerge. One of the hallmark symptoms is unexplained weight loss, where individuals lose weight despite maintaining or even increasing their food intake. Another common symptom is polyuria, characterized by frequent urination, particularly noticeable during the night. This is often accompanied by polydipsia**,** a persistent sensation of thirst that persists even after adequate fluid intake.

Patients may also experience frequent fatigue, marked by a constant feeling of tiredness or lack of energy, which can interfere with daily activities. Irritability and frequent mood swings may occur as a result of fluctuating blood sugar levels. In addition, individuals with diabetes are more prone to recurrent infections, particularly in areas such as the genitals, urinary tract, skin, and oral cavity. These infections are often linked to elevated blood sugar levels and a weakened immune response. Another common issue is delayed wound healing, where minor cuts or sores take longer than usual to recover. Paranesthesia**,** or abnormal sensations in the feet such as tingling, numbness, or burning, is also frequently reported and may indicate diabetic neuropathy. Some patients develop acanthosis nigricans, a condition characterized by the presence of dark, velvety patches on the skin, commonly around the neck, armpits, and groin. Additionally, impotence or erectile dysfunction may occur, particularly in men, as a complication of diabetes-related nerve and vascular damage (Sapra & Bhandari, 2023).

2.1.8 Management and Treatment

The management of diabetes is comprehensive and multifactorial, focusing on lifestyle modification, pharmacologic intervention, and consistent monitoring. The overarching goals are to achieve optimal glycemic control, prevent acute and chronic complications, and improve the patient's overall quality of life. Lifestyle changes are foundational in the management of both type 1 and type 2 diabetes. Adopting a healthy diet—rich in fiber, whole grains, fruits, vegetables, and lean proteins—while limiting the intake of simple sugars and unhealthy fats can greatly aid in maintaining stable blood glucose levels (American Diabetes Association, 2020**).** Regular physical activity plays a crucial role as well, helping not only with weight management but also enhancing the body's sensitivity to insulin (Colberg *et al*., 2016). Pharmacologic treatment varies depending on the type of diabetes. In type 1 diabetes (T1D), insulin therapy is essential, often involving a combination of rapid-acting and long-acting insulin to replicate natural pancreatic function. For type 2 diabetes (T2D), oral medications such as metformin, sulfonylureas, and newer agents like GLP-1 receptor agonists and SGLT2 inhibitors are commonly used. In more advanced cases or when oral medications are insufficient, insulin may also be introduced to achieve better glycemic control (Inzucchi *et al*., 2015). Technological innovations have also significantly enhanced diabetes care. Devices such as continuous glucose monitoring (CGM) systems, insulin pumps, and even artificial pancreas technologies enable patients to manage their condition with greater accuracy and convenience. Additionally, novel drug classes like GLP-1 receptor agonists and SGLT2 inhibitors have shown not only to improve glycemic outcomes but also contribute to weight reduction and cardiovascular protection. Effective diabetes management relies on a personalized, patient-centered approach that integrates lifestyle strategies, medical therapies, and the latest technological advancements to ensure optimal outcomes.

2.1.9 Complications of Diabetes

Complications of diabetes involve microvascular and macrovascular complications.

i. Microvascular complications

These occur as a result of pathological changes in the capillaries following diabetes, and include complications such as diabetic neuropathy, nephropathy and retinopathy (Seid *et al*., 2021). Diabetic retinopathy (DR) is a leading cause of vision impairment and blindness among adults with diabetes. The condition develops due to hyperglycemia-induced damage to the retinal blood vessels, resulting in increased vascular permeability, microaneurysms, and eventual neovascularization. The progression of DR can be categorized into non-proliferative diabetic retinopathy and proliferative diabetic retinopathy (Mansour *et al*., 2023). Non-proliferative DR is marked by the presence of microaneurysms and intraretinal hemorrhages, while Profliferative DR is characterized by the growth of new, fragile blood vessels that may bleed into the vitreous, potentially leading to retinal detachment and vision loss (Mansour *et al*., 2023).

Diabetic nephropathy (DN): this is the leading cause of end-stage renal disease (ESRD) and occurs when prolonged hyperglycemia damages the kidney's filtration system. Pathophysiological changes include thickening of the glomerular basement membrane, mesangial expansion, and podocyte loss, leading to albuminuria and a decline in glomerular filtration rate. DN is often detected by the presence of microalbuminuria, which may progress to overt proteinuria and eventually ESRD (Mansour *et al*., 2023).

Diabetic neuropathy (DNP): this encompasses a range of nerve disorders caused by diabetes and is associated with significant morbidity. The condition results from hyperglycemia-induced damage to nerve fibers, leading to impaired blood flow and increased oxidative stress. Clinically, DNP can present as peripheral neuropathy, which involves pain, tingling, or

numbness in the extremities, or autonomic neuropathy, affecting internal organs such as the digestive tract and heart (Sapra and Bhandari, 2023; Mansour *et al*., 2023).

Diabetic cardiomyopathy: Diabetic cardiomyopathy refers to cardiac dysfunction that occurs without the presence of coronary artery disease, hypertension, or valvular disease. High blood sugar levels (hyperglycemia) and excessive insulin (hyperinsulinemia) in diabetes contribute to capillary damage, myocardial fibrosis, and myocardial hypertrophy, along with mitochondrial dysfunction. Additionally, fat accumulation within cardiomyocytes, known as lipotoxicity, leads to the formation of extensive lipid deposits or droplets. Increased oxidative stress and inflammation further exacerbate cardiac fibrosis and hypertrophy, worsening heart function (Nakamura and Sadoshima, 2020).

Diabetic encephalopathy: Diabetic encephalopathy (DE) is a notable microvascular complication of diabetes, characterized by neurochemical, structural, behavioral, and cognitive changes. There is growing recognition that diabetes contributes to long-term brain complications, leading to cognitive dysfunction and detectable abnormalities on brain imaging, collectively termed "diabetic encephalopathy (Nagayach *et al*., 2024).

ii. Macrovascular complications

The development of macrovascular complications in diabetes is driven by prolonged hyperglycemia, insulin resistance, and dyslipidemia, which collectively promote endothelial dysfunction, chronic inflammation, and oxidative stress. These factors lead to the buildup of atherosclerotic plaques in large arteries, resulting in impaired blood flow and an increased risk of cardiovascular events. Macrovascular complications of diabetes include; coronary artery disease, cerebrovascular disease as well as peripheral artery disease (Mansour *et al*., 2023).

Individuals with diabetes have a significantly higher risk of developing CAD due to accelerated atherosclerosis. Chronic hyperglycemia increases oxidative stress, which

damages the endothelium and promotes plaque buildup. Additionally, insulin resistance contributes to pro-inflammatory states and vascular smooth muscle proliferation, further exacerbating CAD progression (Amelia *et al*., 2021; Mansour *et al*., 2023).

Cerebrovascular disease (Stroke) is another severe complication associated with diabetes, marked by reduced cerebral blood flow due to atherosclerotic changes in the carotid and cerebral arteries. Diabetic patients are more prone to both ischemic and hemorrhagic strokes, with a heightened risk of recurrent stroke and poorer recovery outcomes (Mansour *et al*., 2023).

Peripheral artery disease is characterized by reduced blood flow to the limbs due to atherosclerotic occlusion of peripheral arteries. Diabetes is a significant risk factor for PAD, which can lead to claudication, pain, and in severe cases, limb amputation. The presence of PAD in diabetic individuals is often associated with concurrent neuropathy (Amelia *et al*., 2021; Mansour *et al*., 2023).

2.1.10 Glycemic Control

Glycemic control is the optimal serum glucose concentration in diabetic patients (Bin *et al*., 2022). For the management of all diabetic patients, the key therapeutic goal is to maintain an optimum glycemic control (GC) in order to prevent macro and microvascular complications (Azzam *et al*., 2021). Glycemic control in T2DM patients can be evaluated using three parameters: glycosylated hemoglobin (HbA1c), fasting blood glucose (FBG), and postprandial glucose (P PG). Among these, glycosylated hemoglobin is the gold standard for the estimation of glycemic control (Chehregosha *et al*., 2019). The American Diabetes Association (ADA) defines good glycemic control at an average of glycated hemoglobin (Hb1Ac) 7%, whereas the American College of Endocrinologists set it at 6.5%. Regarding fasting blood glucose, the recommended range is 70-130mg/dL (3.9-7.2mmol/l) as set by ADA, whereas the American College of Endocrinologists and the International Diabetes

Federation set it at less than 110 mg/dL (6.1 mmol/l) and 100 mg/dl (5.5 mmol/l), respectively. Poor glycemic control led to uncontrolled diabetes, which has led to many complications of diabetes mellitus. These complications, in turn, can greatly reduce the quality of life of patients, reduce the life expectancy, as well as increase the healthcare costs of the disease (Tarekegn *et al*., 2025). Improving glycemic control reduces morbidity and increases the life expectancy and quality of life of patients (Abdissa, 2022).

2.2 Theoretical Framework

In literature, several theories of behaviour have been developed to inform interventions for health behaviour change. This present study will adopt the Health Belief Model (HBM). The HBM was introduced in the early 1950s by social scientists at the U.S. Public Health Service to investigate the failure of people to engage in preventive health measures or undergo early disease screening (Boston School of Public Health, 2022; Alyafei and Easton-Carr, 2024). Over time, the model's application expanded to include patients' responses to symptoms and their compliance with medical treatments. According to the model, individual's likelihood of adopting a particular health behaviour depends on two main factors: their perception of personal vulnerability to an illness and their belief in the effectiveness of the recommended health behaviour in reducing or preventing that illness.

The HBM is rooted in psychological and behavioural theory, emphasizing two essential components that influence health-related behaviours: the desire to avoid illness or to recover if already affected, and the belief that a specific health action will prevent or cure the illness (Boston School of Public Health, 2022; Alyafei and Easton-Carr, 2024).

2.2.1 Constructs of the Health Belief Model

The model comprises six constructs, with the first four being core elements initially developed with the model and the last two added as the model evolved through further research.

1. **Perceived Susceptibility:** This construct refers to an individual's personal assessment of their risk of developing a particular illness or condition. People vary widely in their perception of vulnerability to health issues, which can significantly impact their decision to engage in preventive behaviours.
2. **Perceived Severity:** This component concerns an individual's evaluation of the seriousness of a health condition or the potential consequences of leaving it untreated. Individuals may consider both medical consequences and social implications when assessing the severity of a condition.
3. **Perceived Benefits:** This construct relates to an individual's belief in the effectiveness of specific actions to reduce the threat of illness or aid in recovery. People are more likely to adopt a health behaviour if they perceive it as beneficial, weighing both the perceived susceptibility to the condition and the expected benefit of the action.
4. **Perceived Barriers:** This refers to the perceived obstacles that might hinder an individual from undertaking a recommended health action. People often conduct a cost-benefit analysis, balancing the anticipated effectiveness of the health behaviour against concerns about potential costs, dangers, discomfort, time demands, or inconvenience.
5. **Cue to Action:** This construct represents the triggers or stimuli that prompt individuals to consider or decide on a health behaviour. These cues can be internal, such as physical symptoms, or external, such as advice from others, news articles, or the illness of a family member.

6. **Self-Efficacy:** Introduced in the 1980s, self-efficacy reflects an individual's confidence in their ability to successfully perform a particular behaviour. This concept is integral to many behavioural theories and is strongly associated with whether an individual will attempt and maintain a desired health action (Boston School of Public Health, 2022; Alyafei and Easton-Carr, 2024).

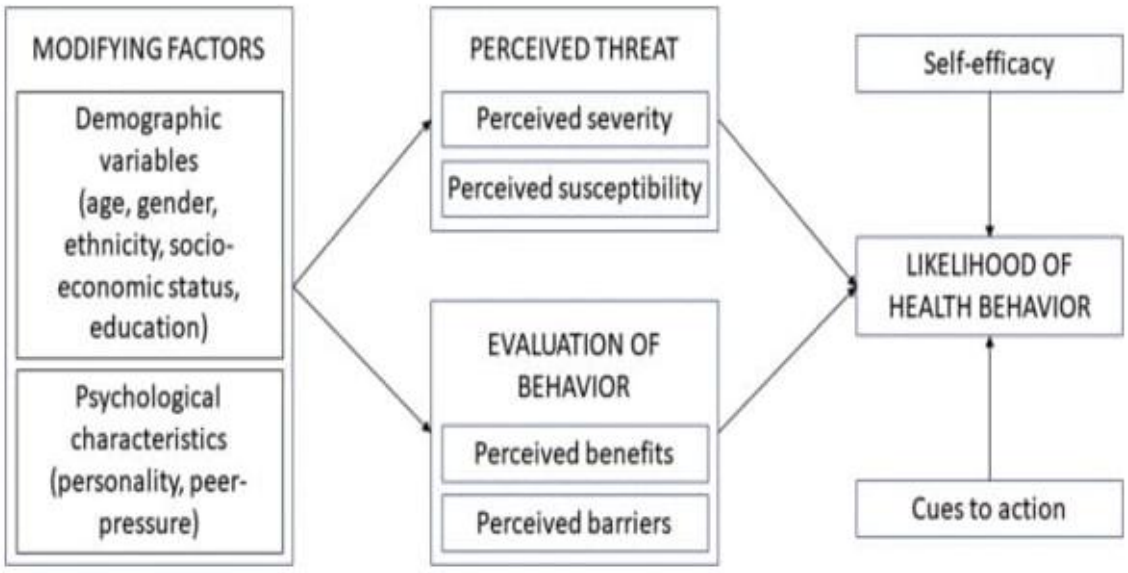

Figure 2.1: Schematic Illustration of The Health Belief Model adopted from (Etheridge *et al*., 2023)

2.2.2 Application of Health Belief Model the Study

The health belief model will be applicable to this study to predict the knowledge, practice and hindrance towards glycemic control among patients with diabetes, given that it has also be successfully applied in prediction of other health related behaviours such as compliance with hypertension management, testicular cancer screening as well as diabetes management (Daniati *et al*., 2021).

1. **Perceived Susceptibility:** This construct examines how patients view their personal risk of experiencing complications due to poor glycemic control. Patients who believe they are more susceptible to complications, such as nerve damage, kidney disease, or vision loss, may be more motivated to manage their blood glucose levels effectively. Knowledge about these risks can increase perceived susceptibility and, in turn, encourage better practices in glycemic control.
2. **Perceived Severity:** relates to patients' beliefs and awareness about the seriousness of diabetes complications if their blood sugar is not well controlled. This includes their understanding of both medical consequences (such as amputations or cardiovascular issues) and social implications (such as impact on family responsibilities or ability to work). If patients are more aware of the severity of potential outcomes, they are more likely to engage in consistent and effective glycemic management practices.
3. **Perceived Benefits:** This construct assesses patients' beliefs in the effectiveness of practices like regular blood glucose monitoring, adherence to medication, dietary control, and physical activity in managing diabetes. When patients perceive these practices as beneficial for controlling their blood glucose levels and preventing complications, they are more likely to adopt and maintain these behaviours as part of their daily routine.
4. **Perceived Barriers:** Perceived barriers refer to the challenges or hindrances patients face in achieving good glycemic control. Common barriers in diabetes management may

include the cost of medications, side effects, dietary restrictions, or time constraints for exercise. Understanding these barriers can help healthcare providers offer targeted support, such as cost-effective treatment options or simpler dietary guidelines, which may improve adherence to glycemic control practices.

5. **Cue to Action:** Cues to action are the triggers or prompts that motivate patients to engage in glycemic control behaviours. These cues can be internal, such as feeling unwell or experiencing symptoms of high blood sugar, or external, such as a doctor's recommendation, a family member's encouragement, or a diabetes education program. Identifying and reinforcing these cues can help patients consistently apply their knowledge and practice strategies to maintain good glycemic control.
6. **Self-Efficacy:** This construct refers to patients' confidence in their ability to successfully control their blood glucose levels through consistent practice of recommended behaviours. Patients with higher self-efficacy are likely to feel more capable of adhering to diet plans, monitoring their blood sugar, and following exercise routines, even in the face of hindrances.

2.3 Empirical Review

2.3.1 Knowledge of Diabetes and Glycemic Control Among Diabetic Patients

Understanding the knowledge of glycemic control among diabetic patients is vital, as it forms the foundation for effective diabetes self-management and improved clinical outcomes. A study conducted by Asmelash *et al*. (2020) among patients in Ethiopia, the researchers aimed to investigate the level of knowledge about diabetes and glycemic control among diabetic patients residing in Ethiopia. The study adopted a quantitative cross-sectional methodology and data were collected using questionnaires. A total of 403 respondents participated in the study. 250 (62%) of the respondents were reported to have good knowledge of glycemic control. The study also explored the relationship between selected sociodemographic factors

and the knowledge of glycemic control among the respondents, their analysis revealed that factors of occupational status and marital status were significantly associated with the knowledge of participants towards glycemic control. While the study highlighted some demographic factors associated with glycemic control, it did not delve deeply into specific barriers faced by patients. The study did not also extensively explore the impact of health literacy on glycemic control knowledge and practices.

In another study by Ninsiima *et al*. (2024), the researchers examined the knowledge of glycemic control among persons with diabetes mellitus in the outpatient clinics at two tertiary hospitals in Uganda. The study was a quantitative cross-sectional study for which 452 participants were recruited. The authors reported that 274 (60%) of the respondents had good knowledge of glycemic control. The authors also reported significant association between the distance of the patients from their health facilities, level of education, as well as training received on glycemic control and the level of knowledge of glycemic control among the respondents. The study identified associations with specific variables, but other potential confounding factors/determinants such as socioeconomic status, comorbidities, access to medications were not discussed, which may influence knowledge and practice of glycemic control. The study recommended that future studies should explore the correlations between knowledge and actual level of glycemic control among patients with diabetes.

Ruszkiewicz *et al*. (2020) investigated the frequency of monitoring blood sugar by patient with diabetes and their knowledge of glycemic control, specifically the nutrition recommendations in diabetes. The study was a cross-sectional study, comprising of 303 participants. Knowledge of glycemic control was assessed using a nutrition knowledge test and several questions concerning glycemic control. The study revealed that majority of the patients had moderate level of knowledge on glycemic control, with patients with Type 1 diabetes having higher knowledge scores that those with type 2 diabetes. The study

concluded that the level knowledge of the patients examined was inadequate and varied based on the type of diabetes. The authors recommended for further education of patients about nutrition and glycaemic control. This study does not account for other factors that may influence knowledge and practices, such as comorbidities, access to healthcare, or previous education about diabetes management.

A study by Al-Maskari *et al*. (2023) in the United Arab Emirates assessed knowledge and practices related to diabetes management among 513 patients. The study found that while general awareness of diabetes was high, knowledge of specific glycemic targets and complications was low. This suggests that even among literate populations, gaps may exist in practical knowledge crucial for glycemic control. Cultural misconceptions, lack of physician communication, and limited use of visual educational tools were also suggested as contributing factors, although not explored in-depth.

A notable study conducted by Alsharit and Alhalal (2022) in Al Ahsa, Saudi Arabia, between April and September 2019, examined the pathways through which health literacy impacts diabetic patients' quality of life (QoL), with self-care management skills and glycemic control (measured by HbA1c) serving as mediators. The study adopted a cross-sectional design and recruited a convenience sample of 256 patients with type 2 diabetes from three primary healthcare centers. Data were obtained through structured interviews and medical record reviews, and structural equation modeling (SEM) was used for analysis.

The study found that 27.3% of the participants had marginal health literacy, while 35.5% had inadequate health literacy. Results demonstrated that health literacy significantly and positively influenced self-care management skills, glycemic control, and overall quality of life—both directly and indirectly. Importantly, self-care management was found to partially mediate the relationship between health literacy and both glycemic control and QoL. This

emphasizes the crucial role of health literacy in diabetes self-management and suggests that improved literacy can lead to better clinical and psychosocial outcomes for patients.

This study contributes to the growing body of evidence that highlights health literacy not merely as a passive variable, but as an active determinant of health behaviour and treatment adherence. Unlike earlier studies that only assessed knowledge levels, this study utilized a more nuanced approach, examining interactions between health literacy, behaviour, and biomedical outcomes. It reinforces the argument that improving health literacy should be a key target of educational and clinical interventions for patients with diabetes.

Similarly, Saleh *et al*. (2021) in Bangladesh studied 594 patients with Type 2 diabetes and found that only 52% had adequate knowledge of glycemic control, with educational status and income being major determinants. The study pointed to the role of poverty and illiteracy in limiting patients' access to reliable diabetes information. The authors emphasized the need for community-based education programs tailored to low-literacy populations.

Overall, across various low- and middle-income countries, studies converge on the notion that while some patients possess fair to good knowledge of glycemic control, significant knowledge gaps persist, especially in the understanding of self-monitoring techniques, dietary potential of digital interventions (e.g., SMS reminders or mobile apps) in improving knowledge retention and practical application.

2.3.2 Practice of Glycemic Control among Patients with Diabetes

Beyond knowledge, actual practice of glycemic control is a crucial determinant of clinical outcomes among diabetic patients. In the aforementioned study by Ninsiima *et al*. (2024), glycemic control practices were assessed alongside knowledge. Common practices included medication adherence, weight control, dietary modifications, physical activity, and blood sugar monitoring. While most patients reported adhering to medications and maintaining

body weight, only about half regularly monitored blood glucose levels. The study lacked a comprehensive adherence scale and did not establish any composite index to assess the overall quality of glycemic control practices, which limits the interpretation of the data.

The study by Ninsiima *et al*. (2024) also examined the practice of glycemic control among the respondents. The study outlined the various practices of the patients towards achieving glycemic control, such as eating vegetables, engaging in physical activity, medication adherence, body weight control, dieting as well as regular check-up. In this study, it was reported that majority of the participants practiced medication adherence and body weight control, while about half of the respondents attested to checking blood sugar level regularly. While this study highlighted the various practices for glycemic control among the respondents, it did not provide an overall assessment of the participants' adherence to glycemic control practices. This lack of comprehensive evaluation limits the understanding of how effectively patients are implementing these practices in their daily lives. The study also did not examine the possible influence of sociodemographic and other confounding factors on the practice of glycemic control.

Abebe *et al*. (2022) explored self-care practice and glycemic control among patients with type 2 diabetes mellitus in a developing country. This study was four-month prospective observational study, which included a total of 138 patients. The findings of this study revealed that nearly three-fourth (74.6%) of the respondents had poor glycemic control and the majority of patients had poor self-care practice. It was reported that 98.6%, 96.4%, and 55.8% of patients had poor adherence to diet, exercise, self-monitoring of blood glucose, and medications respectively. The researchers also explored the influence of factors such as body mass index (BMI) and drug adherence on glycemic control and reported were significantly associated with the practice of glycemic control. The study however didn’t examine the role of factors such as age, gender as well as other sociodemographic variables as determinants of

the level of practice of glycemic control. The study also only included 138 patients, which may not be representative of the broader population of patients with type 2 diabetes in the resource-limited country.

In a study by Letta *et al*. (2022), the authors aimed to examine the practice of glycemic control and correlating factors among patients with type 2 diabetes in eastern Ethiopia. The study was a cross-sectional survey among 879 adult patients with type 2 diabetes. Data were collected via interviews, physical measurements, and the review of medical records. The level of glycemic control was determined from three consecutive fasting plasma glucose (FPG) measurements. The findings of the study revealed that 76% of the study participants had suboptimal glycemic control. Factors such as khat chewing, presence of comorbidities, as well as levels of self-care practices were reported to be correlated with the practice of glycemic control among the respondents. This study also did not investigate the role of factors such as age, gender as well as other sociodemographic variables as determinants of the level of practice of glycemic control.

A recent multicenter cross-sectional study conducted in general hospitals in Northwest Ethiopia by Wondm *et al*. (2024) provides further empirical evidence regarding the association between diabetes self-care activities and glycemic control among patients with type 2 diabetes mellitus (T2DM). The study involved 413 participants and utilized the Amharic version of the Summary of Diabetes Self-Care Activities (SDSCA-Amharic) to evaluate self-care behavior. Glycemic control was assessed using glycated hemoglobin (HbA1c), and linear regression analysis was employed to identify predictors of both self-care and glycemic status.

The findings revealed that 66.3% of patients had poor glycemic control, with a mean HbA1c of 7.94% (SD = 1.75). Among the various self-care domains, blood glucose testing was

identified as the most significant predictor of better glycemic control [β= −0.36, 95], followed by adherence to dietary guidelines [β= 0.29, 95], foot care [β= −0.28, 95] and physical activity [β= −0.27,95]. These results indicate that increased engagement in self-care behaviours is strongly associated with improved glycemic control among T2DM patients.

Moreover, the study identified several key predictors of poor glycemic control. These included illiteracy [β=0.72,95], being overweight [β=0.32,95], obesity [β=0.67,95], and low medication adherence [β=0.7,95]. On the other hand, prior diabetes education emerged as a strong protective factor, significantly associated with better glycemic outcomes [β=−0.88,95].

This study adds critical value to the empirical literature by demonstrating that self-care activities are not only behavioural preferences but statistically significant predictors of metabolic outcomes in diabetes management. Unlike studies that simply document adherence levels, this research quantifies the impact of specific self-care behaviours on glycemic control, using regression analysis to isolate individual contributions. The use of SDSCA-Amharic also enhances the cultural and contextual relevance of the measurement tool, ensuring the findings are well-grounded in the local population's lived experiences.

The high prevalence of poor glycemic control, despite clinical follow-up in general hospitals, underlines a need for interventions that go beyond medication adherence to include health literacy enhancement, nutrition counselling, physical activity promotion, and skills training in self-monitoring of blood glucose. The findings support the design of targeted educational programs, especially for overweight or obese individuals and those with low literacy, and reinforce the importance of prior structured diabetes education as a preventive strategy.

Overall, this study provides compelling evidence that self-care activities are not only correlated with but also independently predictive of glycemic outcomes, and that poor glycemic control is a multifactorial issue requiring a comprehensive, patient-centered management approach.

Diabetes mellitus remains the most prevalent metabolic disorder worldwide. According to the International Diabetes Federation (IDF), approximately 537 million adults globally were living with diabetes in 2021. In the United States alone, the Centers for Disease Control and Prevention (CDC) reported in 2024 that 38.1 million adults, representing 14.7% of the adult population, have diabetes. The burden of diabetes extends beyond outpatient care, as individuals with diabetes are 3 to 4 times more likely to be hospitalized than those without the condition.

Hospitalization of diabetic patients poses significant challenges in glycemic management. In 2020, over 7.86 million hospital discharges in the United States were associated with adult patients diagnosed with diabetes. During hospital stays, hyperglycemia (blood glucose >140 mg/dL or 7.8 mmol/L) is frequently observed, affecting 22% to 46% of non-critically ill hospitalized patients. Numerous studies have documented that inpatient hyperglycemia, whether in patients with a known history of diabetes or those with stress-induced hyperglycemia, is linked to increased rates of complications, prolonged hospital stay, and mortality.

In response to these challenges, the American Diabetes Association (ADA) 2025 guidelines recommend tailored glycemic targets for hospitalized patients. For critically ill (ICU) patients, a blood glucose target of 140–180 mg/dL (7.8–10.0 mmol/L) is advised once therapy is initiated. For selected ICU patients, tighter targets may be considered only if hypoglycemia can be safely avoided. For non-critically ill (non-ICU) inpatients, the ADA recommends a

glycemic range of 100–180 mg/dL (5.6–10.0 mmol/L), again emphasizing the importance of avoiding hypoglycaemia (Dhatariya and Umpierrez, 2024)

Insulin therapy remains the cornerstone of inpatient hyperglycemia management. In ICU settings, intravenous insulin administration is the preferred modality for achieving rapid and safe glycemic control. For stable non-ICU patients with mild to moderate hyperglycemia, subcutaneous basal-bolus insulin regimens remain the standard. However, recent evidence has broadened therapeutic possibilities. The ADA 2025 guidelines now cautiously endorse the use of SGLT2 inhibitors in hospitalized patients with type 2 diabetes and concurrent heart failure, provided contraindications such as recent surgery or prolonged fasting are absent.

Previously, GLP-1 receptor agonists were not recommended for inpatient use due to insufficient data on safety and efficacy. Although the guidelines remain cautious, there is growing evidence supporting the use of oral agents, particularly DPP-4 inhibitors, either as monotherapy or in combination with basal insulin. These agents have shown safety and effectiveness in general medical and surgical patients experiencing mild to moderate hyperglycemia.

This evolving evidence base reflects a paradigm shift in inpatient diabetes management, from a one-size-fits-all insulin-centric model to a more individualized, evidence-informed approach. These developments underline the importance of careful patient stratification, attention to comorbid conditions, and close monitoring in order to achieve optimal outcomes. They also reinforce the need for ongoing professional training and institutional protocols that align with current ADA guidelines to improve glycemic control in hospitalized diabetic patients.

2.3.3 Factors affecting glycemic Control Among Patients with Diabetes

Understanding the multifactorial nature of glycemic control is essential for developing effective interventions. Pamgunkas *et al*. (2020) examined the barriers to effective diabetes mellitus self-management practice for glycemic uncontrolled type 2 diabetes mellitus among patients in Indosenia. The study adopted a qualitative design and the researchers collected data via in-depth interviews and focus group discussions. A total of 28 respondents participated in the study. The findings revealed the themes for the barriers among the respondents to be low perception of susceptibility to and severity of the illness; inadequate knowledge and skill of diabetes mellitus self-management; lack of motivation to perform diabetes mellitus self-management; insufficient human resources; lack of social engagement; and social exclusion and feelings of embarrassment. This study helped highlight the subjective views of patients with diabetes on the hindrance to practicing glycemic control, however, the small sample size may limit the diversity and generalizability of the perspectives gathered. The study also primarily focused on the barriers to effective diabetes mellitus self-management but does not explore potential facilitators or strategies that could enhance diabetes mellitus self-management practices. This study also did not incorporate any quantitative measures to complement the findings of the interview and focus group discussion.

In a study by Bukhsh *et al*. (2020), the researchers examined the perspectives, experiences, and barriers toward diabetes-related self-care among patients with type 2 diabetes mellitus in Pakistan. The study adopted a qualitative design, recruiting 32 individuals to participate in an in-depth interview. Among the respondents, the major barriers identified in the management of diabetes and glycemic control were financial constraints, physical limitations, extreme weather conditions, social gatherings, loving food, forgetfulness, needle phobia, and a hectic job. The authors concluded that among Pakistani individuals with diabetes, family support and education from healthcare providers were crucial in influencing self-care practices.

Similar to the study by Pamgunkas *et al*. (2020), this study recruited a sample size of 32 individuals, thereby limiting the generalizability of the findings. The study also did not incorporate any quantitative measures to complement the findings from the qualitative survey.

Adhikari *et al*. (2021) investigated the barriers and facilitators of diabetes self-management practices among multiple stakeholders in Nepal. The study adopted a qualitative design, recruiting 16 individuals to participate in a focus group discussion and semi-structured interview. The important barriers were lack of knowledge about diabetes self-management practices, cultural practices, insufficient counselling, lack of guidelines and protocols for counselling, and financial problems. The authors concluded that a multilevel approach is required to address these barriers and facilitators to glycemic control and self-management for patients with diabetes. This study assessed both the facilitators and barriers to glycemic control among the respondents, however the lack of quantitative data was a limitation in this study as the relationship between the level of knowledge of diabetes and the barriers to glycemic control and self-management could not be explored.

Further insight into factors affecting glycemic control is provided by a study conducted by Alsharit and Alhalal (2022) in Saudi Arabia involving 256 patients with type 2 diabetes. The study used structural equation modeling to explore how health literacy influences quality of life, self-care behaviors, and glycemic control as measured by HbA1c levels. It was found that health literacy had both direct and indirect effects on glycemic outcomes and self-care ability, with self-care management skills serving as a partial mediator.

These findings underscore the multifaceted nature of glycemic control, where knowledge alone is insufficient without adequate health literacy to interpret, process, and apply the information received. The study's comprehensive analytical approach allowed for the

mapping of causal pathways between literacy, behavior, and clinical outcomes—an advancement over previous models which often consider these variables in isolation.

By identifying health literacy as a critical upstream determinant, the study supports the need for tailored patient education interventions that are sensitive to individual literacy levels. It also reinforces the notion that improving health outcomes in diabetes care requires a holistic, patient-centered approach—one that bridges cognitive understanding, behavioral skills, and access to care resources.

A retrospective study conducted at the Methodist Hospital in Wenchi, Ghana by Adjei *et al*. (2025), further sheds light on the clinical and demographic factors associated with glycemic control among patients with type 2 diabetes. The study assessed glycemic status using HbA1c measurements, in line with American Diabetes Association (ADA) guidelines, where HbA1c levels below 7% indicated good control. Among the sample population, the median HbA1c level was 7.9%, and a majority (59.3%) exhibited poor glycemic control.

Multivariate logistic regression analysis revealed that advanced age, longer duration of diabetes (more than 10 years), insulin therapy, and comorbid hypertension were significantly associated with poor glycemic control. Specifically, older adults had over four times greater odds (AOR = 4.32, $p = 0.012$) of poor glycemic control. Similarly, patients on insulin therapy or those diagnosed with hypertension also showed elevated odds for suboptimal glycemic outcomes.

This study is critical in reinforcing the notion that both physiological and treatment-related factors significantly affect glycemic control, beyond behavioral or knowledge-based factors. The finding that insulin therapy was associated with poor glycemic control is consistent with previous literature, which suggests that patients requiring insulin may already represent a group with more advanced disease and hence, greater glycemic instability.

Moreover, the association of hypertension with poor glycemic control highlights the interconnected nature of diabetes and other non-communicable diseases (NCDs), which often coexist and complicate management. These findings support the urgent need for multidisciplinary and patient-specific management strategies, especially for patients with multiple risk factors or comorbidities. Interventions targeting elderly patients, those with a long history of diabetes, or those with coexisting cardiovascular risk factors should be prioritized to improve outcomes and reduce complications.

This study also underscores the value of routine HbA1c monitoring and retrospective data analysis in identifying high-risk groups, thereby offering valuable insights for healthcare policy and practice in low-resource settings like Ghana.

A hospital-based cross-sectional study conducted by Shareef *et al*. (2024), in the Greater Male' Region of the Maldives adds significant insight into the multifactorial determinants of glycemic control among patients with type 2 diabetes mellitus (T2DM). The study, conducted between January and March 2023, assessed 341 patients through validated questionnaires, anthropometric measurements, and blood sampling for HbA1c levels. The prevalence of suboptimal glycemic control (HbA1c > 7%) was reported at 50.7%, indicating that a considerable proportion of diabetic patients in the region were not achieving recommended glycemic targets.

Multivariable logistic regression analysis identified ten key factors significantly associated with suboptimal glycemic control. These included demographic variables such as age (40–60 years, AOR = 3.35), and marital status (being single, AOR = 2.53); dietary practices such as preparing food with more than three tablespoons of cooking oil (AOR = 2.78) or sugar (AOR = 2.55); and lifestyle factors such as lack of physical activity (AOR = 2.04). Clinical variables such as having diabetes for over 20 years (AOR = 2.59), obesity (AOR = 3.82),

elevated total cholesterol (AOR = 2.43), high triglycerides (AOR = 3.43), and psychological stress (AOR = 2.97) were also found to significantly predict poor glycemic control.

This study offers a more comprehensive view of the interconnectedness of diet, physical inactivity, psychological stress, and long-term metabolic health in influencing glycemic outcomes. It further demonstrates that behavioural and psychosocial determinants are as critical as biomedical factors in achieving optimal glycemic control. The strong influence of dietary oil and sugar consumption suggests the need for culturally relevant nutritional interventions targeting everyday cooking habits, while the link to stress underlines the importance of mental health support in chronic disease management.

In contrast to previous studies that primarily focused on medication adherence and sociodemographic variables, this study contributes novel insights into dietary quantity metrics and their association with glycemic levels—factors that are often overlooked in mainstream diabetes education. Furthermore, the emphasis on exercise and lipid profile management reinforces the need for a multidimensional intervention approach, integrating nutrition, physical activity, psychological well-being, and cardiovascular risk management in diabetes care protocols.

The authors concluded that effective public health interventions should prioritize lifestyle modification, patient education, and long-term follow-up strategies, especially for patients with prolonged disease duration. Their findings support a more holistic and preventive model of diabetes care that not only addresses glycemic control but also promotes overall quality of life.

In a cross-sectional study conducted by Yayaha *et al*. (2023) at the Amana Regional Referral Hospital in Dar es Salaam, Tanzania, the researchers evaluated the prevalence and determinants of poor glycemic control among outpatients with type 2 diabetes mellitus

(T2DM) between December 2021 and September 2022. The study utilized a semi-structured, interviewer-administered questionnaire alongside clinical data. A total of 248 patients participated, with a mean age of 59.8 years. Glycemic control was assessed based on fasting blood glucose levels, with poor control defined as readings exceeding 130 mg/dL or falling below 70 mg/dL.

The findings revealed that 66.1% of the participants had poor glycemic control, with an average fasting blood glucose level of 166.9 mg/dL. Multivariable binary logistic regression identified irregular clinic follow-up as the strongest independent predictor of poor glycemic control [AOR=7.53, 95]. In addition, alcohol consumption was found to significantly predict poor glycemic outcomes [AOR=4.71, 95].

This study highlights important behavioral and adherence-related factors in diabetes management. Unlike many studies that emphasize biomedical predictors, this research underscores the role of consistent medical follow-up and lifestyle modification in achieving glycemic targets. The high odds ratio for missed follow-up suggests that continuity of care is critical, not only for medication management but also for ongoing education, monitoring, and psychological support.

Furthermore, the identification of alcoholism as a significant factor aligns with previous findings that link excessive alcohol consumption to poor dietary habits, medication non-adherence, and glucose fluctuations. This study strengthens the argument for behavioural counselling and psychosocial interventions to be routinely included in outpatient diabetes care models.

The Tanzanian context also emphasizes the relevance of health system engagement, including scheduling, patient outreach, and follow-up mechanisms, particularly in resource-constrained urban healthcare settings. Effective public health interventions should prioritize improved

clinic attendance, lifestyle education, and alcohol reduction strategies to enhance glycemic control outcomes.

2.4 Summary of Literature Review

A literature review was carried out on the knowledge, practice and hindrance towards glycemic control among patients with diabetes, as well as the relationship between knowledge of diabetes and practice of glycemic control among this population. Previous studies employed both cross-sectional and qualitative study designs to determine the level of knowledge, practice and hindrances towards glycemic control among various populations of patients with diabetes. From these studies, it was discovered that the knowledge and practice of glycemic control varied among patients in different populations. Common hindrances to glycemic control reported included financial constraints, inadequate knowledge and poor skills of diabetes management, phobia of needles, insufficient guidelines, love of food as well as hectic job schedules. Significant positive relationships between knowledge of diabetes and practice of glycemic control among patients with diabetes, however one study reported an inverse relationship.

CHAPTER THREE

METHODOLOGY

This chapter details of the description of the research design, research setting, target population, sample and sampling technique, instrument for data collection, methods of data collection and analysis used in the study.

3.1 Research Design

This study adopt a descriptive cross-sectional survey design. The descriptive survey approach aims to observe, describe, and document the characteristics of the phenomena under study. This design was successfully used by Ruszkiewicz *et al*. (2020) to assess the glycemic control and awareness among diabetic patients of nutrition recommendations in diabetes. This design was also adopted by Ninsiima *et al*. (2024) to assess the knowledge, attitude and practice towards glycemic control among persons with diabetes mellitus at two tertiary hospitals in Uganda. Therefore, this design was considered appropriate for this study because it will allow for description of the phenomenon as they exist in their natural setting at the time of research.

3.2 Research Setting

This study was carried out at the University of Benin Teaching Hospital, Benin City, Edo State. The University of Benin Teaching Hospital (UBTH) located in Ugbowo, Egor Local Government Area of Edo State is a multi-specialty healthcare provider in South- South, Nigeria and was established in 1973 under an edict from the Nigeria National Health Act, founded as an affiliate to the University of Benin. UBTH was established to deliver tertiary healthcare services to the then Mid-Western Region (now Edo and Delta states) and surrounding areas. Additionally, UBTH operates Community Health Centres in Ogbonna (Estako Central) and Udo (Ovia South West), Edo state, to extend primary healthcare services to these communities.

On April 1st, 1975, the Federal Government assumed control of UBTH, making it Nigeria's fifth teaching hospital, following those in Ibadan and Lagos. With over 900 beds as of August 2019 and a continuously expanding range of specialized departments, UBTH stands as a leading healthcare institution in Nigeria and across Africa.

UBTH comprises of different departments, including academic institutions; clinical and non - clinical departments. UBTH offers internship programs for various medical professionals, including Medical Doctors, Pharmacists, Physiotherapists, Ophthalmologists, Medical Laboratory Scientists, Nurses, Radiographers, Dentists, Nutritionists, and Dieticians. UBTH is committed to training both high- and mid-level healthcare professionals and promoting research initiatives for university lecturers and other researchers, particularly in areas such as economic morbidity and related health concerns.

UBTH have specialized units for the management of patients with diabetes and diabetes complications, hence choice for this study.

3.3 Target Population

The target population for this study are adult patients with diabetes mellitus receiving treatment at Consultant Out-Patient department (COPD) clinic, University of Benin Teaching Hospital, Benin City. Diabetic patients are scheduled to visit Consultant endocrinologist every Tuesday on a weekly basis. Table 3.1 shows the numbers of patients that visited and were attended to from the months of February to March, 2025.

Table 3.1: Statistics for the month February 2025 – March 2025

February 2024							
ENDOCRINOLOGY	**Old**		**New**		**NHIS**		
	M	**F**	**M**	**F**	**M**	**F**	**Total**
	23	48	6	4	15	29	125
	14	52	3	2	6	16	93
	17	24	2	2	7	8	60
	20	26	4	6	3	4	57
Total							335

March 2025							
ENDOCRINOLOGY	**Old**		**New**		**NHIS**		
	M	**F**	**M**	**F**	**M**	**F**	**Total**
	22	57	3	3	14	12	111
	11	25	1	1	5	15	58
	16	25	2	2	5	7	57
	21	32	5	10	1	8	77
Total							303

Source: DATA INTELLIGENT AND INNOVATION UNIT UBTH

$Total\ no.\ of\ patients = 335 + 303 = 638$

$Average\ no.\ of\ patients = \frac{638}{2} = 319$

The total number of diabetic patients seen for the period of February, 2025 to March 2025 was 638 with an average of 319 patients per month

3.4 Sampling

Sample of a study is a subset of a population selected to participate in a research study. The sample size for this study comprises of adult patients with diabetes receiving treatment at COPD clinic, UBTH. The sample size was derived from Taro Yamane equation below for determining sample size:

$$n = \frac{N}{(1+Ne^2)}$$

Where:

n = sample size

N = population size

e = margin of error (set at 0.05)

$$n = \frac{319}{(1+319(0.05)^2)}$$

$$n = \frac{384}{(1+319(0.0025))}$$

$$n = \frac{319}{(1+ 0.7975)}$$

$$n = \frac{319}{(1.80)}$$

$$n = 177$$

Inclusion Criteria

To ensure the reliability and validity of the study, the following inclusion criteria were applied:

- Patients must have a confirmed diagnosis of either Type 1 or Type 2 Diabetes Mellitus.
- Participants must be aged 18 years and above.
- Only patients attending the outpatient clinic at the University of Benin Teaching Hospital will be included.
- Patients who have been attending the outpatient clinic for at least the past six months to ensure familiarity with self-care practices and clinic protocols.

Exclusion Criteria

The following exclusion criteria were used to exclude participants from the study:

- Patients with severe comorbid conditions that could impair their ability to participate in the study, such as advanced cancer or severe psychiatric disorders.
- Pregnant women will be excluded due to different self-care practice requirements and challenges.
- Patients who have been diagnosed with diabetes within the past six months, as they may not have established self-care practices.
- Patients who do not provide informed consent or withdraw their consent at any stage of the study.

3.5 Sampling Technique

The researcher used a convenience non- probability sampling techniques to select the 177 respondents for this study. Prospective respondents was approached at the outpatient clinics at UBTH, where the researcher explain the purpose of the study to them. Respondents who meet the inclusion criteria and also indicate interest to participate in the study was recruited for the study.

3.6 Instrument for Data Collection

A structured questionnaire was used to collect the data for this study. Questions will be thoughtfully designed, sequenced, and structured to gather in-depth, relevant information from the respondents for the study. The questionnaire that was used comprises of three sections.

Section A: This section comprises of demographic data of the participants such as age, gender, marital status, educational level, religion, duration of diagnosis and occupation.

Section B: This section comprises of information on knowledge of diabetes mellitus and glycemic control.

Section C: This section comprises of practice of glycemic control among the participants.

Section D: This section comprises of factors affecting to glycemic control among the participants.

3.7 Validity of the Instrument

Validity indicates whether the instrument measures what they are designed to measure. Validity is the most critical criterion of sound measurements and indicate the degree to which an instrument measures what it supposes to measure. A face content validity of the instrument was used to examine if the question asked will be able to assess what they are ought to measure and there was no use of ambiguous language. The face validity of the questionnaire was sequential, well organized and focused on the applicable areas. The

validity of the questionnaire was examined by my project supervisor and a member of the research and ethics department.

3.8 Reliability of the Instrument

Reliability of instrument refers to consistently and the extent to which the instrument produces the same results on repeated trials. For this study, the reliability was tested using a test-retest method. This was done by administering questionnaire to 10% of the population sample size. Data will be compared using a cronbach's alpha to ensure internal consistency and thus, reliability. The reliability of the instrument will be pegged at 0.8% level of reliability.

3.9 Method of data collection

Data for this study was collected via the administration of a well-structured questionnaire. Individuals who meet the inclusion criteria for the study was identified and those who consent to participate in the study was given the questionnaire to fill. This was done until the required sample size is achieved. The target population of the study was identified by the researcher and assisted by a research assistant who was also briefed on the ethics of questionnaire administration. The target population was approached at the outpatient clinics for management of patients with diabetes at UBTH, after seeking necessary permissions from the hospital authorities. The questionnaire was administered to patients while they are waiting to receive treatment, and should not take more than 20 minutes to fill and be collected back. All data collected was encoded and entered into IBM SPSS spreadsheet for appropriate data analysis.

3.10 Method of Data Analysis

Data analysis is a mechanism for organizing data to produce findings that require interpretation by the researcher (Andersson, 2020). In this study, data collected from respondents was analyzed using descriptive statistics, including frequency, percentages, mean,

and standard deviation, presented in tables. Hypothesis testing was carried out using Pearson correlation and Chi-square test. The level of significance will be set at $p < 0.05$. The data analysis was carried out with the aid of International Business Machines - Statistical Package for Social Sciences (IBM SPSS) version 27.0, a statistical analysis software package.

3.11 Ethical Consideration

Ethical clearance and permission to carry out the study was sought and obtained from the Chairman of the Health Research Ethics Committee, University of Benin Teaching Hospital, Benin City, and informed consent was obtained from all respondents. The purpose of the study was explained to the respondents and their choice of participation were respected. The informations obtained were kept confidential and used strictly for the purpose of the study. The items on the questionnaire was clearly explained to the selected respondents before data collection l begin. Finally, all authors used in the study were appropriately cited both in the body of the work and at the reference page.

The following ethical consideration was maintained in this study.

- **Informed consent:** Researcher ensues that participants were fully informed about the purpose of the research study before participating in the process.
- **Confidentiality:** Participants' information was handled with the utmost confidentiality, and no personal identifiers was requested in the study questionnaire. All participants was informed that their responses was kept confidential and used solely for scientific research purposes.
- **Self-determination/Voluntary participation:** Participants in this study have the right to choose whether to participate or not, without any risk of penalty or prejudicial treatment. They also have the freedom to withdraw at any time or decline to answer any questions they find unclear.
- **Right to fair treatment:** All participants were treated fairly without discrimination.

Plagiarism: **all authors whose works have been used in this study were appropriately cited, both in the body of the work and the main reference list.**

CHAPTER FOUR

RESULTS

This chapter presents the analysis and interpretation of data collected on the knowledge, practice, and hindrances to glycemic control among patients with diabetes mellitus in a tertiary healthcare institution in Benin City, Edo State. A total of 177 questionnaires were distributed to adult diabetic patients attending the Consultant Outpatient Department (COPD) clinic of the University of Benin Teaching Hospital (UBTH). Out of these, 174 were properly filled and deemed valid for analysis, giving a response rate of 98.3%.

Table 4.1: Distribution of Respondents by Demographic Information (n = 174)

Variable	Categories	Frequency (f)	Percentage (%)
Age	30 – 39 years	13	7.5
	40 – 49 years	18	10.3
	50 – 59 years	45	25.9
	60 years and above	98	56.3
Gender	male	52	29.9
	Female	122	70.1
Marital Status	Single	15	8.6
	Married	120	69.0
	Divorced	8	4.6
	Widowed	31	17.8
Education	No formal education	11	6.3
	Primary	56	32.2
	Secondary	63	36.2
	Tertiary	44	25.3
Religion	Christianity	167	96.0
	Islam	7	4.0
	Traditional	**0**	**0.0**
Duration of diagnosis	Less than 1 year	21	12.1
	1 – 5 years	41	23.6
	6 – 10 years	39	22.4
	Above 10 years	73	42.0

Table 4.1 presents the demographic characteristics of the respondents. Out of the 174 participants, the majority (56.3%) were aged 60 years and above, while 25.9% were between 50 and 59 years, 10.3% were between 40 and 49 years, and only 7.5% fell within the 30–39 years age group. In terms of gender, most respondents were female (70.1%), while males

accounted for 29.9%. With respect to marital status, the majority were married (69.0%), followed by widowed respondents (17.8%), singles (8.6%), and a smaller proportion who were divorced (4.6%). Regarding educational attainment, 36.2% had secondary education, 32.2% had primary education, 25.3% attained tertiary education, while 6.3% had no formal education. In terms of religion, Christianity was predominant among the respondents (96.0%), while 4.0% practiced Islam; none identified with traditional religion. Concerning the duration since diagnosis of diabetes, most respondents (42.0%) had lived with the condition for over 10 years, 23.6% for 1–5 years, 22.4% for 6–10 years, while 12.1% had been diagnosed for less than one year.

Answering research question

1. What is the level of knowledge of diabetic patients regarding glycemic control in a tertiary health care facility in Benin City?

Table 4.2: Knowledge of Glycemic Control among Diabetic Patients (n = 174)

Question	Frequency %	Correct	Wrong	Mean	SD	Decision
Which of the following best defines glycemic control?	Avoiding sweet foods (145, 83.3); Maintaining target range (29, 16.7)	29 (16.7%)	145 (83.3%)	0.17	0.374	Poor
What is the recommended normal fasting blood glucose range for a diabetic patient?	50–80 (56, 32.2); 70–130 (92, 52.9); 140–200 (17, 9.8); >200 (9, 5.2)	92 (52.9%)	82 (47.1%)	0.53	0.784	Poor
Which of the following tests is commonly used to assess long-term glycemic control?	FBS (160, 92.0); RBS (9, 5.2); HbA1c (5, 2.9)	5 (2.9%)	169 (97.1%)	0.03	0.541	Poor
What HbA1c level is considered the target for most adults with diabetes?	<9% (35, 20.1); <7% (78, 44.8); ~10% (54, 31.0); >8% (7, 4.0)	78 (44.8%)	96 (55.2%)	0.45	0.800	Poor
Which of the following symptoms may indicate poorly controlled blood glucose?	Blurred vision + frequent urination (166, 95.4); Others (8, 4.6)	166 (95.4%)	8 (4.6%)	0.95	0.210	Good

Question continues	Frequency %	Correct	Wrong	Mean	SD	Decision
Which lifestyle change is most effective in achieving glycemic control?	Regular exercise + balanced diet (170, 97.7); Insulin only (4, 2.3)	170 (97.7%)	4 (2.3%)	0.98	0.150	Good
How often should blood glucose levels ideally be monitored at home?	Once/month (10, 5.7); Daily (91, 52.3); As recommended (46, 26.4); Only with symptoms (27, 15.5)	46 (26.4%)	128 (73.6%)	0.26	0.824	Poor
Skipping diabetes medications can lead to which complication?	Poor glycemic control + complications (158, 90.8); Others (16, 9.2)	158 (90.8%)	16 (9.2%)	0.91	0.402	Good
Which is a possible effect of consistently poor glycemic control?	Organ damage (161, 92.5); Others (13, 7.5)	161 (92.5%)	13 (7.5%)	0.93	0.527	Good
Which healthcare provider is most appropriate to educate patients on glycemic control?	Nurse/Diabetic Educator (167, 96.0); Others (7, 4.0)	167 (96.0%)	7 (4.0%)	0.96	0.197	Good

Decision mean=0.617

Table 4.2 presents respondents' knowledge of glycemic control. Findings reveal generally poor knowledge among the majority of participants. Only 16.7% correctly identified glycemic control as maintaining blood glucose within a target range, while most (83.3%) wrongly equated it with simply avoiding sweet foods. Similarly, just 52.9% knew the recommended fasting blood glucose range of 70–130 mg/dl, while nearly half (47.1%) gave incorrect responses. Knowledge of HbA1c was particularly poor, as only 2.9% recognized it as the standard test for long-term glycemic control, and less than half (44.8%) correctly identified <7% as the target HbA1c level. On the other hand, knowledge was high regarding symptoms, lifestyle, complications, and appropriate educators. A large majority (95.4%) correctly associated blurred vision and frequent urination with poor glycemic control, while 97.7% identified regular exercise and a balanced diet as the most effective lifestyle modification. In addition, 90.8% recognized that skipping medications could result in poor glycemic control and complications, 92.5% linked consistent poor control with organ damage,

and 96.0% identified nurses or diabetic educators as the most appropriate source of education. However, knowledge on home monitoring was low: only 26.4% knew that blood glucose should ideally be checked as recommended by healthcare providers, while the majority (73.6%) gave incorrect answers. Overall, the decision mean (0.617) indicates that respondents had poor knowledge of glycemic control, with strength in recognizing symptoms, lifestyle modifications, complications, and educators, but notable gaps in technical knowledge such as HbA1c targets, tests, and home monitoring.

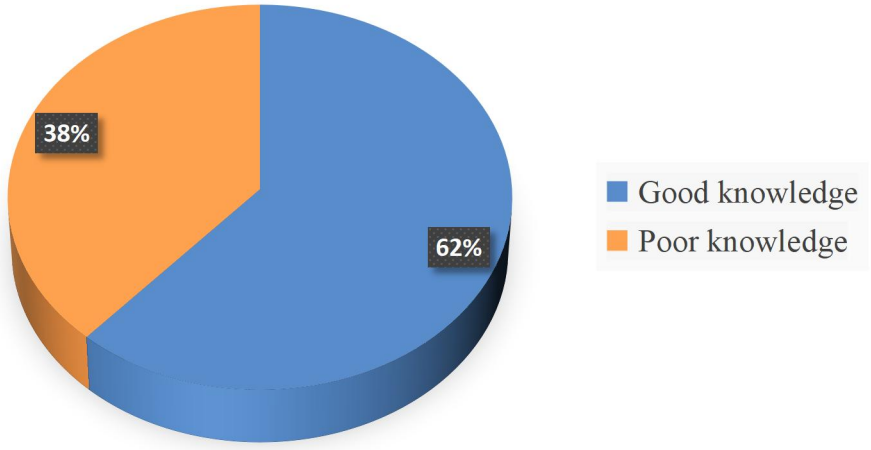

Figure 4.1: Knowledge of Glycemic Control among Diabetic Patients

The pie chart shows that 108 respondents (62.0%) had good knowledge of Glycemic control while 66 respondents (38.0%) had poor knowledge of glycemic control

Research question 2.

What are the practices of diabetic patients toward diabetes mellitus, and how do these practices align with clinical recommendations for glycemic control

Table 4.3: Diabetes Self-Management practice

Statement	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)	Mean	SD	Decision
I monitor my blood glucose levels regularly as advised by my healthcare provider.	17 (9.8)	23 (13.2)	43 (24.7)	91 (52.3)	3.20	1.01	Poor practice
I take my diabetes medications (oral drugs or insulin) exactly as prescribed.	12 (6.9)	13 (7.5)	27 (15.5)	122 (70.1)	3.49	0.90	Good practice
I follow a diet plan recommended for diabetic patients (e.g., low sugar, high fiber, portion control).	3 (1.7)	18 (10.3)	60 (34.5)	93 (53.4)	3.40	0.74	Good practice
I avoid consuming sugary drinks and high-carbohydrate snacks.	3 (1.7)	10 (5.7)	34 (19.5)	127 (73.0)	3.64	0.67	Good practice
I engage in regular physical activity or exercise (e.g., walking, cycling) at least 3–5 times per week.	14 (8.0)	6 (3.4)	76 (43.7)	78 (44.8)	3.25	0.86	Poor practice
I attend my scheduled medical check-ups and diabetes clinic appointments regularly.	0 (0.0)	15 (8.6)	31 (17.8)	128 (73.6)	3.65	0.63	Good practice
I inspect my feet daily for cuts, swelling, or signs of infection.	57 (32.8)	35 (20.1)	25 (14.4)	57 (32.8)	2.47	1.25	Poor practice
I avoid smoking and excessive alcohol consumption as part of managing my diabetes.	25 (14.4)	2 (1.1)	0 (0.0)	147 (84.5)	3.55	1.07	Good practice
I manage stress effectively through relaxation techniques, counseling, or healthy routines.	9 (5.2)	13 (7.5)	54 (31.0)	98 (56.3)	3.39	0.84	Good practice
I seek guidance from healthcare professionals when I experience unusual symptoms or complications.	5 (2.9)	8 (4.6)	26 (14.9)	135 (77.6)	3.67	0.70	Good practice
Cut off mean					**3.37**		**Good**

Table 4.3 shows the diabetes self-management practices of respondents. The findings reveal a mix of good and poor practices across different areas of self-care. While 77% of respondents agreed or strongly agreed that they monitor their blood glucose levels regularly, the decision mean (3.20) classified this as a poor practice, suggesting irregular or inconsistent adherence. In contrast, medication adherence was reported as good practice, with 85.6% of respondents taking their medications exactly as prescribed. Dietary habits were generally positive: 87.9% followed recommended diet plans, and 92.5% avoided sugary drinks and high-carbohydrate snacks, both of which were rated as good practices. Similarly, clinic attendance was commendable, with 91.4% of respondents regularly keeping medical appointments. Lifestyle-related practices showed some weaknesses, however. Although 88.5% engaged in some form of regular physical activity, the practice was still classified as poor, reflecting gaps in meeting recommended exercise frequency. Daily foot inspection was notably poor, as only 32.8% performed it consistently, while over half either neglected or disagreed with the practice. Other self-management aspects were encouraging. A vast majority (84.5%) reported avoiding smoking and excessive alcohol, and 87.3% practiced stress management through relaxation or counseling. In addition, 92.5% sought guidance from healthcare professionals when experiencing unusual symptoms or complications. The overall cut-off mean of **3.37** indicates that respondents demonstrated generally good diabetes self-management practices, though weaknesses remain in blood glucose monitoring, physical activity, and foot care.

Research question 3

What factors affect good glycemic control among diabetic patients in a tertiary health care facility in Benin City?

Table 4.4: Factors Affecting Good Glycemic Control

Questions	Strongly Agree (%)	Agree (%)	Disagree (%)	Strongly Disagree (%)	Mean	SD	Decision
I find it difficult to afford diabetic medications.	75 (43.1)	27 (15.5)	31 (17.8)	41 (23.6)	2.22	1.23	Factor
I used herbal or alternative remedy to complement prescribed medications.	24 (13.8)	29 (16.7)	16 (9.2)	105 (60.3)	3.16	1.14	Not a Factor
I lack reminders or support to help me stay consistent with my medications.	20 (11.5)	15 (8.6)	44 (25.3)	95 (54.6)	3.23	1.02	Not a Factor
The medications present unpleasant side effects on me.	26 (14.9)	35 (20.1)	20 (11.5)	93 (53.4)	3.03	1.15	Not a Factor
I hardly have access to glucometer to monitor my blood sugar.	25 (14.4)	33 (19.0)	18 (10.3)	98 (56.3)	3.09	1.15	Not a Factor
I cannot use glucometer correctly.	53 (30.5)	25 (14.4)	23 (13.2)	73 (42.0)	2.67	1.29	Factor
Glucometer kits supply are too expensive.	114 (65.5)	30 (17.2)	16 (9.2)	14 (8.0)	1.60	0.95	Factor
Monitoring blood glucose level is painful and uncomfortable.	80 (46.0)	69 (39.7)	11 (6.3)	14 (8.0)	1.76	0.89	Factor
Exercise and physical activities cause pain and discomfort.	7 (4.0)	52 (29.9)	72 (41.4)	43 (24.7)	2.87	0.83	Not a Factor
My daily schedule prevents me from doing exercise.	20 (11.5)	25 (14.4)	61 (35.1)	68 (39.1)	3.02	1.00	Not a Factor
I lack adequate knowledge about diabetic-friendly diets.	8 (4.6)	21 (12.1)	29 (16.7)	116 (66.7)	3.45	0.87	Not a Factor
I find diabetic diets unsatisfactory.	16 (9.2)	83 (47.7)	43 (24.7)	32 (18.4)	2.52	0.89	Factor
I often eat outside the home where I have less control over my food choice.	3 (1.7)	14 (8.0)	40 (23.0)	117 (67.2)	3.56	0.71	Not a Factor

My cultural or native food are not suitable for diabetic control.	87 (50.0)	33 (19.0)	28 (16.1)	26 (14.9)	1.96	1.12	Factor

Mean cut off = 2.72

Table 4.4 highlights the various factors influencing good glycemic control among diabetic patients. The results show that financial barriers play a significant role. A large proportion of respondents (43.1% strongly agreed and 15.5% agreed) reported difficulty affording diabetic medications, while 65.5% strongly agreed that glucometer kits were too expensive. Additionally, 46.0% strongly agreed and 39.7% agreed that monitoring blood glucose was painful and uncomfortable, making this another key factor. Knowledge and skills in self-management also emerged as challenges. About 30.5% strongly agreed and 14.4% agreed that they could not use a glucometer correctly, while 50% strongly agreed that their cultural or native foods were not suitable for diabetes control. Furthermore, 47.7% agreed that diabetic diets were unsatisfactory, showing dietary challenges in adherence. On the other hand, some potential barriers were not considered significant. The majority of respondents disagreed that herbal remedies, lack of support, side effects of medications, lack of access to glucometers, daily schedules, or eating outside the home significantly hindered glycemic control. Similarly, most disagreed that they lacked knowledge about diabetic-friendly diets, with 66.7% strongly disagreeing. With a cut-off mean of 2.72, the findings indicate that the most prominent factors affecting good glycemic control were financial constraints, difficulty with glucometer use, pain associated with monitoring, dissatisfaction with diabetic diets, and cultural food practices. Other commonly assumed barriers such as side effects, exercise difficulties, or external eating habits were not strongly supported in this study.

Table 4.5: Hypothesis testing

Variables	N	Correlation Coefficient (r)	p-value	Decision on Ho
Knowledge vs Practice	174	0.45	0.000*	Reject Ho: Significant positive relationship

CHAPTER FIVE

DISCUSSION OF FINDINGS

This chapter discusses the major findings of the research compared with the literature reviewed, the implication for nursing, summary, conclusion, Recommendations and Suggestions for further Studies.

5.1 Discussion of Findings

5.1.1 Knowledge of Glycemic Control among Diabetic Patients

The present study revealed a paradoxical pattern in knowledge levels among diabetic patients at UBTH. While 62% demonstrated overall good knowledge based on cumulative scoring, critical deficits emerged in technical understanding of glycemic control. Only 16.7% correctly defined glycemic control as maintaining blood glucose within target ranges, and a mere 2.9% identified HbA1c as the gold standard for long-term monitoring. These findings contrast sharply with studies by Asmelash et al. (2020) and Ninsiima et al. (2024), where 62% and 60% respectively demonstrated good knowledge, but those studies did not report such severe deficits in understanding core monitoring concepts. The current findings align more closely with Ruszkiewicz et al. (2020), who reported inadequate knowledge particularly regarding technical aspects of glycemic management. However, respondents in the present study demonstrated strong awareness of symptoms, lifestyle modifications, and complications, with over 90% correctly identifying these domains. This suggests a knowledge pattern characterized by strong symptom recognition but weak technical competence. The low recognition of HbA1c testing is particularly concerning given that Alsharit and Alhalal (2022) established glycemic monitoring as a critical mediator between

health literacy and clinical outcomes. The finding that only 26.4% understood appropriate monitoring frequency echoes the recommendations of Ninsiima et al. (2024), who called for enhanced education on self-monitoring techniques. These gaps likely reflect the inadequate structured diabetes education highlighted across multiple African studies and may explain the disconnect between knowing consequences and implementing effective monitoring practices.

5.1.2 Practices of Diabetic Patients Toward Glycemic Control

The assessment of diabetes self-management practices revealed an overall good practice level with a mean score of 3.37, yet significant weaknesses persisted in critical areas. Medication adherence was exemplary at 85.6%, and clinic attendance reached 91.4%, surpassing the patterns reported in many comparable settings. However, blood glucose monitoring, despite 77% claiming regular practice, was classified as poor with a mean of 3.20, suggesting irregular or inconsistent execution. This finding directly parallels the observations of Ninsiima et al. (2024) and Wondm et al. (2024), where blood glucose testing emerged as the strongest predictor of glycemic outcomes yet remained poorly practiced by approximately half of participants. Daily foot inspection was particularly deficient in the current study, with only 32.8% performing it consistently, aligning with the low foot care adherence documented in Ethiopian studies. Physical activity, though reported by 88.5%, was classified as poor practice, likely reflecting inadequate frequency or intensity to meet clinical recommendations. These patterns mirror the findings of Abebe et al. (2022), who reported 98.6% and 96.4% poor adherence to diet and exercise respectively among Ethiopian patients. Dietary practices showed more promise, with 92.5% avoiding sugary foods and 87.9% following recommended meal plans, exceeding the adherence levels in several reviewed studies. The strong medication adherence but weak monitoring practice suggests a compliance pattern focused on treatment rather than self-assessment, potentially reflecting the healthcare

system's emphasis on pharmaceutical management over patient empowerment in self-monitoring, a gap identified by Al-Maskari et al. (2023) in Gulf settings.

5.1.3 Factors Affecting Good Glycemic Control

The identification of barriers to glycemic control revealed financial constraints as the predominant challenge, with 58.6% reporting difficulty affording medications and 82.7% finding glucometer kits prohibitively expensive. These findings provide stronger quantitative evidence than the qualitative observations by Bukhsh et al. (2020) and Pamgunkas et al. (2020), and suggest more severe access barriers in Nigeria compared to other sub-Saharan African contexts. Additionally, 85.7% identified blood glucose monitoring as painful and uncomfortable, a factor infrequently quantified in previous literature. The finding that 44.9% lacked competence in glucometer use aligns with the skill deficits implied by low technical knowledge scores and supports the educational gaps documented by Adhikari et al. (2021). Notably, 69% perceived their cultural or native foods as incompatible with diabetes control, and 56.9% found diabetic diets unsatisfactory. This cultural dietary barrier represents an underexplored dimension in the reviewed literature, where dietary challenges were mentioned but not systematically quantified. The findings contrast with those of Shareef et al. (2024) in the Maldives, where specific cooking practices were associated with poor control, suggesting cultural food beliefs may operate differently across contexts. Interestingly, commonly assumed barriers such as medication side effects, lack of support systems, and exercise-related discomfort were not identified as significant factors by most respondents. This diverges from Pamgunkas et al. (2020) and Yayaha et al. (2023), who found these psychosocial factors prominent. The emphasis on cost barriers and technical skill deficits rather than motivational factors suggests that structural and educational interventions may be more impactful than behavioral counseling alone in this setting.

5.2 Implications for Nurses

The findings of this study have several practical implications for nursing practice. First, the identified knowledge gaps in technical aspects of glycemic control underscore the need for nurses to intensify patient education on blood glucose monitoring, HbA1c testing, and self-management strategies. Nurses must adopt a more structured and individualized approach to diabetes education, ensuring patients understand not only the consequences of poor control but also the technical means to achieve optimal glycemic outcomes. Second, the suboptimal adherence to practices such as foot inspection, physical activity, and consistent monitoring highlights the critical role of nurses in reinforcing daily self-care behaviors. Nurses should integrate regular demonstrations, practical skill sessions, and follow-up assessments into routine care to enhance patient competence. Third, the financial and cultural barriers identified indicate that nurses must advocate for accessible care and culturally sensitive interventions, including cost-effective monitoring options and dietary guidance that aligns with patients' food practices. Overall, nurses are pivotal in bridging the gap between knowledge and practice, and must assume an active role in patient empowerment.

5.3 Summary

This study assessed knowledge, practices, and factors affecting glycemic control among diabetic patients at UBTH. While 62% of respondents demonstrated overall good knowledge, significant deficits were noted in technical understanding, particularly regarding HbA1c monitoring and self-assessment frequency. Self-management practices were generally good for medication adherence and clinic attendance but poor in areas such as blood glucose monitoring, foot care, and physical activity. Financial constraints, high costs of glucometer kits, and low technical competence were the most significant barriers to effective glycemic control. Cultural dietary preferences also contributed to challenges in following

recommended meal plans. These findings highlight the need for targeted educational interventions, structural support, and culturally sensitive approaches to enhance patient outcomes.

5.4 Conclusion

The study concludes that while diabetic patients at UBTH exhibit reasonably good knowledge and adherence in some areas of self-management, critical gaps in technical understanding and practical skills hinder optimal glycemic control. Financial limitations and cultural dietary practices further compound these challenges. Nurses play a central role in mitigating these barriers through patient education, skill-building, and advocacy for accessible care. Addressing these knowledge, practice, and structural gaps is essential for improving glycemic outcomes and reducing diabetes-related complications in this population.

5.5 Limitations of the Study

Several limitations were noted in this study. First, the cross-sectional design limits causal inferences between knowledge, practices, and glycemic control. Second, self-reported data on practices may be subject to social desirability or recall bias, potentially overestimating adherence. "The knowledge and practice scales demonstrated low internal consistency (α = 0.130 and 0.280 respectively), reflecting the heterogeneous nature of diabetes knowledge domains and self-management behaviors. Unlike attitude scales that measure a single psychological construct, these instruments assessed diverse competencies and behaviors that may not necessarily correlate. Therefore, findings were interpreted at the item level rather than as composite scores. Future studies should consider domain-specific subscales or alternative assessment approaches.

5.6 Recommendations

Based on the study findings, the following recommendations are proposed:

1. **Enhanced Diabetes Education:** Nurses and healthcare providers should implement structured, practical, and patient-centered education programs focusing on blood glucose monitoring, HbA1c testing, foot care, and lifestyle modifications.
2. **Skill-Building Sessions:** Regular hands-on sessions should be conducted to improve patients' competence in using glucometers and performing self-care practices.
3. **Cultural and Cost-Sensitive Interventions:** Healthcare providers should tailor dietary advice to align with patients' cultural food practices and promote cost-effective monitoring strategies.
4. **Policy Advocacy:** Nursing leadership and hospital management should advocate for subsidized diabetes care, including affordable glucometer kits and medications.
5. **Follow-up and Reinforcement:** Nurses should establish consistent follow-up systems to monitor adherence and reinforce self-management behaviors.

5.7 Suggestions for Further Study

Future research could explore the following areas:

1. Multi-center studies assessing knowledge and practices across diverse Nigerian healthcare settings to enhance generalizability.
2. Longitudinal studies to examine causal relationships between patient education, self-management practices, and glycemic outcomes.
3. Intervention studies evaluating the effectiveness of structured nurse-led education and culturally tailored programs on improving glycemic control.

4. Exploration of healthcare system and institutional factors influencing patient adherence and knowledge, including availability of resources and staff competencies.
5. Studies investigating psychosocial factors, such as motivation, family support, and mental health, in relation to diabetes self-management

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APPENDIX I

Questionnaire

Department of Nursing Science

Faculty of Basic Medical Sciences

University of Benin, Benin City

Dear Respondent,

I am a 500 level student of Department of Nursing in the above mentioned institution conducting a research work on **"Assessment of knowledge, practice and hindrances to glycemic control among diabetes patients in a tertiary healthcare facility, Benin City, Edo State"** as part of the requirement for partial fulfillment of Bachelors of Nursing Science degree. Please, kindly and sincerely provide and answers to the questions in the space provided each of the sections. Note that information provided is strictly for academic purpose and will be treated with utmost confidentiality. No name is required and participation is not a must. Answer the questions to the best of your understanding, thus be independent and truthful as possible. Thank you

Yours faithfully,

Ojo, Ayobami Esther

SECTION A: Demographic Information

Answer the following questions by ticking (√) in the appropriate box:

i. **Age:** ( ) Less than 20 years ( ) 20 – 29 years ( ) 30 – 39 years ( ) 40 – 49 years ( ) 50 – 59 years ( ) 60 years and above

ii. **Gender:** ( ) Male ( ) Female

iii. **Marital Status:** ( ) Single ( ) Married ( ) Divorced ( ) Widowed

iv. **Level of Education:** ( ) No formal education ( ) Primary ( ) Secondary ( ) Tertiary

v. **Religion:** ( ) Christianity ( ) Islam ( ) Traditional Religion ( ) Others

vi. **Duration since diagnosis of diabetes:** ( ) Less than 1 year ( ) 1 – 5 years ( ) 6 – 10 years ( ) Above 10 years

SECTION B: **Knowledge of Glycemic Control Among Diabetic Patients**

2 **Which of the following best defines glycemic control?**

a) Avoiding sweet foods altogether b) Maintaining blood glucose levels within a target range c) Taking insulin only when symptoms occur d) Drinking plenty of water daily

3 **What is the recommended normal fasting blood glucose range for a diabetic patient?**

a) 50–80 mg/dL b) 70–130 mg/dL c) 140–200 mg/dL d) Above 200 mg/dL

4 **Which of the following tests is commonly used to assess long-term glycemic control?**

a) Fasting Blood Sugar (FBS) b) Random Blood Sugar (RBS) c) Oral Glucose Tolerance Test (OGTT) d) Hemoglobin A1c (HbA1c)

5 **What HbA1c level is considered the target for most adults with diabetes?**

a) Below 9% b) Less than 7% c) Around 10% d) Greater than 8%

6 **Which of the following symptoms may indicate poorly controlled blood glucose?**

a) Blurred vision and frequent urination b) Headache and low blood pressure c) Fever and vomiting d) Sneezing and coughing

7 **Which of these lifestyle changes is most effective in achieving glycemic control?**

a) Eating once daily b) Regular physical activity and balanced diet c) Taking insulin only d) Drinking herbal mixtures

8 **How often should blood glucose levels ideally be monitored at home by a diabetic patient?**

a) Once a month b) Every morning before breakfast c) As recommended by healthcare provider d) Only when symptoms are present

9 **Skipping diabetes medications can lead to which of the following complications?**

a) Improved liver function b) Stable weight c) Poor glycemic control and complications d) Lower insulin resistance

10 **Which of the following is a possible effect of consistently poor glycemic control?**

a) Strengthened immune system b) Prevention of heart disease c) Damage to eyes, kidneys, and nerves d) Improved digestion

11 **Which healthcare provider is most appropriate to educate patients on glycemic control?**

a) Pharmacist b) Nurse or Diabetic Educator c) Laboratory technician d) Radiologist

SECTION C: Diabetes Self-Management

Rate your frequency using the scale as follows ticking (√) in the appropriate column: 4= Strongly Agree, 3 = Agree, 2 = Disagree, 1 = Strongly disagree,

S/N	Questions	4	3	2	1
1	I monitor my blood glucose levels regularly as advised by my healthcare provider.				
2	I take my diabetes medications (oral drugs or insulin) exactly as prescribed.				
3	I follow a diet plan recommended for diabetic patients (e.g., low sugar, high fiber, portion control).				
4	I avoid consuming sugary drinks and high-carbohydrate snacks.				
5	I engage in regular physical activity or exercise (e.g., walking, cycling) at least 3–5 times per week.				
6	I attend my scheduled medical check-ups and diabetes clinic appointments regularly.				
7	I inspect my feet daily for cuts, swelling, or signs of infection.				
8	I avoid smoking and excessive alcohol consumption as part of managing my diabetes.				
9	I manage stress effectively through relaxation techniques, counseling, or				

	healthy routines.				
10	I seek guidance from healthcare professionals when I experience unusual symptoms or complications.				

SECTION D: factors affecting good Glycemic Control

Rate your degree of agreement with each question using the scale as follows: Strongly Disagree (SD); Disagree (D); Neutral (N); Agree (A); Strongly Agree (SA)

S/N	Questions	SD	D	A	SA
1	I find it difficult to afford diabetic medications				
2	I used herbal or alternative remedy to complement prescribed medications				
3	I lack reminders or support to help me stay consistent with my medications				
4	The medications presents unpleasant side effects on me				
5	I hardly have access to glucometer to monitor my blood sugar				
6	I cannot use glucometer correctly				
7	Glucometer kits supply are too expensive				
8	Monitoring blood glucose level is painful and uncomfortable				
9	Exercise and physical activities causes pain and discomfort				
10	My daily schedule prevents me from doing exercise				
11	I lack adequate knowledge about diabetic friendly diets				
12	I find diabetic diets unsatisfactory				
13	I often eat outside the home where I have less control over my food choice				
14	My cultural or native food are not suitable for diabetic control				

APPENDIX II

RELIABILITY ANALYSIS RESULTS

Knowledge of Glycemic Control Among Diabetic Patients

Case Processing Summary

		N	%
Cases	Valid	174	100.0
	Excluded[a]	0	.0
	Total	174	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.130	.038	10

Diabetes Self-Management

Case Processing Summary

		N	%
Cases	Valid	174	100.0
	Excluded[a]	0	.0
	Total	174	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.280	.324	10

Factors affecting good Glycemic Control

Case Processing Summary

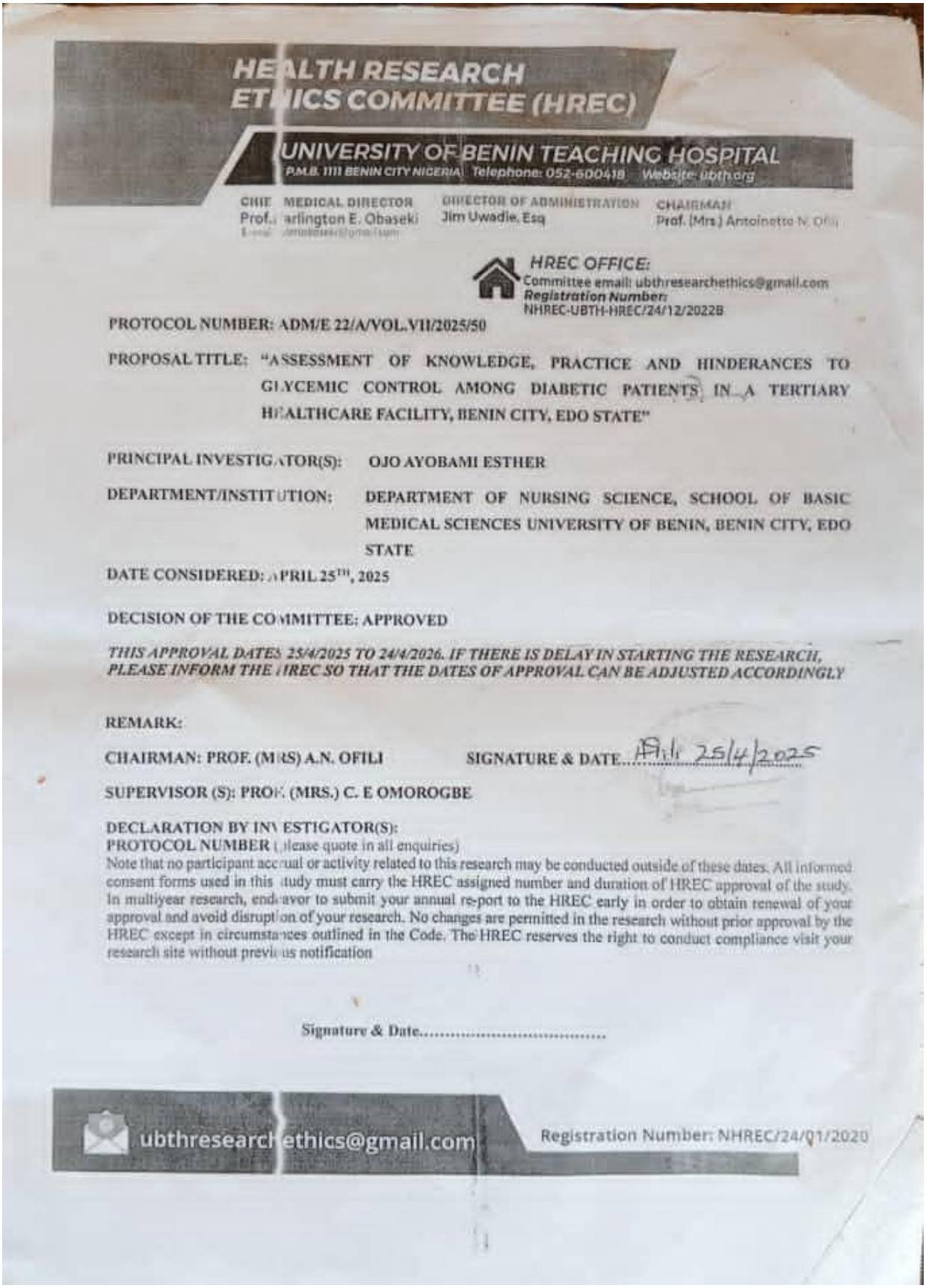
		N	%
Cases	Valid	174	100.0
	Excluded[a]	0	.0
	Total	174	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.651	.630	14

ETHICAL APPROVAL



HEALTH RESEARCH ETHICS COMMITTEE (HREC)

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Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/2025/50

PROPOSAL TITLE: "ASSESSMENT OF KNOWLEDGE, PRACTICE AND HINDERANCES TO GLYCEMIC CONTROL AMONG DIABETIC PATIENTS IN A TERTIARY HEALTHCARE FACILITY, BENIN CITY, EDO STATE"

PRINCIPAL INVESTIGATOR(S): OJO AYOBAMI ESTHER

DEPARTMENT/INSTITUTION: DEPARTMENT OF NURSING SCIENCE, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE

DATE CONSIDERED: APRIL 25TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 25/4/2025 TO 24/4/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI SIGNATURE & DATE April 25/4/2025

SUPERVISOR (S): PROF. (MRS.) C. E OMOROGBE

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

Signature & Date.....

ubthresearchethics@gmail.com Registration Number: NHREC/24/01/2020