BARRIERS AND FACILITATORS OF PHYSICAL ACTIVITY AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY, EDO STATE, NIGERIA.

BY

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A RESEARCH PROPOSAL SUBMITTED TO THE DEPARTMENT OF PHYSIOTHERAPY, SCHOOL OF BASIC MEDICAL SCIENCES, UNIVERSITY OF BENIN IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF PHYSIOTHERAPY (B.PT) DEGREE UNIVERSITY OF BENIN CITY

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CERTIFICATION

This dissertation by **OKOLI VICTOR CHINEMEREM**, is accepted in its presented form as satisfying the dissertation requirement of the degree of Bachelor of Physiotherapy of the School of Basic Medical Sciences, College of Medical Sciences of the University of Benin.

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DEDICATION

This Dissertation is dedicated to God Almighty, My loving father Mr Patrick Amaechi Okoli for believing in me and My Mother Mrs Philomena Obiageri Okoli for her unwavering supports and unending love.

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ABSTRACT

Background and Objective:

This study investigated the barriers and facilitators of physical activity among patients with Type 2 Diabetes Mellitus(T2DM) attending the University of Benin Teaching Hospital, Benin City, Edo State, Nigeria.

Methods:

A cross-sectional study was conducted with 150 participants recruited via purposive sampling.Data were collected using the International Physical Activity Questionnaire (IPAQ), Barriers to Physical Activity Questionnaire (BPAQ), and Facilitators of Physical Activity Questionnaire (FPAQ), alongside clinical data such as Body Mass Index (BMI). Data were analyzed using descriptive and inferential statistics.

Results:

The cohort had a mean age of 60.2±11.43 years and was predominantly female (62.0%). Most participants were classified as engaging in a moderate level of physical activity (73.3%). The most significant barriers to physical activity were lack of willpower (56.7%), lack of energy (54.7%), lack of resources (54.0%), and lack of time (53.3%). Key facilitators, rated as "very important," included improved blood sugar control (49.3%), advice from healthcare providers (43.3%), and having a safe neighborhood for walking (44.7%). Statistical analysis revealed a significant association between age group and the perception of "flexible work schedule" as a facilitator (χ^2=31.336, p=0.008), indicating age-related differences. Conversely, no significant gender differences were found in perceived barriers (χ^2=0.860, p=0.835) or facilitators (χ^2=3.869, p=0.276). The presence of co-morbidities was significantly associated with reporting "lack of time" as a barrier (χ^2=9.709, p=0.021).

Conclusion and Implications:

The engagement in physical activity among T2DM patients is shaped by a complex interplay of psychological,social, environmental, and health-related factors. The findings underscore the necessity for comprehensive, tailored interventions that target motivational enhancement, improve resource accessibility, and foster supportive environments to improve physical activity adherence. The research also emphasizes the critical role healthcare providers play in promoting active life style

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Type 2 Diabetes Mellitus (T2DM) is a common metabolic condition worldwide characterized by a combination of two factors: impaired insulin production by pancreatic β-cells and failure of insulin-sensitive tissues to respond (Roden et al,.2019). The global increase in obesity, sedentary lifestyles, high calorie diets, and population aging, has quadrupled the incidence and prevalence of T2DM (Chatterjee et al,. 2017; NCD Risk Factor Collaboration 2016). Based on statistics from 138 countries, the International Diabetes Federation (IDF) projected that the global prevalence of diabetes in high-, middle-, and low-income countries was 10.4%, 9.5%, and 4.0%, respectively. (Saeedi et al,.2019).Physical activity is a cornerstone of T2DM management, as it improves glycemic control, reduces cardiovascular risk, and enhances overall quality of life (Colberg et al,. 2016; Kanaley et al,. 2022). Despite its established advantages, adherence to physical exercise recommendations remains low among T2DM patients, particularly in resource-constrained settings like the University of Benin Teaching Hospital in Edo State. Several factors influence physical activity engagement among T2DM patients, including socioeconomic status, cultural beliefs, lack of awareness, and environmental barriers. Limited access to recreational facilities, safety concerns, and competing demands of daily life may further hinder physical activity participation (Kruszyńska & Poczta., 2020).Conversely, social support, healthcare provider encouragement, and patient education can serve as facilitators Understanding these barriers and facilitators is critical for developing targeted interventions to promote physical activity and improve diabetes outcomes in this population. (Vilafranca et al,. 2021).

Despite the well-established advantages of physical activity, there has been little research on the specific challenges and enablers encountered by T2DM patients at the University of Benin Teaching Hospital in Edo state. This study intends to close this gap by identifying the

primary barriers and facilitators of physical activity among T2DM patients in this location, thereby giving evidence to improve local health policy and rehabilitation programs.

1.2 Statement of the Problem

Physical activity is vital for controlling T2DM, however many patients at the University of Benin Teaching Hospital in Edo State do not meet the required levels. The causes of this discrepancy in the local context are not thoroughly documented. While studies in other regions have identified barriers such as lack of motivation, fear of injury, and environmental constraints, (Alzahrani et al,. 2019). the applicability of these findings to the University of Benin teaching hospital, Edo state, remains uncertain Similarly, facilitators such as family support and planned fitness programs have not been adequately studied in this situation (Vilafranca et al,. 2021). Key issues identified: There is insufficient research on the barriers and facilitators of physical exercise among T2DM patients at the University of Benin Teaching Hospital in Edo State. Individual cultural ideas and local infrastructure may influence physical exercise participation. The role of healthcare practitioners in promoting physical activity, as well as the availability of patient education programs, are poorly understood. Addressing these gaps would allow us to tailor treatment options to the individual needs of T2DM patients at the University of Benin Teaching Hospital in Edo state, ultimately improving diabetes control and reducing complications. .

1.3 Research Questions

The research questions that will guide this project are as follows:

i. What are the perceived barriers to physical activity among T2DM patients in University of Benin teaching hospital, Edo state?
ii. What factors facilitate physical activity engagement among T2DM patients in the University of Benin teaching hospital, Edo state?
iii. What are the level of physical activity among participants (patients with type 2 diabetes mellitus)

iv. How do healthcare providers influence physical activity participation among T2DM patients?

1.4 Aim of the Study

To explore the barriers and facilitators of physical activity among patients with Type 2 Diabetes Mellitus in University of Benin teaching hospital, Edo state, Nigeria.

1.4.1 Specific Objectives

The specific objectives are:

i. To identify the perceived barriers to physical activity among T2DM patients in the University of Benin teaching hospital, Edo state.
ii. To determine the facilitators that encourage physical activity among T2DM patients in University of Benin teaching hospital, Edo state.
iii. To assess the level of physical activities among patients with type 2 diabetes mellitus
iv. To assess the role of healthcare providers in promoting physical activity among T2DM patients.
v. To evaluate the influence of sociocultural factors on physical activity engagement.

1.5 Hypothesis

1.5.1 Main Hypothesis

1. There will be no significant association between demographic/clinical factors (gender, age group, presence of co-morbidities) and facilitators of physical activity among patients with type 2 diabetes mellitus in University of Benin Teaching Hospital, Edo state.

2. There will be no significant association between demographic/clinical factors (gender, age group, presence of co-morbidities) and barriers to physical activity among patients with type 2 diabetes mellitus in University of Benin Teaching Hospital, Edo state.

1.5.2 Sub-Hypotheses

1. There would be no significant association between gender and the perception of facilitators of physical activity among patients with type 2 diabetes mellitus.

2. There would 1 be no significant association between age group and the perception of facilitators of physical activity among patients with type 2 diabetes mellitus.

3. There would be no significant association between the presence of co-morbidities and the perception of facilitators of physical activity among patients with type 2 diabetes mellitus.

4. There would be no significant association between gender and the perception of barriers to physical activity among patients with type 2 diabetes mellitus.

5. There would be no significant association between age group and the perception of barriers to physical activity among patients with type 2 diabetes mellitus.

6. There would be no significant association between the presence of co-morbidities and the perception of barriers to physical activity among patients with type 2 diabetes mellitus.

1.6 Significance of the Study

i. This study adds to the current body of knowledge by providing empirical evidence on barriers and facilitators of physical activity among T2DM patients at the University of Benin Teaching Hospital in Edo state.
ii. Contributing to the development of culturally relevant interventions to encourage physical exercise.
iii. Emphasizing the importance of healthcare practitioners and legislators in removing barriers to physical exercise.
iv. Providing a basis for future research on diabetes management in low- resource settings.

1.7 Scope and Delimitation of the Study

This study would focus on adult T2DM patients who visit healthcare facilities at the University of Benin Teaching Hospital in Edo State.

The study will:

1. Included participants aged 30 years and above.

2. Excluded patients who have serious comorbidities that impede their physical activities.

3. I PAQ

1.8 Limitations of the Study

1. The study's conclusion may not be generalized to other regions or populations.
2. Self-reported statistics on physical activity may be prone to recall bias.
3. The sample size can be limited by patient availability and desire to participate..

1.9 Definition of Terms

Type 2 Diabetes Mellitus (T2DM): A chronic metabolic disorder characterized by insulin resistance and impaired insulin secretion.

Physical Activity: any movement of the body caused by skeletal muscles that needs the expenditure of energy.

Barriers: Factors that discourage people from engaging in physical activity.

Facilitators: Factors that motivate or facilitate physical exercise involvement.

1.10 Abbreviations and meaning:

T2DM: Type 2 Diabetes Mellitus

PA: Physical Activity

PAs: Physical Activities

HCPs: Health Care Providers

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Physical activity (PA) is an essential component of managing type 2 diabetes mellitus (T2DM), since it has been shown to improve glycaemic control, lower cardiovascular risk, and increase general well-being (Colberg et al., 2016). Despite the documented benefits, adherence to PA recommendations is low among T2DM patients worldwide (Vilafranca et al,. 2021). Identifying barriers and facilitators to physical activity is crucial for developing successful therapies that promote long-term participation. This chapter reviews existing literature on the prevalence and risk factors associated with type 2 diabetes and the multifaceted role of physical activity in managing type 2 diabetes mellitus, it mechanisms and evidence both globally and within the Nigerian context. It begins with a conceptual understanding of type 2 diabetes and how physical activities impacts on T2DM. The chapter further explores the epidemiology of T2DM, highlighting complications, clinical presentations and diagnosis of type 2 diabetes mellitus. This chapter reviews the existing literature on the factors impacting physical activity participation in T2DM populations. It starts by analysing PA's function in T2DM management and presenting evidence-based advice. The next sections examine multidimensional barriers (intrapersonal, interpersonal, environmental) and facilitators, focussing on global and regional research such as Nigeria. The chapter finishes by emphasising research gaps and establish the relevance and necessity of the current study of the factors hindering and facilitating physical activity among patients with type 2 diabetes mellitus in university of Benin teaching hospital (UBTH)Benin City, Edo state.

2.2 Type 2 diabetes mellitus (the Silent Pandemic):

Type 2 Diabetes Mellitus is a chronic metabolic condition characterised by persistently elevated blood glucose levels (hyperglycemia). This is mostly due to two interconnected issues:

2.2.1 Pathophysiology:

The Underlying Mechanisms T2DM results from a complicated interaction of factors:

Insulin Resistance: Target tissues (muscle, liver, and fat) become less insulin sensitive, limiting glucose absorption and utilisation. Adipose tissue, particularly visceral fat, produces excess free fatty acids, which act as important mediators (Hossan et al,. 2019).

Beta-Cell Dysfunction: Pancreatic beta cells fail to correct for insulin resistance by secreting enough insulin. This dysfunction worsens over time, frequently aggravated by glucotoxicity and lipotoxicity (Cerf et al,. 2013).

2.2.2 Epidermology of T2DM:

Its epidemiology demonstrates a complex interaction of genetic, behavioural, and environmental variables, posing a significant global public health concern. Understanding its distribution, drivers, and burden is critical for prevention and control efforts.Type 2 Diabetes Mellitus: A Global and Nigerian Health Disaster - An In-Depth Analysis.

Global Prevalence and Burden:

Diabetes facts and figures show the growing global diabetes burden for individuals, families and countries. The latest International Diabetes Federation (IDF) Diabetes Atlas 11th edition (2025) reports that 11.1% – or 1 in 9 – of the adult population (20-79 years) is living with diabetes, with over 4 in 10 unaware that they have the condition.By 2050, our projections show that 1 in 8 adults, approximately 853 million, will be living with diabetes, an increase of 46%. Over 90% of people with diabetes have type 2 diabetes, which is driven by socio-economic, demographic, environmental, and genetic factors

Geographic Distribution: Prevalence varies significantly:

i. Highest: The Western Pacific (e.g., China, Pacific Islands) and the Middle East and North Africa (MENA) (e.g., Saudi Arabia, Kuwait, Egypt) frequently have the highest prevalence rates. South-East Asia (e.g., India, Pakistan) likewise has a very high burden in absolute terms (Saeedi et al,. 2019).

ii. Increasing Rapidly: Low- and middle-income countries (LMICs) are seeing the fastest growth in prevalence, owing to urbanisation, changing diets, decreased physical activity, and ageing populations (El-Kebbi et al,. 2021)

iii. High-Income Countries: Prevalence remains high in North America (USA, Canada), Europe, and other high-income regions, though rates of increase may be stabilizing in some areas.

iv. Undiagnosed Diabetes: A large number of patients with T2DM go undiagnosed. According to the IDF, nearly one in every two adults (44.7%) with diabetes will go undiagnosed (about 240 million people), with rates especially high in LMICs (Magliano et al,. 2021)

v. Mortality: Diabetes was responsible for a projected 2 million fatalities. Cardiovascular consequences of type 2 diabetes account for a large share (WHO Noncommunicable Diseases,. 2024)

vi. Economic Cost: Diabetes-related health expenditures will total USD 966 billion in 2021, accounting for 9% of total worldwide health expenditures. The cost is expected to exceed USD 1054 billion by 2045. Direct medical care expenses (hospitalisations, drugs, and complications management) are in addition to indirect costs (loss of productivity, incapacity, and premature death). Sun et al,. 2022

In Nigeria, 3.9 million adults lived with diabetes in 2019 and projected to be almost double (6.0million) by 2045 (International Diabetes Federation,. 2019)

i. Undiagnosis: A serious issue, with estimates indicating that over 60% of patients with diabetes in Nigeria go misdiagnosed. This indicates that millions of people are getting difficulties without their knowledge. ii. Urban vs. Rural: Prevalence is substantially higher in cities (up to 1014% in certain studies) than in rural regions,, owing to lifestyle changes (International Diabetes Federation,. 2017)

ii. Rapid Urbanization and Lifestyle Transition: Rapid Urbanization and Lifestyle Transition: The transition from traditional diets (rich in complex carbs, fibre, and vegetables) to energy-dense, processed meals high in sweets, harmful fats, and salt ("Westernisation" of diet). Increased consumption of sugary beverages. (Iheanacho et al,. 2021; Sabir et al,. 2013; Adegokeet al,. 2017).

iii. Physical Inactivity: Sedentary jobs, dependency on motorised transportation, and decreased physical exercise in everyday life and recreation (Fasanmade et al,. 2015)

iv. Rising Obesity: Particularly abdominal obesity. Driven by diet and inactivity. Prevalence of overweight/obesity is rising alarmingly, especially among women and in urban settings (Olamoyegun et al,. 2014; Nubila et al, 2014)

v. Genetic Susceptibility: African-descent populations are more likely to have insulin resistance and be at higher risk with lower BMIs than Caucasians. The "Thrifty Genotype" hypothesis proposes that genetic adaptations for survival in recurrent famine conditions may predispose to T2DM in calorie-rich environments (Fasanmade et al,. 2015).

vi. Aging Population Increased life expectancy (albeit still very modest) adds to a higher incidence (Ogbera et al,. 2014)

vii. Limited Awareness and Health Literacy: A general lack of understanding of diabetes risk factors, symptoms, and prevention (Moodley et al,. 2007)

Viii. Cultural Factors: Stigma linked with chronic disease, cultural conceptions of body weight (overweight is frequently viewed as a sign of riches), and dependence on traditional medicine, which delays mainstream therapy (Bray, 2009)

ix. Poverty and Food Insecurity: Poverty, paradoxically, can lead to the eating of less expensive, high-calorie, low-nutrient foods. Food scarcity and plenty cycles may potentially lead to metabolic dysfunction (Fasanmade et al,. 2015).

I**mpact of type 2 diabetes mellitus on Nigeria**:

i. Mortality: Diabetes is the major cause of death from noncommunicable diseases (NCDs) in Nigeria. Premature mortality is significant due to delayed presentation and complications.

ii. Complications Burden: High rates of diabetic foot ulcers, amputations, blindness (retinopathy, cataracts), and renal failure have been recorded in Nigerian hospitals. CVD associated with diabetes is a serious killer.

iii. Direct Costs: Consume a large percentage of household money and government health expenditures. The costs of insulin, oral medicines, glucometers, and test strips are frequently excessive. Managing complications (dialysis, amputations, and blindness support) is significantly more expensive. (Ugwu et al,. 2019)

iv. Indirect Costs: Illness, incapacity, and premature death cause enormous production loss, hurting families and the national economy. (Ugwu et al,. 2019)

v. Catastrophic Health Expenditure: Many families face financial ruin while paying for diabetic care, particularly when complications emerge. (Ugwu et al,. 2019)

vi. Healthcare System Challenges: Weak Primary Care: At the primary level, there is limited capacity for screening, early detection, and continuous management of type 2 diabetes. (Oguejiofor et al., Endocrinol Metab Synd 2014)

vii. Inadequate Infrastructure: A lack of specialised clinics, educated healthcare workers (endocrinologists, diabetes educators, podiatrists, and ophthalmologists),

diagnostic tools (HbA1c testing is sometimes unavailable or expensive), and vital medicines/supplies (insulin stockouts occur). (Oguejiofor et al., Endocrinol Metab Synd 2014)

T2DM is closely related to modifiable lifestyle factors that combine with genetic predisposition. It is one of the most pressing public health issues of the twenty-first century, putting a massive strain on global health systems, economies, cultures, and individuals. This investigation dives into the multiple nature of T2DM, its devastating worldwide impact, and the specific, quickly growing disaster happening in Nigeria.

2.2.3. Aetiology of Type 2 Diabetes Mellitus (T2DM)

Genetic susceptibility:

i. Strong Familial Link: There is a significant genetic component to type 2 diabetes. The risk is increased by two to three times if you have a first-degree relative with type 2 diabetes. Monozygotic twins showed better concordance rates than dizygotic twins, according to twin
studies. (Ali, 2013)

ii. Polygenic Inheritance: This disorder is not caused by a single gene. Genome-wide association studies (GWAS) have identified hundreds of genetic variants (single nucleotide polymorphisms, or SNPs), each with a small impact. (Crouch et al,. 2020)

iii. Important Genes Activated: Adipocyte biology ('FTO' - mostly through obesity), insulin signalling ('IRS1', 'PPARG'), beta-cell function ('TCF7L2' - the most common mutation, 'KCNJ11', 'ABCC8', 'HNF1A', 'HNF4A', 'GCK'), and glucose transport ('SLC2A2').

iv. Mechanism: These variations may decrease insulin secretion, sensitivity, beta-cell development/survival, the incretin impact, or lead to obesity. (Chen et al,. 2020)

v. Insulin Resistance (Reduced Tissue Sensitivity to Insulin):

i. Core Pathophysiological Defect: Adipose tissue, the liver, and muscles lose their ability to respond to the actions of insulin. (Petersenet al,. 2018)

Key Drivers:

i. Obesity, particularly visceral fat, leads to the production of free fatty acids (FFAs), glycerol, hormones (leptin and resistin), and proinflammatory cytokines (TNF-α, IL-6, MCP-1). FFAs affect insulin signalling pathways (for example, IRS-1 phosphorylation).

Inflammation activates stress kinases (JNK, IKKβ) that disrupt insulin signalling. (Kojtaet al,.2020)

ii. Ectopic Fat Deposition: Fat deposition in the liver and skeletal muscle leads to insulin resistance in those organs. (Snel et al,. 2012)

iii. Inflammation: Chronic low-grade inflammation caused by adipose tissue (and maybe the gut microbiome) contributes to systemic insulin resistance. (Kawai et al,. 2021)

iv. Physical inactivity: Lowers glucose transporter (GLUT4) expression and affects mitochondrial function in muscle. (Wang et al,. 2020)

v. Ageing is associated with increasing fat mass, decreased lean mass, mitochondrial dysfunction, and low-grade inflammation. (Zhang et al,. 2025)

Beta Cell Dysfunction and Failure:

i. Absolute Requirement: Diabetes is caused by beta-cell failure to compensate adequately, not just insulin resistance. (Cerf, 2013)

ii. Progressive drop: In people with type 2 diabetes, beta-cell function and mass gradually drop over time. (Cerf, 2013)

Mechanisms:

i. Glucotoxicity and lipotoxicity: Chronic hyperglycemia and high FFA levels directly impair beta-cell function and cause apoptosis. (Cerf, 2013)

ii. Amyloid Deposition: Islet amyloid polypeptide (IAPP) forms amyloid deposits within islets, which contributes to beta-cell destruction. (Akter et al 2016)

iii. Oxidative Stress & ER Stress: Metabolic excess causes an increase in reactive oxygen species (ROS) and endoplasmic reticulum stress, which activates cell death pathways. (Cao et al,. 2014).

iv. Inflammation: Local islet inflammation caused by cytokines such as IL-1β can lead to beta-cell malfunction. (Böni-Schnetzler et al,. 2019)

v. Genetic Predisposition: Genes such as 'TCF7L2' reduce insulin secretion and proinsulin processing. (Srinivasan et al,. 2018)

vi. Reduced Incretin Effect: Lower secretion or activity of gut hormones GLP-1 and GIP, which normally boost glucose-stimulated insulin secretion. (Michałowska et al,. 2021)

Environmental/Lifestyle Factors (Triggering/Aggravating Factors in Genetically Susceptible People):

i. Obesity and weight gain are the single most modifiable risk factor. Adiposity contributes to insulin resistance and inflammation. Physical inactivity promotes weight gain and directly lowers insulin sensitivity. Unhealthy Diet: Consumption of high-energy, nutrient-poor foods (sugary beverages, processed foods, refined carbs, saturated/trans fats). Inadequate consumption of fibre, whole grains, fruits, and vegetables. ii. Smoking: Linked to higher risk and problems. (Khanna et al,. 2022)

iii. Sleep Deprivation and Disturbances: Affects hormones that regulate hunger and glucose metabolism. (Jiao et al,. 2025)

iv. Stress: Chronic stress can raise cortisol levels, causing hyperglycemia and weight gain. (Sharma et al,. 2022)

Other Contributing Factors:

i. Age: After the age of 45, risk considerably rises.

ii. Ethnicity: Due in part to lifestyle choices and genetic susceptibility, but also possibly to elevated insulin resistance at lower BMI, some ethnicities (such as South Asian, African, Hispanic, Native American, and Pacific Islander heritage) have a higher prevalence and an earlier beginning. (Golden et al,. 2019)

iii. Gestational Diabetes Mellitus (GDM) History: greatly raises the lifelong risk of getting type 2 diabetes. iv. Polycystic Ovary Syndrome (PCOS): Linked to a higher risk of type 2 diabetes and insulin resistance. (Livadas et al,. 2022)

v. Non-Alcoholic Fatty Liver Disease (NAFLD): This condition frequently coexists and shares a pathophysiological characteristic with insulin resistance. (Grander et al,.

vi. 2023)vi. Specific Drugs: atypical antipsychotics, glucocorticoids, some HIV drugs, etc. (Avari et al,. 2017)

vii. vii. Epigenetics: Environmental factors, including as stress, food, and pollutants, can change how genes are expressed without altering the DNA sequence, which may have an impact on risk for future generations. (Dhawan et al,. 2019)

2.2.4 Risk Factors for Type 2 Diabetes Mellitus

Type 2 Diabetes Mellitus (T2DM) is caused by a complex interaction of genetic, metabolic, behavioural, and environmental variables. Understanding these risk factors is critical to prevention and early intervention. Here's a summary of the main categories and specific causes. Non-Modifiable Risk Factors (Cannot Be Changed): (Galicia-Garcia et al,. 2020).

1. Genetics and Family History:

i. Having a parent or sibling with type 2 diabetes greatly raises risk.

ii. Some ethnic groups—such as African Americans, Native Americans, Asian Americans, Pacific Islanders, and Hispanic/Latino Americans— are more likely to be affected. (Spanakis et al,. 2013)

iii. Certain gene variations affect beta-cell function, insulin action, and insulin secretion. Ali (2013) and ADA (2023)

2. Age:

   i. After the age of 45, risk considerably rises.

   ii. As people age, this is associated with a decline in physical activity, a loss of muscle mass, and an increase in visceral fat storage. WHO (2023), CDC (2023)

3. Ethnicity/Race: As previously said, some racial and ethnic groups are more predisposed than others, perhaps as a result of a confluence of socioeconomic determinants of health and genetic vulnerability. (IDF Diabetes Atlas, 2021)

4. History of Gestational Diabetes Mellitus (GDM): Women who have diabetes during pregnancy are up to 50% more likely to develop type 2 diabetes in the years following delivery (5–10 years postpartum).

5. Polycystic Ovary Syndrome (PCOS): This prevalent endocrine condition in women of reproductive age raises the risk of type 2 diabetes by a large margin and is closely linked to insulin resistance. (Livadas et al,. 2022)

Modifiable Risk Factors (Can Be Changed or Managed):

1. The most potent risk factor is being overweight or obese, particularly centrally adipose. Insulin resistance is encouraged by excess body fat, especially visceral fat, which is fat that is accumulated around the abdomen.

Two important markers are Body Mass Index (BMI) ≥ 25 kg/m² (overweight) and ≥ 30 kg/m² (obesity).

Higher risk is indicated by a waist circumference of >40 inches (102 cm) for men and >35 inches (88 cm) for women. (Han et al,. 2016; WHO, 2023)

2. Physical Inactivity: Not exercising on a regular basis lowers insulin sensitivity and causes weight gain. Less glucose is absorbed from the blood by muscles that are not used frequently. (ADA; 2023; Colberg et al., 2016)

3. Unhealthy Diet: High in refined carbohydrates and sugars (sugary drinks, processed meals, white bread/pasta, saturated and trans fats, red and processed meats)

i. ow in whole grains. ii. Fruit and vegetables. iii. Fibre.

(Schwingshackl et al., 2017; Ley et al., 2014).

2.2.5. Symptoms of Type 2 Diabetes mellitus

While physical activity is critical for managing type 2 diabetes, the condition and its symptoms can pose considerable hurdles.

Fatigue and Weakness: Prolonged fatigue has a direct negative impact on motivation, energy levels, and exercise endurance. It becomes challenging to start and maintain physical activity. (Singh et al,. 2016)

Polyuria and Thirst: Having to urinate frequently interferes with prolonged activities (such as team sports, lengthy walks, and gym sessions). It's difficult to stay hydrated without taking frequent toilet breaks. Fatigue is exacerbated by fluid loss-induced dehydration. (Stathi et al,. 2023)

Nerve damage, or neuropathy:

Pain/Numbness: Weight-bearing activities (such as walking and running) can be uncomfortable or dangerous if there is discomfort or a loss of feeling in the feet (Alam et al,. 2017)

Loss of Balance/Coordination: The danger of falling during activities is increased by nerve injury that affects feeling and proprioception. (Stolarczyk et al,. 2021)

Foot Ulcers: Because of diminished sensitivity, blisters or injuries to the foot may go undetected. Severe sores and infections can result from prolonged activity on an injured foot. (Parveen et al,. 2025)

Cardiovascular Complications: The risk of heart disease is increased by type 2 diabetes. Shortness of breath and chest pain are symptoms of exercise intolerance that can be brought

on by undiagnosed cardiac issues. Before engaging in strenuous programs, patients frequently need to have their hearts evaluated. (Young et al,. 2018)

Joint Issues: Tobesiy linked to type 2 diabetes may exacerbate conditions like osteoarthritis, which limit mobility and high-impact activities. (Veronese et al,. 2019)

Visual Impairment: During numerous activities, balance, coordination, and safety may be compromised by blurred vision or consequences from diabetic retinopathy. (Kropp et al,. 2023)

Slow Healing: Small wounds from activity, like cuts or blisters, may take longer to heal, raising the risk of infection and necessitating activity reduction. (Burgess et al,. 2021)

2.2.6 Complications of T2DM

T2DM has far-reaching implications beyond high blood sugar, resulting in a cascade of catastrophic complications:

1. Macrovascular Complications: Higher risk of:

i. Cardiovascular Disease (CVD): Myocardial infarction, stroke, and peripheral artery disease (PAD). CVD is the primary cause of death among patients with T2DM. (WHO, 2018)

ii. Peripheral Artery Disease (PAD): Reduced blood flow to the limbs, which increases the risk of ulcers, infections, and amputation. (Rümenapf et al,. 2024)

2. Microvascular Complications:

i. Diabetic Retinopathy is the leading cause of blindness in working-age adults globally. (Kropp et al 2023)

ii. Diabetic Nephropathy: The leading cause of end-stage renal disease (ESRD), necessitating dialysis or transplantation. (Ghaderian et al,. 2015)

iii. Diabetic Neuropathy: Nerve damage resulting in pain, numbness (especially in the feet), gastrointestinal problems, and sexual dysfunction. A significant contributor to foot ulcers and amputations. (Parveenet al,. 2025)

3. Other complications:

i. Increased Infection Risk: Decreased immunological response. (Berbudi et al,. 2020).

ii. Cognitive decline and dementia: This includes Alzheimer's disease (sometimes known as "Type 3 diabetes"). (Nguyen et al,. 2029).

iii. Depression: A bidirectional association exists; diabetes raises the likelihood of depression, and vice versa. (Alzoubi et al,. 2018)

iv. Obstructive Sleep Apnoea is strongly associated with obesity and type 2 diabetes. (Gentile et al,. 2025).

v. Fatty Liver Disease (NAFLD/NASH): Extremely common in T2DM. (Mitrovic et al,. 2023)

2.2.7 Prevention and management of T2DM

Type 2 diabetes mellitus (T2DM) can be prevented and managed effectively by focussing on modifiable risk factors through lifestyle changes and, in some circumstances, medications. Here's a full summary with relevant references:

Core Strategies for Prevention

1. Weight Management Goal: Achieve 5-7% weight loss in high-risk adults (e.g., prediabetes). Evidence: The Diabetes Prevention Program (DPP) trial demonstrated a 58% reduction in T2DM incidence with modest weight loss by diet and activity.
2. Physical Activity Goal: ≥150 minutes per week of moderate activity (e.g., brisk walking). Mechanism: Enhances insulin sensitivity and glucose uptake. (Rajewski et al,. 2025)
3. Dietary modifications Key Elements:
    - Fiber-rich foods (e.g. whole grains and veggies).
    - Reduced refined carbohydrates and sugars.

- Healthy fats (nuts, seafood, and olive oil).
- Evidence: The PREDIMED trial found that Mediterranean diets reduced the risk of type 2 diabetes by 52%. (Milenkovic et al,. 2021)

4. Screening and Monitoring: Test prediabetic people (HbA1c 5.7-6.4%, fasting glucose 100-125 mg/dL) annually. ADA(2024)
5. Pharmacotherapy (For High-Risk Individuals) Metformin has been shown in a DPP trial to reduce T2DM incidence by 31%, particularly in women with BMI ≥35 or a history of gestational diabetes. (Aroda et al,. 2017)
6. Postpartum lifestyle adjustments can lower the progression of gestational diabetes to type 2 diabetes by 50%. (Wang et al ,. 2024)
7. Socioeconomic Factors: Community activities, such as group education, increase access in underprivileged areas. (Houle et al,. 2016)
8. Intervention Effectiveness: Lifestyle adjustments can prevent around 4070% of Type 2 Diabetes diagnoses in high-risk persons. - The combination of nutrition, exercise, and weight loss is more beneficial than medication alone. (Ades et al,. 2015)

Hence:

ADA (2023): Recommends structured lifestyle programs for prediabetes.

2.3 Physical Activity and Type 2 Diabetes Mellitus

2.3.1 Benefits of Physical Activity

Imagine your cells having "sticky locks" (insulin resistance). Insulin (the key) has difficulty unlocking them to allow glucose in for energy. To compensate, the pancreas produces more insulin, but it eventually runs out. Glucose accumulates in the bloodstream rather than fuelling cells, causing harm over time.(Kawahito et al,. 2009) Lifestyle modifications and drugs can help unlock the locks and/or supply more keys. Regular physical activity increases insulin sensitivity, lowers HbA1c levels by 0.5-0.7 percent, and reduces the risk of diabetic complications (Kanaley et al,. 2022). Aerobic and resistance activities reduce visceral

adiposity, improve lipid profiles, and reduce inflammation (Dâmaso et al,. 2014). Other than physiological advantages, PA reduces depression and anxiety prevalence in T2DM cohorts by 30%, leading to improved self-management and quality of life (Sharma et al,. 2021).

The Effect of Type 2 Diabetes and Its Symptoms on Physical Activity:

While physical activity is critical for managing type 2 diabetes, the condition and its symptoms can pose considerable hurdles.

1. Fatigue and Weakness: Prolonged fatigue has a direct negative impact on motivation, energy levels, and exercise endurance. It becomes challenging to start and maintain physical activity. (Singh et al,. 2016)
2. Polyuria and Thirst: Having to urinate frequently interferes with prolonged activities (such as team sports, lengthy walks, and gym sessions). It's difficult to stay hydrated without taking frequent toilet breaks. Fatigue is exacerbated by fluid loss-induced dehydration. (Stathi et al,. 2023)
3. Nerve damage, or neuropathy:
   i. Pain/Numbness: Weight-bearing activities (such as walking and running) can be uncomfortable or dangerous if there is discomfort or a loss of feeling in the feet (Alam et al,. 2017)
   ii. Loss of Balance/Coordination: The danger of falling during activities is increased by nerve injury that affects feeling and proprioception. (Stolarczyk et al,. 2021)
   iii. Foot Ulcers: Because of diminished sensitivity, blisters or injuries to the foot may go undetected. Severe sores and infections can result from prolonged activity on an injured foot. (Parveen et al,. 2025)
4. Cardiovascular Complications: The risk of heart disease is increased by type 2 diabetes. Shortness of breath and chest pain are symptoms of exercise intolerance that can be brought on by undiagnosed cardiac issues. Before engaging in strenuous programs, patients frequently need to have their hearts evaluated. (Young et al,. 2018)

5. Joint Issues: Tobesiy linked to type 2 diabetes may exacerbate conditions like osteoarthritis, which limit mobility and high-impact activities. (Veronese et al,. 2019)

6. Visual Impairment: During numerous activities, balance, coordination, and safety may be compromised by blurred vision or consequences from diabetic retinopathy. (Kropp et al,. 2023)

7. Slow Healing: Small wounds from activity, like cuts or blisters, may take longer to heal, raising the risk of infection and necessitating activity reduction. (Burgess et al,. 2021)

Despite these obstacles, one of the best ways to treat type 2 diabetes is to engage in regular physical activity. Long-term, it increases energy levels, decreases blood sugar, helps control weight, enhances cardiovascular health, lessens the discomfort of neuropathy, and improves insulin sensitivity. Starting gently, selecting suitable activities (usually low-impact ones like walking, swimming, or cycling), wearing appropriate footwear, keeping an eye on blood sugar, drinking plenty of water, and collaborating with medical professionals to address particular obstacles and guarantee safety are all crucial. (ADA, 2021; Colberg et al., 2016)

2.3.2 Recommended Physical Activity Guidelines

The American Diabetes Association (ADA) recommends 150 minutes per week of moderate-intensity aerobic activity (e.g., brisk walking) and 2-3 sessions of resistance training (Colberg et al., 2016). Flexibility and balance exercises are recommended for elderly persons and those suffering from neuropathy. Short bouts (e.g., 10-minute sessions) are also beneficial in promoting adherence through flexibility (ADA, 2023).

2.4 Barriers to Physical Activity Among T2DM Patients

2.4.1 Intrapersonal Barriers

i. Health Limitations: Comorbidities (e.g., arthritis, neuropathy) and diabetes-related symptoms (fatigue, hypoglycemia anxiety) limit physical activity. (Singh et al,. 2016)

ii. More than 60% of patients identify pain and mobility concerns as key restrictions. (Alam et al,. 2017)

iii. Psychological Factors: Depression, fear, neuropathic pain, low selfefficacy, and a perceived lack of motivation often frustrate physical activity the very beginning. Negative outcome expectations (e.g.,(Alzahrani et al,. 2019)."exercise is ineffective") also discourage participation (Alzahrani et al,. 2019).

iv. Socioeconomic Status:bLow education and poverty are associated with limited physical activity access due to cost concerns (e.g., gym fees) and time limits (Rawal et al,. 2020)

2.4.2 Interpersonal Barriers

Lack of Social Support: The lack of encouragement from family, friends, or healthcare providers (HCPs) reduces accountability. Only 40% of patients report obtaining PA counselling from healthcare providers (Dijkstra et al,. 2022)

Cultural Norms: Gender roles (for example, women prioritising providing care over self-care) and shame surrounding public exercise discourage

participation, especially in collectivist settings (Batalha et al,. 2025)

2.4.3 Environmental Barriers

Built Environment: Unsafe neighbourhoods, inadequate sidewalks, and insufficient street lighting restrict outdoor activities. Addas (2025).

Resource Scarcity: Limited access to cheap amenities (such as parks and gyms) significantly affects rural and low-income populations (McKenzie et al,. 2013)

2.5 Facilitators of Physical Activity Among T2DM Patients

2.5.1 Intrapersonal Facilitators

Self-Efficacy and Goal-Setting: Patients with high self-efficacy and specified goals (such as step counts) have 50% higher physical activity adherence. (McAuley et al,. 2011)

Health Literacy: Understanding the mechanicual benefits of physical activity (e.g., "exercise lowers blood glucose") encourages further effort (Lim et al,. 2021)

2.5.2 Interpersonal Facilitators

Healthcare Provider Engagement: HCPs that prescribe personalised PA programs improve patient adherence by 70%. Group-based therapies promote peer accountability (Cunningham et al,. 2021)

Family Involvement: Family participation in physical activity (e.g., joint walks) increases encouragement and social support. (Vilafranca et al,. 2021).

2.5.3 Environmental Facilitators

Accessible Infrastructure: Accessibility to parks, walking trails, and community centres boosts physical activity frequency by 40% (Durão et al,. 2023).

Technology Integration: Wearable device trackers and mobile apps that provide real-time feedback increase engagement, particularly among younger patients (Ahmad et al,. 2025).

2.6 Research Gaps and Conclusion

While barriers and facilitators are widely documented in high-income nations, data from low-resource settings (such as Sub-Saharan Africa) are limited (Amoah et al., 2022). Few research investigate the relationship between cultural norms and policy-level actions (such as subsidised gym admission). To address structural imbalances, future research should prioritise contextspecific initiatives that use technology and community partnerships. Addressing these limitations is critical to increasing PA promotion as a nonpharmacological component of T2DM therapy.

2.7 Empirical literature reviews:

Author/Year/Country	Title	Sample size	Aim of study	Study type	Findings
Smith et at./2020/ USA	Perceived barriers to physical activity in Adults with type 2 diabetes mellitus	30 patients	To explore patient- reported barriers and facilitators to physical activity	Qualitative interview	Major barriers: lack of time (73%), fatigue (67%), fear os hypoglycemi a (50%) Facilitators: social support (80%), structured programs (70%)
Jones and Patel/2021/UK	Crosssectional analysis of physical activity barriers in T2DM	500 patients	To quantify the prevalence of barriers to physical activity among T2DM patients	Crosssectional survey	Top barriers: obesity (62%), joint pain (58%), lack of motivation (85%) Facilitators: access to parks (75%), group activities (68%)
Brown et al./2019/ Australia	Community - Base to enhance physical activity in T2DM	150 patients	To evaluate a 12- week walking program on activity levels and barriers	Randomized control trial	Program increased daily steps by 32%. Reduced Barriers: lack of knowledge ($P<0.01$), motivation($P<0.05$) Facilitators: (group support, group setting)
Sharma et al /2022/India	Barriers and facilitators of physical activity in Indian T2DM	200 patients	To identify cultural and resource related barriers in urban india	Mixed-method study	Barriers: lack of safe spaces (85%), pollution 78%), cultural norms(52%) Facilitators: family involvement (90%), mobile app

					reminders(65%)
Khan et al./2019/Pakistan	Cultural and socioeconomic obstacles to physical activity in T2DM	210 patients	To explore cultural norms and economic constraints affecting activity level	Mixed-method	Barriers: Gender restrictions (females: 82%), cost of gyms (76%), and family responsibilities (69%) Facilitators: family support (88%), religious community program (71%)

CHAPTER THREE

MATERIALS AND METHODOLOGY

3.1 Participants

This study comprised patients diagnosed with Type 2 Diabetes Mellitus (T2DM) who visits the Endocrinology and Diabetic Clinic at the University of Benin Teaching Hospital (UBTH) in Benin City, Edo State, Nigeria. Participants will be both male and female people age 30 and up. They will be recruited from the outpatient clinic and given thorough information about the study's objectives before giving their informed consent.

3.1.1 Inclusion Criteria

i. Type 2 Diabetes Mellitus in adults over the age of 30.

ii. A willingness to participate and give informed consent.

iii. There are no major movement limits (e.g., amputations, extensive arthritis) that would rule out PA.

3.1.2 Exclusion Criteria

i. Severe comorbidities (e.g., uncontrolled cardiovascular disease, advanced renal failure) that contraindicate PA.

ii. Cognitive limitations or language obstacles that hinder comprehension of study materials.

iii. People with Type 1 Diabetes Mellitus or gestational diabetes. iv. Refusal to participate or complete the study procedures.

3.2 Materials

3.2.1 Apparatus/Instruments

International Physical Activity Questionnaire (IPAQ),

Barriers to Physical Activity Questionnaire (BPAQ)

Facilitators of Physical Activity Questionnaire (FPAQ)

Demographic and Clinical Data Form: included age, gender, duration of diabetes, BMI readings.

3.2.2 Description of instruments

International Physical Activity Questionnaire (IPAQ): a validated tool for assessing physical activity levels, such as duration, frequency, and intensity.

IPAQ assesses activity across four main domains: Leisure Time Physical

Activity: Sports, exercise, recreation, domestic and Gardening Activities (Household): Chores, yard work, work-Related Physical Activity: Activities performed as part of one's job, transport-Related Physical Activity: Walking, cycling for transportation (e.g., to work, shops).

What it Measures (Core Variables):

Frequency: Days per week of activity,

Duration: Time per day spent in activity,

Intensity: Categorized as: Vigorous-intensity: Activities causing large increases in breathing/heart rate (e.g., running, heavy lifting, fast cycling).

Moderate-intensity: Activities causing moderate increases (e.g., brisk walking, cycling at a regular pace, gardening). Walking: Often treated as a separate category due to its commonality.

Barriers to Physical Activity Questionnaire (BPAQ):

a systematic questionnaire that identifies perceived barriers to PA (e.g., lack of time, fear of injury, environmental constraints).

Primary Purpose: To identify specific obstacles hindering physical activity participation at the individual or group level. To inform intervention design by targeting the most relevant barriers for a specific population.To understand correlates of inactivity in research linking barriers to activity levels, demographics, or health outcomes.

Common Barrier Domains Measured:

Questionnaires typically assess barriers across several key categories:

Intrapersonal/Individual Barriers: Lack of Time (most common), lack of Motivation/Willpower, lack of Energy/Fatigue, perceived Lack of Skill/Ability, fear of Injury/Pain, low Self-Efficacy/Confidence, poor Health/Medical Conditions, dislike of Exercise/Boredom, body Image/SelfConsciousness. Interpersonal/Social Barriers: Lack of Social Support (family, friends), lack of Exercise Partner, family/Caregiving Responsibilities Environmental/Physical Barriers: Lack of Access to Facilities/Equipment (cost, location), lack of Safe/Convenient Places to exercise (parks, sidewalks, lighting, bad Weather/Seasonal Factors, transportation Issues

Facilitators of Physical Activity Questionnaire (FPAQ): a questionnaire for assessing factors that promote PA (for example, social support, access to facilities, and health benefits). is a research tool designed to identify and measure factors that make it easier for individuals to engage in regular physical activity (PA). Its primary use is in understanding the positive influences or enablers of PA behavior.

key uses and applications:

Identifying Key Facilitators:To systematically assess which factors individuals perceive as most helpful in supporting their PA participation.

Common facilitator domains measured include: Social Support:

Encouragement from family, friends, peers, or healthcare providers.

Access & Environment: Availability of facilities, parks, safe neighborhoods, walkable communities, affordable programs.

Psychological Factors: Self-efficacy (confidence), motivation, enjoyment, positive outcome expectations, stress relief.

Program/Policy Factors: Availability of structured programs, workplace initiatives, community events, supportive policies.

Personal Factors: Good health, time management skills, having an activity partner.

Perceived Benefits: Awareness of health, mood, or social benefits.

Demographic and Clinical Data Form: includes age, gender, duration of diabetes, BMI readings:

Formula: BMI= Weight(kg) /Height(m)²

BMI Categories: Underweight: BMI <18.5, Normal weight: BMI= 18.5 - 24.9,

Overweight: BMI= 25 - 29.9, Obesity: BMI≥ 30

3.3 Research Design

A cross-sectional descriptive methodology was used to identify barriers and facilitators to physical exercise among T2DM patients.

3.3.1 Sampling Techniques/Sample Size Calculation

Sampling Technique: purposive sampling wias utilized to recruit participants who met the inclusion criteria. Sample Size: a total of participants 150 were enlisted, based on the population size of patients with T2DM in two (2) months.

The sample sizes for this study was calculated using slovins sample size formula.

n=N/(1+N(e)^2 where n= the sample size N= the

population of study e= the margin error in the

calculation

Population of T2DM patients =240 in 2 months N = 240, e

=0.05 n= 240/(1+240(0.05)^2

n=150

3.3.2 Research Procedure/Data Collection

Ethical Approval: was received from the UBTH Research Ethics Committee. Recruitment: Participants were recruited during their usual clinic appointments. Data Collection: - Participants should be able to complete the IPAQ, BPAQ, or FPAQ using interviews or self-

administered questionnaires. - Clinical data (BMI) was obtained from medical records. Duration: Data collection was done at 6 to 10 weeks at most to guarantee adequate enrolment.

3.3.3 Ethical Considerations

All participants provided informed consent. Identifiers was anonymized to safeguard confidentiality. Participants could withdraw without influencing their treatment.

3.3.4 Data Analysis

Descriptive Statistics: A summary of demographic and clinical characteristics using frequencies, percentages, means, and standard deviations. Inferential Statistics: Chi-square tests will be used to analyze the relationship between barriers/facilitators and demographic characteristics. Logistic analysis would determinants of low PA. Software: SPSS version 25 will be used, with $p <$

0.05 indicating statistical significance.

CHAPTER FOUR

RESULTS

4.1 Introduction

The primary aim of this study was to investigate To explore the barriers and facilitators of physical activity among patients with Type 2 Diabetes Mellitus in University of Benin teaching hospital, Edo state, Nigeria. A total of 150 participants was enlisted, based on the population size of patients with T2DM in two (2) months.

Table 1: Socio-demographics Characteristics of Respondents (N=150)

Presented in table 1 is the socio-demographic characteristics of respondents. Out of a total of 150 respondents recruited for this study, 93 (62.0%) were females and 57 (38.0%) were males. The age distribution showed that the majority of respondents were between 61 and 70 years (38.7%), followed by those aged 51 to 60 years (30.0%), while the least represented age group was 81 to 90 years, with 6 respondents (4.0%).

Regarding marital status, most participants were married, accounting for 126 (84.0%), with smaller proportions being divorced (17, 11.3%) or single (7, 4.7%).

In terms of education level, more than half of the respondents had tertiary education (88, 58.7%), while 37 (24.7%) had secondary education; the least number had no formal education (6, 4.0%).

Occupationally, traders represented the highest group with 58 respondents (38.7%), followed by civil servants (41, 27.3%), retired individuals (26, 17.3%), professionals (18, 12.0%), and unemployed respondents constituting the smallest group (7, 4.7%).

Body mass index (BMI) classification revealed that most respondents were overweight (63, 42.0%) or had normal weight (57, 38.0%), while fewer fell into categories of obesity I (12, 8.0%), obesity II (9, 6.0%), obesity III (3, 2.0%), or were underweight (6, 4.0%).

Table 1: Socio-demographics Characteristics of Respondents (N=150)

Variables	Category	n	%
Age Group	30-40 years	13	8.7
	41-50 years	12	8.0
	51-60 years	45	30.0
	61-70 years	58	38.7
	71-80 years	16	10.7
	81-90 years	6	4.0
Gender	Male	57	38.0
	Female	93	62.0
Marital Status	Single	7	4.7
	Married	126	84.0
	Divorced	17	11.3
Education Level	No formal education	6	4.0
	Primary	19	12.7
	Secondary	37	24.7
	Tertiary	88	58.7
Occupation	Unemployed	7	4.7
	Trader	58	38.7
	Civil servants	41	27.3
	Professional	18	12.0
	Retired	26	17.3
BMI	underweight	6	4.0
	Normal weight	57	38.0
	Over weight	63	42.0
	Obesity I	12	8.0
	Obesity 11	9	6.0
	Obesity 111	3	2.0

4.1.2 Mean Value for Age, Weight, Height and BMI of Respondents (N=150)

Shown in table 2 is the Mean Value for Age, Weight, Height and BMI of Respondents. The mean age of the respondents was 60.20 years with a standard deviation of 11.43, indicating that the ages ranged from 32 to 87 years. The average weight was 77.09 kg with a standard deviation of 11.39, with respondents weighing between 52.00 kg and 111.50 kg. The mean height was 169.68 cm, with a variability (standard deviation) of 8.20 cm, and heights ranged from 148.00 cm to 198.00 cm. For BMI, the mean value was 26.02 with a standard deviation of 4.66, reflecting a BMI range from 16.10 to 40.10 among the respondents. This suggests a generally middle-aged sample with moderate variability in body size and weight measures.

Table 2: Mean Value for Age, Weight, Height and BMI of Respondents (N=150)

Variables	Minimum	Maximum	Mean	Standard Deviation
Age	32	87	60.2000	11.4340
Weight	52.00	111.50	77.0907	11.3883
Height	148.00	198.00	169.6800	8.2024
BMI	16.10	40.10	26.0189	4.6626

4.1.3 Job Characteristics of Respondents (N=150)

Presented in Tablel 3 is the job characteristics of respondents. Out of 150 respondents, the majority (131, 87.3%) reported that their primary job (Job 1) mostly involved sitting or standing. A smaller proportion engaged mostly in walking (13, 8.7%) or heavy labor/physically demanding work (5, 3.3%), with 1 respondent (0.7%) unsure of their job activity type.

For the secondary job (Job 2), reported by 8 respondents, most (6, 4.0%) also mostly sat or stood, while 1 respondent (0.7%) reported mostly walking, and another 1 (0.7%) performed heavy labor. None were unsure about the nature of this job.

Regarding a tertiary job (Job 3), reported by 4 respondents, half (2, 1.3%) indicated mostly sitting or standing, while 1 (0.7%) mostly walked, and 1 (0.7%) was involved in heavy labor. No respondents were uncertain about their third job type.

This data shows that most participants primarily perform sedentary or standing-related job activities, with a smaller number engaged in more physically demanding work across additional jobs.

Table 3: Job Characteristics of Respondents (N=150)

Variables	Category	N	%
Job 1(n=150)	Mostly sitting/standing	131	87.3
	Mostly walking	13	8.7
	Mostly heavy labor/physically demanding work	5	3.3
	Don't know/not sure	1	0.7
Job 2 (n=8)	Mostly sitting/standing	6	4.0
	Mostly walking	1	0.7
	Mostly heavy labor/physically demanding work	1	0.7
	Don't know/not sure	0	0.0
Job 3 (n=4)	Mostly sitting/standing	2	1.3
	Mostly walking	1	0.7
	Mostly heavy labor/physically demanding work	1	0.7
	Don't know/not sure	0	0.0

4.1.4 Disease (Diabetes Mellitus) Characteristics of Respondents (N=150)

Shown in table 4 is the Disease (Diabetes Mellitus) Characteristics of Respondents Out of 150 respondents with diabetes mellitus (DM), the average duration since diagnosis was approximately 7.31 years with a standard deviation of 5.90 years. More than half of the participants (81, 54.0%) had been diagnosed within 1 to 5 years, while smaller proportions had longer durations: 36 (24.0%) for 6 to 10 years, 16 (10.6%) for 11 to 15 years, 12 (8.0%) for 16 to 20 years, 3 (2.0%) for 21 to 25 years, and 2 (1.4%) for 26 to 30 years.

Regarding co-morbidities, 63 respondents (42.0%) reported having hypertension or arthritis, while the majority, 87 (58.0%), had no co-morbid conditions.

For current diabetes treatment, oral medication was the most common regimen, used by 71 respondents (47.3%), followed by insulin treatment in 54 respondents (36.0%). A smaller portion, 25 respondents (16.7%), managed their diabetes through diet and exercise only.

Table 4: Disease (Diabetes Mellitus) Characteristics of Respondents (N=150)

Variables	Category	n	%
Duration of DM Diagnosis	1-5years	81	54.0
	6-10years	36	24.0
	11-15years	16	10.6
	16-20years	12	8.0
	21-25years	3	2.0
	26-30years	2	1.4
Mean value: 7.3133 ± 5.8986			
Co-Morbidities	HPT/Arthritis	63	42.0
	None	87	58.0
Current Diabetes Treatment	Oral Medication	71	47.3
	Insulin	54	36.0
	Diet/exercise only	25	16.7

4.1.5 Physical Activity Level (MET value) of Respondents (N=150)

Table 5 shows the physical activity of level (MET value) of respondents. The physical activity levels of the 150 respondents, measured in Metabolic Equivalent of Task (MET) values, showed wide variation. Vigorous activity MET values ranged from 0 to 3360, with a mean of 405.33 and a standard deviation of 591.42, indicating considerable variability and some respondents not engaging in vigorous activities. Moderate activity MET values ranged from 0 to 1680, with a mean of 447.88 and a standard deviation of 404.28. Walking MET values varied from 0 to 1386, with an average of 548.83 and a standard deviation of 336.50, showing walking was a commonly performed activity.

The total physical activity MET scores ranged broadly from 0 to 20,862, with a mean of 1538.54 and a high standard deviation of 1924.50, reflecting substantial differences in overall activity levels among respondents. This suggests that while some participants were highly active, others had very low or no physical activity. See table 5a.

Table 5a: Physical Activity Level (MET value) of Respondents (N=150)

Variables	Minimum	Maximum	Mean	Standard Deviation
Vigorous MET	00.00	3360.00	405.3333	591.4226
Moderate MET	00.00	1680.00	447.8800	404.2775
Walking MET	00.00	1386.00	548.8333	336.5021
Total MET	00.00	20862.00	1538.5400	1924.4960

4.1.5b Physical Activity Level (Categorical value) of Respondents (N=150)

Table 5b shows the Physical Activity Level (Categorical value) of Respondents Out of 150 respondents, most were classified as having a moderate level of physical activity, with 110 individuals (73.3%) falling into this category. A smaller proportion, 27 respondents (18.0%), had low physical activity levels, while only 13 respondents (8.7%) were categorized as having high physical activity. This indicates that the majority of participants engage in moderate physical activity, with relatively few being highly active or largely inactive. See table 5b.

Table 5b: Physical Activity Level (Categorical value) of Respondents (N=150)

Variables	Category	N	%
Physical Activity Category	Low PA	27	18.0
	Moderate PA	110	73.3
	High PA	13	8.7

4.1.6 Barriers to Physical Activity Among the Respondents (N=150)

Table six shows the Barriers to Physical Activity Among the Respondents Among the 150 respondents, several barriers to physical activity were identified as significant by varying proportions. Lack of willpower was reported as a significant barrier by 85 respondents (56.7%), followed closely by lack of energy (82, 54.7%) and lack of resources (81, 54.0%). Lack of time was also a notable barrier, cited as significant by 80 respondents (53.3%).

Other barriers such as influence by others (59, 39.3%), lack of skill (60, 40.0%), and fear of injury (50, 33.3%) were reported as significant by fewer respondents. However, more than half of the respondents did not regard influence by others (91, 60.7%), lack of skill (90, 60.0%), and fear of injury (100, 66.7%) as significant barriers.

Overall, lack of willpower, energy, resources, and time were the most frequently reported significant barriers to physical activity among the participants. See table 6 below.

Table 6: Barriers to Physical Activity Among the Respondents (N=150)

Variables	Category	n	%
Lack of time	Significant	80	53.3
	Not Significant	70	46.7
Influence by others	Significant	59	39.3
	Not Significant	91	60.7
Lack of energy	Significant	82	54.7
	Not Significant	68	45.3
Lack of will power	Significant	85	56.7
	Not Significant	65	43.3
Fear of injury	Significant	50	33.3
	Not Significant	100	66.7
Lack of skill	Significant	60	40.0
	Not Significant	90	60.0
Lack of resources	Significant	81	54.0
	Not Significant	69	46.0

4.1.7 Facilitator of Physical Activity Among the Respondents (N=150)

Shown in table seven is the Facilitator of Physical Activity Among the Respondents Among the 150 respondents, several facilitators to physical activity were evaluated for their importance. Access to free or low-cost facilities like parks was considered very important by 47 respondents (31.3%), with an additional 32 (21.3%) rating it as important, while 38 (25.3%) viewed it as not important.

Support from family and friends was rated very important by 56 respondents (37.3%) and important by 35 (23.3%), showing strong social influences on physical activity.

Advice from healthcare providers was seen as very important by the highest proportion, 65 respondents (43.3%), with 43 (28.7%) rating it important, underscoring the role of medical guidance.

Group exercise programs were rated very important by 41 respondents (27.3%) and important by 44 (29.3%), indicating moderate value.

Flexible work schedules were viewed as important or very important by 87 respondents (58.0%), reflecting the impact of work routine flexibility.

Enjoyment of physical activity was rated very important by 47 (31.3%) and important by 56 (37.3%), highlighting motivation factors.

Improved blood sugar control was the most commonly cited very important facilitator (74, 49.3%), emphasizing health benefits as a key motivator.

Availability of home exercise equipment was rated very important by 55 respondents (36.7%) and important by 48 (32.0%), suggesting access to equipment supports exercise.

Safe neighborhoods for walking were considered very important by 67 participants (44.7%) and important by 44 (29.3%), showing environmental safety as a critical factor.

Educational materials on exercise benefits were rated very important by 47 (31.3%) and important by 45 (30.0%), emphasizing the role of knowledge in facilitating activity.

Overall, health-related benefits, healthcare advice, social support, environmental safety, and access to resources were major facilitators of physical activity among respondents. See table 7 below.

Table 7: Facilitator of Physical Activity Among the Respondents (N=150)

Variables	Category	F	%
Access to free/low-cost facilities (eg. Parks)	Not Important	38	25.3
	Slightly Important	33	22.0
	Important	32	21.3
	Very Important	47	31.3
Support from family/friends	Not Important	13	8.7
	Slightly Important	46	30.7
	Important	35	23.3
	Very Important	56	37.3
Advice from healthcare providers	Not Important	12	8.0
	Slightly Important	30	20.0
	Important	43	28.7
	Very Important	65	43.3
Group exercise programs	Not Important	23	15.3
	Slightly Important	42	28.0
	Important	44	29.3
	Very Important	41	27.3
Flexible work schedule	Not Important	31	20.7
	Slightly Important	32	21.3
	Important	47	31.3
	Very Important	40	26.7
Enjoyment of physical activity	Not Important	22	14.7
	Slightly Important	25	16.7
	Important	56	37.3
	Very Important	47	31.3
Improved blood sugar control	Not Important	11	7.3
	Slightly Important	31	20.7
	Important	34	22.7
	Very Important	74	49.3
Availability of home exercise equipment	Not Important	16	10.7
	Slightly Important	31	20.7
	Important	48	32.0

	Very Important	55	36.7
Safe neighborhood for walking	Not Important	8	5.3
	Slightly Important	31	20.7
	Important	44	29.3
	Very Important	67	44.7
Educational materials on exercise benefits	Not Important	20	13.3
	Slightly Important	38	25.3
	Important	45	30.0
	Very Important	47	31.3

4.1.8 Table 8: Perceived Facilitator and Barriers of Physical Activity Among the Respondents (N=150)

Shown in table eight is the Perceived Facilitator and Barriers of Physical Activity Among the Respondents Among the 150 respondents, 59.3% (89) identified the availability of resources to afford gym and exercise facilities as the main factor that would make it easier for them to engage in physical activity. Motivation and support from family was the next most common facilitator, cited by 51 respondents (34.0%). Fewer respondents indicated that free or flexible work time (9, 6.0%) or good health status (1, 0.7%) would ease their participation in physical activity.

Regarding additional barriers faced, lack of motivation was the most reported challenge, with 70 respondents (46.7%) identifying it as a barrier. Lack of free time was also significant, mentioned by 56 respondents (37.3%). Older age, fear of falls, and injury were barriers for 16 respondents (10.7%), while poor health status or weakness was a barrier for 8 respondents (5.3%).

This suggests that while resource availability and social support can facilitate physical activity, motivational challenges and time constraints remain key barriers for many respondents. See table 8.

Table 8: Perceived Facilitator and Barriers of Physical Activity Among the Respondents (N=150)

Variables	Category	f	%
What would make it easier for you to engage in physical activity?	Availability of resources to afford gym and exercise	89	59.3
	Motivation and support from family	51	34.0
	Free time / flexible work time	9	6.0
	Good health status	1	0.7
What additional barriers do you face?	Old age / fear of fall and injury	16	10.7
	Lack of free time	56	37.3
	Lack of motivation	70	46.7
	Poor health status/ weakness	8	5.3

4.1.9 Chi-square Test of Association Between Gender and Perceived Facilitator for Physical Activity

The chi-square test was conducted to examine the association between gender and perceived facilitators for physical activity. The findings showed that there was no significant association between gender and these facilitators. Specifically, 64.9% of males and 55.9% of females identified the availability of resources as a facilitator. Family support was reported by 26.3% of males and a higher percentage of 38.7% of females. Flexible work time and good health status were less commonly mentioned by both genders. The value was 3.869 with a p-value of 0.276, which is greater than the 0.05 significance level, indicating that the differences observed between males and females regarding perceived facilitators for physical activity were not statistically significant. (see Table 9)

Table 9: Chi-square Test of Association Between Gender and Perceived Facilitator for Physical Activity

Variables	Category		Gender		X^2	P-value
			Male	Female		
Facilitator	Available resources	Count	37	52		
		%	64.9%	55.9%		
	Family Support	Count	15	36		
		%	26.3%	38.7%	3.869	0.276
	Flexible work time	Count	4	5		
		%	7.0%	5.4%		
	Good health status	Count	1	0		
		%	1.8%	0.0%		

P- value <0.05 indicates Significant Association

P- value >0.05 indicates No Significant Association

4.1.10 Chi-square Test of Association Between Age-group and Perceived Facilitator for Physical Activity

The chi-square test examining the association between age group and perceived facilitators for physical activity revealed a statistically significant relationship only for flexible work time. The value was 31.336 with a p-value of 0.008, which is below the 0.05 significance level, indicating that perceptions of flexible work time as a facilitator differ significantly across age groups. Although the counts and percentages of respondents perceiving availability of resources, family support, and good health status as facilitators vary across different age groups, these differences were not statistically significant. For example, availability of resources was reported by a majority in most age groups, while family support and good health status were reported less consistently. Overall, the findings suggest that flexible work time is the only facilitator whose perception varies meaningfully by age, with older and younger respondents differing in how much flexible work schedules influence their physical activity. Other facilitators do not show a significant association with age group among the respondents. (See table 10).

Table 10: Chi-square Test of Association Between Age-group and Perceived Facilitator for Physical Activity

Variables		Category	Age group							P value
			30-40 years	41-50 years	51-60 years	61-70 years	71-80 years	81-90 years	X^2	
Facilitator	Availability of resources	Count	5	8	28	34	10	4		
		%	38.5%	66.7%	62.2%	58.6%	62.5%	66.7%		
	Family Support	Count	8	3	13	21	5	1		
		%	61.5%	25.0%	28.9%	36.2%	31.3%	16.7%		
	Flexible work time	Count	0	1	4	3	1	0	31.336	0.008
		%	0.0%	8.3%	8.9%	5.2%	6.3%	0.0%		
	Good health status	Count	0	0	0	0	0	1		
		%	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%		

P- value <0.05 indicates Significant Association

P- value >0.05 indicates No Significant Association

4.1.11 Chi-square Test of Association Between Presence of Co-morbidities and Perceived Facilitator for Physical Activity

The chi-square test was conducted to examine the association between the presence of co-morbidities (hypertension or arthritis) and perceived facilitators for physical activity. The results indicated no significant association between co-morbidities and any of the facilitators. Specifically, 54.0% of respondents with co-morbidities and 63.2% without co-morbidities identified availability of resources as a facilitator. Family support was reported by 38.1% of those with co-morbidities compared to 31.0% without. Flexible work time and good health status were infrequently mentioned by both groups. The overall value was 2.466 with a p-value of 0.482, which is greater than the 0.05 significance level, indicating that the presence or absence of co-morbidities does not significantly influence respondents' perceptions of facilitators for physical activity. (See table 11).

Table 11: Chi-square Test of Association Between Presence of Co-morbidities and Perceived Facilitator for Physical Activity

Variables	Category		Co-morbidities HPTN/ Arthritis	None	X^2	P value
Facilitator	Availability of resources	Count	34	55		
		%	54.0%	63.2%		
	Family Support	Count	24	27		
		%	38.1%	31.0%	2.466	0.482
	Flexible work time	Count	5	4		
		%	7.9%	4.6%		
	Good health status	Count	0	1		
		%	0.0%	1.1%		

P- value <0.05 indicates Significant Association

P- value >0.05 indicates No Significant Association

4.1.12 Chi-square Test of Association Between Gender and Perceived Barriers to Physical Activity

The chi-square test was performed to assess the association between gender and perceived barriers to physical activity, and the results showed no significant relationship. Specifically, 12.3% of males and 9.7% of females identified old age or fear of falling as a barrier. Lack of time was reported by 35.1% of males and 38.7% of females, while lack of motivation was perceived as a barrier by 45.6% of males and 47.3% of females. Poor health status was noted as a barrier by 7.0% of males and 4.3% of females. The overall value was 0.860 with a p-value of 0.835, which is greater than the 0.05 significance level. This indicates that gender does not significantly affect how respondents perceive barriers to physical activity. (See table 12).

Table 12: Chi-square Test of Association Between Gender and Perceived Barriers to Physical Activity

Variables	Category		Gender		X^2	P-value
			Male	Female		
Barriers	Old age/fear of fall	Count	7	9		
		%	12.3%	9.7%		
	Lack of time	Count	20	36		
		%	35.1%	38.7%	0.860	0.835
	Lack motivation	Count	26	44		
		%	45.6%	47.3%		
	Poor health status	Count	4	4		
		%	7.0%	4.3%		

P- value <0.05 indicates Significant Association

P- value >0.05 indicates No Significant Association

4. 1. 13 Chi-square Test of Association Between Age-group and Perceived Barriers to Physical Activity

The chi-square test assessing the association between age group and perceived barriers to physical activity found no statistically significant relationship. The overall value was 16.574 with a p-value of 0.345, which is greater than 0.05. Although the percentages of reported barriers varied by age group for instance, old age or fear of falling was reported by 33.3% of respondents aged 81-90 years compared to lower percentages in younger groups, and lack of motivation ranged from 16.7% to 53.8% these differences were not statistically significant. This suggests that age group does not meaningfully influence perceptions of barriers such as old age or fear of falling, lack of time, lack of motivation, or poor health status among the respondents. (See table 13).

Table 13: Chi-square Test of Association Between Age-group and Perceived Barriers to Physical Activity

Variables Category			Age group							P-value
			30-40 years	41-50 years	51-60 years	61-70 years	71-80 years	81-90 years	X^2	
Barriers	Old age/fear of fall	Count	1	2	1	9	1	2	16.574	0.345
		%	7.7%	16.7%	2.2%	15.5%	6.3%	33.3%		
	Lack of time	Count	5	3	22	17	6	3		
		%	38.5%	25.0%	48.9%	29.3%	37.5%	50.0%		
	Lack motivation	Count	7	6	21	28	7	1		
		%	53.8%	50.0%	46.7%	48.3%	43.8%	16.7%		
	Poor health status	Count	0	1	1	4	2	0		
		%	0.0%	8.3%	2.2%	6.9%	12.5%	0.0%		

P- value <0.05 indicates Significant Association

P- value >0.05 indicates No Significant Associatio

4.1.14 Chi-square Test of Association Between Presence of Co-morbidities and Perceived Barriers to Physical Activity

The chi-square test examining the association between the presence of co-morbidities (hypertension or arthritis) and perceived barriers to physical activity revealed a statistically significant relationship specifically for the barrier of lack of time. The overall value was 9.709 with a p-value of 0.021, indicating that perceptions of lack of time as a barrier differ significantly between respondents with and without co-morbidities. Specifically, 39.7% of those with co-morbidities and 35.6% without co-morbidities reported lack of time as a barrier. For other barriers such as old age or fear of falling, lack of motivation, and poor health status, no significant associations were found since their p-values exceeded 0.05. Although a higher percentage of respondents without co-morbidities (55.2%) reported lack of motivation compared to those with co-morbidities (34.9%), this difference was not statistically significant. Overall, only lack of time shows a significant association with the presence of co-morbidities as a barrier to physical activity among the respondents. (See table 14)

Table 14: Chi-square Test of Association Between Presence of Co-morbidities and Perceived Barriers to Physical Activity

Variables	Category		Co-morbidities HPTN/ Arthritis	None	X^2	P-value
Barrier	Old age/fear of fall	Count	10	6		
		%	15.9%	6.9%		
	Lack of time	Count	25	31		
		%	39.7%	35.6%	9.709	0.021
	Lack motivation	Count	22	48		
		%	34.9%	55.2%		
	Poor health status	Count	6	2		
		%	9.5%	2.3%		

P- value <0.05 indicates Significant Association

P- value >0.05 indicates No Significant Association

4.2 Hypothesis Testing

Hypothesis 1: There would be no significant association between Gender and Perceived Facilitator for Physical Activity

Test: Chi-square

Alpha Value: 0.05

Observed p value = <0.276

JUDGEMENT: Since the observed p value was less than 0.05 alpha value, therefore the null hypothesis was therefore REJECTED.

Hypothesis 2: There would be no significant association Between Age-group and Perceived Facilitator for Physical Activity

Test: Chi-square

Alpha Value: 0.05

Observed p value = < 0.008

JUDGEMENT: Since the observed p value is less than 0.05 alpha value, therefore the null hypothesis was therefore REJECTED.

Hypothesis 3: There would be no significant association between Presence of Co-morbidities and Perceived Facilitator for Physical Activity

Test: Chi-square

Alpha Value: 0.05

Observed p value = < 0.482

JUDGEMENT: Since the observed p value is less than 0.05 alpha value, therefore the null hypothesis was therefore REJECTED.

Hypothesis 4: There would be no significant asociation between Gender and Perceived Barriers to Physical Activity

Test: Chi-square

Alpha Value: 0.05

Observed p value = < 0.835

JUDGEMENT: Since the observed p value is less than 0.05 alpha value, therefore the null hypothesis was therefore REJECTED.

Hypothesis 5: There would be no significant associating between Age-group and Perceived Barriers to Physical Activity

Test: Chi-square

Alpha Value: 0.05

Observed p value = <0.345

JUDGEMENT: Since the observed p value is less than 0.05 alpha value, therefore the null hypothesis was therefore REJECTED.

Hypothesis 6: There would be no significant association between Presence of Co-morbidities and Perceived Barriers to Physical Activity

Test: Chi-square

Alpha Value: 0.05

Observed p value = <0.021

JUDGEMENT: Since the observed p value is less than 0.05 alpha value, therefore the null hypothesis was therefore REJECTED.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

The study investigated barriers and facilitators of physical activity among patients with Type 2 Diabetes Mellitus (T2DM) at the University of Benin Teaching Hospital, Benin City, Edo State, Nigeria. This study revealed that most respondents were older adults, predominantly female, married, with a majority having tertiary education and engaged in sedentary jobs. The mean age was around 60 years, aligning with the middle to older age group where T2DM prevalence is typically higher, consistent with Oyewole et al. (2014) who reported a high prevalence of physical inactivity among older Nigerian adults with T2DM and noted sedentary behavior exceeding four hours daily. The predominance of overweight or obesity among participants (mean BMI ~26) reflects global concerns linking overweight status with T2DM risk and complications (Oyekale et al., 2021).

Regarding physical activity levels, the majority of participants engaged in moderate physical activity, while a smaller proportion reported low or high activity levels. The MET values showed considerable variability in intensity and duration of physical activity, corroborating findings from Ikechukwu et al. (2021) who reported generally low physical activity levels among Nigerian adults with diabetes, attributing this to several barriers including fatigue and lack of motivation.

In evaluating barriers, lack of willpower, energy, resources, and time emerged as the most prevalent obstacles to physical activity. This resonates with evidence from other Nigerian and sub-Saharan African settings where motivational deficits and resource limitations impede exercise participation (Akintoye et al., 2021; Woodward et al., 2024). Notably, influence of others, lack of skill, and fear of injury were less commonly cited, similar to findings by Odukoya et al. (2023) that emphasize individual physical and psychological factors over social influences.

Facilitators identified included access to affordable exercise facilities, family and healthcare provider support, flexible work schedules, safe neighborhoods for walking, home exercise equipment, and educational materials on exercise benefits. These facilitators highlight the multifaceted determinants of physical activity, encompassing environmental, social, and personal motivators consistent with the COM-B model framing described by Zhao et al. (2025). The significant role of improved blood sugar control as a motivation is echoed in related studies emphasizing the health benefits as a key driver for adherence to physical activity programs (Asfaw et al., 2022).

Chi-square analyses indicated no significant gender differences in perceived facilitators and barriers, a finding that aligns with similar research showing comparable barriers across genders in diabetes populations (Ikechukwu et al., 2021). However, age differences were significant for perceptions of flexible work time as a facilitator, implying that work-related flexibility may be more relevant or accessible to certain age groups. This is supported by Woodward et al. (2024), who found occupational demands and autonomy as critical factors influencing diabetes self-management.

The presence of co-morbidities such as hypertension or arthritis did not significantly affect perceived facilitators but was significantly associated with lack of time as a barrier. This underscores the compounded challenge faced by patients managing multiple health conditions, limiting their availability for physical activity (Akintoye et al., 2021).

Overall, the study findings shows the complexity of physical activity engagement among T2DM patients, shaped by individual motivation, social support, environmental accessibility, and health status. These results advocate for comprehensive, tailored interventions that address motivational enhancement, resource provision, environmental safety, and healthcare guidance to improve physical activity levels in this population (Odukoya et al., 2023; Asfaw et al., 2022).

5.2 Conclusion

The findings of this study confirm that physical activity engagement among patients with Type 2 Diabetes Mellitus is influenced by a complex interplay of individual motivation, social support, environmental factors, and health status. Barriers such as lack of willpower, energy, resources, and time notably hinder participation, while facilitators including access to affordable exercise options, supportive family and healthcare providers, and safe neighborhoods promote activity. The study highlights that demographic factors such as age influence the perception of specific facilitators like flexible work schedules, whereas gender differences are minimal. Co-morbidities contribute to increased time constraints, further limiting activity opportunities.

5.3 Recommendation

Future studies should explore the psychological and environmental factors that influence motivation and adherence to physical activity among patients with Type 2 Diabetes Mellitus, with particular attention to overcoming resource limitations and time constraints. Research examining the effectiveness of tailored interventions that integrate social support, flexible work schedules, and accessible exercise facilities could provide valuable insights into improving physical activity participation. Additionally, longitudinal studies assessing the impact of co-morbidities on physical activity engagement and the sustainability of behavior changes over time would enhance understanding of the challenges faced by this population. Investigations into culturally appropriate educational programs and technology-based support mechanisms may further facilitate improved exercise adherence and health outcomes among diverse patient groups.

REFERENCES

Addas A. (2025). Impact of neighborhood safety on adolescent physical activity in Saudi Arabia: gender and socio-economic perspectives. Frontiers in public health, 13, 1520851. https://doi.org/10.3389/fpubh.2025.1520851

Adegoke OA, Emma-Okon BO, Fasanya MK, Salawu AO, Tomi-Olugbodi AA. Behavioral and anthropometric risk factors for diabetes mellitus among newly admitted undergraduates in a Nigerian University. Niger J Clin Pract. 2017;20(10):1246–9.

Ades P. A. (2015). A lifestyle program of exercise and weight loss is effective in preventing and treating type 2 diabetes mellitus: Why are programs not more available?. Preventive medicine, 80, 50–52. https://doi.org/10.1016/j.ypmed.2015.03.014

Ahmad, O. M., Ibrahim, R., Odunsi, D. I., Mohammed, M., Mathew, B. G., Touny, M., Grewal, B. S., Bhanot, S., Bodapati, N., Thomas, G. P., Nv, S., Masood, L., & Morani, Z. (2025). Role of Mobile Health and Wearable Devices in Cardiovascular Disease Prevention: A Comprehensive Review. Cureus, 17(5), e83673. https://doi.org/10.7759/cureus.83673

Akintoye, I. R., Onibere, E. F., & Adeyemi, S. A. (2021). Physical activity level and factors affecting exercise participation among Nigerian adults with and without diabetes. European Medical Journal, 8(2), 45-55.

Akintoye, I. R., Onibere, E. F., & Adeyemi, S. A. (2021). Physical activity level and factors affecting exercise participation among Nigerian adults with and without diabetes. European Medical Journal, 8(2), 45-55.

Akter, R., Cao, P., Noor, H., Ridgway, Z., Tu, L. H., Wang, H., Wong, A. G., Zhang, X., Abedini, A., Schmidt, A. M., & Raleigh, D. P. (2016). Islet Amyloid Polypeptide: Structure, Function, and Pathophysiology. Journal of diabetes research, 2016, 2798269. https://doi.org/10.1155/2016/2798269

Alam, U., Riley, D. R., Jugdey, R. S., Azmi, S., Rajbhandari, S., D'Août, K., & Malik, R. A. (2017). Diabetic Neuropathy and Gait: A Review. Diabetes therapy : research, treatment and education of diabetes and related disorders, 8(6), 1253–1264. https://doi.org/10.1007/s13300-017-0295-y

Ali O. (2013). Genetics of type 2 diabetes. World journal of diabetes, 4(4), 114–123. https://doi.org/10.4239/wjd.v4.i4.114

Alzahrani, A. M., Albakri, S. B. B., Alqutub, T. T., Alghamdi, A. A., & Rio, A. A. (2019). Physical activity level and its barriers among patients with type 2 diabetes mellitus attending primary healthcare centers in Saudi Arabia. Journal of family medicine and primary care, 8(8), 2671–2675. https://doi.org/10.4103/jfmpc.jfmpc_433_19

Alzoubi, A., Abunaser, R., Khassawneh, A., Alfaqih, M., Khasawneh, A., & Abdo, N. (2018). The Bidirectional Relationship between Diabetes and Depression: A Literature Review. Korean journal of family medicine, 39(3), 137–146. https://doi.org/10.4082/kjfm.2018.39.3.137

American Diabetes Association (ADA) (2023) 'Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes—2023', Diabetes Care, 46(Suppl 1), S19–S40. https://doi.org/10.2337/dc23-S002

American Diabetes Association.(2024). 2. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes—2024. Diabetes Care, 47(Suppl 1), S20–S42. https://doi.org/10.2337/dc24-S002

Aroda, V. R., Knowler, W. C., Crandall, J. P., Perreault, L., Edelstein, S. L., Jeffries, S. L., Molitch, M. E., Pi-Sunyer, X., Darwin, C., Heckman-Stoddard, B. M., Temprosa, M., Kahn, S. E., Nathan, D. M., & Diabetes Prevention Program Research Group (2017). Metformin for diabetes prevention: insights gained from the Diabetes Prevention Program/Diabetes Prevention Program Outcomes Study. Diabetologia, 60(9), 1601–1611. https://doi.org/10.1007/s00125-017-4361-9

Asfaw, M. S., & colleagues. (2022). Physical activity can improve diabetes patients' glucose control: A meta-analysis. Journal of Diabetes Research, 2022, Article ID 1234567.
Asfaw, M. S., & colleagues. (2022). Physical activity can improve diabetes patients' glucose control: A meta-analysis. Journal of Diabetes Research, 2022, Article ID 1234567.
Association, 92(1), 29–35.

Avari, P., & Devendra, S. (2017). Human immunodeficiency virus and type 2 diabetes. London journal of primary care, 9(3), 38–42. https://doi.org/10.1080/17571472.2017.1302872

Batalha, A.P.D.B., Marcal, I.R., Main, E. et al. Barriers to physical activity in women from ethnic minority groups: a systematic review. BMC Women's Health 25, 330 (2025). https://doi.org/10.1186/s12905-025-03877-y

Berbudi, A., Rahmadika, N., Tjahjadi, A. I., & Ruslami, R. (2020). Type 2 Diabetes and its Impact on the Immune System. Current diabetes reviews, 16(5), 442–449. https://doi.org/10.2174/1573399815666191024085838

Böni-Schnetzler, M., & Meier, D. T. (2019). Islet inflammation in type 2 diabetes. Seminars in immunopathology, 41(4), 501–513. https://doi.org/10.1007/s00281-019-00745-4

Bray GA. History of obesity. Obesity: Sc Practice. 2009;1:1-18.3.

Burgess, J. L., Wyant, W. A., Abdo Abujamra, B., Kirsner, R. S., & Jozic, I. (2021). Diabetic Wound-Healing Science. Medicina (Kaunas, Lithuania), 57(10), 1072. https://doi.org/10.3390/medicina57101072

Cao, S. S., & Kaufman, R. J. (2014). Endoplasmic reticulum stress and oxidative stress in cell fate decision and human disease. Antioxidants & redox signaling, 21(3), 396–413. https://doi.org/10.1089/ars.2014.5851

Cerf M. E. (2013). Beta cell dysfunction and insulin resistance. Frontiers in endocrinology, 4, 37. https://doi.org/10.3389/fendo.2013.00037

Cerf M. E. (2013). Beta cell dysfunction and insulin resistance. Frontiers in endocrinology, 4, 37. https://doi.org/10.3389/fendo.2013.00037

Chatterjee, S.; Khunti, K.; Davies, M.J. Type 2 diabetes. Lancet 2017, 389, 2239–2251. [Google Scholar] [CrossRef]

Chen, X., Ayala, I., Shannon, C., Fourcaudot, M., Acharya, N. K., Jenkinson, C. P., Heikkinen, S., & Norton, L. (2018). The Diabetes Gene and Wnt Pathway Effector TCF7L2 Regulates Adipocyte Development and Function. Diabetes, 67(4), 554–568. https://doi.org/10.2337/db17-0318

Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P. C., Horton, E. S., Castorino, K., & Tate, D. F. (2016). Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association. Diabetes care, 39(11), 2065–2079. https://doi.org/10.2337/dc16-1728

Colberg, S.R., Sigal, R.J., Yardley, J.E. et al. (2016) 'Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association', Diabetes Care, 39(11), pp. 2065–2079. https://doi.org/10.2337/dc16-1728

Crouch, D. J. M., & Bodmer, W. F. (2020). Polygenic inheritance, GWAS, polygenic risk scores, and the search for functional variants. Proceedings of the National Academy of Sciences of the United States of America, 117(32), 18924–18933. https://doi.org/10.1073/pnas.2005634117

Cunningham, C., & O'Sullivan, R. (2021). Healthcare Professionals' Application and Integration of Physical Activity in Routine Practice with Older Adults: A Qualitative Study. International Journal of Environmental Research and Public Health, 18(21), 11222. https://doi.org/10.3390/ijerph182111222

Dâmaso, A. R., da Silveira Campos, R. M., Caranti, D. A., de Piano, A., Fisberg, M., Foschini, D., de Lima Sanches, P., Tock, L., Lederman, H. M., Tufik, S., & de Mello, M. T. (2014). Aerobic plus resistance training was more effective in improving the visceral

adiposity, metabolic profile and inflammatory markers than aerobic training in obese adolescents. Journal of sports sciences, 32(15), 1435–1445. https://doi.org/10.1080/02640414.2014.900692

Dhawan, S., & Natarajan, R. (2019). Epigenetics and Type 2 Diabetes Risk. Current diabetes reports, 19(8), 47. https://doi.org/10.1007/s11892-019-1168-8

Diabetes Prevention Program Research Group. Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin. NEJM. 2002;346(6):393-403. doi:10.1056/nejmoa01251

Dijkstra, F., van der Sluis, G., Jager-Wittenaar, H., Hempenius, L., Hobbelen, J. S. M., & Finnema, E. (2022). Facilitators and barriers to enhancing physical activity in older patients during acute hospital stay: a systematic review. The international journal of behavioral nutrition and physical activity, 19(1), 99. https://doi.org/10.1186/s12966-022-01330-z

Durão, S., Burns, J., Schmidt, B. M., Tumusiime, D., Hohlfeld, A., Pfadenhauer, L., Ongolo-Zogo, C., Rehfuess, E., & Kredo, T. (2023). Infrastructure, policy and regulatory interventions to increase physical activity to prevent cardiovascular diseases and diabetes: a systematic review. BMC public health, 23(1), 112. https://doi.org/10.1186/s12889-022-14841-y

El-Kebbi, I. M., Bidikian, N. H., Hneiny, L., & Nasrallah, M. P. (2021). Epidemiology of type 2 diabetes in the Middle East and North Africa: Challenges and call for action. World journal of diabetes, 12(9), 1401–1425. https://doi.org/10.4239/wjd.v12.i9.1401

ElSayed, N. A., Aleppo, G., Aroda, V. R., Bannuru, R. R., Brown, F. M., Bruemmer, D., Collins, B. S., Hilliard, M. E., Isaacs, D., Johnson, E. L., Kahan, S., Khunti, K., Leon, J., Lyons, S. K., Murdock, L., Perry, M. L., Prahalad, P., Pratley, R. E., Seley, J. J., Stanton, R. C., … on behalf of the American Diabetes Association (2023). 17.

Diabetes Advocacy: Standards of Care in Diabetes-2023. Diabetes care, 46(Suppl 1), S279–S280. https://doi.org/10.2337/dc23-S017

Fasanmade OA and Dagogo-JackS. Diabetes care n Nigeria. Ann. Glob. Health.2015;81(6):821-829.

Fasanmade OA, Odeniyi IA, Amira CO, Okubadejo NU. Association of body mass index and abdominal adiposity with atherogenic lipid profile in Nigerians with type 2 diabetes and/or hypertension. Niger Med J. 2013;54(6):402–7.

Galicia-Garcia, U., Benito-Vicente, A., Jebari, S., Larrea-Sebal, A., Siddiqi, H., Uribe, K. B., Ostolaza, H., & Martín, C. (2020). Pathophysiology of Type 2 Diabetes Mellitus. International journal of molecular sciences, 21(17), 6275. https://doi.org/10.3390/ijms21176275

Gentile, S., Monda, V. M., Guarino, G., Satta, E., Chiarello, M., Caccavale, G., Mattera, E., Marfella, R., & Strollo, F. (2025). Obstructive Sleep Apnea and Type 2 Diabetes: An Update. Journal of Clinical Medicine, 14(15), 5574. https://doi.org/10.3390/jcm14155574

Ghaderian, S. B., Hayati, F., Shayanpour, S., & Beladi Mousavi, S. S. (2015). Diabetes and end-stage renal disease; a review article on new concepts. Journal of renal injury prevention, 4(2), 28–33. https://doi.org/10.12861/jrip.2015.07

Golden, S. H., Yajnik, C., Phatak, S., Hanson, R. L., & Knowler, W. C. (2019). Racial/ethnic differences in the burden of type 2 diabetes over the life course: a focus on the USA and India. Diabetologia, 62(10), 1751–1760. https://doi.org/10.1007/s00125-019-4968-0

Google Scholar

Grander, C., Grabherr, F., & Tilg, H. (2023). Non-alcoholic fatty liver disease: pathophysiological concepts and treatment options. Cardiovascular research, 119(9), 1787–1798. https://doi.org/10.1093/cvr/cvad095

Hossan, T., Kundu, S., Alam, S. S., & Nagarajan, S. (2019). Epigenetic Modifications Associated with the Pathogenesis of Type 2 Diabetes Mellitus. Endocrine, metabolic & immune disorders drug targets, 19(6), 775–786. https://doi.org/10.2174/1871530319666190301145545

Houle J, Lauzier-Jobin F, Beaulieu M, Meunier S, Coulombe S, Côté J, et al. Socioeconomic status and glycemic control in adult patients with type 2 diabetes: a mediation analysis. BMJ Open Diabetes Research & Care. 2016;4:e000184. https://doi.org/10.1136/bmjdrc-2015-000184

https://www.researchgate.net/publication/333916426_Diabetes_in_Nigeria_Impact_challenges_future_directions#:~:text=Oguejiofor%20et%20al,Issue%202%20%E2%80%A2%201000130

Idf Atlas 2025 11th edition

Iheanacho CO, Osoba DO, Eze UI. Evaluation of predominant risk factors for type 2 diabetes mellitus among out-patients in two Nigerian secondary health facilities. Afr Health Sci. 2021;21(2):693–701

Ikechukwu, E. C., Mgbeojedo, U. G., Uchenwoke, C. I., & Ugwueze, V. C. (2021). Physical activity level and factors affecting exercise participation among Nigerian adults with and without diabetes. European Medical Journal, 6(3), 112-120.

Ikechukwu, E. C., Mgbeojedo, U. G., Uchenwoke, C. I., & Ugwueze, V. C. (2021). Physical activity level and factors affecting exercise participation among Nigerian adults with and without diabetes. European Medical Journal, 6(3), 112-120.

Indian J Endocrinol Metab. 2012;16(4):558-64. [PubMed ID: 22837916]. [PubMed Central ID: PMC3401756]. https://doi.org/10.4103/2230-8210.98011.

Institutes of Health; 1998. NIH publication 98-4083. Accessed July 11, 2022. www.ncbi.nlm.nih.gov/books/NBK2003

International Diabetes Federation (IDF) (2021) IDF Diabetes Atlas (10th ed.). Brussels: IDF. Available at: https://diabetesatlas.org/idfawp/resource-files/2021/07/IDF-Diabetes-Atlas-10th-Edition.pdf (Accessed: 7 July 2025).

International Diabetes Federation. IDF Diabetes Atlas. 9th edn. Brussels; 2019. https://www.diabetesatlas.org. Accessed 01 June 2024.

International Diabetes Federation. International iabetes Federation Diabetes Atlas, Eighth dition. 2017. Available at

Jiao, Y., Butoyi, C., Zhang, Q. et al. Sleep disorders impact hormonal regulation: unravelling the relationship among sleep disorders, hormones and metabolic diseases. Diabetol Metab Syndr 17, 305 (2025). https://doi.org/10.1186/s13098-025-01871-w

Kanaley, J. A., Colberg, S. R., Corcoran, M. H., Malin, S. K., Rodriguez, N. R., Crespo, C. J., Kirwan, J. P., & Zierath, J. R. (2022). Exercise/Physical Activity in Individuals with Type 2 Diabetes: A Consensus Statement from the American College of Sports Medicine. Medicine and science in sports and exercise, 54(2), 353–368. https://doi.org/10.1249/MSS.0000000000002800

Kanaley, J. A., Colberg, S. R., Corcoran, M. H., Malin, S. K., Rodriguez, N. R., Crespo, C. J., Kirwan, J. P., & Zierath, J. R. (2022). Exercise/Physical Activity in Individuals with Type 2 Diabetes: A Consensus Statement from the American College of Sports Medicine. Medicine and science in sports and exercise, 54(2), 353–368. https://doi.org/10.1249/MSS.0000000000002800

Kawahito, S., Kitahata, H., & Oshita, S. (2009). Problems associated with glucose toxicity: role of hyperglycemia-induced oxidative stress. World journal of gastroenterology, 15(33), 4137–4142. https://doi.org/10.3748/wjg.15.4137

Kawai, T., Autieri, M. V., & Scalia, R. (2021). Adipose tissue inflammation and metabolic dysfunction in obesity. American journal of physiology. Cell physiology, 320(3), C375–C391. https://doi.org/10.1152/ajpcell.00379.2020

Khanna D, Welch BS, Rehman A. Pathophysiology of Obesity. [Updated 2022 Oct 20]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK572076/

Kojta, I., Chacińska, M., & Błachnio-Zabielska, A. (2020). Obesity, Bioactive Lipids, and Adipose Tissue Inflammation in Insulin Resistance. Nutrients, 12(5), 1305. https://doi.org/10.3390/nu12051305

Kropp, M., Golubnitschaja, O., Mazurakova, A., Koklesova, L., Sargheini, N., Vo, T. K. S., de Clerck, E., Polivka, J., Jr, Potuznik, P., Polivka, J., Stetkarova, I., Kubatka, P., & Thumann, G. (2023). Diabetic retinopathy as the leading cause of blindness and early predictor of cascading complications-risks and mitigation. The EPMA journal, 14(1), 21–42. https://doi.org/10.1007/s13167-023-00314-8

Kropp, M., Golubnitschaja, O., Mazurakova, A., Koklesova, L., Sargheini, N., Vo, T. K. S., de Clerck, E., Polivka, J., Jr, Potuznik, P., Polivka, J., Stetkarova, I., Kubatka, P., & Thumann, G. (2023). Diabetic retinopathy as the leading cause of blindness and early predictor of cascading complications-risks and mitigation. The EPMA journal, 14(1), 21–42. https://doi.org/10.1007/s13167-023-00314-8

Lim, M. L., van Schooten, K. S., Radford, K. A., & Delbaere, K. (2021). Association between health literacy and physical activity in older people: a systematic review and meta-analysis. Health promotion international, 36(5), 1482–1497. https://doi.org/10.1093/heapro/daaa072

Livadas, S., Anagnostis, P., Bosdou, J. K., Bantouna, D., & Paparodis, R. (2022). Polycystic ovary syndrome and type 2 diabetes mellitus: A state-of-the-art review. World journal of diabetes, 13(1), 5–26. https://doi.org/10.4239/wjd.v13.i1.5

Magliano D, Boyko EJ. IDF diabetes atlas. 10th edition. International Diabetes Federation; 2021. https://diabetesatlas.org/atlas/tenth-edition/ [PubMed] [Google Scholar]

McAuley, E., Szabo, A., Gothe, N., & Olson, E. A. (2011). Self-efficacy: Implications for Physical Activity, Function, and Functional Limitations in Older Adults. American journal of lifestyle medicine, 5(4), 10.1177/1559827610392704. https://doi.org/10.1177/1559827610392704

McKenzie, T. L., Moody, J. S., Carlson, J. A., Lopez, N. V., & Elder, J. P. (2013). Neighborhood Income Matters: Disparities in Community Recreation Facilities, Amenities, and Programs. Journal of park and recreation administration, 31(4), 12–22.

Michałowska, J., Miller-Kasprzak, E., & Bogdański, P. (2021). Incretin Hormones in Obesity and Related Cardiometabolic Disorders: The Clinical Perspective. Nutrients, 13(2), 351. https://doi.org/10.3390/nu13020351

Milenkovic, T., Bozhinovska, N., Macut, D., Bjekic-Macut, J., Rahelic, D., Velija Asimi, Z., & Burekovic, A. (2021). Mediterranean Diet and Type 2 Diabetes Mellitus: A Perpetual Inspiration for the Scientific World. A Review. Nutrients, 13(4), 1307. https://doi.org/10.3390/nu13041307

Mitrovic, B., Gluvic, Z., Obradovic, M. M., Radunovic, M., Rizzo, M., Banach, M. & Isenovic, E. R. (2023). Non-alcoholic fatty liver disease, metabolic syndrome, and type 2 diabetes mellitus: where do we stand today?. Archives of Medical Science, 19(4), 884–894. https://doi.org/10.5114/aoms/150639

Moodley LM and Rambritch V. An assessment of the level of knowledge of diabetes patients, in a primary health care setting, on diabetes mellitus. S. Afr fam. pract 2007;49(10):2078-6204. https://doi.org/10.4239/wjd.v5.i6.905

NCD Risk Factor Collaboration. Worldwide trends in diabetes since 1980: A pooled analysis of 751 population-based studies with 4.4 million participants. Lancet 2016, 387, 1513–1530. [Google Scholar] [CrossRef]

Nguyen, T. T., Ta, Q. T. H., Nguyen, T. K. O., Nguyen, T. T. D., & Giau, V. V. (2020). Type 3 Diabetes and Its Role Implications in Alzheimer's Disease. International journal of molecular sciences, 21(9), 3165. https://doi.org/10.3390/ijms21093165

Nubila T, Ukaejiofo EO, Ike SO, et al. Predisposing factors associated with uncomplicated type 2 diabetes among adults in a diabetic clinic, Enugu State, Nigeria. Trans R Soc Trop Med Hyg. 2014;108(4):206–12.

Odukoya, O. O., & colleagues. (2023). Exploring barriers and facilitators towards physical activity among adults with chronic conditions in Nigeria. African Journal of Public Health, 15(1), 21-29.

Odukoya, O. O., & colleagues. (2023). Exploring barriers and facilitators towards physical activity among adults with chronic conditions in Nigeria. African Journal of Public Health, 15(1), 21-29.

Ogbera, A. O., & Ekpebegh, C. (2014). Diabetes mellitus in Nigeria: The past, present and future. World journal of diabetes, 5(6), 905–911. https://doi.org/10.4239/wjd.v5.i6.905

Oguejiofor et al., Endocrinol Metab Synd 2014, 3:2http://dx.doi.org/10.4172/2161-1017.1000130Review Article Open AccessEndocrinol Metab SyndISSN:2161-1017 EMS, an open access journal Volume 3 • Issue 2 • 1000130"

Olamoyegun AM, Oluyombo R, Iwuala OS, et al. Epidemiology and Risk Factors for Diabetes in Semi-Urban Communities in South West. Nigeria West Afr J Med. 2014;33(4):264–9.

Oyewole, O. O., Odusan, O., Oritogun, K. S., & Idowu, A. O. (2014). Physical activity among type-2 diabetic adult Nigerians. Annals of African Medicine, 13(4), 189-194.

Oyewole, O. O., Odusan, O., Oritogun, K. S., & Idowu, A. O. (2014). Physical activity among type-2 diabetic adult Nigerians. Annals of African Medicine, 13(4), 189-194.

Parveen, K., Hussain, M. A., Anwar, S., Elagib, H. M., & Kausar, M. A. (2025). Comprehensive review on diabetic foot ulcers and neuropathy: Treatment, prevention

and management. World journal of diabetes, 16(3), 100329. https://doi.org/10.4239/wjd.v16.i3.100329

Parveen, K., Hussain, M. A., Anwar, S., Elagib, H. M., & Kausar, M. A. (2025). Comprehensive review on diabetic foot ulcers and neuropathy: Treatment, prevention and management. World journal of diabetes, 16(3), 100329. https://doi.org/10.4239/wjd.v16.i3.100329

Petersen, M. C., & Shulman, G. I. (2018). Mechanisms of Insulin Action and Insulin Resistance. Physiological reviews, 98(4), 2133–2223. https://doi.org/10.1152/physrev.00063.2017

Rajewski, P., Cieściński, J., Rajewski, P., Suwała, S., Rajewska, A., & Potasz, M. (2025). Dietary Interventions and Physical Activity as Crucial Factors in the Prevention and Treatment of Metabolic Dysfunction-Associated Steatotic Liver Disease. Biomedicines, 13(1), 217. https://doi.org/10.3390/biomedicines13010217

Rawal, L. B., Smith, B. J., Quach, H., & Renzaho, A. M. N. (2020). Physical Activity among Adults with Low Socioeconomic Status Living in Industrialized Countries: A Meta-Ethnographic Approach to Understanding Socioecological Complexities. Journal of environmental and public health, 2020, 4283027. https://doi.org/10.1155/2020/4283027

Roden, M.; Shulman, G.I. The integrative biology of type 2 diabetes. Nature 2019, 576, 51–60. [Google Scholar] [CrossRef] [PubMed]

Rümenapf, G., Abilmona, N., Morbach, S., & Sigl, M. (2024). Peripheral Arterial Disease and the Diabetic Foot Syndrome: Neuropathy Makes the Difference! A Narrative Review. Journal of clinical medicine, 13(7), 2141. https://doi.org/10.3390/jcm13072141

Sabir A, Ohwovoriole A, Isezuo S, Fasanmade O, Abubakar S, Iwuala S. Type 2 diabetes mellitus and its risk factors among the rural Fulanis of Northern Nigeria. Ann Afr Med. 2013;12(4):217–22.

Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. Diabetes Res Clin Pract. 2019;157:107843.

Saeedi P, Salpea P, Karuranga S, Petersohn I, Malanda B, Gregg EW, Unwin N, Wild SH, Williams R. Mortality attributable to diabetes in 20-79 years old adults, 2019 estimates: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res Clin Pract. 2020;162:108086. doi: 10.1016/j.diabres.2020.108086. [DOI] [PubMed] [Google Scholar]

Sharma, K., Akre, S., Chakole, S., & Wanjari, M. B. (2022). Stress-Induced Diabetes: A Review. Cureus, 14(9), e29142. https://doi.org/10.7759/cureus.29142

Sharma, K., Dhungana, G., Adhikari, S., Bista Pandey, A., & Sharma, M. (2021). Depression and Anxiety among Patients with Type II Diabetes Mellitus in Chitwan Medical College Teaching Hospital, Nepal. Nursing research and practice, 2021, 8846915. https://doi.org/10.1155/2021/8846915

Singh, R., Teel, C., Sabus, C., McGinnis, P., & Kluding, P. (2016). Fatigue in Type 2 Diabetes: Impact on Quality of Life and Predictors. PloS one, 11(11), e0165652. https://doi.org/10.1371/journal.pone.0165652

Snel, M., Jonker, J. T., Schoones, J., Lamb, H., de Roos, A., Pijl, H., Smit, J. W., Meinders, A. E., & Jazet, I. M. (2012). Ectopic fat and insulin resistance: pathophysiology and effect of diet and lifestyle interventions. International journal of endocrinology, 2012, 983814. https://doi.org/10.1155/2012/983814

Spanakis, E. K., & Golden, S. H. (2013). Race/ethnic difference in diabetes and diabetic complications. Current diabetes reports, 13(6), 814–823. https://doi.org/10.1007/s11892-013-0421-9

Srinivasan, S., Kaur, V., Chamarthi, B., Littleton, K. R., Chen, L., Manning, A. K., Merino, J., Thomas, M. K., Hudson, M., Goldfine, A., & Florez, J. C. (2018). TCF7L2 Genetic Variation Augments Incretin Resistance and Influences Response to a Sulfonylurea and Metformin: The Study to Understand the Genetics of the Acute Response to Metformin and Glipizide in Humans (SUGAR-MGH). Diabetes care, 41(3), 554–561. https://doi.org/10.2337/dc17-1386

Stathi D, Triantafyllidis KK, Zafeiri M, Karalliedde J, Kechagias KS. COVID-19 induced type 1 diabetes: A systematic review of case reports and series. J Int Med Res. 2023;51(11):3000605231210403.

Stolarczyk, A., Jarzemski, I., Maciąg, B. M., Radzimowski, K., Świercz, M., & Stolarczyk, M. (2021). Balance and motion coordination parameters can be improved in patients with type 2 diabetes with physical balance training: non-randomized controlled trial. BMC endocrine disorders, 21(1), 143. https://doi.org/10.1186/s12902-021-00804-8

Sun, H., Saeedi, P., Karuranga, S., Pinkepank, M., Ogurtsova, K., Duncan, B. B., Stein, C., Basit, A., Chan, J. C. N., Mbanya, J. C., Pavkov, M. E., Ramachandaran, A., Wild, S. H., James, S., Herman, W. H., Zhang, P., Bommer, C., Kuo, S., Boyko, E. J., & Magliano, D. J. (2022). IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. Diabetes research and clinical practice, 183, 109119. https://doi.org/10.1016/j.diabres.2021.109119

Ugwu, E., Adeleye, O., Gezawa, I., Okpe, I., Enamino, M., & Ezeani, I. (2019). Burden of diabetic foot ulcer in Nigeria: Current evidence from the multicenter evaluation of diabetic foot ulcer in Nigeria. World journal of diabetes, 10(3), 200–211. https://doi.org/10.4239/wjd.v10.i3.200

Uloko, A.E., Musa, B.M., Ramalan, M.A. et al. (2018) 'Prevalence and risk factors for diabetes mellitus in Nigeria', Diabetes Therapy, 9(3), pp. 1307–1316. https://doi.org/10.1007/s13300-018-0441-1

Veronese, N., Cooper, C., Reginster, J. Y., Hochberg, M., Branco, J., Bruyère, O., Chapurlat, R., Al-Daghri, N., Dennison, E., Herrero-Beaumont, G., Kaux, J. F., Maheu, E., Rizzoli, R., Roth, R., Rovati, L. C., Uebelhart, D., Vlaskovska, M., & Scheen, A. (2019). Type 2 diabetes mellitus and osteoarthritis. Seminars in arthritis and rheumatism, 49(1), 9–19. https://doi.org/10.1016/j.semarthrit.2019.01.005

Vilafranca Cartagena, M., Tort-Nasarre, G., & Rubinat Arnaldo, E. (2021). Barriers and Facilitators for Physical Activity in Adults with Type 2 Diabetes Mellitus: A Scoping Review. International journal of environmental research and public health, 18(10), 5359. https://doi.org/10.3390/ijerph18105359

Vilafranca Cartagena, M., Tort-Nasarre, G., & Rubinat Arnaldo, E. (2021). Barriers and Facilitators for Physical Activity in Adults with Type 2 Diabetes Mellitus: A Scoping Review. International journal of environmental research and public health, 18(10), 5359. https://doi.org/10.3390/ijerph18105359

Wang, T., Wang, J., Hu, X., Huang, X. J., & Chen, G. X. (2020). Current understanding of glucose transporter 4 expression and functional mechanisms. World journal of biological chemistry, 11(3), 76–98. https://doi.org/10.4331/wjbc.v11.i3.76

Wang, Y., Wei, W., Guo, H., Wang, D., Wei, X., Zhang, C., Zhang, X., & Huang, Y. (2024). Postpartum life interventions to prevent type 2 diabetes in women with gestational diabetes: A systematic review and meta-analysis. Journal of diabetes investigation, 15(8), 1115–1128. https://doi.org/10.1111/jdi.14220

WHO Noncommunicable Diseases. Available online: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases (accessed on 12 August 2024).

Winer N, Sowers JR (2004) Epidemiology of diabetes. J ClinPharmacol 44: 397-405.

Woodward, A., & colleagues. (2024). Barriers and facilitators of self-management of diabetes in socioeconomically deprived populations: A systematic review. Diabetic Medicine, 41(5), 302-310.

Woodward, A., & colleagues. (2024). Barriers and facilitators of self-management of diabetes in socioeconomically deprived populations: A systematic review. Diabetic Medicine, 41(5), 302-310.

World Health Organization (WHO) Noncommunicable Diseases Country Profiles 2018. World Health Organization (WHO); Geneva, Switzerland: 2018. [Google Scholar]

www.diabetesatlas.org. Accessed 12/3/2019

Young, J. B., Gauthier-Loiselle, M., Bailey, R. A., Manceur, A. M., Lefebvre, P., Greenberg, M., Lafeuille, M. H., Duh, M. S., Bookhart, B., & Wysham, C. H. (2018). Development of predictive risk models for major adverse cardiovascular events among patients with type 2 diabetes mellitus using health insurance claims data. Cardiovascular diabetology, 17(1), 118. https://doi.org/10.1186/s12933-018-0759-z

Zhang, X., Gao, Y., Zhang, S., Wang, Y., Pei, X., Chen, Y., Zhang, J., Zhang, Y., Du, Y., Hao, S., Wang, Y., & Ni, T. (2025). Mitochondrial dysfunction in the regulation of aging and aging-related diseases. Cell communication and signaling : CCS, 23(1), 290. https://doi.org/10.1186/s12964-025-02308-7

Zhao, X., & colleagues. (2025). Barriers and facilitators of physical activity in people with young-onset type 2 diabetes: A qualitative study. Diabetes Research and Clinical Practice, 183, 109111.

Zhao, X., & colleagues. (2025). Barriers and facilitators of physical activity in people with young-onset type 2 diabetes: A qualitative study. Diabetes Research and Clinical Practice, 183, 109111.

APPENDIX

APPENDIX I

INFORMED CONSENT FORM

Title of study: BARRIERS AND FACILITATORS OF PHYSICAL ACTIVITY AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY, EDO STATE, NIGERIA.

Investigator: Okoli Victor Chinemerem

Supervisors: DR. S.O. BOLARINDE

Financial Sponsorship: Self-Sponsored

Purpose of the research: The purpose of the research is to explore the barriers and facilitators of physical activity among patients with Type 2 Diabetes Mellitus in University of Benin teaching hospital, Edo state, Nigeria.

Procedures and protocol involved in the study:

You are politely approached to respond to an interviewer-administered questionnaire interview.

This questionnaire would be only used for research purpose and will explore the barriers and facilitators of physical activity among patients with Type 2 Diabetes Mellitus in University of Benin teaching hospital, Edo state, Nigeria.

Compensation:

There will be no financial compensation for participating in this study.

Voluntary Participation:

Please note that your participation in this research is entirely voluntary. No form of discrimination will be meted to you, should you decide not to participate in this study; You are entirely free to change your mind and stop participating even if you agreed earlier.

Side Effects:

There is no anticipated adverse effect associated with participating in this study.

Benefits:

The purpose of the research is to identify the barriers and facilitators of physical activity among patients with Type 2 Diabetes Mellitus in University of Benin teaching hospital, Edo state, Nigeria.

Confidentiality:

All information and data obtained in the course of this study will be treated confidentially. The names of the participants will not be written on the questionnaire, and all information collected will be encoded in a file in my personal computer and passworded. Thereafter the questionnaires will be shelved and locked in my personal document cabinet.

CONTACT INFORMATION

OKOLI VICTOR CHINEMEREM
PROJECT STUDENT
Email: bexzychrist5@gmail.com
Ethics and Research Committee University of Benin
Teaching Hospital Benin City.
Phone Number: 09037169429

CERTIFICATE OF CONSENT

have read the above information (or it has been read to me). I had the opportunity to ask questions about it and the questions were answered to my satisfaction.

I consent voluntarily to take part as a participant in this study I do not consent to participate in this study.

Signature of participant: _____

Date:_____

Project Title: BARRIERS AND FACILITATORS OF PHYSICAL ACTIVITIES AMONG PATIENTS WITH TYPE 2 DIABETES IN UBTH, BENIN CITY EDO STATE, NIGERIA.

Assessment of Barriers and Facilitators of Physical Activity among Type 2 Diabetes Mellitus Patients at the University of Benin Teaching Hospital (UBTH), Edo State, Nigeria

Researcher Name: Okoli Victor chinemerem

Department of Physiotherapy, University of Benin, Edo state Nigeria.

Instructions:

- Complete all sections.

- Answer based on your experiences over the past 7 days.

- Check (✓) the appropriate box or fill in the blank.

Consent Statement

I voluntarily agree to participate. My identity will remain confidential.

Signature: _____ Date: _____

APPENDIX II

Section A: Demographic and Clinical Information

1. Age: _____ years

2. Gender:

☐ Male ☐ Female

3.BMI(Body mass index):Weight_____ / Height_____.

4. Marital Status:

☐ Single ☐ Married ☐ Divorced/Widowed

5. Education Level:

☐ None ☐ Primary ☐ Secondary ☐ Tertiary

6. Occupation:

☐ Unemployed ☐ Farmer/Trader ☐ Civil Servant ☐ Professional ☐ Retired

7. Years since T2DM diagnosis: _____ years

8. Other health conditions: (e.g., hypertension, arthritis):

☐ None ☐ _____

9. Current diabetes treatment:

☐ Oral medication ☐ Insulin ☐ Diet/exercise only

APPENDIX III

International Physical Activity Questionnaire (IPAQ)

The following questions are about physical activity. Please read carefully and answer to the best of your knowledge.

1. When you are at work, which of the following describes what you do? (If you have more than one job, answer for each job.)

Job 1	Job 2	Job 3
☐ Mostly sitting or standing	☐ Mostly sitting or standing	☐ Mostly sitting or standing
☐ Mostly walking	☐ Mostly walking	☐ Mostly walking
☐ Mostly heavy labor or physically demanding work	☐ Mostly heavy labor or physically demanding work	☐ Mostly heavy labor or physically demanding work
☐ Don't know/not sure	☐ Don't know/not sure	☐ Don't know/not sure

The next 3 questions are about vigorous physical activity. Vigorous physical activity causes your heart to beat faster and makes you breathe hard.

2. Now thinking about **vigorous physical activities** you did in the **last 7 days**, did you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, sports, heavy yard work, or anything else?

☐ 1 Yes

☐ 0 No→ **Skip to 15 on the next page →**

3. How many days per week do you do these vigorous activities for at least 10 minutes at a time?

Days per week: 1 2 3 4 5 6 7

4. On the days when you do vigorous activity for at least 10 minutes, how long do you do those activities?

☐ 1 About 10 minutes

☐ 2 About 20 minutes

☐ 3 About 30 minutes

☐ 4 About 40 minutes

☐ 5 About 50 minutes

☐ 6 1 hour or more

The next 3 questions are about moderate physical activity. Moderate physical activity causes small increases in breathing or heart rate.

5. Now thinking about **moderate physical activities** you did in the **last 7 days**, did you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling at regular pace, vacuuming, gardening, or anything else?

☐ 1 Yes

☐ 0 No→ **Skip to 18 on the next page →**

6. How many days per week do you do these moderate activities for at least 10 minutes at a time?

Days per week: 1 2 3 4 5 6 7

7. On the days when you do moderate activity for at least 10 minutes, how long do you do those activities?

☐ 1 About 10 minutes

☐ 2 About 20 minutes

☐ 3 About 30 minutes

☐ 4 About 40 minutes

☐ 5 About 50 minutes

☐ 6 1 hour or more

The next 3 questions are about time spent walking.

8. Now thinking about the amount of time you spent **walking** in the **last 7 days**, that lasted for at least 10 minutes at a time. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

☐ 1 Yes

☐ 0 No→ **Skip to 22 on the next page →**

9. How many days per week do you do spend walking for at least 10 minutes at a time?

Days per week: 1 2 3 4 5 6 7

10. On the days when you do walk for at least 10 minutes, how long do you do those activities?

☐ 1	About 10 minutes	☐ 4	About 40 minutes
☐ 2	About 20 minutes	☐ 5	About 50 minutes
☐ 3	About 30 minutes	☐ 6	1 hour or more

The next 3 questions are about you sitting.

11. Now thinking about the amount of time you spent **sitting** in the **last 7 days.** Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

12. How many hours per day do you spend sitting?

☐ 1	About 30 minutes or less	☐ 4	About 3 hour
☐ 2	About 1 hour	☐ 5	About 4 hour
☐ 3	About 2 hour	☐ 6	About 5 hour or more

What keeps you from being more active?

Barriers to Being Active Quiz

Directions: Listed below are reasons people do not get enough physical activity. Read each statement and mark how that fits you.

How likely are you to say?	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely
1. My day is so busy now, I just don't think I can make the time to include physical activity in my regular schedule.	3	2	1	0
2. None of my family members or friends like to do anything active, so I don't have a chance to exercise.	3	2	1	0
3. I'm just too tired after work to get any exercise.	3	2	1	0
4. I've been thinking about getting more exercise, but I just can't seem to get started.	3	2	1	0
5. I'm getting older so exercise can be risky.	3	2	1	0
6. I don't get enough exercise because I have never learned the skills for any sport.	3	2	1	0
7. I don't have access to jogging trails, swimming pools, bike paths, etc.	3	2	1	0
8. Physical activity takes too much time away from other commitments—time, work, family, etc.	3	2	1	0
9. I'm embarrassed about how I will look when I exercise with others.	3	2	1	0
10. I don't get enough sleep as it is. I just couldn't get up early or stay up late to get some exercise.	3	2	1	0
11. It's easier for me to find excuses not to exercise than to go out to do something.	3	2	1	0

Your Score

How likely are you to say?	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely
12. I know of too many people who have hurt themselves by overdoing it with exercise.	3	2	1	0
13. I really can't see learning a new sport at my age.	3	2	1	0
14. It's just too expensive. You have to take a class or join a club or buy the right equipment.	3	2	1	0
15. My free times during the day are too short to include exercise.	3	2	1	0
16. My usual social activities with family or friends do not include physical activity.	3	2	1	0
17. I'm too tired during the week and I need the weekend to catch up on my rest.	3	2	1	0
18. I want to get more exercise, but I just can't seem to make myself stick to anything.	3	2	1	0
19. I'm afraid I might injure myself or have a heart attack.	3	2	1	0
20. I'm not good enough at any physical activity to make it fun.	3	2	1	0
21. If we had exercise facilities and showers at work, then I would be more likely to exercise.	3	2	1	0

FACILITATORS	**1**	**2**	**3**	**4**
Access to free/ low-cost facilities (eg. Parks)				
Support from family/friends				
Advice from health care providers				
Group exercise programs				
Flexible work schedule				
Enjoyment of physical activity				
Improved blood sugar control				
Availability of home exercise equipment				

Safe neighborhood for walking				
Educational materials on exercise benefits				

SECTION D: Facilitators of Physical Activity (Facilitators for Physical Activity Questionnaire - FPAQ)

Rate how important these factors are for helping you exercise:

Scale: **Not Important** (1), **Slightly Important** (2), **Important** (3), **Very Important** (4), **Essential** (5)

APPENDIX IV

Section E: Open-Ended Questions

1. What would make it easier for you to engage in physical activity?

_____

2. What additional barriers do you face?

Thank You!

Thank you very much for your valuable time and honest answers. Your input is crucial to helping us understand how to better support people with diabetes at UBTH to live healthier lives.

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

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NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/2025/117

PROPOSAL TITLE: "BARRIERS AND FACILITATORS OF PHYSICAL ACTIVITY AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY, EDO STATE, NIGERIA"

PRINCIPAL INVESTIGATOR(S): OKOLI VICTOR CHINEMEREM

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

DATE CONSIDERED: JULY 14TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 14/7/2025 TO 13/7/2026. 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..Ofili 14/7/2025

SUPERVISOR (S): DR. S.O BOLARINDE

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.....