KNOWLEDGE OF RISK FACTORS AND PREVALENCE OF HYPERTENSION AMONG UNIVERSITY STUDENTS IN BENIN CITY: A CROSS-SECTIONAL STUDY

By

OJOMO JEREMIAH OSASERE **MED1807454**

OKWUFULUEZE SAMSON **MED1807465**

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE,

SCHOOL OF MEDICINE, COLLEGE OF MEDICAL SCIENCES,

UNIVERSITY OF BENIN, BENIN CITY, EDO STATE.

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OJOMO JEREMIAH OSASERE **MED1807454**

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A ONE-YEAR PROJECT PRESENTED TO

THE DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY.

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE IN THE UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.

APRIL, 2026

DECLARATION

We hereby declare that this project work is original and was carried out by the under-listed students under the supervision of **Dr. O. E. Obarisagbon** and **Dr. Gregory Oko-Oboh** and has not been published elsewhere for the award of a degree or certificate.

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JEREMIAH OSASERE OJOMO

MED1807454

+2348151566773

ojomojeremiah@gmail.com

_____

SAMSON OKWUFULUEZE

MED1807465

+2349095970021

Okwufuluezesamson213@gmail.com

CERTIFICATION

This is to certify that this research work titled **"Knowledge of risk factors and prevalence of hypertension among university students in Benin City"** was carried out in the Department of Public Health and Community Medicine, School of Medicine, College of Medical Sciences, University of Benin, Benin City, Edo State, Nigeria, as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) by **JEREMIAH OSASERE OJOMO** with matriculation number **MED1807454** and **SAMSON OKWUFULUEZE** with matriculation number **MED1807465.**

_____

PROJECT SUPERVISOR

DR. (MRS) O. E. OBARISIAGBON

MBBS; MPH; FMCPH

Associate Professor,

Department of Public Health and

Community Medicine,

College of Medical Sciences,

University of Benin,

Benin City, Edo State, Nigeria.

_____

PROJECT CO-SUPERVISOR

Dr. GREGORY OKO-OBOH

MBBS; MPH; MSc; FWACP; PhD

Adjunct Lecturer,

Department of Public Health and

Community Medicine,

College of Medical Sciences,

University of Benin,

Benin City, Edo State, Nigeria.

_____

HEAD OF DEPARTMENT

DR. (MRS) O. E. OBARISIAGBON

MBBS; MPH; FMCPH

Associate Professor,

Department of Public Health and Community Medicine,

College of Medical Sciences,

University of Benin,

Benin City, Edo State, Nigeria.

DEDICATION

We dedicate this work to God Almighty, who has brought us this far in our pursuit of becoming Medical Doctors. This project is also dedicated to our families and teachers, who have been our pillars over the years and have contributed immensely to our project. We also dedicate this to our colleagues, friends, and well-wishers.

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BMI: Body mass index

BP: Blood pressure

CVD: Cardiovascular Diseases

DASH: Dietary Approaches to Stop Hypertension

JNC: Joint National Committee

NCD: Non-communicable diseases

NAFDAC: National Agency for Food and Drug Administration and Control

WHO: World Health Organisation

DEFINITION OF TERMS

Blood Pressure**:** The force exerted by circulating blood against the walls of the arteries, expressed as systolic over diastolic pressure and measured in millimetres of mercury (mmHg).

Body Mass Index (BMI): An anthropometric measure used to classify weight status, calculated as weight in kilograms divided by the square of height in meters (kg/m^2).

Cardiovascular Diseases (CVDs): A group of disorders affecting the heart and blood vessels, including heart disease and stroke.

Hypertension: A chronic non-communicable disease characterised by persistently elevated arterial blood pressure, defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg based on standard clinical guidelines.

Non-Communicable Diseases (NCDs): Diseases that are not transmitted from person to person are typically chronic and are influenced by genetic, environmental, and lifestyle factors.

Obesity: A condition characterised by excessive accumulation of body fat, typically defined using Body Mass Index (BMI), which poses a health risk.

Pre-hypertension: A condition in which blood pressure is above normal but below the threshold for hypertension, indicating an increased risk of developing hypertension.

Prevalence: The proportion of individuals in a population who have a specific disease or condition at a given time.

Risk Factor: Any attribute, characteristic, or exposure that increases the likelihood of developing a disease or health condition.

Screening: The systematic application of tests to identify asymptomatic individuals at risk of a disease before symptoms develop.

ABSTRACT

Background: Hypertension is an increasingly important public health problem among young adults, yet many university students underestimate their susceptibility despite exposure to lifestyle-related cardiovascular risks. This study assessed knowledge of hypertension risk factors and determined the prevalence of hypertension among university students in Benin City, Nigeria.

Methods: A descriptive cross-sectional study was conducted among 560 undergraduate students of the University of Benin, Ugbowo campus. Respondents were selected using a multistage sampling technique. Data were collected with an adapted structured self-administered questionnaire, while blood pressure, weight, and height were measured using standard procedures. Knowledge of hypertension risk factors was scored over eight items; scores of 4 and above were classified as good knowledge. Blood pressure was classified using the Joint National Committee criteria.

Results: The mean age of respondents was 20.3 ± 2.6 years, and 64.8% were females. All respondents had heard of hypertension, with school being the commonest source of information (62.3%). Overall, 73.8% had good knowledge of hypertension risk factors, and 80.7% had good general knowledge of hypertension. Stress (88.8%), obesity (79.8%), excessive alcohol consumption (74.8%), family history (70.5%), smoking (70.0%), and high salt intake (69.5%) were the most commonly identified risk factors, while fewer respondents recognised processed foods (57.0%) and physical inactivity (55.2%). Measured blood pressure showed that 48.3% were normotensive, 43.8% were prehypertensive, 6.8% had stage 1 hypertension, and 1.1% had stage 2 hypertension, giving an overall hypertension prevalence of 7.9%. Hypertension was significantly more common among males than females (13.2% vs 5.0%, $p < 0.001$) and increased across BMI categories from underweight to obesity ($p < 0.05$).

Conclusion: Although knowledge of hypertension risk factors was generally good, the high proportion of students with prehypertension and the measurable burden of hypertension highlight the need for routine campus-based screening and sustained preventive interventions targeting modifiable cardiovascular risk factors among young adults.

Keywords: Hypertension; risk factors; knowledge; university students; prehypertension; Nigeria.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Hypertension, commonly known as high blood pressure, is a long-term medical condition of significant global health concern due to its widespread prevalence and its role as a leading cause of cardiovascular diseases and premature death.[1] Hypertension is a non-communicable disease that is a silent threat to the health of people all over the world, with up to one-third of the world population being affected.[2] The condition is often asymptomatic, earning it the moniker "silent killer," as it can lead to severe health complications such as heart attacks, strokes, heart failure, and kidney damage if left untreated.[3]

Historically perceived as a pathology confined to the affluent and elderly populations of the developed world, the epidemiological landscape of hypertension has undergone a radical shift over the last three decades[3,4]. This transition is inextricably linked to rapid urbanisation, demographic ageing, and the widespread adoption of westernised lifestyles characterised by sedentary behaviour and dietary alterations, often referred to as the epidemiological transition. Consequently, the prevalence of hypertension has remained stable or decreased in high-income countries due to improved awareness and control measures, while it has risen sharply in low-resource settings where health systems are ill-equipped to manage chronic non-communicable diseases alongside the persisting burden of infectious diseases.[3]

Knowledge of the risk factors of hypertension is a fundamental precursor to preventing the disease. Among university students, there exists a paradoxical gap between general literacy and specific health literacy regarding cardiovascular risk. While a substantial majority of students may be familiar with the term 'hypertension,' their understanding of its aetiology, asymptomatic progression, and specific risk factors is often superficial or marred by

misconceptions. Many students attribute hypertension solely to excessive thinking, psychological stress, or even spiritual causes rather than physiological or lifestyle causes[5,6]. This disconnect is critical because misconceptions regarding the root causes of the disease often lead to poor health-seeking behaviour and a lack of adherence to preventive measures. Students often perceive themselves as invulnerable due to their age, failing to apply their academic knowledge to their own lifestyle choices. This phenomenon, sometimes referred to as "optimism bias," leads young adults to believe that they are less likely than others to experience negative health outcomes.

The prevalence of elevated blood pressure among young adults in West Africa has reached alarming levels, challenging the narrative that this is a condition of the aged. The high frequency of pre-hypertension is particularly concerning. While not a disease state in itself under JNC 8, pre-hypertension serves as a strong predictor for the development of clinical hypertension and cardiovascular disease later in life. The rising profile of hypertension in university students is driven by a complex interplay of modifiable and non-modifiable determinants. Modifiable risk factors comprise the following: Anthropometric Factors**:** Body mass index (BMI) and waist circumference are among the strongest predictors of blood pressure variability in young adults.

There is a robust, linear correlation between increasing BMI and elevated blood pressure, with overweight and obese students showing significantly higher risks than their normal-weight peers.[2,8] Furthermore, central obesity, measured via waist circumference or waist-to-height ratio, has emerged as a critical independent determinant, often predicting cardiovascular risk more accurately than BMI alone in this population. The mechanism linking obesity to hypertension in youth involves sympathetic nervous system activation and insulin resistance, pathways that are exacerbated by the modern student lifestyle.[5,9]

Dietary Habits**:** The "nutrition transition" is evident on university campuses, where students often rely on convenient, ultra-processed foods. Specific dietary habits, such as the frequent consumption of instant noodles, a staple food for many students due to its low cost and ease of preparation, have been statistically linked to higher blood pressure readings. These foods are often laden with sodium, which drives fluid retention and elevates pressure.[10] Additionally, the habit of adding extra salt to meals at the table remains a prevalent, yet modifiable, risk factor. The low consumption of fruits and vegetables, which provide essential potassium and magnesium to counteract sodium's effects, further compounds the risk.[5,11] Food insecurity among students can also drive the consumption of cheap, calorie-dense, and nutrient-poor foods, creating a link between socioeconomic status within the student body and cardiovascular risk.

Lifestyle Factors (Physical Inactivity and Substance Use**):** Physical inactivity is a growing determinant, as academic pressures and the digital nature of modern entertainment foster sedentary behaviour. While some students engage in sports, a large segment of the population falls below recommended activity levels, contributing to weight gain and poor cardiovascular fitness.[12] The proliferation of smartphones and personal computers has led to increased screen time, which is independently associated with sedentary behaviour and elevated blood pressure.

The academic environment necessitates long hours of sitting for lectures and study, which, when combined with a lack of structured exercise, creates a perfect storm for cardiovascular risk. Alcohol consumption and tobacco use also play distinct roles, particularly among male students, acting as pressor agents that acutely and chronically raise blood pressure.[3,5]

Psychosocial Stress**:** Stress is another significant determinant; the academic environment is fraught with performance anxiety, deadline pressures, and financial constraints. Students

frequently identify stress as a primary cause of their health issues, and physiological responses to chronic stress, mediated by the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis, can lead to sustained blood pressure elevation.[13] The perception of stress and the coping mechanisms employed by students vary, and maladaptive coping strategies such as overeating or substance use can further exacerbate blood pressure issues. The transition from the supervised home environment to the independence of university life can also induce psychosocial stress, which acts as a silent contributor to the hypertensive profile of this demographic.

Non-modifiable factors**:** Age remains a factor even within the young adult range, with older students (late 20s to early 30s) often showing higher pressures than younger undergraduates.[14] A family history of hypertension is also a potent determinant, reflecting the genetic component of the disease. Students with hypertensive parents are at a markedly increased risk, necessitating earlier and more frequent screening.[2,12] Understanding the interplay between these genetic predispositions and environmental triggers is key; for example, students with a family history may be more sensitive to the hypertensive effects of salt or stress. This hereditary influence underscores the importance of obtaining a detailed family medical history during student health assessments. The understanding of these risk factors is crucial for the prevention and management of hypertension. While non-modifiable factors cannot be changed, addressing modifiable risk factors through lifestyle changes can significantly reduce the risk of developing hypertension.[1]

In the relationship between participation in health promotion activities and actual health knowledge of hypertension, there is an assumption that students who have previously participated in health screening programmes or health promotion seminars would possess superior knowledge regarding risk factors and exhibit better blood pressure control. This

assumption relies on the Health Belief Model, which suggests that cues to action (such as screening) can trigger health-promoting behaviours.

However, evidence suggests that awareness does not always translate into action or sustained knowledge retention. While screening increases the detection of hypertension, the "rule of halves" often applies, where many diagnosed individuals do not seek treatment or fail to achieve control.[4] In the university context, identifying whether previous exposure to health promotion campaigns correlates with better knowledge of the DASH diet (Dietary Approaches to Stop Hypertension), physical activity requirements, and the dangers of substance abuse is essential. Conversely, the lack of such programmes or low participation rates often correlates with poor knowledge and unhealthy lifestyle choices.

Identifying, understanding, and assessing the level of awareness of these risk factors among university students is essential for developing targeted prevention and comprehensive management strategies, which include public health initiatives to raise awareness, promote healthy lifestyles, and improve access to healthcare services for early detection and effective management. Prioritising early detection and management of hypertension is vital for preventing severe health issues and promoting long-term well-being.[7] Classification of hypertension is essential for diagnosis, treatment, and management.

Classification of hypertension is essential for diagnosis, treatment, and management. The Joint National Committee (JNC) on prevention, detection, evaluation, and treatment provides guidelines for hypertension management, with the current classification of hypertension as follows: Normal: BP < 120/80 mmHg, Prehypertension: BP 120-139/80-89 mmHg, Stage 1 Hypertension: BP 140-159/90-99 mmHg, Stage 2 Hypertension: BP ≥ 160/100 mmHg.[15]

1.2 STATEMENT OF PROBLEM

As of 2019, approximately 1.28 billion adults aged 30–79 years worldwide were living with hypertension, with two-thirds residing in low- and middle-income countries. Alarmingly, about 46% of these individuals are unaware of their condition.[1] In the United States, data from August 2021 to August 2023 indicate that 47.7% of adults have hypertension. Among these individuals, 59.2% are aware of their condition, 51.2% are receiving treatment, but only 20.7% have their blood pressure under control.[16] Globally, the prevalence of hypertension was estimated at 31.1% in 2010, with 28.5% in high-income countries and 31.5% in low- and middle-income countries.[17] Hypertension is a significant public health concern in Nigeria, with studies indicating a notable increase in its prevalence over recent decades. A systematic review and meta-analysis estimated that in 1995, approximately 4.3 million Nigerians aged 20 years and above had hypertension, representing an age-adjusted prevalence of 8.6%. By 2020, this number had surged to about 27.5 million individuals, with an age-adjusted prevalence of 32.5%.[18] Further research estimated that in 2010, around 20.8 million Nigerians aged 20 years and above were living with hypertension, corresponding to a prevalence of 28.0%. These statistics underscore the escalating burden of hypertension in Nigeria, highlighting the need for effective public health interventions to enhance awareness, prevention, and management of the condition.[4] Hypertension, though a significant risk factor for cardiovascular diseases, remains underdiagnosed and poorly managed, especially among young adults. University students, in particular, are increasingly at risk due to lifestyle changes, academic stress, poor dietary habits, physical inactivity, and substance use. Hypertension, traditionally associated with older populations, is increasingly affecting young adults in Nigeria. Recent studies have highlighted a concerning rise in prevalence among this demographic. A cross-sectional study conducted in Enugu State, Southeast Nigeria, reported an overall hypertension prevalence of 21.3% among

young adults aged 18 to 40 years, with a higher prevalence in males (24.3%) compared to females (20.3%).[12] Similarly, research among university students in Rivers State found a hypertension prevalence of 21%. The study identified significant associations between hypertension and factors such as high salt intake and frequent consumption of instant noodles.[10] These findings underscore the escalating burden of hypertension among Nigerian young adults, emphasising the need for targeted public health interventions focusing on lifestyle modifications and early detection within this age group. Early detection and effective management of hypertension are crucial in preventing severe health complications. Hypertension often presents without noticeable symptoms, leading to its designation as a "silent killer." Without timely diagnosis and control, it can result in life-threatening conditions such as heart disease, stroke, kidney failure, and vision loss. Recent studies underscore the significance of early intervention. Research indicates that early detection, adequate treatment, and good control of high blood pressure can lower the risk of complications associated with hypertension.[19] A study by Johns Hopkins researchers found that hypertension in midlife raises the odds of memory problems in old age. When treated early, though, this risk may drop.[20] There is a significant lack of recent large-scale studies conducted in Africa that focus on adolescent hypertension and obesity while utilising internationally standardised metrics for assessing elevated blood pressure (BP) and body mass index (BMI).[14] Implementing regular blood pressure screenings, especially for individuals over 40 or those with risk factors, is essential for early detection. Once diagnosed, management strategies include lifestyle modifications such as a balanced diet, regular physical activity, stress reduction, and adherence to prescribed medications. These measures not only control blood pressure but also significantly reduce the risk of associated complications.

1.3 JUSTIFICATION OF THE STUDY

Many university students may not be aware of hypertension, its risk factors, and its long-term health consequences. Despite this, there is limited awareness and insufficient research on the prevalence and risk factors of hypertension among university students in Benin City.

The extent to which unhealthy lifestyle habits such as high salt intake, excessive consumption of processed foods, alcohol and tobacco use, physical inactivity, and irregular sleep patterns contribute to hypertension among university students is not well documented. This lack of knowledge may lead to undiagnosed and untreated cases, increasing the risk of complications.

While hypertension is often associated with older adults, recent studies suggest a rising prevalence among young adults. However, there is limited data on the actual prevalence of hypertension among university students in Benin City. Understanding this prevalence is crucial for developing targeted interventions. Many young adults do not routinely check their blood pressure or seek medical advice until complications arise. There is a need to assess the frequency of blood pressure screenings and healthcare-seeking behaviours among university students; without adequate awareness and preventive measures, hypertension may continue to rise among young adults. This study will help identify gaps in knowledge and recommend strategies to improve awareness, early detection, and prevention of hypertension among university students. By addressing these issues, the research will provide evidence-based insights to guide public health interventions, encourage routine hypertension screening, and promote healthier lifestyles among university students in Benin City.

1.4 RESEARCH QUESTIONS

1. What is the level of awareness and knowledge of risk factors of hypertension among university students in Benin City?

2. What is the prevalence of hypertension among university students in Benin City?

3. What are the common modifiable and non-modifiable risk factors for hypertension among university students in Benin City?

4. Is there an association between previous participation in health promotion programs and knowledge of risk factors of hypertension among university students in Benin City?

1.5 OBJECTIVES

1.5.1 GENERAL OBJECTIVE

To assess knowledge of risk factors and prevalence of hypertension among university students in Benin City with a view to contributing to the body of knowledge

1.5.2 SPECIFIC OBJECTIVES

1. To assess the knowledge of risk factors of hypertension among university students in Benin City.

2. To determine the prevalence of hypertension among university students in Benin City.

3. To identify the determinants of hypertension among university students in Benin City.

4. To assess the association between previous participation in health promotion programs and knowledge of risk factors of hypertension among university students in Benin City.

CHAPTER TWO

LITERATURE REVIEW

Hypertension is a major modifiable cardiovascular risk factor that is increasingly prevalent among young adults.[3] Students may possess theoretical awareness of cardiovascular risk factors, but they often underestimate their personal susceptibility.[13,21] Students commonly demonstrate an optimism bias, recognising cardiovascular risk factors in principle yet inaccurately considering themselves protected from adverse events because of their youth, and consequently persisting in cardiometabolic risk behaviours.[21] Recent studies across different regions of Nigeria report a rising prevalence of elevated blood pressure among undergraduates.[10,22] The university environment may significantly contribute to this burden as transition to campus life is frequently associated with unhealthy dietary patterns, physical inactivity, substance use, and obesity.[2,23] Structured educational interventions have demonstrated short-term effectiveness. Addressing this crisis requires moving beyond clinical treatment toward robust, targeted health promotion. Theoretical frameworks, such as the Information-Motivation-Behavioural Skills model, suggest that providing accurate health information coupled with personal motivation is critical for initiating and maintaining preventive practices.[24] It remains unclear whether prior participation in health promotion programmes is associated with sustained knowledge.[25]

2.1 KNOWLEDGE OF RISK FACTORS OF HYPERTENSION AMONG UNIVERSITY STUDENTS

A cross-sectional study conducted in February 2020 to examine Knowledge about Hypertension and its Associated Risk Factors among 605 Saudi University Students in Riyadh city, aged between 18 and 30 years across 11 universities in Riyadh, Saudi Arabia, and data

were collected using a self-administered electronic survey. Knowledge was assessed across three domains: risk factors, complications, and general hypertension statements. Scores above 50% were categorised as good knowledge. 31.1% of participants demonstrated good overall knowledge. The study found that although many students have heard about the term hypertension, their knowledge about the risk factors was insufficient. Males were more knowledgeable than females, but this comparison was not significant. Knowledge also varied significantly by academic discipline; students in health-related tracks performed substantially better, while 84.4% of those in humanitarian disciplines exhibited poor knowledge.[26]

An institution-based cross-sectional study was conducted in 2021 to assess knowledge of hypertension risk factors among undergraduate students at the Mwanza campus of St. Augustine University of Tanzania. Using a non-probability convenience sampling approach, the researchers recruited 390 participants and data were collected via a pre-tested, self-administered, semi-structured questionnaire. Knowledge of eight established hypertension risk factors: family history, unhealthy diet, stress, sedentary lifestyle, excessive alcohol consumption, cigarette smoking, obesity, and older age was assessed, and a composite knowledge score ranging from 0 to 8 was generated. Participants scoring ≥4 were categorised as having good knowledge, whereas those scoring <4 were classified as having poor knowledge. The findings revealed a pronounced knowledge gap within the study population; only 11.0% of the participants demonstrated good knowledge of risk factors for hypertension. Stress (68.2%) and older age (51.8%) were relatively well recognised, less than one-third of students identified sedentary lifestyle (28.7%) and obesity (26.4%) as risk factors, while recognition of excessive alcohol consumption (14.6%), cigarette smoking (9.7%), unhealthy diet (9.5%), and family history (8.5%) was particularly poor. The single-institution setting limits the external validity and generalizability of this study.[13]

In 2025, A cross-sectional descriptive study was done to assess knowledge, dietary habits, and risk perception among 438 undergraduates at the Federal University of Technology Owerri (FUTO), Nigeria. Multi-stage simple random sampling was employed, and data were collected via a structured, validated, self-administered questionnaire. The study evaluated knowledge of hypertension risk factors, students' perceptions regarding preventive behaviours (e.g., salt reduction and exercise), and sources of health information. Overall knowledge was reported to be high (89%); however, substantial misconceptions persisted, notably the erroneous belief among 69.6% of participants that hypertension presents with early physiological symptoms. Informal sources accounted for 62.6% of health information acquisition, raising concerns regarding accuracy. The single-university setting and cross-sectional design limit generalisability and causal interpretation.[27]

A descriptive cross-sectional study conducted in 2020 among 500 undergraduate students at the University of Ibadan, Ibadan, Nigeria, to examine knowledge of cardiovascular diseases and their modifiable risk factors within a university population. A multistage sampling technique involving faculty and departmental stratification, followed by proportionate sampling, was employed, and data were collected using a structured, self-administered questionnaire designed to evaluate knowledge of cardiovascular diseases and associated modifiable risk factors. The findings indicated that although many students were able to identify cardiovascular diseases and their causes, substantive gaps in comprehensive knowledge remained. Overall, 56.4% of respondents were classified as having good knowledge of modifiable cardiovascular risk factors. Awareness of specific behavioural risks was relatively high: 85.4% recognised excessive alcohol consumption as a risk factor, 77.6% identified unhealthy diet, 75.2% acknowledged physical inactivity, and 70.2% were aware of the role of smoking in cardiovascular disease development. Additionally, 93.2% of respondents

understood the importance of regular blood pressure monitoring as a preventive measure. Students enrolled in non-health-related courses exhibited comparatively lower awareness of cardiovascular diseases and modifiable risk factors, suggesting that academic exposure to health sciences may positively influence cardiovascular health literacy. The cross-sectional design, which precludes causal inference and reliance on self-reported data, introduces the possibility of recall and social desirability biases.[28]

A cross-sectional study conducted between 2024 and 2025 to investigate cardiovascular disease knowledge, risk perception, and lifestyle behaviours among 1,300 undergraduates from two public universities in North-Central Nigeria. A rigorous multistage sampling approach incorporating stratified sampling, matched-pair cluster selection, and systematic random sampling enhanced representativeness. Data were collected using a culturally adapted, interviewer-administered version of the validated ABCD Risk Questionnaire. Knowledge was assessed using eight true/false/don't know items targeting modifiable and physiological cardiovascular risk factors. The findings indicated high theoretical knowledge, with 77.6% of students demonstrating good overall knowledge. Smoking (96.1%), high blood pressure (93.0%), and physical inactivity (90.1%) were widely recognised. The reliance on self-reported data introduced potential social desirability bias.[21]

2.2 PREVALENCE OF HYPERTENSION AMONG UNIVERSITY STUDENTS

A cross-sectional investigation was conducted in 2023 to explore hypertension prevalence and risk factors among university students in Syria. The study enrolled 1,100 undergraduate students from the University of Aleppo, a public institution, and Al-Wataniya Private University, using a random sampling approach. Data were collected through a self-constructed face-to-face interview questionnaire, and blood pressure was measured using a mercury

column sphygmomanometer, with final classification based on the average of three readings taken on separate occasions. Under the ACC/AHA 2017 criteria, hypertension prevalence was 15.9%, and elevated blood pressure was 27.7%, and males demonstrated significantly higher rates of hypertension and elevated blood pressure compared to females. The study was limited by the cross-sectional design, which restricted causal inference.[29]

A cross-sectional study was conducted in 2024 among 411 student participants aged 18 to 25 years in Bahrain, drawn from the College of Medicine and Medical Sciences at Arabian Gulf University and the College of Business Administration at Bahrain University, to assess the prevalence of prehypertension and hypertension and their associated risk factors. Participants were randomly selected using a calculated sample size formula from an initial pool of 425 invited students. This study found that 8% were hypertensive and 30.7% were pre-hypertensive. The prevalence of hypertension and pre-hypertension was higher in male students (13.8% and 44.9%, respectively) compared to female students (2.8% and 17.7%, respectively). Medical students showed a higher incidence of hypertension and pre-hypertension compared to non-medical students. The study also found that older students had a higher prevalence of pre-hypertension. The study's primary limitation was that blood pressure was measured during a single visit using only two readings, which risks misclassifying temporary stress-induced elevations as chronic hypertension.[23]

A cross-sectional study with data collected between February and April 2016 to investigate the prevalence of prehypertension, hypertension, and related risk factors among undergraduate students in a tertiary institution in Ghana. The study enrolled 540 undergraduate students from Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana, selected through a simple random sampling technique stratified across the university's six colleges. Participants completed structured questionnaires and had blood pressure measured using both

a mercury sphygmomanometer and an automated monitor, with repeated measurements taken six hours apart for students recording persistently elevated readings to confirm diagnosis. Findings reported a relatively low hypertension prevalence of 2.2%, while prehypertension was substantially more common, affecting 26.1% of the cohort, with male students disproportionately represented in both categories. The cross-sectional nature of the study and the relatively small number of confirmed hypertensive cases limited statistical power for causal inference.[2]

A descriptive cross-sectional study was conducted in 2022 to examine the prevalence and risk factors of prehypertension and hypertension among clinical students at the University of Ibadan, Nigeria. A total of 346 undergraduate clinical students from the College of Medicine, University of Ibadan (University College Hospital), were recruited using a stratified simple random probability sampling method that ensured proportional representation across academic classes. Data collection combined a self-administered structured questionnaire with objective blood pressure measurements obtained using an OMRON electronic sphygmomanometer, with the average of three consecutive readings recorded. Results indicated a hypertension prevalence of 8.0%, while 33.0% of students were classified as pre-hypertensive and 59.0% recorded normal blood pressure. Hypertension was notably more prevalent among male students than their female counterparts. The cross-sectional design fundamentally restricted the ability to establish causal relationships, and reliance on self-reported data for certain lifestyle variables, particularly perceived stress, introduced an element of subjectivity into the findings.[22]

A cross-sectional study conducted in 2022 to determine the point prevalence of both hypertension and prehypertension within the student population among 300 undergraduate students across three campuses: Delta, Choba, and Unipark of the University of Port Harcourt,

Rivers State, Nigeria. A simple random sampling method was employed to select participants, and blood pressure was measured using a mercury sphygmomanometer and stethoscope, with the average of three readings recorded. Results revealed a notably high point prevalence of overt hypertension at 31.7%, with an additional 11.3% classified as pre-hypertensive. A higher percentage of males (50.7%) were hypertensive compared to females (13.6%). Specifically, 50.7% of male participants were diagnosed as hypertensive, 13% as pre-hypertensive, and 36.3% as normotensive. Among females, 76.6% were normotensive, 9.8% were pre-hypertensive, and 13.6% were hypertensive. The principal limitation was that blood pressure was captured at a single point in time, which restricts the clinical ability to confirm the chronicity of elevated readings.[8]

A cross-sectional study was conducted in 2021 among 279 students to investigate the prevalence of prehypertension, hypertension, and associated determinants among young adults in Enugu State, Nigeria. Data were gathered using a structured questionnaire alongside standardised clinical measurements, including blood pressure readings taken with a standard mercury sphygmomanometer following a minimum of ten minutes of rest. This study found a prevalence rate of 19.93% for hypertension among medical students at the University of Nigeria, Enugu Campus. Isolated diastolic hypertension was more prevalent (13.65%) than systolic hypertension (0.74%) and systolic-diastolic hypertension (5.4%). The prevalence of prehypertension was 48.7%, with a higher incidence in females (25.8%), individuals aged 21-25 years (26.4%), and those with normal BMI (35.1%). The prevalence of hypertension in young adults in Enugu state, Southeast Nigeria, was 21.3%, with 24.3% in males and 20.3% in females, according to another study. The increasing prevalence of hypertension among students may also be partly attributed to various psychosocial stressors. The primary

limitation of the study was restricted access to students, as data collection had to be conducted during lecture breaks, and the small sample size, which limits the generalizability of the study.[12]

2.3 DETERMINANTS OF HYPERTENSION AMONG UNIVERSITY STUDENTS

A cross-sectional study was conducted in 2024 to evaluate the impact of parental history, physical inactivity, and diet on hypertension among 337 young asymptomatic university students at a private university in North India. Participants were randomly selected from a detailed registry of eligible students obtained from university authorities. Data were gathered through a pre-validated structured questionnaire evaluating lifestyle and dietary habits, coupled with standardised blood pressure measurements taken by trained personnel. The study specifically evaluated the influence of dietary patterns, including consumption of fast food, high-fat foods, and sugary beverages, alongside duration and intensity of physical exercise and parental history on students' blood pressure readings. Findings revealed profound dietary determinants, with the consumption of sugar-sweetened beverages and Western fast food demonstrating statistically significant relationships with increased blood pressure. Additionally, a lack of regular physical exercise, male gender, and a positive family history of hypertension were identified as significant risk factors. The study was confined to a single institution, limiting generalisability to students in different socio-economic or geographical contexts, and the absence of long-term follow-up restricted evaluation of the persistent impact of these risk factors.[30]

A cross-sectional study conducted in 2019 to investigate the prevalence and determinants of hypertension among 1,281 undergraduate students at the University of Kinshasa, Democratic Republic of Congo. Participants were recruited randomly through door-to-door visits within student residences. Questionnaires assessing socio-demographic and lifestyle parameters were

administered face-to-face by trained medical students, while anthropometric and blood pressure measurements were obtained by trained nurses strictly following the WHO STEPwise approach. In addressing the objective of identifying determinants, the researchers applied multivariate logistic regression analysis to isolate significant socio-demographic and lifestyle predictors of hypertension according to international diagnostic guidelines. The regression models revealed that male sex, older age (24 years and above), low physical activity, active smoking, and being overweight were significant independent determinants of high blood pressure among the university students. The primary limitation was the inability to explore the effects of sodium intake, cholesterol, and triglyceride levels on blood pressure due to resource constraints, while the cross-sectional design precluded causal interpretation of the observed associations.[31]

A cross-sectional study conducted in 2018 investigated the prevalence of prehypertension and hypertension and related risk factors among 540 undergraduate students at Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana. A simple random sampling technique stratified across the university's six colleges was employed. Data were collected using questionnaires alongside physical anthropometric measurements, including BMI, waist circumference, and waist-to-height ratio and blood pressure readings. The study examined the association of socio-demographic characteristics, anthropometric indices, and lifestyle factors, including fast food and snack consumption, with prehypertension and hypertension. Male gender and increased age were identified as significant demographic determinants, while high BMI, increased waist circumference, and a high waist-to-height ratio emerged as powerful anthropometric predictors of elevated blood pressure. The regular consumption of unhealthy snacks and fast food was also significantly linked to the development of hypertension in the cohort. The cross-sectional design precluded definitive causal inference between the observed

lifestyle and anthropometric factors and the onset of hypertension, and dietary and lifestyle data were additionally subject to self-reporting bias.[2]

A descriptive cross-sectional study was conducted in 2024 to examine the prevalence and risk factors of prehypertension and hypertension among 346 undergraduate clinical students at the College of Medicine, University of Ibadan, University College Hospital, Nigeria. Participants were recruited using a random probability sampling technique. Data were collected through a self-administered structured questionnaire alongside objective clinical measurements of blood pressure, weight, height, body mass index, and waist-to-hip ratio. With respect to identifying determinants of hypertension, the study examined the relationship between socio-demographic factors, medical history, and lifestyle variables, including perceived stress, sleep duration, physical inactivity, smoking, and alcohol use and the development of elevated blood pressure. Findings revealed that male gender, marital status, and level of study were significantly associated with hypertension. Among modifiable determinants, current tobacco smoking and moderate-to-high perceived stress were significant drivers of elevated blood pressure, while having a hypertensive sibling was identified as a significant genetic determinant. The authors acknowledged that psychological variables such as stress were strictly self-reported, introducing subjectivity into the findings. Blood pressure measurements were also predominantly taken during the day without accounting for circadian variations, and the cross-sectional design restricted the establishment of cause-and-effect relationships.[22]

A cross-sectional study was conducted in 2021 to examine the prevalence of prehypertension, hypertension, and its determinants among 279 undergraduate medical students at the University of Nigeria, Enugu Campus, Enugu State, Nigeria. Participants were recruited from the student body, though the exact probability sampling method was constrained by students' availability on campus. Data were gathered using a structured questionnaire for sociodemographic and

lifestyle information alongside standardised clinical measurements of blood pressure, waist circumference, weight, and height for BMI calculation. With respect to identifying determinants, the study statistically evaluated the association between blood pressure and potential predictors, including age, gender, weight, BMI, and abdominal obesity as measured by waist circumference. Findings established that anthropometric indices were profound determinants of hypertension, with participant weight ($p = 0.007$) and waist circumference ($p < 0.0001$) demonstrating highly significant positive associations with elevated systolic and diastolic blood pressure. Advancing age and male gender were additionally identified as significant non-modifiable determinants of progressing into higher stages of hypertension. The study's primary limitation was its restricted focus on medical students at a single campus, which limits generalisability to the broader university population, and data collection was further hindered by the off-campus residence of many students.[12]

2.4 PREVIOUS PARTICIPATION IN HEALTH PROMOTION PROGRAMS ON HYPERTENSION AMONG UNIVERSITY STUDENTS

A cross-sectional study was conducted in 2024 to evaluate the prevalence of elevated blood pressure, associated risk factors, and baseline knowledge deficits among 138 apparently healthy undergraduate students at a faith-based Midwestern university in the United States. Demographic characteristics, standardised blood pressure measurements, behavioural risk factors, and perceived stress levels were collected through a combination of in-person assessments and an online Google Form survey. The primary objective of the study was to determine the prevalence of elevated blood pressure among undergraduate students and to inform the development of a campus-wide educational initiative. The study measured students' baseline understanding of elevated blood pressure, its risk factors, and strategies for blood pressure management before the delivery of the educational programme. Following the

intervention, which consisted of a structured campus-wide health promotion initiative, 96% of participants were able to accurately define elevated blood pressure, identify its risk factors, and describe strategies to lower blood pressure, indicating a profound and statistically significant improvement attributable to the health education programme. The study's limitations included the confinement to a single institution, which restricts the generalisability of the findings. Furthermore, the pre-post knowledge assessment lacked a comparator control group, and the absence of a follow-up period prevented evaluation of the sustainability of the observed knowledge gains.[32]

A descriptive cross-sectional study conducted in 2022 examined the public's knowledge of hypertension and its associated factors across four major governorates in Jordan. The study enrolled 723 adult participants, including university-aged young adults and members of the general population, using a convenience sampling approach. Data were collected via a self-reported survey employing the Hypertension Knowledge Test (HKT) instrument to evaluate participants' understanding of hypertension risk factors, symptoms, and management strategies. The analysis utilised multivariate linear regression to identify predictors of hypertension knowledge, with particular focus on the influence of prior exposure to hypertension-related health information. The study found that participants who reported previous engagement with health education about hypertension demonstrated significantly higher knowledge scores than those without such exposure. This association held across multiple domains, including awareness of risk factors, recognition of symptoms, and understanding of treatment strategies, indicating that prior health information exposure serves as a powerful and independent predictor of hypertension health literacy. Despite these important insights, the study was limited by the use of convenience sampling, which may affect representativeness, and its cross-sectional design, which restricts the ability to draw causal

inferences regarding the temporal relationship between knowledge acquisition and prior health information exposure.[33]

A pre-post intervention study conducted in 2020 to evaluate the effect of self-paced online learning on hypertension knowledge among medical students at Makerere University College of Health Sciences, Kampala, Uganda. The study randomly selected 121 students from the 3rd, 4th, and 5th academic years to participate. Data were collected using pre- and post-intervention theoretical knowledge tests administered via a digital survey system focusing on students' understanding of the fundamentals of hypertension, its risk factors, and basic clinical management. The study found that baseline knowledge among participants was moderate, indicating gaps even within a health-oriented student population and following engagement with the structured online modules, students demonstrated a significant improvement in their total knowledge scores. These results suggest that targeted online health education can effectively enhance students' competencies and bridge existing knowledge deficits. Despite these positive findings, the study was limited by the absence of a parallel control group, restricting the ability to conclusively attribute the observed improvements to the intervention alone.[34]

A 2023 study was conducted in two public universities in the region: the University of Nigeria, Nsukka, in Enugu State, and Nnamdi Azikiwe University, Awka, in Anambra State, to investigate the efficacy of a rational emotive behaviour therapy health educational intervention for improving knowledge and risk perception of hypertension among university lecturers in South East Nigeria. A total of 84 university lecturers, drawn from the education foundation and business education departments, participated in the study. The researchers utilised a group randomised controlled trial design to assign participants to either a treatment group or a waiting-list control group. Data were collected using two validated instruments: a Hypertension

Knowledge Questionnaire and the Perceived Risks of Hypertension Questionnaire. Measurements were taken at three distinct time points: pretest (conducted before the intervention commenced), posttest (administered immediately after the completion of the 10-week program), and follow-up (conducted one month after the program had ended). This design allowed the researchers to assess both the immediate and sustained effects of the intervention. The specific aspect of the study relevant to the present review assessed the effectiveness of the rational emotive behaviour therapy health educational intervention in increasing knowledge of hypertension risks among university lecturers. The study compared knowledge scores between the treatment group, which received the intervention, and the waitlist control group, which did not. Statistical analyses, including repeated measures analysis of variance and t-tests, were employed to evaluate differences between the groups across the three time points. The findings revealed that the rational emotive behaviour therapy health educational intervention effectively increased the lecturers' knowledge and perceived risk of hypertension compared to participants in the waitlist control group. The relatively small sample size of 84 participants, limited to education and business education lecturers, may affect the generalisability of findings to other academic disciplines. Additionally, the focus on only two universities in Southeast Nigeria limits geographic generalisability to other regions of the country.[35]

CHAPTER THREE

METHODOLOGY

3.1: STUDY AREA

The study was conducted in the University of Benin, Ugbowo, Benin City, Edo State, Nigeria. Edo State, located in the South-South geopolitical region, was formed from the division of Bendel State on August 27, 1991, creating the present-day Edo and Delta States with Benin City as the capital of Edo State.[36] Edo State borders Kogi State to the north, Anambra State to the east, Delta State to the southeast and south), and Ondo State to the west[37]. The main ethnic groups in Edo State are Edos, Afemais, Esans, Owans, and Akoko Edos.[38] Edo State is the 21st largest state by landmass in Nigeria; the state's capital and largest city, Benin City, is the fourth largest city in Nigeria[37]. Benin City is located within longitude: 50 35'E to 50 41'E and latitude: 60 26'N to 60 31'N.[39] It comprises four local government areas: Ikpoba Okha, Egor, Oredo, and Uhunmwunode. It has an area of 249 km^2 and a population of 1,086,882 at the 2006 census, and a projected population of 3,043,270 in 2025.[40]

Benin City houses several institutions of higher learning, like the University of Benin, Wellspring University, and Benson Idahosa University. These universities are all accredited by the National Universities Commission.[40] The Universities offer a diverse range of courses at different levels, like the Undergraduate, Diploma, Certificate, and Postgraduate. University of Benin is located in two campuses (Ugbowo and Ekehuan), and it has the following faculties: Agriculture, Arts, Basic Medical Sciences, Life Sciences, Law, Pharmacy, Medicine, Dentistry, Management Sciences, Social Sciences, Education, Physical Sciences, Engineering, Environmental Sciences, and Veterinary Medicine.[41]

3.2. STUDY DESIGN

A descriptive cross-sectional study design was used for this research.

3.3. SCOPE OF STUDY

The study assessed the knowledge of risk factors of hypertension and determined the prevalence of hypertension among university students in Benin City.

3.4. STUDY DURATION

This study was carried out within a period of one year from December 2024 to January 2026.

3.5. STUDY POPULATION

The study was conducted among undergraduate students in the Ugbowo campus of the University of Benin.

3.6. SELECTION CRITERIA

3.6.1: Inclusion criteria:

Undergraduate students of the University of Benin.

3.7. SAMPLE SIZE DETERMINATION

The minimum sample size (n) was calculated using Cochran's formula for descriptive studies.[42]

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

Where:

n = Minimum Sample Size.

Z = Standard normal deviate set at 1.96 (at 95% confidence interval).

p = Prevalence rate of a particular characteristic of the target population. In this case, p = 31.7% from a 2022 study, which assessed the prevalence of hypertension among students of the University of Port Harcourt.[8]

q= 1-p

d = Degree of precision set at 0.05

Therefore, p=31.7%

$$= \frac{31.7}{100}$$

= 0.317

q = 1- p = 1 – 0.317 = 0.683

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

$$n = \frac{1.962 \text{ x } 0.317 \text{ x } 0.683}{0.05 \text{ x } 0.05}$$

n = 332.69

Therefore, the minimum sample size for this study was 333.

To make room for non-response, 10% non-response rate was added to the minimum sample size, utilising the formula for non-response rate.

$$ns = \frac{n}{1 - nr}$$

n = Minimum sample size = 333

nr = Non response rate = 10% = 0.10

ns = Final Minimum sample size

$$ns = \frac{333}{1 - 0.1}$$

= 370

Adding a design effect of 1.5

=370x1.5

=555

Thus, the final minimum sample size for this study was 555. However, for this study, a sample size of 560 was used.

3.8. SAMPLING TECHNIQUE

A multi-stage sampling technique was adopted. This technique comprised 5 stages that were used in selecting undergraduates who participated in this study.

STAGE ONE: Selection of an institution

There are three Universities in Benin City: Wellspring University, Benson Idahosa University, and University of Benin. A simple random sampling technique via balloting was used to select one of the Universities.

STAGE TWO: Selection of campus

A simple random sampling technique via balloting was used in selecting one campus from the selected university.

STAGE THREE: Selection of faculties

A simple random sampling technique via balloting was used in selecting six faculties from the selected university campus. The faculties selected were: Arts, Basic Medical Sciences, Education, Engineering, Management Sciences, and Social Sciences. The total number of students was obtained from the Information and Communication Technology department of the University of Benin.[41]

$$\text{Factuly of Arts} = \frac{4119}{21500} \text{ x } 560 = 107$$

$$\text{Factuly of Basic Medical Sciences} = \frac{3697}{21500} \text{ x } 560 = 96$$

$$\text{Factuly of Education} = \frac{3758}{21500} \text{ x } 560 = 98$$

$$\text{Factuly of Engineering} = \frac{4226}{21500} \text{ x } 560 = 110$$

$$\text{Factuly of Management Sciences} = \frac{4119}{21500} \text{ x } 560 = 82$$

$$\text{Factuly of Social Sciences} = \frac{2458}{21500} \text{ x } 560 = 67$$

STAGE FOUR: Selection of departments

A list of departments in the selected faculties was obtained from the university brochure, and one department was selected from each of the six selected faculties using simple random sampling by balloting. The selected departments from each faculty were as follows: English and Literature, Medical Biochemistry, Curriculum and Instructional Technology, Chemical Engineering, Accounting, and Social Sciences from Arts, Basic Medical Sciences, Education, Engineering, Management Sciences, and Social Sciences, respectively.

STAGE FIVE: Selection of respondents

Stratified sampling techniques were utilised to select respondents. The departments were the basis of the strata. The total number of students in each department was calculated. A sampling fraction was then used to proportionally allocate respondents within each department and at every level. Within each level, systematic sampling was utilised to select the respondents by

determining the sampling interval. 1st respondent was selected using simple random sampling, after which every nth(1st) person was selected and invited to participate in the study till the required sample size for each level was attained.

English and Literature:

$$100 \text{ Level} = \frac{182}{603} \text{ x } 107 = 32$$

$$200 \text{ Level} = \frac{126}{603} \text{ x } 107 = 23$$

$$300 \text{ Level} = \frac{142}{603} \text{ x } 107 = 25$$

$$400 \text{ Level} = \frac{153}{603} \text{ x } 107 = 27$$

Medical Biochemistry:

$$100 \text{ Level} = \frac{138}{441} \text{ x } 96 = 30$$

$$200 \text{ Level} = \frac{119}{441} \text{ x } 96 = 26$$

$$300 \text{ Level} = \frac{110}{441} \text{ x } 96 = 24$$

$$400 \text{ Level} = \frac{74}{441} \text{ x } 96 = 16$$

Curriculum and Instructional Technology:

$$100 \text{ Level} = \frac{315}{896} \text{ x } 98 = 35$$

$$200\ \text{Level} = \frac{229}{896}\ \text{x}\ 98 = 25$$

$$300\ \text{Level} = \frac{194}{896}\ \text{x}\ 98 = 21$$

$$400\ \text{Level} = \frac{158}{896}\ \text{x}\ 98 = 17$$

Chemical Engineering:

$$100\ \text{Level} = \frac{91}{334}\ \text{x}\ 110 = 30$$

$$200\ \text{Level} = \frac{66}{334}\ \text{x}\ 110 = 22$$

$$300\ \text{Level} = \frac{51}{334}\ \text{x}\ 110 = 17$$

$$400\ \text{Level} = \frac{126}{334}\ \text{x}\ 110 = 41$$

Accounting:

$$100\ \text{Level} = \frac{245}{943}\ \text{x}\ 82 = 21$$

$$200\ \text{Level} = \frac{224}{943}\ \text{x}\ 82 = 20$$

$$300\ \text{Level} = \frac{229}{943}\ \text{x}\ 82 = 20$$

$$400\ \text{Level} = \frac{245}{943}\ \text{x}\ 82 = 21$$

Social Works:

$$100\ \text{Level} = \frac{130}{463}\ \text{x}\ 67 = 19$$

$$200\ \text{Level} = \frac{103}{463}\ \text{x}\ 67 = 15$$

$$300\ \text{Level} = \frac{73}{463}\ \text{x}\ 67 = 11$$

$$400\ \text{Level} = \frac{157}{463}\ \text{x}\ 67 = 22$$

3.9. DATA MANAGEMENT

3.9.1 TOOLS FOR DATA COLLECTION

Data for this study were collected using an adapted online standardised structured self-administered questionnaire.[43] It was tested before the commencement of the survey. The questionnaire contained both open-ended and closed-ended questions and was divided into the following sections:

SECTION A: Socio-demographic information

This section was aimed at gathering the socio-demographic information of the respondents. Information like age (as at last birthday), sex, marital status, religion, faculty, and department was obtained from this section.

SECTION B: Knowledge of risk factors of hypertension

This section was aimed at assessing respondents' knowledge of hypertension and its risk factors, and it also assessed respondents' knowledge of the complications of hypertension.

SECTION C: Prevalence of hypertension

This section was aimed at assessing the prevalence of hypertension among the respondents. The questions included questions on diagnosed hypertension, age at diagnosis of hypertension, and treatment of hypertension, if present.

SECTION D: Determinants of Hypertension

This section was aimed at assessing the determinants of hypertension among the respondents.

SECTION E: Previous participation in health promotion programs

This section was aimed at assessing the effectiveness of health promotion interventions in improving knowledge and reducing the risk of hypertension, and also whether these interventions have resulted in any attitude change.

3.9.2 METHOD OF DATA COLLECTION

Data was collected using a quantitative method via a self-administered questionnaire. Informed consent was obtained from the respondents, and respondents were assured of confidentiality. Blood pressure measurement was taken according to the World Health Organisation's general standardised procedure for proper electronic blood pressure measurements on more than one occasion at least 30 minutes apart, and the average of the two was used. Blood pressure was measured using an approved, calibrated, and validated electronic device attached to an arm cuff. The weights of respondents were measured to the nearest 0.1kg using a calibrated weighing scale, and heights to the nearest 0.1cm using a measuring tape. Body mass index (BMI) was calculated as the weight in kilograms divided by the height in meters squared (BMI (kg/m^2) = weight (kg)/height (m^2).

3.9.3 PRETESTING

Pretesting of the questionnaire was carried out among students of universities that weren't selected for this study. 10% of the sample size in the proportion was used for pretesting.

Pretesting was conducted to test the questionnaire for correctness and appropriate understanding by the respondents, so as to aid in the appropriate collection of data. Appropriate corrections were made to the questionnaire where applicable before the commencement of the survey.

3.9.4 DATA ANALYSIS

Before data entry and analysis, accuracy and completeness were verified before coding in IBM SPSS Statistics software (version 27). The results were presented using frequency distribution tables, text, and graphs/charts. Categorical variables such as sex, age, marital status, tribe, and religion were analysed using frequencies and percentages, while numerical data, such as age, were expressed using the mean and standard deviation.

3.9.5 SCORING OF VARIABLES

This study constructed a quantitative scoring framework to evaluate variables aligned with the research objectives. These variables were organised into four thematic groups reflecting the study's specific objectives

1. **Knowledge of Risk Factors for Hypertension**

An adapted composite scoring framework was utilised to quantitatively assess university students' theoretical knowledge of hypertension risk factors.[13] The assessment tool measured awareness across eight recognised risk determinants: smoking, alcohol consumption, high salt intake, physical inactivity, stress, obesity, family history, and processed foods.

The instrument employed a binary response structure in which participants indicated either "yes" or "no" to identify whether each listed factor constituted a risk factor for hypertension. For scoring purposes, one point was assigned for each correct affirmative "yes" response,

while incorrect or negative "no" responses received zero points. The individual item scores were summed to generate a composite knowledge score ranging from 0 to 8.

The continuous score was subsequently categorised to reflect knowledge proficiency levels. A total score of four or higher was defined as representing "good knowledge of risk factors", whereas a score below four was classified as "poor knowledge of risk factors"

2. Knowledge of Hypertension

Hypertension knowledge was assessed using a structured scoring framework adapted from previously validated instruments.[44] Questions 13 and 14 functioned as preliminary screening items to determine progression to subsequent knowledge questions. Respondents who indicated no prior knowledge of hypertension were assigned a score of one (1) within the section to reflect their response status.

Knowledge items (Questions 15–24) were scored using a binary system. Correct responses were awarded one (1) point, while incorrect responses received zero (0) points. Specifically:

- Knowledge of normal blood pressure (120/80 mmHg) – 1 point.
- Correct diagnostic threshold for hypertension (>140/90 mmHg) – 1 point.
- Recognition of hypertension as a "silent killer" – 1 point.
- Identification of risk factors (smoking, alcohol consumption, high salt intake, physical inactivity, stress, obesity, family history, processed foods) – 1 point for each correct response (maximum = 8 points).
- Awareness that young people can develop hypertension – 1 point.
- Recognition that hypertension is preventable – 1 point.

- Identification of complications (stroke, heart failure, kidney disease, blindness) – 1 point per correct response (maximum = 4 points).
- Knowledge of recommended blood pressure check frequency (yearly) – 1 point.
- Recognition that lack of regular medical check-ups contributes to hypertension – 1 point.
- Identification of age as a non-modifiable risk factor – 1 point.

The categorisation of knowledge scores into "poor" (0–12) and "good" (13–20) was based on a modified Bloom's cut-off criterion, which is commonly applied in health knowledge assessment studies. Using this approach, a score of 65% and above is considered indicative of adequate knowledge, while scores below this threshold reflect inadequate knowledge. Given that the maximum obtainable score was 20 points, a minimum score of 13 (equivalent to 65%) was operationally defined as demonstrating good knowledge. This threshold was selected to ensure that respondents classified as knowledgeable had correctly identified the majority of core concepts relating to hypertension definition, risk factors, prevention, and complications.

3.9.6 DATA PRESENTATION

This study's data were gathered and input into IBM SPSS Statistics software (version 27). The data was presented using prose, tables, and charts. To ensure accuracy, the entered data was cross-checked for errors. It was then categorised and analysed using descriptive statistics, including frequencies and percentages, based on the total number of respondents.

3.10 ETHICAL CLEARANCE

Ethical approval was obtained from the Health Research Ethics Committee of the University of Benin Teaching Hospital with protocol number ADM/E 22/A/VOL.VII/148654912558. Informed consent was obtained from the respondents before administering the questionnaires.

Information provided by respondents was treated with the utmost confidentiality. Respondents were informed of their right to voluntarily decide whether to participate in the study or not, without incurring any penalty or prejudicial treatment. They were given the right to determine at any point during the study to withdraw their participation or refuse to provide any information on any point that was not clear to them.

3.11 LIMITATIONS OF STUDY

This study depends entirely on the information provided by the respondents, and this may allow for errors due to recall bias, language, or prejudice. Some respondents may give what they perceive as the most favourable answers, which are contrary to their actual opinions; this can lead to over-reporting or under-reporting.

CHAPTER FOUR

RESULTS

A total of five hundred and sixty (560) respondents participated in this study, and the results are presented in the following sections in line with the specific objectives.

1. To assess the knowledge of risk factors of hypertension among university students in Benin City.
2. To determine the prevalence of hypertension among university students in Benin City.
3. To identify the determinants of hypertension among university students in Benin City.
4. To assess the association between previous participation in health promotion programs and knowledge of risk factors of hypertension among university students in Benin City.

SECTION A:

SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 1a: Sociodemographic characteristics among respondents

Variables	Frequency (n=560)	Percent (%)
Age		
15 – 19 years	227	40.5
20 – 24 years	308	55.0
25 – 29 years	22	3.9
≥ 30 years	3	0.5
Mean (SD) = 20.3 (2.6)		
Sex		
Male	197	35.2
Female	363	64.8
Marital status		
Single	558	99.6
Married	1	0.2
Widowed	1	0.2
Religion		
Christianity	548	97.9
Islam	12	2.1
Ethnicity		
Benin	179	32.0
Igbo	92	16.4
Esan	86	15.4
Yoruba	61	10.9
Urhobo	48	8.6
Etsako	38	6.8
Efik	15	2.7
Isoko	13	2.3
Ika	10	1.8
Igarra	9	1.6
Others*	9	1.6
Faculty/Department		
Arts/English and Literature	107	19.1
Basic Medical Sciences/Medical Biochemistry	96	17.1
Education/Curriculum and Instructional Technology	98	17.5
Engineering/Electrical Engineering and Electronics	110	19.6
Management Sciences/Accounting	82	14.6
Social Sciences/Social works	67	12.0
Level of Study		
100 level	155	27.7
200 level	127	22.7
300 level	118	21.1
400 level	160	28.6

*Others – Itsekiri, Ijaw, and Hausa

The ages of the respondents ranged from 15 to 35 years, with a mean age of 20.3 ± 2.6 years. The majority of the respondents, 308 (55.0%), were aged 20–24 years, followed by 227 (40.5%) who were aged 15–19 years. Only 22 (3.9%) were aged 25–29 years, while 3 (0.5%) were aged 30 years and above.

Regarding sex distribution, 363 (64.8%) were females, while 197 (35.2%) were males.

Almost all the respondents were single, accounting for 558 (99.6%), while 1 (0.2%) was married and 1 (0.2%) was widowed.

In terms of religion, the majority, 548 (97.9%), were Christians, while 12 (2.1%) were Muslims.

With respect to ethnicity, the largest proportion were Benin, 179 (32.0%), followed by Igbo, 92 (16.4%), and Esan, 86 (15.4%). Other ethnic groups included Yoruba 61 (10.9%), Urhobo 48 (8.6%), Etsako 38 (6.8%), Efik 15 (2.7%), Isoko 13 (2.3%), Ika 10 (1.8%), Igarra 9 (1.6%), and others 9 (1.6%).

Concerning faculty, the highest proportion of respondents were from Engineering, 110 (19.6%), followed by Arts, 107 (19.1%). Education accounted for 98 (17.5%), Basic Medical Sciences 96 (17.1%), Management Sciences 82 (14.6%), and Social Sciences 67 (12.0%).

In terms of level of study, 160 (28.6%) were in the 400 level, 155 (27.7%) in 100 level, 127 (22.7%) in 200 level, and 118 (21.1%) in 300 level.

Table 1b: Sociodemographic characteristics among respondents…

Variables	Frequency (n=560)	Percent (%)
Monthly income		
Less than 20,000	205	36.6
20,000 – 30,000	153	27.3
31,000 – 40,000	46	8.2
41,000 – 50,000	37	6.6
> 50,000	100	17.9
No monthly income	19	3.4
Residence		
On-campus hostel	372	66.4
Off-campus hostel	140	25.0
Family house	48	8.6
Source of funding for education		
Parents and guardians	520	92.8
Self-sponsored	35	6.3
Scholarship	5	0.9
Highest level of education (Father)		
No formal education	16	2.9
Primary	51	9.1
Secondary	165	29.5
Tertiary	328	58.6
Highest level of education (Mother)		
No formal education	21	3.8
Primary	61	10.9
Secondary	182	32.5
Tertiary	296	52.9
Parents occupation (Father)		
Level 0	7	1.3
ILO classification level 1	3	0.5
ILO classification level 2	282	50.4
ILO classification level 3	123	22.0
ILO classification level 4	145	25.9
Parents occupation (Mother)		
Level 0	1	0.2
ILO classification level 1	8	1.6
ILO classification level 2	336	60.0
ILO classification level 3	170	30.4
ILO classification level 4	45	8.0

Note: ILO – International Labour Organisation

Monthly allowances varied, with most respondents (36.6%) receiving less than #20,000, followed by 27.3% who earned between ₦20,000 - ₦30,000, then 17.9% earned more than

#50,000, while 8.2% and 6.6% earned between #31,000 - #40,000 and #41,000 - #50,000, respectively; 3.4% indicated not receiving any monthly allowance.

Regarding residence, the majority of respondents, 372 (66.4%), lived in on-campus hostels. One hundred and forty (25.0%) resided in off-campus hostels, while 48 (8.6%) lived in family houses.

In terms of the source of funding for education, most respondents, 520 (92.8%), were sponsored by parents or guardians. 35 (6.3%) were self-sponsored, while 5 (0.9%) were on scholarship.

Concerning the highest level of education of fathers, 328 (58.6%) had a tertiary education, 165 (29.5%) had secondary education, 51 (9.1%) had primary education, and 16 (2.9%) had no formal education. Similarly, for mothers' educational level, 296 (52.9%) had a tertiary education, 182 (32.5%) had secondary education, 61 (10.9%) had primary education, and 21 (3.8%) had no formal education.

About parents' occupation (based on International Labour Organisation classification), 282 (50.4%) of fathers were in ILO classification level 2, followed by 145 (25.9%) in level 4, and 123 (22.0%) in level 3. Very few were in level 0, 7 (1.3%), and level 1, 3 (0.5%).

For mothers' occupation, the majority, 336 (60.0%), were in ILO classification level 2, while 170 (30.4%) were in level 3. Forty-five (8.0%) were in level 4, 8 (1.6%) in level 1, and 1 (0.2%) in level 0.

SECTION B:

KNOWLEDGE OF RISK FACTORS OF HYPERTENSION AMONG RESPONDENTS

Table 2a: Knowledge of risk factors of hypertension among respondents

Variables	Frequency (n=560)	Percent (%)
Heard of hypertension		
Yes	560	100.0
Source of information*		
School	349	62.3
Social media	238	42.5
Health facility	204	36.4
Average normal blood pressure (n = 437)		
120/80 mmHg	378	86.5
140/90 mmHg	37	8.5
80/50 mmHg	22	5.0
Definition of hypertension (n = 504)		
A condition where the blood pressure is consistently above 140/90 mmHg	389	77.2
A condition where the heart beats irregularly	112	22.2
A disease of the lungs	3	0.6
Hypertension is a silent killer		
Yes	440	78.6
No	120	21.4
Risk factors for hypertension*		
Stress	497	88.8
Obesity	447	79.8
Excessive alcohol consumption	419	74.8
Family history of hypertension	395	70.5
Smoking	392	70.0
High salt intake	389	69.5
Consumption of processed food	319	57.0
Physical inactivity	309	55.2
Young people can be hypertensive		
Yes	477	85.2
No	83	14.8
Hypertension can be prevented by lifestyle modification		
Yes	455	81.2
No	105	18.8

*Multiple responses

All the respondents, 560 (100.0%), had heard of hypertension. The major source of information was school, reported by 349 (62.3%) respondents. This was followed by social media, 238 (42.5%), and health facilities, 204 (36.4%).

Regarding knowledge of the average normal blood pressure (n = 437), the majority, 378 (86.5%), correctly identified 120/80 mmHg as the normal blood pressure. Thirty-seven (8.5%) selected 140/90 mmHg, while 22 (5.0%) chose 80/50 mmHg.

In terms of the definition of hypertension (n = 504), most respondents, 389 (77.2%), correctly defined it as a condition where the blood pressure is consistently above 140/90 mmHg. However, 112 (22.2%) defined it as a condition where the heart beats irregularly, and 3 (0.6%) described it as a disease of the lungs.

A total of 440 (78.6%) respondents agreed that hypertension is a silent killer, while 120 (21.4%) disagreed.

Concerning knowledge of risk factors (multiple responses), stress was the most commonly identified risk factor, reported by 497 (88.8%) respondents. This was followed by obesity, 447 (79.8%); excessive alcohol consumption, 419 (74.8%); family history of hypertension, 395 (70.5%); smoking, 392 (70.0%); high salt intake, 389 (69.5%); consumption of processed food, 319 (57.0%); and physical inactivity, 309 (55.2%).

Furthermore, 477 (85.2%) respondents agreed that young people can be hypertensive, while 83 (14.8%) disagreed. In addition, 455 (81.2%) agreed that hypertension can be prevented through lifestyle modification, whereas 105 (18.8%) disagreed.

Table 2b: Knowledge of risk factors of hypertension among respondents…

Variables	Frequency (n=560)	Percent (%)
Complications from untreated hypertension*		
Heart failure	476	85.0
Stroke	440	78.6
Kidney disease	229	40.9
Blindness	120	21.4
Frequency of blood pressure check (n = 505)		
Monthly	304	60.2
Weekly	138	27.3
Daily	44	8.7
Yearly	16	3.2
Only when sick	3	0.6
Lack of regular health check-ups contributes to undiagnosed hypertension		
Yes	456	81.4
No	104	18.6
Non-modifiable risk factor for hypertension (age)		
Yes	332	59.3
No	228	40.7

*Multiple response question

The most commonly identified complications from untreated hypertension were heart failure (85.0%), followed by stroke (78.6%). A majority of respondents (81.4%) stated that lack of regular health check-ups contributed to undiagnosed hypertension. Knowledge of age as a non-modifiable risk factor was reported by 59.3%.

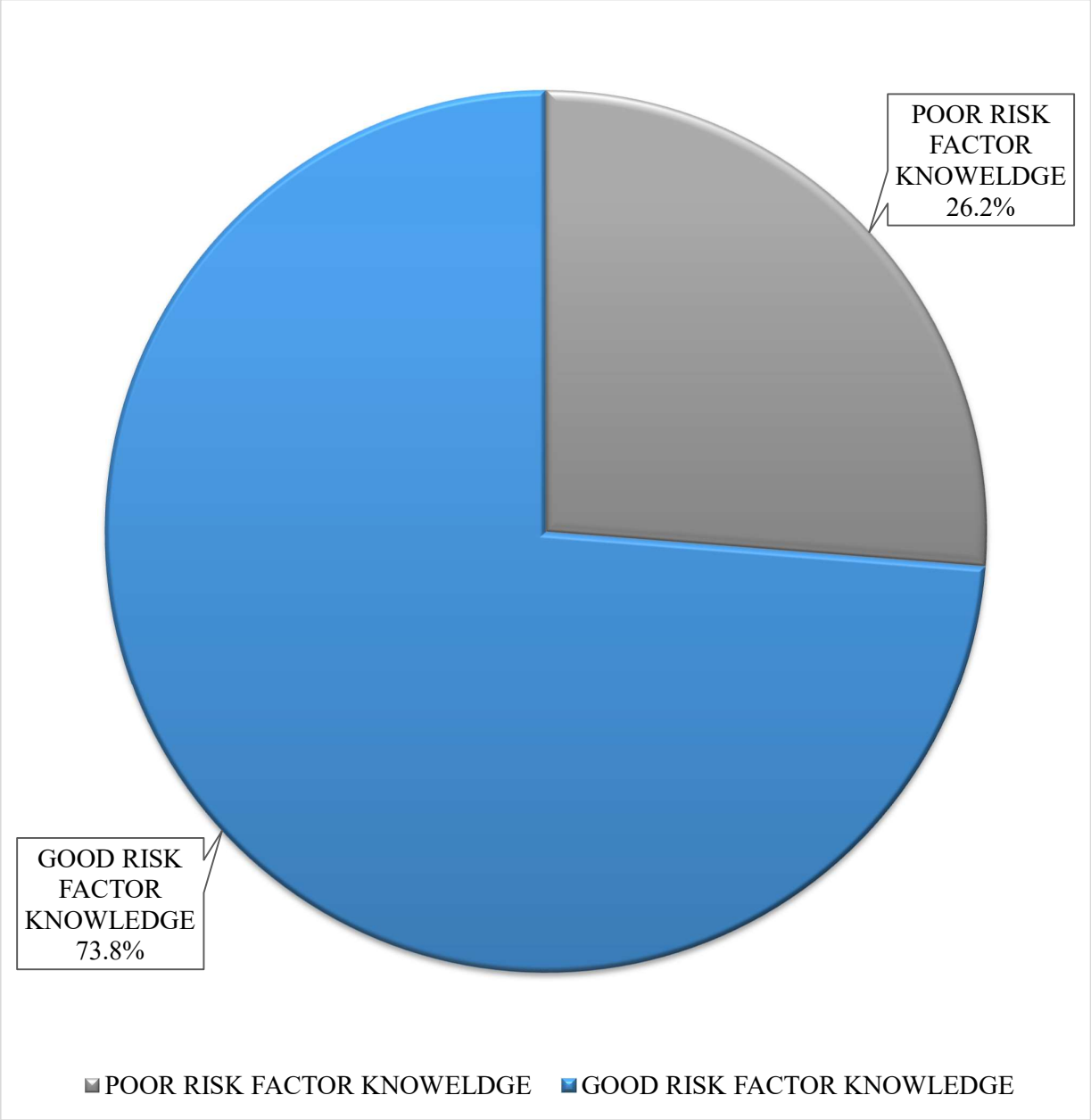

Fig 1: Overall knowledge of risk factors of hypertension among respondents

The majority of respondents, 73.8%, had good knowledge of the risk factors of hypertension, while 26.2% had poor knowledge of the risk factors.

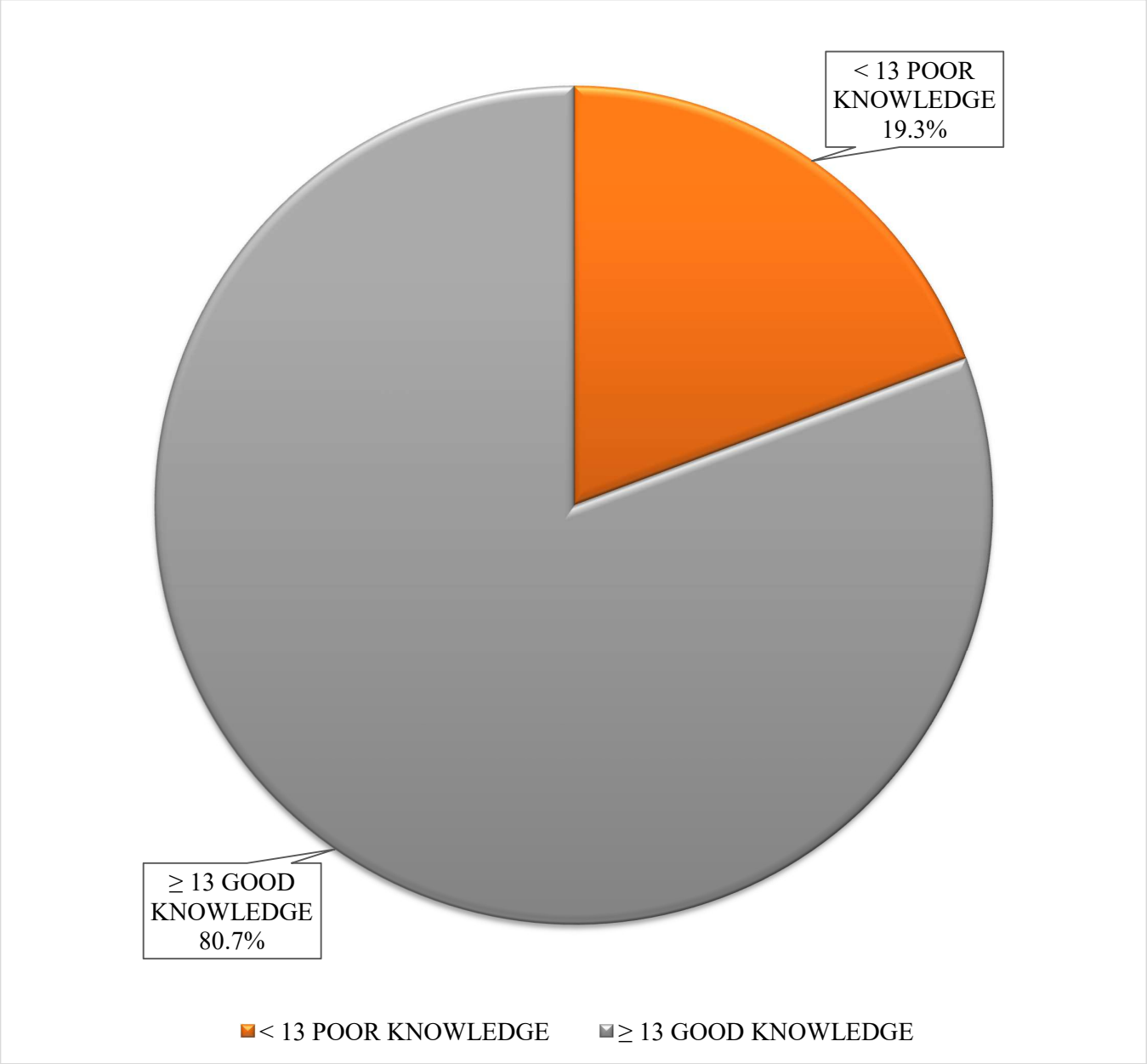

Fig 2: Overall knowledge of hypertension among respondents

The majority of the respondents, 80.7%, had good knowledge of hypertension, while 19.3% had poor knowledge of hypertension.

Table 2c: Sociodemographic characteristics and knowledge of risk factors of hypertension

Variables	Knowledge of risk factors		Chi-square	p-value
	Good knowledge n=413 (%)	Poor knowledge n=147 (%)		
Age			7.099*	0.058
15 – 19 years	155 (68.3)	72 (31.7)		
20 – 24 years	237 (76.9)	71 (23.1)		
25 – 29 years	19 (86.4)	3 (13.6)		
≥ 30 years	2 (66.7)	1 (33.3)		
Sex			1.131	0.315
Male	140 (71.1)	57 (28.9)		
Female	273 (75.2)	90 (24.8)		
Faculty/ Department			23.17	**<0.001**
Arts/ENL	77 (72.0)	30 (28.0)		
BMS/MBC	86 (89.6)	10 (10.4)		
Edu/CIT	60 (61.2)	38 (38.8)		
Engineering/EEE Electronics	85 (77.3)	25 (22.7)		
Management Sciences/Accounting	55 (67.1)	27 (32.9)		
Social Sciences/Social Works	50 (74.6)	17 (25.4)		
Level of Study			10.181	**0.017**
100 Level	105 (67.7)	50 (32.3)		
200 Level	89 (70.1)	38 (29.9)		
300 Level	99 (83.9)	19 (16.1)		
400 Level	120 (75.0)	40 (25.0)		
Knowledge of Hypertension			240.066	**<0.001**
Good knowledge	397 (87.8)	55 (12.2)		
Poor knowledge	16 (14.8)	92 (85.2)		
Frequency of Blood Pressure Check			27.957	**<0.001**
Correct	387 (77.1)	115 (22.9)		
Incorrect	26 (44.8)	32 (55.2)		

*Fisher's Exact

Note: ENL - English and Literature, MBC- Medical Biochemistry, CIT - Curriculum and Instructional Technology, EEE - Electrical Engineering and Electronics.

Knowledge about the risk factors of hypertension tended to be highest among science-based faculties in comparison to commercial and art faculties. For instance, in the faculty of basic medical sciences, 86 individuals (89.6%) had good knowledge of the risk factors of hypertension, while in the faculty of arts, 77 individuals (72.0%) demonstrated good

knowledge. The differences in knowledge across faculties were statistically significant (p-value <0.001).

Respondents in higher study levels exhibited a higher level of good knowledge when compared to those in lower levels. The differences in knowledge across levels were statistically significant (p-value = 0.017).

452 respondents had good general knowledge of hypertension; only 397 individuals (87.8%) had good knowledge of the risk factors of hypertension, while the remaining 55 individuals (12.2%) had poor knowledge of the risk factors of hypertension. The differences in knowledge among these groups were statistically significant (p-value <0.001).

Among the 502 respondents that gave a right to the question on the regularity of blood pressure checks, only 387 individuals (77.1%) had good knowledge about the risk factors of hypertension, while the remaining 115 individuals (22.9%) had poor knowledge of the risk factors of hypertension. The differences in knowledge among these groups were statistically significant (p-value <0.001).

Female respondents (75.2%) had a slightly higher proportion of respondents with good knowledge of the risk factors of hypertension in comparison to males, of which 71.1% showed good knowledge. However, the difference in knowledge between males and females was not statistically significant (p-value = 0.315).

Table 2d: Multivariate binary logistic regression model for the predictors of good knowledge of hypertension among respondents

Factors	B (Regression Coefficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Age					
15-19*		1.000			
20-24	0.521	1.684	1.040	2.727	**0.034**
25-29	1.328	3.773	1.010	14.100	**0.048**
>30	0.576	1.778	0.141	22.430	0.656
Sex					
Female*		1.000			
Male	-0.355	0.701	0.436	1.127	0.143
Faculty/Department					
BMS/Medical Biochemistry*		1.000			
Arts/ENL	-1.420	0.242	0.107	0.545	**<0.01**
Edu/CIT	-1.656	0.191	0.086	0.423	**<0.01**
Engineering/EEE Electronics	-0.910	0.403	0.171	0.946	**0.037**
Management Sciences/Accounting	-1.257	0.285	0.121	0.668	**0.004**
Social Sciences/Social Works	-1.179	0.308	0.127	0.743	**0.009**
Level of Study					
100 Level*		1.000			
200 Level	0.001	1.001	0.582	1.724	0.996
300 Level	0.824	2.279	1.215	4.273	**0.010**
400 Level	0.085	1.088	0.599	1.979	0.781
Monthly allowance					
No monthly allowance*		1.000			
Less than 20,000	0.522	1.685	0.619	4.582	0.307
20,000 - 30,000	1.080	2.945	1.040	8.334	**0.042**
31,000 - 40,000	0.440	1.552	0.482	5.002	0.462
41,000 - 50,000	0.403	1.496	0.448	4.991	0.512
More than 50,000	1.206	3.340	1.121	9.959	**0.030**

Note: OR = odds ratio; CI = confidence interval. R^2 = 13.7% ENL - English and Literature, MBC- Medical Biochemistry, CIT - Curriculum and Instructional Technology, EEE - Electrical Engineering and Electronics.
*Reference

The results of the multivariate binary logistic regression analysis conducted to identify independent predictors of good knowledge of hypertension risk factors among respondents

revealed that age, faculty, level of study, and monthly allowance were significant predictors of good knowledge, while sex was not statistically significant.

With respect to age, respondents aged 20–24 years were significantly more likely to have good knowledge compared to those aged 15–19 years (OR = 1.684, p = 0.034). Similarly, those aged 25–29 years were about four times more likely to have good knowledge (OR = 3.773, p = 0.048). However, respondents aged above 30 years did not show a statistically significant association (p = 0.656). This suggests that knowledge of hypertension risk factors tends to improve with age, particularly among young adults, although the trend was not consistent across all age groups.

Sex was not found to be a significant predictor of knowledge (OR = 0.701, p = 0.143), indicating that there was no statistically significant difference in knowledge between male and female respondents.

In terms of faculty, respondents from Arts had significantly lower odds of having good knowledge compared to those in BMS (OR = 0.242, p < 0.01). Other faculties such as Arts, Engineering, Management Sciences and Social Sciences did not show statistically significant associations. This finding suggests that exposure to health-related information may vary across disciplines.

Regarding the level of study, respondents in 300 level were significantly more likely to have good knowledge compared to those in 100 level (OR = 2.279, p = 0.010), while other levels did not show significant associations. This may reflect increased academic exposure and maturity as university students progress in their studies.

The monthly allowance was also a significant predictor. Respondents earning ₦20,000–₦30,000 (OR = 2.945, p = 0.042) and those earning more than ₦50,000 (OR = 3.340, p =

0.030) were significantly more likely to have good knowledge compared to those with no monthly allowance. This suggests that better financial status may enhance access to health information and resources.

Table 2e: Multivariate binary logistic regression model for the predictors of good knowledge of risk factors for hypertension among respondents…

Factors	B (Regression Coefficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Average Normal Blood Pressure					
Incorrect*		1.000			
Correct	0.952	2.590	1.678	3.999	**<0.001**
Definition of Hypertension					
Incorrect*		1.000			
Correct	0.036	1.036	0.653	1.643	0.880
Hypertension can occur without symptoms.					
No*		1.000			
Yes	0.167	1.182	0.720	1.940	0.508
Young people can develop hypertension					
No*		1.000			
Yes	0.744	2.105	1.187	3.732	**0.011**
Lifestyle modifications can prevent hypertension					
No*		1.000			
Yes	0.583	1.792	1.064	3.019	**0.028**
Knowledge of the frequency of blood pressure Check					
Incorrect*		1.000			
Correct	0.655	1.925	1.002	3.700	**0.049**
Lack of regular checkups can contribute to undiagnosed hypertension					
No*		1.000			
Yes	0.830	2.293	1.373	3.829	**0.002**
Non-modifiable risk factor of hypertension					
smoking/lack of exercise/poor diet*		1.000			
Age	0.477	1.611	1.050	2.471	**0.029**

Note: OR = odds ratio; CI = confidence interval, R^2: 33.1%
*Reference

Several significant predictors of good knowledge of risk factors for hypertension were identified among respondents. Individuals who correctly identified the average normal blood

pressure were significantly more likely to have good overall knowledge, with over twice the odds compared to those with incorrect knowledge (OR = 2.59, $p < 0.001$). Similarly, respondents who were aware that young people can develop hypertension demonstrated significantly higher odds of good knowledge (OR = 2.11, $p = 0.011$). Knowledge that lifestyle modifications can prevent hypertension was also a significant predictor (OR = 1.79, $p = 0.028$).

Furthermore, correct knowledge of the recommended frequency of blood pressure checks was associated with increased odds of good knowledge, although this was of borderline statistical significance (OR = 1.93, $p = 0.049$). Respondents who understood that lack of regular check-ups can contribute to undiagnosed hypertension were also significantly more likely to have good knowledge (OR = 2.29, $p = 0.002$). In addition, correctly identifying age as a non-modifiable risk factor was significantly associated with good knowledge (OR = 1.61, $p = 0.029$).

In contrast, the correct definition of hypertension (OR = 1.04, $p = 0.880$) and awareness that hypertension can occur without symptoms (OR = 1.18, $p = 0.508$) were not significantly associated with good knowledge. Overall, the findings suggest that practical and preventive knowledge elements are more strongly associated with good knowledge of hypertension risk factors than purely theoretical understanding.

Table 2f: Multivariate binary logistic regression model for the predictors of good knowledge of risk factors for hypertension among respondents…

Factors	B (Regression Coefficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Knowledge of Complication: Stroke					
No*		1.000			
Yes	0.853	2.347	1.336	4.123	**0.003**
Knowledge of Complication: Heart Failure					
No*		1.000			
Yes	0.669	1.951	1.003	3.795	**0.049**
Knowledge of Complication: Kidney Disease					
No*		1.000			
Yes	0.558	1.747	1.032	2.960	**0.038**
Knowledge of Complication: Blindness					
No*		1.000			
Yes	0.984	2.674	1.259	5.683	**0.011**

Note: OR = odds ratio; CI = confidence interval, R^2: 33.1%.
*Reference

Knowledge of specific hypertension-related complications was a strong predictor of overall knowledge. Awareness of blindness as a complication emerged as the most influential factor, with respondents who identified this less commonly recognised outcome being about 2.7 times more likely to have good overall knowledge (OR = 2.674, p = 0.011). Knowledge of stroke was also a significant predictor, increasing the odds of good knowledge by more than twofold (OR = 2.347, p = 0.003). Similarly, awareness of heart failure and kidney disease as complications significantly predicted good knowledge, raising the odds by approximately 1.95 times (OR = 1.951, p = 0.049) and 1.75 times (OR = 1.747, p = 0.038), respectively.

SECTION C:

PREVALENCE OF HYPERTENSION AMONG RESPONDENTS

Table 3a: Prevalence of hypertension among respondents

Variables	Frequency (n=560)	Percent (%)
Frequency of blood pressure check		
Occasionally (Once or twice per year)	261	46.6
Rarely (> five years interval)	139	24.8
Only when feeling unwell	107	19.1
Regularly (at least once every three months)	53	9.5
Knowledge of current blood pressure		
Yes	423	75.5
No	137	24.5
Previous diagnosis of hypertension		
Yes	57	10.2
No	503	89.8
Age at diagnosis (n = 57)		
< 18 years old	15	26.3
18 - 22 years old	37	64.9
23 - 27 years old	5	8.8
Current treatment/management for hypertension (n = 57)		
Yes, lifestyle changes only	9	15.8
Yes, medication only	7	12.3
Yes, medication and lifestyle changes	3	5.3
No	38	66.7
Family history of hypertension		
Yes	120	21.4
No	360	64.3
Not sure	80	14.3
Symptoms experienced*		
Headache	386	68.9
Dizziness	257	45.9
Chest pain	205	36.6
Diagnosis of hypertension among other university students		
Yes	26	4.6
No	534	95.4
Increasing prevalence of hypertension among university students		
Yes	255	45.6
No	83	14.8
Not sure	222	39.6

*Multiple response question

Nearly half of the respondents, 261 (46.6%), reported checking their blood pressure occasionally (once or twice per year). About 139 (24.8%) checked rarely (at intervals greater than five years), while 107 (19.1%) reported checking only when feeling unwell. Only 53 (9.5%) checked their blood pressure regularly (at least once in three months).

A majority of respondents, 423 (75.5%), stated that they knew their current blood pressure, whereas 137 (24.5%) did not.

Out of the 560 respondents, 57 (10.2%) reported that they had previously been diagnosed with hypertension, indicating a prevalence of 10.2% among the study population. The majority, 503 (89.8%), had not been diagnosed.

Among those diagnosed with hypertension, 15 (26.3%) were diagnosed before 18 years of age, 37 (64.9%) were diagnosed between 18 and 22 years, and 5 (8.8%) were diagnosed between 23 and 27 years. Thus, most diagnoses occurred between 18 and 22 years.

Among the hypertensive respondents (n = 57), 9 (15.8%) were managing their condition with lifestyle changes only, 7 (12.3%) were on medication only, 3 (5.3%) were using both medication and lifestyle modifications, and 38 (66.7%) were not currently on any form of treatment.

A total of 120 (21.4%) reported a positive family history of hypertension, while 360 (64.3%) reported no family history, and 80 (14.3%) were not sure.

The most commonly reported symptom was headache (386; 68.9%), followed by dizziness (257; 45.9%) and chest pain (205; 36.6%).

Only 26 (4.6%) reported knowing other university students diagnosed with hypertension, while the majority (95.4%) did not.

About 255 (45.6%) believed that hypertension is increasing among university students, 83 (14.8%) disagreed, and 222 (39.6%) were unsure.

Table 3b: Measurements of the average blood pressure of respondents and BMI

Variables	Frequency (n=560)	Percent (%)
Average blood pressure		
Normal	271	48.3
Prehypertension	245	43.8
Stage 1 hypertension	38	6.8
Stage 2 hypertension	6	1.1
Body Mass Index		
Underweight	62	11.1
Normal	389	69.5
Overweight	83	14.8
Class 1 obesity	22	3.9
Class 2 obesity	2	0.4
Class 3 obesity	2	0.4

A significant proportion of respondents, totalling 271 (48.3%), were within the normal blood pressure range, while 245 respondents (43.8%) were within the pre-hypertensive range. The remaining 44 respondents (7.9%) fell into the hypertensive class (6.8% in stage 1 and 1.1% in stage 2).

A significant proportion of respondents, totalling 389 (69.5%), had normal BMI, while 14.8% were overweight and 11.1% were underweight. The remaining 4.7% were obese.

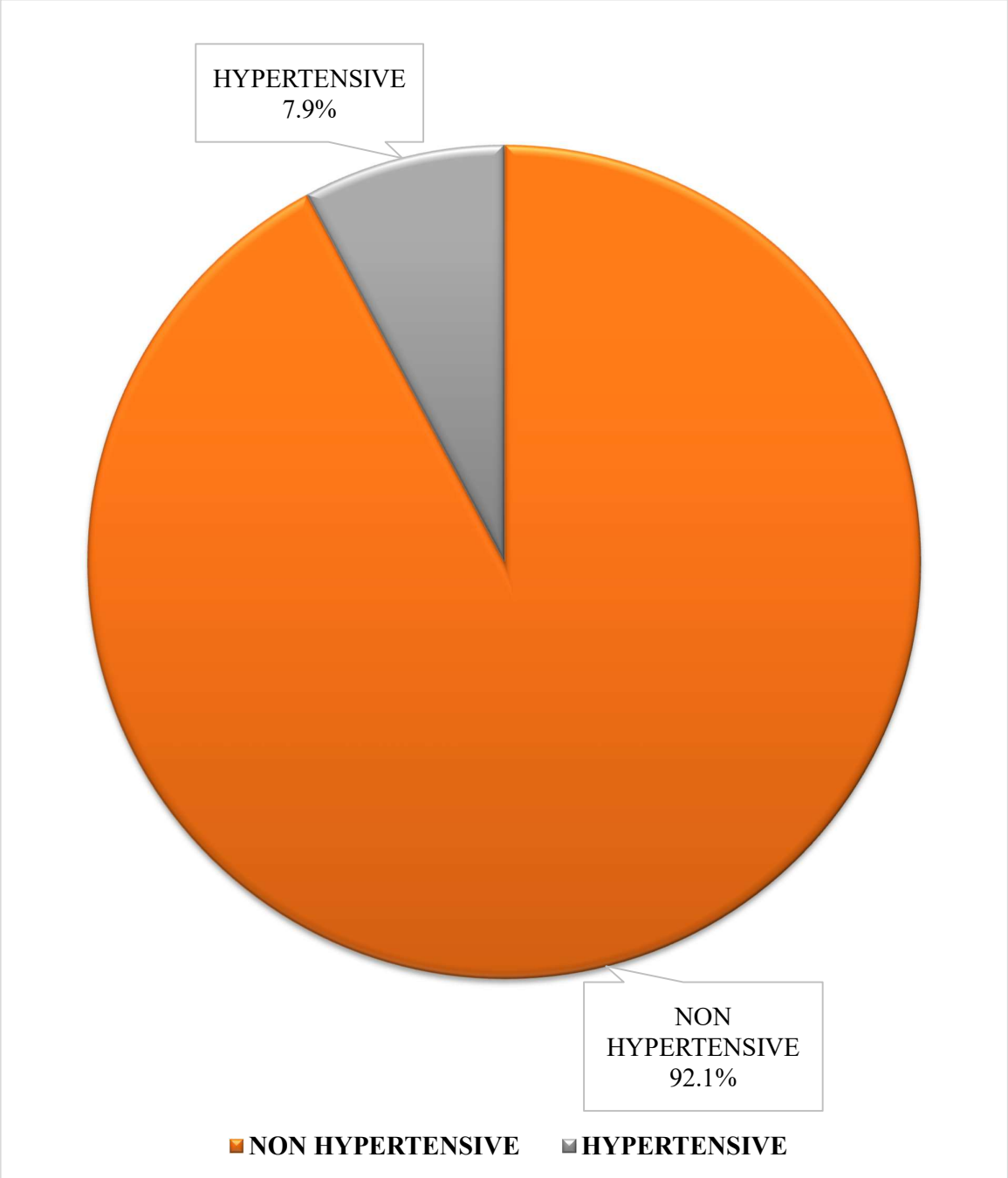

Fig 3: Prevalence of hypertension among respondents

44 respondents (7.9%) were hypertensive, while the other 92.1% were not hypertensive.

Table 3c: Sociodemographic characteristics and prevalence of hypertension among respondents

Variables	Measured Blood Pressure		Chi-square	p-value
	Hypertensive n=44 (%)	Non-hypertensive n=516 (%)		
Age			3.805*	0.257
15-19	15 (6.6)	212 (93.4)		
20-24	25 (8.1)	283 (91.9)		
25-29	4 (18.2)	18 (81.8)		
>30	0 (0)	3 (100)		
Sex			11.974	**<0.001**
Male	26 (13.2)	171 (86.8)		
Female	18 (5.0)	345 (95.0)		
Faculty/ Department			6.150	0.293
Arts/ENL	5 (4.7)	102 (95.3)		
BMS/MBC	11 (11.5)	85 (88.5)		
Edu/CIT	6 (6.1)	92 (93.9)		
Engineering/EEE	12 (10.9)	98 (89.1)		
Management Sciences/Accounting	7 (8.5)	75 (91.5)		
Social Sciences/Social Works	3 (4.5)	64 (95.5)		

Note: BMS – Basic Medical Sciences, ENL - English and Literature, MBC- Medical Biochemistry, CIT - Curriculum and Instructional Technology, EEE - Electrical Engineering and Electronics.
*Fisher's exact test

Although respondents aged 25–29 years had the highest proportion (18.2%), the association between age and hypertension was not statistically significant (p = 0.257).

The prevalence of hypertension was higher among male participants (13.2%) than among female participants (5%). This difference in prevalence of hypertension between both sex groups was statistically significant (p-value <0.001).

Individuals aged 25-29 reveal a substantial 18.2% prevalence of hypertension, with 4 individuals falling within the hypertensive class. However, the difference in prevalence of hypertension across the various age groups was not statistically significant (p-value = 0.257).

The prevalence of hypertension was highest among science-based faculties in comparison to commercial and art faculties. For instance, in the faculty of BMS, the blood pressure of 11

individuals (11.5%) fell within the hypertensive class, while in the faculty of Social Sciences, only 3 individuals (4.5%) had their blood pressure values falling within the hypertensive class. However, the differences in the prevalence of hypertension across faculties were not statistically significant (p-value = 0.293).

Table 3d: Sociodemographic characteristics and prevalence of hypertension among respondents…

Variables	Measured Blood Pressure		Chi-square	p-value
	Hypertensive n=44 (%)	Non-hypertensive n=516 (%)		
Level of Study			1.137	0.769
100 Level	13 (8.4)	142 (91.6)		
200 Level	12 (9.4)	115 (90.6)		
300 Level	7 (5.9)	111 (94.1)		
400 Level	12 (7.5)	148 (92.5)		
Monthly allowance			4.697*	0.428
Less than 20,000	15 (7.3)	190 (92.7)		
20,000 - 30,000	15 (9.8)	138 (90.2)		
31,000 - 40,000	4 (8.7)	42 (91.3)		
41,000 - 50,000	0 (0)	37 100)		
More than 50,000	9 (9.0)	91 (91.0)		
No monthly income	1 (5.3)	18 (94.7)		
Residence			3.889	0.129
Off-campus	29 (7.8)	343 (92.2)		
On-campus	8 (5.7)	132 (94.3)		
Family house	7 (14.6)	41 (85.4)		

*Fisher's exact test

The prevalence of hypertension appeared to have been higher among participants from the 200 level (9.4%), higher among those earning between 20,000 and 30,000 (9.8%) and highest among those residing in their family homes (14.6%). However, these findings were not statistically significant (p-value> 0.05).

Table 3e: BMI of respondents and prevalence of hypertension

Variable	Measured Blood Pressure		Test statistics	p-value
	Hypertensive n=44 (%)	Non-hypertensive n=516 (%)		
Body Mass Index			14.031*	**<0.05**
Underweight	1 (1.6)	61 (98.4)		
Normal	26 (6.7)	363 (93.3)		
Overweight	11 (13.3)	72 (86.7)		
Obese	6 (23.1)	20 (76.9)		

*Fisher's exact test

BMI was significantly associated with blood pressure ($p < 0.05$). Among underweight respondents, 98.4% were non-hypertensive, while 1.6% were hypertensive. Among the normal weight group, 93.3% were non-hypertensive, while 6.7% were hypertensive. For overweight respondents, 86.7% were non-hypertensive, while 13.3% were hypertensive. In the obese group, 76.9% were non-hypertensive, while 23.1% were hypertensive. The proportion of respondents who were non-hypertensive declined steadily from 98.4% (underweight) to 76.9% (obese), while that of those with hypertension increased from 1.6% (underweight) to 23.1% (obese).

Table 3f: Multivariate binary logistic regression model for predictors of students with hypertension

Factors	B (Regression Coefficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Age					
15-19*		1.000			0.400
20-24	0.327	1.386	0.648	2.966	0.066
25-29	1.283	3.606	0.921	14.127	0.999
>30	-18.046	0.000	0.000	-	**0.006**
Sex					
Female*		1.000			
Male	1.047	2.848	1.358	5.971	0.389
Faculty/Department					
BMS/Medical Biochemistry*		1.000			
Arts/ENL	-1.015	0.363	0.115	1.143	0.083
Edu/CIT	-0.813	0.444	0.151	1.302	0.139
Engineering/EEE Electronics	-0.415	0.660	0.244	1.788	0.414
Management Sciences/Accounting	-0.777	0.460	0.152	1.396	0.170
Social Sciences/Social Works	-1.074	0.342	0.087	1.337	0.123
Level of Study					
100 Level*		1.000			
200 Level	0.062	1.063	0.450	2.515	0.889
300 Level	-0.475	0.622	0.231	1.674	0.347
400 Level	-0.537	0.584	0.222	1.534	0.275
Monthly allowance					
No monthly allowance*		1.000			
Less than 20,000	0.303	1.353	0.162	11.336	0.780
20,000 - 30,000	0.490	1.633	0.194	13.761	0.652
31,000 - 40,000	0.302	1.352	0.131	13.925	0.800
41,000 - 50,000	-18.327	0.000	0.000	-	0.998
More than 50,000	0.348	1.417	0.159	12.623	0.755

OR = odds ratio; CI = confidence interval R^2 = 11.4%
Note: ENL - English and Literature, MBC- Medical Biochemistry, CIT - Curriculum and Instructional Technology, EEE - Electrical Engineering and Electronics.
*Reference

The results indicate that age had a statistically significant association with hypertension. Specifically, respondents aged above 30 years showed a significant relationship with

hypertension compared to those aged 15–19 years ($p = 0.006$). However, other age categories (20–24 years and 25–29 years) were not statistically significant ($p > 0.05$).

Sex was not a significant predictor of hypertension, as males did not differ significantly from females (OR = 2.848; $p = 0.389$).

Similarly, faculty showed no significant association with hypertension across all categories ($p > 0.05$). Students from Arts, Education, Engineering, Management Sciences, and Social Sciences did not significantly differ from BMS.

The level of study was also not significantly associated with hypertension. Students in 200, 300, and 400 levels had no statistically significant difference compared with 100-level students ($p > 0.05$).

In addition, the monthly allowance did not significantly predict hypertension among respondents, as all allowance categories had p-values greater than 0.05.

Table 3g: Multivariate binary logistic regression model for predictors of students with hypertension…

Factors	B (Regression Coefficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
BMI					
Normal*		1.000			
Underweight	-1.369	0.254	0.033	1.950	0.185
Obese	1.402	4.063	2.320	21.177	**0.007**
Overweight	0.774	2.168	1.289	6.628	**0.046**
Previous diagnosis of hypertension					
No*		1.000			
Yes	1.367	3.925	1.890	8.149	**<0.001**

OR = odds ratio; CI = confidence interval $R^2 = 10\%$
*Reference

Body Mass Index (BMI) and previous diagnosis of hypertension were significant predictors of hypertension. Compared with respondents who had normal BMI, those who were obese were significantly more likely to be hypertensive (OR = 4.063; p = 0.007), and those who were overweight also had significantly higher odds of hypertension (OR = 2.168; p = 0.046). In contrast, respondents who were underweight were less likely to be hypertensive, although this association was not statistically significant (OR = 0.254; p = 0.185).

Furthermore, respondents who had a previous diagnosis of hypertension were significantly more likely to be hypertensive compared to those without a prior diagnosis (OR = 3.925; p < 0.001).

SECTION D:

DETERMINANTS OF HYPERTENSION AMONG RESPONDENTS

Table 4a: Determinants of hypertension among respondents

Variables	Frequency (n=560)	Percent (%)
Engagement in physical exercise		
Daily	212	37.9
Occasionally	210	37.5
Rarely/Never	108	19.3
3-5 times weekly	30	5.4
Consumption of processed food		
Occasionally	282	50.4
Daily	169	30.2
Rarely/Never	60	10.7
3-5 times weekly	49	8.8
Addition of extra salt to meals		
Rarely/never	337	60.2
Sometimes	223	39.8
Consumption of energy drinks		
Occasionally	301	53.8
Daily	120	21.4
Rarely/Never	95	17.0
3-5 times weekly	44	7.9
Smoking of cigarettes/tobacco products		
Rarely/Never	531	94.8
Occasionally	15	2.7
3-5 times weekly	7	1.3
Daily	7	1.3
Consumption of alcohol		
Yes	143	25.5
No	417	74.5

With respect to lifestyle practices, just over one-third of the respondents (37.9%, n = 212) reported engaging in daily exercise; however, nearly one-fifth (19.3%, n = 108) indicated that they rarely or never exercised. In terms of dietary habits, almost one-third of participants (30.2%, n = 169) consumed processed foods on a daily basis. Salt intake patterns showed that 39.8% (n = 223) sometimes added extra salt to their meals, a behaviour known to contribute to hypertension risk. Additionally, energy drink consumption was notable, with 21.4% (n = 120) reporting daily use, likely reflecting attempts to maintain academic alertness. Regarding substance use, cigarette smoking was uncommon, as the majority of respondents (94.8%)

reported never smoking, whereas alcohol consumption was more prevalent, with about one-quarter (25.5%, n = 143) indicating alcohol use.

Table 4b: Determinants of hypertension among respondents…

Variables	Frequency (n=560)	Percent (%)
Average sleep duration		
< 5 hours	122	21.8
> 8 hours	34	6.1
7-8 hours	120	21.4
5-6 hours	284	50.7
Academic stress		
Low	38	6.8
Moderate	323	57.7
High	199	35.5
Family history of hypertension		
Yes	120	21.4
No	440	78.6
Regular Health Monitoring		
Yes	87	15.5
No	433	84.5

Sleep and stress patterns among the respondents revealed notable health concerns. Only about one-quarter of participants (27.5%) reported achieving adequate sleep duration of more than six hours per night, while a substantial proportion (21.8%, n = 122) slept for less than five hours. In addition, over one-third of the respondents (35.5%, n = 199) reported experiencing high levels of academic stress, highlighting a considerable burden of stress within the study population.

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Table 4c: Determinants of hypertension and blood pressure status of respondents

Variables	Blood Pressure Status		Chi-square	p-value
	Hypertensive n=44 (%)	Non-hypertensive n=516 (%)		
Engagement in physical exercise			4.384	0.219
Rarely/Never	11 (10.2)	97 (89.8)		
Occasionally	23 (11.0)	187 (89.0)		
3-5 times weekly	6 (20.0)	24 (80.0)		
Daily	17 (8.0)	195 (92.0)		
Consumption of processed or fast food			0.893	0.845
Rarely/Never	8 (13.3)	52 (86.7)		
Occasionally	28 (9.9)	254 (90.1)		
3-5 times weekly	4 (8.2)	45 (91.8)		
Daily	17 (10.1)	152 (89.9)		
Addition of extra salt to meals			3.237	0.086
Rarely/never	28 (8.3)	309 (91.7)		
Sometimes	29 (13.0)	194 (87.0)		
Consumption of sugary drinks			1.760	0.634
Rarely/Never	11 (11.6)	84 (88.4)		
Occasionally	26 (8.6)	275 (91.4)		
3-5 times weekly	5 (11.4)	39 (88.6)		
Daily	15 (12.5)	105 (87.5)		
Smoking of cigarettes/tobacco products			19.673	**<0.01**
Rarely/Never	48 (9.0)	483 (91.0)		
Occasionally	2 (13.3)	13 (86.7)		
3-5 times weekly	5 (71.4)	2 (28.6)		
Daily	2 (28.6)	5 (71.4)		
Consumption of alcohol			5.693	**0.024**
Yes	22 (15.4)	121 (84.6)		
No	35 (8.4)	382 (91.6))		

Tobacco use was significantly associated with blood pressure status ($p < 0.01$). Among those who smoked 3-5 times weekly, 71.4% were hypertensive, while 28.6% were non-hypertensive. 9.0% of those who rarely or have never used a tobacco product were hypertensive, while 91.0% were non-hypertensive. Alcohol consumption showed a significant association with blood pressure status ($p = 0.024$). Alcohol drinkers had a higher proportion of persons with hypertension (15.4%) compared to non-drinkers (8.4%). Engagement in physical exercise was not significantly associated with blood pressure status ($p = 0.219$). Both those who engaged in

physical exercise occasionally and those who did so 3-5 times weekly showed high hypertension rates (11.0% and 20.0%, respectively). Consumption of processed or fast foods, meals with extra salt and sugary drinks showed no significant statistical associations with the blood pressure status of the participants.

Table 4d: Determinants of hypertension and blood pressure status of respondents

Variables	Blood Pressure Status		Chi-square	p-value
	Hypertensive n=44 (%)	Non-hypertensive n=516 (%)		
Average sleep duration			6.853	0.075
< 5 hours	19 (15.6)	103 (84.4)		
> 8 hours	5 (14.7)	29 (85.3)		
7-8 hours	8 (6.7)	112 (93.3)		
5-6 hours	25 (8.8)	259 (91.2)		
Academic stress			4.147	0.124
Low	6 (15.8)	32 (84.2)		
Moderate	26 (8.0)	297 (92.0)		
High	25 (12.6)	174 (87.4)		
Family history of hypertension			1.973	0.190
Yes	20 (10.0)	180 (90.0)		
No	24 (6.7)	336 (93.3)		
Regular health monitoring			0.633	0.521
Yes	5 (5.7)	82 (94.3)		
No	39 (8.2)	434 (91.8)		

Sleep duration was not significantly associated with blood pressure status ($p = 0.075$). Both Those who slept >8 hours and ≤5 hours per night had higher proportions of hypertension (14.7% and 15.6%). Academic stress was not significantly associated with blood pressure status ($p = 0.124$). Those with a family history of hypertension had a higher proportion of hypertension (16.7%) in comparison to those without a family history of hypertension (7.5%); family history of hypertension was not statistically significant in its association with blood pressure ($p = 0.190$).

SECTION E:

PREVIOUS PARTICIPATION IN HEALTH PROMOTION PROGRAMS

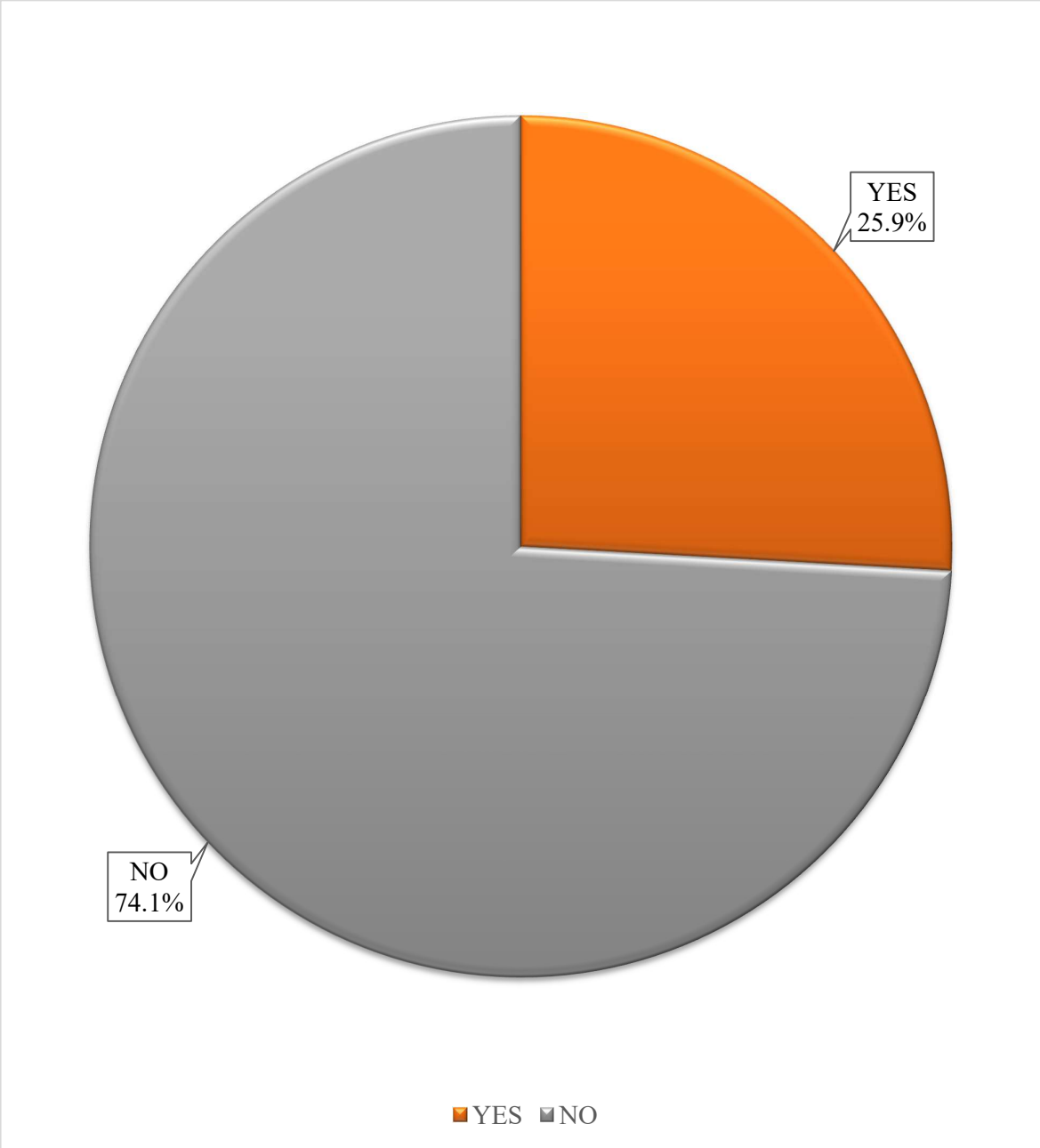

Fig 4: Respondents' participation in health promotion programs related to hypertension

The majority of the respondents (74.1%) indicated not having ever participated in a health education or promotion program related to hypertension. While the remaining 25.9% of respondents indicated otherwise.

Table 5a: Previous participation in health promotion programs among respondents

Variables	Frequency (n=145)	Percent (%)
Type of program attended*		
Blood pressure screening event	87	60
Health seminar/workshop	84	57.9
Peer health education	71	49.0
Posters/online fliers/brochures	61	42.1
Online campaign	51	35.2
Program improving understanding of hypertension		
Yes	104	71.7
No	28	19.3
Not sure	13	9.0
Improved confidence in identifying symptoms and complications of hypertension		
Yes	78	53.8
No	32	22.1
Not sure	35	24.1
A program aiding the understanding of the importance of regular blood pressure monitoring		
Yes	113	77.9
No	20	13.8
Not sure	12	8.3
Lifestyle changes since attending the program		
Reduced salt intake	105	72.4
Increased physical activity	103	71.0
Consumption of a healthy diet	102	70.3
Reduced or quit alcohol consumption	101	69.7
Regular blood pressure checks	78	53.8
Recommend the program to other students.		
Yes	123	84.8
No	15	10.3
Not sure	7	4.8

*Multiple response question

The blood pressure screening event was the most indicated type of health promotion program attended by the respondents (60%). 71.7% of all those who attended a health promotion program indicated that it improved their understanding of hypertension, while 53.8% indicated that it improved their confidence in identifying symptoms and complications of hypertension, and 77.9% indicated that the Program aided their understanding of the importance of regular blood pressure monitoring.

As regards making lifestyle changes since attending the program, 53.8% indicated having regular blood pressure checks, 71.0% indicated increased physical activity, 72.4% indicated reducing their salt intake, 69.7% indicated they had reduced/quit alcohol consumption, and 70.3% indicated consumption of a healthy diet.

The majority of the respondents (84.8%) who indicated having ever participated in a health education or promotion program related to hypertension, also indicated that they will recommend similar programs to other students.

Table 5b: Knowledge of hypertension and Previous participation in health promotion programs by respondents

Variables	Previous participation in health promotion programs		Chi-square	p-value
	Yes n=145 (%)	No n=415 (%)		
Knowledge of risk factors			0.000	1.000
Good knowledge	107 (25.9)	306 (74.1)		
Poor knowledge	38 (25.9)	109 (74.1)		
Knowledge of Hypertension			1.516	0.223
Good knowledge	112 (24.8)	340 (75.2)		
Poor knowledge	33 (30.6)	75 (69.4)		
Knowledge of stroke as a complication of Hypertension			0.853	0.411
Yes	110 (25.0)	330 (75.0)		
No/Maybe	35 (29.2)	85 (70.8)		
Knowledge of Heart Failure as a complication of Hypertension			0.114	0.787
Yes	122 (25.6)	354 (74.4)		
No/Maybe	23 (27.4)	61 (72.6)		
Knowledge of Kidney Disease as a complication of Hypertension			0.112	0.769
Yes	61 (26.6)	168 (73.4)		
No/Maybe	84 (25.4)	247 (74.6)		
Knowledge of Blindness as a complication of Hypertension			0.853	0.411
Yes	35 (29.2)	85 (70.8)		
No/Maybe	110 (25.0)	330 (75.0)		

Participation in health promotion programs was not significantly associated with knowledge of hypertension or its complications among respondents. For knowledge of risk factors, both respondents with good knowledge and those with poor knowledge had the same proportion of prior participation (25.9%), and the association was not statistically significant ($p = 1.000$).

Similarly, there was no significant association between participation and overall knowledge of hypertension ($p = 0.223$). Among those with good knowledge, 24.8% had participated in health promotion programs compared to 30.6% among those with poor knowledge.

Knowledge of complications also showed no statistically significant relationship with participation. Specifically, knowledge of stroke ($p = 0.411$), heart failure ($p = 0.787$), kidney

disease ($p = 0.769$), and blindness ($p = 0.411$) as complications of hypertension were not significantly associated with prior participation in health promotion activities.

Table 5c: Sociodemographic characteristics and Previous participation in health promotion programs

Variables	Previous participation in health promotion programs		Test statistics	p-value
	Yes n=145 (%)	No n=415 (%)		
Sex			0.365	0.614
Male	54 (27.4)	143 (72.6)		
Female	91 (27.4)	272 (72.6)		
Grouped Age			2.599*	0.443
15-19 years	58 (25.6)	169 (74.4)		
20-24 years	80 (26.0)	228 (74.0)		
25-29 years	5 (22.7)	17 (77.3)		
30 years and above	2 (66.7)	1 (33.3)		
Faculty/Department			7.680	0.175
Arts/English and Literature	25 (23.4)	82 (76.6)		
Basic Medical Sciences/Medical Biochemistry	23 (24.0)	73 (76.0)		
Education/Curriculum and Instructional Technology	27 (27.6)	71 (72.4)		
Engineering/Electrical Engineering and Electronics	21 (19.1)	89 (80.9)		
Management Sciences/Accounting	25 (30.5)	57 (69.5)		
Social Sciences/Social works	24 (35.8)	43 (64.2)		
Level of Study			2.647	0.450
100 Level	45 (29.0)	110 (71.0)		
200 Level	36 (28.3)	91 (71.7)		
300 Level	29 (24.6)	89 (75.4)		
400 Level	35 (21.9)	125 (78.1)		
Monthly Income			6.196	0.288
< 20,000	52 (25.4)	153 (74.6)		
20,000 - 30,000	36 (23.5)	117 (76.5)		
31,000 - 40,000	15 (32.6)	31 (67.4)		
41,000 - 50,000	6 (16.2)	31 (83.8)		
> 50,000	28 (28.0)	72 (72.0)		
No income	8 (42.1)	11 (57.9)		
Residence			1.135	0.567
On-campus	101 (27.2)	271 (72.8)		
Off-campus	34 (24.3)	106 (75.7)		
Family house	10 (20.8)	38 (79.2)		

*Fisher's exact test

Sex of respondents was not significantly associated with participation in health promotion programs (p = 0.614), as equal proportions of males and females (27.4%) reported prior participation.

There was also no statistically significant association between age group and participation (p = 0.443). Although respondents aged 30 years and above had the highest proportion of participation (66.7%), this difference was not statistically significant.

Similarly, faculty was not significantly associated with participation in health promotion programs (p = 0.175). Participation rates varied across departments, with Social Sciences showing the highest proportion (35.8%) and Engineering the lowest (19.1%), but these differences were not significant.

Level of study also showed no significant relationship with participation (p = 0.450). Although 100-level students had slightly higher participation (29.0%) compared to other levels, the variation was not statistically meaningful.

Likewise, monthly income was not significantly associated with participation (p = 0.288). Respondents without income had the highest participation proportion (42.1%), whereas those earning ₦41,000–₦50,000 had the lowest (16.2%), but these differences were not statistically significant.

Finally, place of residence was not significantly related to participation (p = 0.567). A slightly higher proportion of on-campus residents (27.2%) participated compared with off-campus residents (24.3%), but the difference was not significant.

Overall, the findings indicate that none of the sociodemographic variables examined was significant predictors of participation in health promotion programs among the respondents.

Table 5d: Previous participation in health promotion programs and respondents' blood pressure status

Variables	Blood Pressure Status		Chi-square	p-value
	Hypertensive n=44 (%)	Non-hypertensive n=51 (%)		
Previous participation in health promotion programs			4.041	0.050
Yes	17 (11.7)	128 (88.3)		
No	27 (6.5)	388 (93.5)		

88.3% of the respondents who attended health promotion programs were non-hypertensive while 11.7% were hypertensive. This finding was not statistically significant (p = 0.05).

Table 5e: Multivariate binary logistic regression model for previous participation in health promotion programs

Factors	B (Regression Coefficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Age					
15-19*		1.000			
20-24	-0.215	0.807	0.512	1.272	0.355
25-29	0.117	1.125	0.376	3.360	0.834
>30	-2.161	0.115	0.009	1.400	0.090
Sex					
Female		1.000			
Male	-0.221	0.801	0.504	1.274	0.349
Faculty/Department					
BMS/Medical Biochemistry*		1.000			
Arts/ENL	0.076	1.079	0.554	2.103	0.823
Edu/CIT	-0.033	0.968	0.498	1.882	0.923
Engineering/EEE Electronics	0415	1.514	0.728	3.150	0.267
Management Sciences/Accounting	-0.235	0.790	0.386	1.618	0.520
Social Sciences/Social Works	-0.609	0.544	0.269	1.096	0.089
Level of Study					
100 Level*		1.000			
200 Level	0.027	1.028	0.601	1.759	0.921
300 Level	0.196	1.216	0.689	2.144	0.499
400 Level	0.454	1.575	0.874	2.838	0.130
Monthly allowance					
No monthly allowance*		1.000			
Less than 20,000	0.886	2.425	0.896	6.565	0.081
20,000 - 30,000	0.959	2.610	0.942	7.230	0.065
31,000 - 40,000	0.415	1.514	0.483	4.751	0.477
41,000 - 50,000	1.489	4.432	1.186	16.567	0.027
More than 50,000	0.748	2.114	0.737	6.059	0.164

OR = odds ratio; CI = confidence interval $R^2 = 5.5\%$
Note: ENL - English and Literature, MBC- Medical Biochemistry, CIT - Curriculum and Instructional Technology, EEE - Electrical Engineering and Electronics.
*Reference

Age was not a statistically significant predictor of participation in health promotion programs.

Respondents aged 20–24 years (OR = 0.807; p = 0.355), 25–29 years (OR = 1.125; p = 0.834),

and above 30 years (OR = 0.115; p = 0.090) did not differ significantly from those aged 15–19 years.

Similarly, sex was not significantly associated with participation, as males were not significantly different from females (OR = 0.801; p = 0.349). Faculty of respondents was not a significant predictor (p > 0.05).

Level of study was not significantly associated with participation. Students in 200 level (OR = 1.028; p = 0.921), 300 level (OR = 1.216; p = 0.499), and 400 level (OR = 1.575; p = 0.130) did not differ significantly from 100-level students.

Regarding monthly allowance, only respondents earning ₦41,000–₦50,000 were significantly more likely to have participated in health promotion programs compared with those without allowance (OR = 4.432; 95% CI: 1.186–16.567; p = 0.027). All other income categories were not statistically significant (p > 0.05).

CHAPTER FIVE

DISCUSSION

Hypertension is a major global public health challenge and a leading modifiable risk factor for cardiovascular morbidity and mortality. Increasingly, it is being identified among young adults, including university students, largely due to the adoption of unhealthy lifestyle behaviours such as poor diet, physical inactivity, alcohol consumption, smoking and stress. Despite this growing burden, awareness and perception of personal risk among young people often remain suboptimal, thereby increasing the likelihood of progression to established hypertension and its complications later in life.

This chapter discusses the key findings from this study, which aimed to assess the knowledge of risk factors of hypertension, determine the prevalence and determinants of hypertension and assess the association between previous participation in health promotion programs and knowledge of risk factors of hypertension among university students in Benin City.

In this study, a higher proportion of the participants were aged 20 – 24 years with a mean age of 20.3 years, indicating that most participants were young adults within the typical undergraduate age bracket. This finding is expected because university undergraduate populations generally consist of individuals in late adolescence and early adulthood who have recently transitioned from secondary education into tertiary institutions. Additionally, most Nigerian universities admit students shortly after completion of secondary school, which explains the concentration of respondents within this age group.

This finding is consistent with a study conducted among undergraduate students in North-Central Nigeria, where most participants were also within the 18–25 year age range, highlighting the youthful demographic composition of university populations.[21]

From a public health perspective, the predominance of young adults in this study population is important because this age group often begins to adopt lifestyle behaviours that may predispose them to future cardiovascular diseases such as hypertension. Early adulthood, therefore, presents a critical window for implementing preventive health interventions aimed at promoting healthy lifestyles. It is therefore recommended that universities implement early cardiovascular health education programs targeting students from their first year, focusing on modifiable risk factors such as diet, physical activity, and substance use.

A majority of the participants were single. This finding is not surprising, as the majority of university students fall within the early adult age group when marriage rates are generally low. Additionally, academic commitments and financial dependence may delay marriage among undergraduate students. This finding aligns with observations from studies conducted among university students in Ghana, where the majority of respondents were also reported to be single due to the youthful nature of the study population.[2]

From a public health standpoint, marital status may influence lifestyle patterns, stress levels, and social support systems, which can indirectly affect cardiovascular health outcomes. Universities should therefore promote healthy coping strategies for academic and social stress, as unmarried students may lack strong support systems that help buffer stress.

The results of this study indicated that the majority of respondents were Christians. In terms of ethnicity, Benin, Igbo, and Esan constituted the largest ethnic groups. This distribution likely reflects the demographic composition of Benin City and Edo State, where Christianity is the predominant religion and the Benin ethnic group represents the indigenous population. The presence of other ethnic groups reflects the multicultural nature of Nigerian universities, which attract students from different parts of the country.

The public health implication of this finding is that cultural and religious contexts may influence health behaviours, dietary patterns, and attitudes toward disease prevention. Therefore, health promotion interventions within universities should adopt culturally sensitive approaches that consider the diverse backgrounds of students.

The findings showed that more than half of the respondents received less than ₦30,000 monthly allowance, indicating relatively modest financial resources among most students. Additionally, the majority of students relied on parents or guardians to fund their education. This pattern is typical in Nigeria, where many undergraduate students are financially dependent on their families due to limited opportunities for part-time employment.

Socioeconomic status is an important determinant of health because it can influence dietary choices, access to healthcare services, and lifestyle behaviours. Public health programs targeting university students should therefore consider the economic realities of students when designing interventions, ensuring that healthy lifestyle options remain affordable and accessible.

The majority of respondents resided in on-campus hostels. This distribution may be explained by the availability of university accommodation and the convenience of living within the campus environment. Living arrangements can influence lifestyle behaviours, including dietary habits, physical activity patterns, and exposure to stress. From a public health perspective, students residing on campus may be more easily reached through campus-based health promotion initiatives. It is therefore recommended that universities strengthen campus health promotion programs, including regular blood pressure screening, healthy diet campaigns, and physical activity initiatives within student hostels.

The study revealed that a large proportion of respondents' parents had a tertiary education. Similarly, many parents were engaged in skilled occupations according to International Labour Organisation (ILO) classifications. This finding suggests that many respondents may come from relatively educated households where awareness of health issues may be higher.

Parental education has been shown to influence health literacy, lifestyle practices, and access to healthcare resources among young adults. Consequently, parental educational status may indirectly contribute to students' knowledge and attitudes toward hypertension prevention.

In this study, the majority of the respondents had good knowledge of the risk factors for hypertension, and a higher proportion of participants demonstrated good general knowledge of hypertension. Stress, obesity, alcohol consumption, and family history were the most commonly identified risk factors. Knowledge was significantly associated with faculty and level of study, with students from science-related faculties and higher academic levels demonstrating better knowledge. Logistic regression analysis further showed that knowledge was predicted by age, faculty, level of study, and monthly allowance. Recognition of complications such as stroke, heart failure, kidney disease, and blindness also significantly predicted overall knowledge. High knowledge levels may be attributed to university exposure, academic curriculum, and widespread access to information through school and social media. Students in science-based disciplines are more likely to encounter health-related topics in coursework, explaining their higher knowledge levels. Increased knowledge among higher-level students may reflect cumulative academic exposure and maturity.

This is in contrast to a study carried out in 2021 among undergraduate students in Tanzania, which showed that only a small proportion of the students had good knowledge of the risk factors of hypertension.[13] The present study is also in contrast to a study carried out in 2020 among University Students in Riyadh city, which found that although many students had heard

about the term hypertension, their knowledge about the risk factors was insufficient.[26] This study also reported lower awareness levels among undergraduates, particularly in non-health disciplines, indicating that institutional exposure plays a major role. The present study, therefore, aligns with the literature showing that educational background significantly influences health knowledge.[26] Adequate knowledge is a key determinant of preventive health behaviour. The high level of awareness observed suggests a good foundation for hypertension prevention programs within the university population. However, gaps in knowledge about less obvious complications indicate areas requiring targeted education. Incorporating cardiovascular health education into general university orientation programs, introducing compulsory health literacy modules for all faculties and strengthening peer-education programs focusing on non-communicable diseases are key ways in bridging these identified gaps in the knowledge of the risk factors of hypertension.

Based on measured blood pressure, a majority of the participants were hypertensive, while nearly half of the participants were pre-hypertensive. Hypertension prevalence was significantly higher among males than among females. BMI was significantly associated with hypertension, with prevalence increasing steadily from underweight to obese categories. The observed prevalence may be due to lifestyle patterns common among university students, such as stress, irregular sleep, unhealthy diet, and physical inactivity. Higher prevalence among males may reflect behavioural risk factors such as alcohol consumption and reduced healthcare-seeking behaviour. The strong association with BMI reflects well-established physiological links between excess body weight and increased vascular resistance.

This was similar to a study carried out among 346 undergraduate clinical students from the College of Medicine, University of Ibadan, which showed a low prevalence of hypertension, while one-third of students were classified as pre-hypertensive and more than half recorded

normal blood pressure.[22] These findings, however, contrast with a study conducted among undergraduate students from Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana, which reported a relatively low hypertension prevalence.[2] The presence of hypertension and pre-hypertension among young adults is concerning because early-onset hypertension increases lifetime risk of cardiovascular disease. The large proportion of pre-hypertensive students indicates a potential future surge in hypertension cases if preventive interventions are not implemented. To curb this surge, routine blood pressure screening should be integrated into campus health services, weight management programs should be established in universities, and students should be encouraged to monitor their blood pressure regularly.

Lifestyle practices showed mixed patterns. Smoking and alcohol use were significantly associated with hypertension, while exercise, salt intake, sleep duration, stress, and family history were not statistically significant. Logistic regression analysis identified BMI and previous diagnosis as significant predictors of hypertension. The significant relationship between substance use and hypertension may be explained by the physiological effects of nicotine and alcohol on vascular tone and blood pressure regulation. The lack of statistical significance for some expected determinants may be due to the relatively young age of respondents or the short duration of exposure to risk factors.

This aligns with a study carried out among undergraduate medical students at the University of Nigeria, Enugu State, Nigeria, which also reported advancing age and male gender were significant non-modifiable determinants of progressing into higher stages of hypertension.[12] These findings, however, contrast with a study conducted among undergraduate students in North India, which showed that consumption of fast food, high-fat foods, and sugary beverages, alongside lack of regular physical exercise and a positive family history of hypertension, were

identified as significant risk factors for hypertension.[30] The association between BMI, smoking, alcohol, and hypertension aligns with numerous epidemiological studies globally. However, the absence of a significant association with stress and physical activity contrasts with some research that identified these factors as predictors. Differences may be due to variations in measurement methods or sample characteristics.

The findings highlight modifiable behavioural risk factors that can be targeted for intervention. Since many determinants identified are lifestyle-related, preventive strategies can substantially reduce future disease burden. A few of such preventive strategies include: implementation of campus-based lifestyle intervention programs, restrictions on the sale and marketing of tobacco and excessive alcohol near campuses and promotion of physical activity through sports and recreation initiatives.

Only a quarter of respondents had previously participated in health promotion programs, although most participants reported that such programs improved their understanding and encouraged lifestyle changes. However, statistical analysis showed no significant association between participation in health promotion programs and knowledge of hypertension or its complications. The lack of significant association may indicate that knowledge is obtained primarily through academic instruction and informal sources rather than organised programs. It may also suggest that existing programs are not sufficiently intensive, frequent, or comprehensive to produce measurable knowledge differences.

This is in contrast to a study conducted in 2024 among undergraduate students in a faith-based Midwestern university in the United States, which showed that following a campus-wide health promotion initiative, a majority of participants were able to accurately define elevated blood pressure, identify its risk factors, and describe strategies to lower blood pressure, indicating a profound and statistically significant improvement attributable to the health education

programme.[16] Another contrast study was one conducted in 2022, in Jordan, which showed that participants who reported previous engagement with health education about hypertension demonstrated significantly higher knowledge scores than those without such exposure. This association held across multiple domains, including awareness of risk factors, recognition of symptoms, and understanding of treatment strategies, indicating that prior health information exposure serves as a powerful and independent predictor of hypertension health literacy.[33] The difference between those findings and the present study may be due to program design, duration, or participant engagement levels.

Low participation rates suggest missed opportunities for preventive health education. If well structured, such programs could enhance behavioural change and early detection practices among students. Increasing the frequency of campus health promotion programs, incorporating interactive approaches such as peer-led sessions and screenings, and monitoring and evaluating program effectiveness regularly will go a long way in improving the health status of students in the university.

CONCLUSION

This study revealed that more than two-thirds of the undergraduate students had good knowledge of the risk factors of hypertension.

The study also found that less than one-tenth of the students were hypertensive, while nearly half of the students were pre-hypertensive.

The study demonstrated that lifestyle behaviours such as alcohol use, smoking, and elevated BMI were significant determinants of hypertension.

The study revealed that while participation in health promotion programs was low, participation was not significantly associated with knowledge, thereby underscoring the need for structured, sustained health promotion interventions targeting young adults to prevent early onset of hypertension and reduce long-term cardiovascular risk.

RECOMMENDATIONS

TO THE FEDERAL GOVERNMENT THROUGH THE MINISTRY OF HEALTH AND SOCIAL WELFARE

1. To establish a policy mandating annual blood pressure screening in all tertiary institutions.

2. To integrate hypertension screening into the National Non-Communicable Disease (NCD) control framework targeting young adults.

3. To fund nationwide university-based hypertension awareness campaigns.

4. To provide subsidised blood pressure monitors to university health centres.

5. To partner with the National Agency for Food and Drug Administration and Control (NAFDAC) and public health agencies in enforcing stricter control on sales of tobacco and alcohol within designated proximity to universities and to monitor compliance.

TO THE FEDERAL GOVERNMENT THROUGH THE FEDERAL MINISTRY OF AGRICULTURE AND FOOD SECURITY

1. To collaborate with universities to improve the availability of affordable fruits and vegetables in campus cafeterias.

2. To develop guidelines on salt reduction in commercially prepared foods sold within university premises.

2. To support public campaigns educating students on the relationship between diet, BMI, and hypertension.

TO THE ADMINISTRATORS OF THE UNIVERSITY OF BENIN THROUGH THE VICE CHANCELLOR AND DEAN OF STUDENTS

1. To make BP checks compulsory during registration or clearance processes.

2. To restrict tobacco and excessive alcohol marketing on campus.

3. To increase the frequency of campus-wide health education programs.

4. To introduce peer-led hypertension awareness campaigns.

5. To organise inter-faculty sports competitions in a bid to promote physical activity among students.

TO THE UNIVERSITY OF BENIN HEALTH SERVICE DEPARTMENT THROUGH THE DIRECTOR

1. To establish walk-in BP screening clinics weekly and create follow-up protocols for pre-hypertensive students.

2. To provide BMI monitoring and counselling services.

3. To offer smoking cessation and alcohol reduction counselling services.

3. To regularly assess effectiveness of health promotion programs so as to ensure measurable impact.

TO PARENTS AND GUARDIANS

1. To promote healthy feeding patterns and regular exercise habits early.

2. To provide adequate financial support for healthy living by way of ensuring students' allowances can accommodate healthier food choices.

3. To encourage their wards to undergo regular medical check-ups.

TO STUDENTS

1. To adopt healthy lifestyle practices such as engagement in regular physical exercise (at least 150 minutes weekly), reduction of salt intake and avoidance of excessive fast food consumption.

2. To avoid risky health behaviours such as abstinence from smoking and limiting alcohol intake.

3. To check blood pressure periodically, even when asymptomatic.

4. To monitor body weight and maintain a healthy BMI.

5. To actively attend campus health education sessions.

5. To practice healthy coping strategies such as time management, adequate sleep, and recreational engagement.

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APPENDIX

APPENDIX I

QUESTIONNAIRE

Questionnaire: Knowledge of Risk Factors and Prevalence of Hypertension Among University Students

Dear respondent, we are 600 Level students of the School of Medicine, University of Benin, Benin City. We are researching to assess the knowledge of risk factors and prevalence of hypertension among University students in Benin City. This questionnaire will be used as a tool for data collection during this research. Your sincere response will be highly appreciated, and any information shared will be treated with the utmost confidentiality.

Section A: Sociodemographic Information

1. Age(as at last birthday): _____ years
2. Sex: [ ] Male [ ] Female
3. Marital status: Single [ ] Married [ ] Divorced/Separated [ ] Widowed [ ]
4. Religion: Christianity [ ] Islam [ ] Traditional religion [ ] Others (please specify): _____
5. Ethnicity: Bini [ ] Esan [ ] Yoruba [ ] Igbo [ ] Hausa [ ] Others [ ]_____ (please specify)
6. Faculty/Department: _____/_____
7. Level of study: 100 level [ ] 200 level [ ] 300 level [ ] 400 level [ ] 500 level [ ] 600 level [ ]
8. 10. Monthly allowance/income: Less than ₦10,000 [ ] ₦10,000 - ₦20,000 [ ] ₦21,000 - ₦30,000 [ ] ₦31,000 - ₦40,000 [ ] Above ₦40,000 [ ]
9. Residence: On-campus hostel [ ] Off-campus hostel/apartment [ ] Family house [ ]
10. Source of funding for education: Parents/Guardian [ ] Self-sponsored [ ] Scholarship [ ] Others (please specify): _____
11. Parents' highest educational level: **Father**: No formal education [ ] Primary education [ ] Secondary education [ ] Tertiary education [ ] **Mother**: No formal education [ ] Primary education [ ] Secondary education [ ] Tertiary education [ ]
12. Parents' occupation: Father: _____ (please specify) Mother: _____ (please specify)

Section B: Knowledge of Hypertension

13. Have you ever heard of hypertension (high blood pressure)? Yes [ ] No [ ]

14. Source of information about hypertension? Social media [ ] school [ ] family members[ ]

15. What do you think is the average normal blood pressure? 80/50 mmHg [ ] 120/80 mmHg [ ] 140/90 mmHg [ ] I don't know [ ]

16. Which of the following best defines hypertension? A condition where blood pressure is consistently above 140/90 mmHg [ ] A condition where the heart beats irregularly [ ] A disease of the lungs [ ] I don't know [ ]

17. Do you believe that hypertension can occur without symptoms (i.e., “silent killer”)? Yes [ ] No [ ] Not sure [ ]

18. Which of the following are risk factors for hypertension? (You may tick more than one) Smoking [ ] Excessive alcohol consumption [ ] High salt intake [ ] Physical inactivity [ ] Stress [ ] Obesity [ ] Family history of hypertension [ ] eating a lot of processed or fried foods [ ] I don’t know [ ]

19. Do you think young people, like university students, can develop hypertension? Yes [ ] No [ ] Not sure [ ]

20. Can hypertension be prevented through lifestyle modifications? Yes [ ] No [ ] Not sure [ ]

21. Which of the following complications can result from untreated hypertension? (Tick all that apply) Stroke [ ] Heart failure [ ] Kidney disease [ ] Blindness [ ] I don’t know [ ]

22. How often should a person check their blood pressure? Daily [ ] Weekly [ ] Monthly [ ] Once a year [ ] Only when sick [ ] I don’t know [ ]

23. Can lack of regular health check-ups contribute to undiagnosed hypertension? Yes [ ] No [ ] Not sure [ ]

24. Which of the following is a non-modifiable risk factor for hypertension? Smoking [ ] Age [ ] Lack of exercise [ ] Poor diet [ ]

Section C: Prevalence of Hypertension Among University Students

25. Have you ever had your blood pressure checked? Yes [ ] No [ ]

26. How often do you check your blood pressure? Regularly (at least once every 3 months) [ ] Occasionally (once or twice a year) [ ] Only when feeling unwell [ ] Never [ ]

27. Do you know your current blood pressure status? Yes [ ] No [ ]

28. Have you ever been told by a healthcare professional that you have high blood pressure (hypertension)? Yes [ ] No [ ] Not sure [ ]

29. If yes, at what age were you diagnosed with hypertension? Under 18 [ ] 18–22 [ ] 23–27 [ ] 28 and above [ ] Not applicable [ ]

30. Are you currently on medication or lifestyle modification for high blood pressure? Yes, on medication [ ] Yes, using lifestyle changes [ ] No treatment [ ] Not applicable [ ]

31. Do you know if any university student in your family has been diagnosed with hypertension? Yes [ ] No [ ] Not sure [ ]

32. Do you experience symptoms like frequent headaches, dizziness, or chest pain? Frequently [ ] Occasionally [ ] Rarely [ ] Never [ ]

33. Do you know any fellow students who have been diagnosed with hypertension? Yes [ ] No [ ] Not sure [ ]

34. Do you believe hypertension is becoming more common among university students? Yes [ ] No [ ] Not sure [ ]

Section E: Determinants of Hypertension Among University Students

35. How often do you engage in physical exercise (e.g., jogging, walking, gym)? Daily [ ] 3–4 times a week [ ] Once a week [ ] Rarely/Never [ ]

36. How often do you consume processed or fast foods? Daily [ ] 3–5 times a week [ ] Occasionally [ ] Rarely/Never [ ]

37. Do you usually add extra salt to your meals? Always [ ] Sometimes [ ] Rarely [ ] Never [ ]

38. How often do you consume sugary drinks or energy drinks? Daily [ ] 3–5 times a week [ ] Occasionally [ ] Rarely/Never [ ]

39. How often do you smoke cigarettes or use tobacco products? Daily [ ] Occasionally [ ] Used to, but quit [ ] Never [ ]

40. Do you consume alcohol? Yes, regularly [ ] Yes, occasionally [ ] No [ ]

41. How many hours of sleep do you get on average per night? Less than 5 hours [ ] 5–6 hours [ ] 7–8 hours [ ] More than 8 hours [ ]

42. How would you rate your level of academic or personal stress? Very high [ ] Moderate [ ] Low [ ] No stress at all

43. Do you have a family history of hypertension? Yes [ ] No [ ] Not sure [ ]

44. Do you regularly monitor your health (e.g., check-ups, blood pressure screenings)? Yes [ ] No [ ]

Section F: Health Promotion Intervention on Hypertension Awareness and Risk Reduction

45. Have you ever participated in any health education or promotion program related to hypertension? Yes [ ] No [ ]

46. What kind of hypertension-related program did you attend? (Tick all that apply) Health seminar/workshop [ ] Peer health education [ ] Posters/flyers or brochures [ ] Online campaigns (e.g., social media, WhatsApp groups) [ ] Blood pressure screening event [ ] None [ ]

47. Where did you receive the information or intervention? School [ ] On social media [ ] At a hospital/clinic [ ] Other (specify): _____

48. Did the program improve your understanding of what hypertension is? Yes [ ] No [ ] Not sure [ ]

49. After the intervention, are you more aware of the risk factors for hypertension? Yes [ ] No [ ] Not sure [ ]

50. Are you now more confident in identifying symptoms and complications of hypertension? Yes [ ] No [ ] Not sure [ ]

51. Do you now understand the importance of regular blood pressure monitoring? Yes [ ] No [ ] Not sure [ ]

52. Have you made any lifestyle changes since attending the health promotion program? (Tick all that apply) Reduced salt intake [ ] Increased physical activity [ ] Reduced or quit smoking/alcohol [ ] Started regular blood pressure checks [ ] Started eating healthier [ ] No changes [ ]

53. Do you now check your blood pressure more frequently? Yes [ ] No [ ] Not applicable [ ]

54. Would you recommend this health promotion program to other students? Yes [ ] No [ ] Not sure [ ]

Measurements

55. Blood Pressure: _____mmHg

56. Height: _____ metres

57. Weight: _____Kilograms

58. BMI: ____ Kilograms per square metre

APPENDIX II

INFORMED CONSENT FORM

TITLE OF STUDY: KNOWLEDGE OF RISK FACTORS AND PREVALENCE OF HYPERTENSION AMONG UNIVERSITY STUDENTS IN BENIN CITY: A CROSS-SECTIONAL STUDY

INSTITUTION: Department of Public Health and Community Medicine, College of Medicine, University of Benin, Benin City, Edo State, Nigeria.

PRINCIPAL INVESTIGATORS: Ojomo Jeremiah Osasere, Okwufulueze Samson

PARTICIPATION: Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue your participation at any time without penalty or loss of benefits. The principal investigator may decide to withdraw you from the study if we are unable to obtain the necessary information.

INTRODUCTION: We are interested in assessing the knowledge of risk factors and prevalence of hypertension among University students in Benin City

PROCEDURES TO BE FOLLOWED

If respondents agree to participate, a Google form containing the questionnaire will be sent to such respondents, and this questionnaire will only assess the knowledge of risk factors and prevalence of hypertension, determinants of hypertension, and assess the effectiveness of health promotion intervention in improving knowledge and reducing the risk of hypertension among University students.

BENEFITS: Participants would contribute to important research that may help improve public health promotion strategies. The results obtained from this research work would help us assess the knowledge of risk factors and prevalence of hypertension among University students in Benin City with the view to contributing to the knowledge base and promoting healthy lifestyle practices among University students.

COMPENSATION: Participants will not receive any compensation for their participation.

DURATION OF PARTICIPATION: This study only requires the questionnaire. There is no follow-up or further information needed.

WHO CAN PARTICIPATE IN THIS STUDY: The study focuses on students of the University of Benin. The participants will be selected from different faculties within the University to ensure representation across various departments.

ASSURANCE OF CONFIDENTIALITY OF VOLUNTEER'S IDENTITY:

Records relating to your participation in the study will remain confidential. Your name will not be used in any report resulting from this study. All questionnaires, computerised records, and analysis of data will contain only a unique study number, not your name.

PERSONS AND PLACES FOR ANSWERS REGARDING YOUR RIGHTS AS A RESEARCH SUBJECT:

If during the course of this study you have questions concerning the nature of the research or you believe you have sustained a research-related injury or assault, you should contact;

Ojomo Jeremiah Osasere
Department of Public Health and Community Medicine, College of Medicine,
University of Benin.
Benin City,
Edo State,

Nigeria.

Phone number: 08151566773

Email: ojomojeremiah@gmail.com

Okwufulueze Ssamson

Department of Public Health and Community Medicine, College of Medicine,

University of Benin.

Benin City,

Edo State,

Nigeria.

Phone number: 09095970021

Email: okwufuluezesamson213@gmail.com

Ethics and Research Committee,

Phone number:

Email: ubthresearchethics@gmail.com

APPENDIX III

ETHICAL APPROVAL

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR
Prof.Darlington E. Obaseki
E-mail: darlobaseki@gmail.com

DIRECTOR OF ADMINISTRATION
Jim Uwadie, Esq

CHAIRMAN
Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
Committee email: ubthresearchethics@gmail.com
Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/ 148654912558

PROPOSAL TITLE: **"KNOWLEDGE OF RISK FACTORS AND PREVALENCE OF HYPERTENSION AMONG UNIVERSITY STUDENTS IN BENIN CITY; A CROSS- SECTIONAL STUDY."**

PRINCIPAL INVESTIGATOR(S): **OJOMO JEREMIAH OSASERE, OKWUFULUEZE SAMSON**

DEPARTMENT/INSTITUTION: **DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.**

DATE CONSIDERED: 13TH MAY 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 29/11/2024 TO 28/11/2025. 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**..... 13/5/2025

SUPERVISOR (S): DR. (MRS) O.E OBARISIAGBON

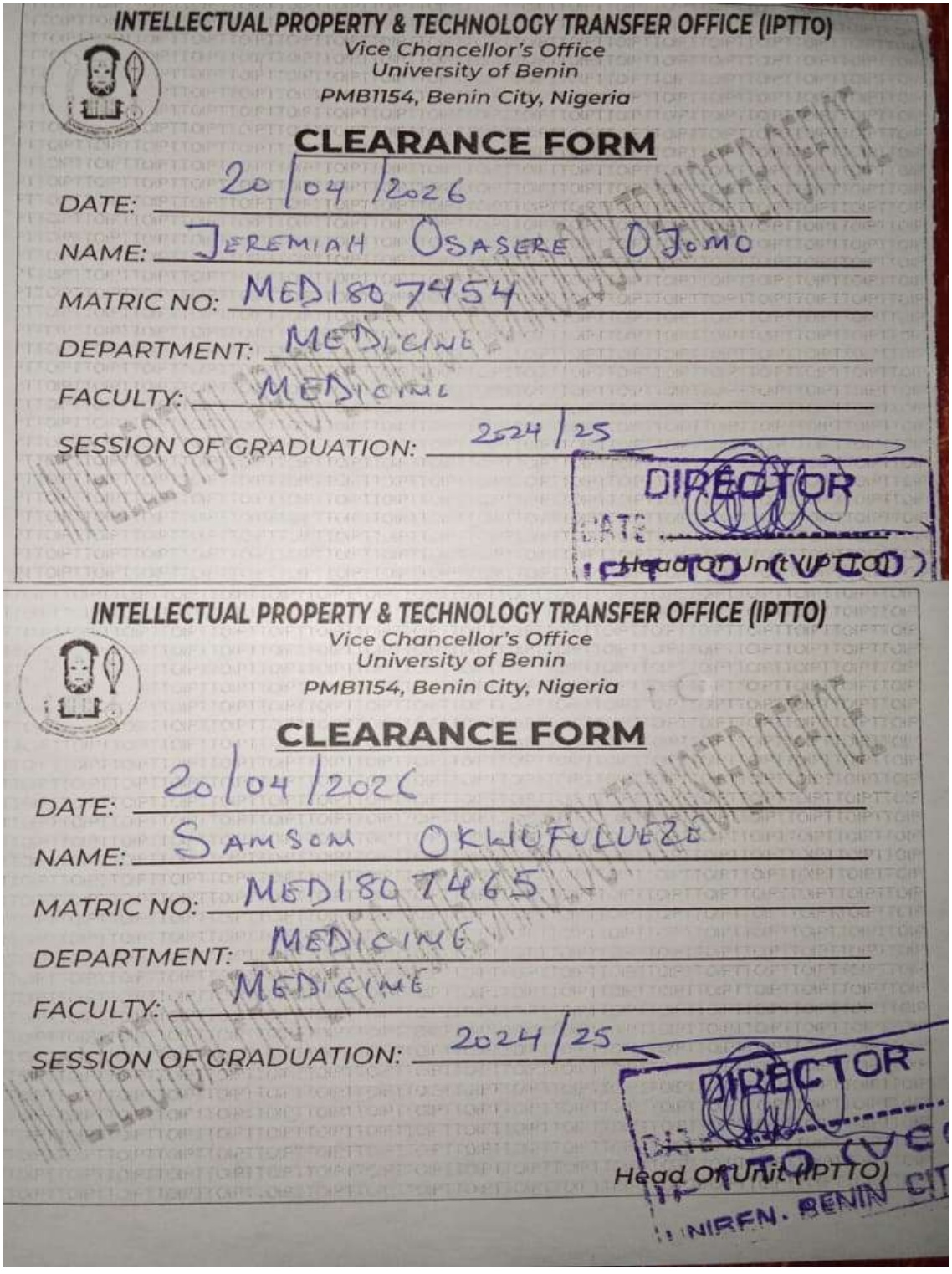
DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval 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..... 17/5/2025

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

APPENDIX IV

PLAGIARISM CLEARANCE FORM



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 20/04/2026
NAME: JEREMIAH OSASERE OJOMO
MATRIC NO: MED1807454
DEPARTMENT: MEDICINE
FACULTY: MEDICINE
SESSION OF GRADUATION: 2024/25

DIRECTOR
DATE
Head Of Unit (IPTTO)

INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 20/04/2026
NAME: SAMSON OKWUFULUEZE
MATRIC NO: MED1807465
DEPARTMENT: MEDICINE
FACULTY: MEDICINE
SESSION OF GRADUATION: 2024/25

DIRECTOR
DATE
Head Of Unit (IPTTO)
NIRFN. BENIN CITY