PREVALENCE AND DETERMINANTS OF FOOD INSECURITY AMONG HOUSEHOLDS IN BENIN CITY

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BEING 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, EDO STATE, NIGERIA

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DEDICATION

This work is dedicated to our families, for their unwavering love, constant prayers, and the immense sacrifices they made to see us through this journey, and to our research participants, whose cooperation and shared experiences made this study possible.

DECLARATION

We hereby declare that this project work titled "Prevalence and determinants of food insecurity among households in Benin City" was conducted under the supervision of **Prof. V.O Omuemu** and has not been submitted anywhere else in part or in full for the award of a degree or certificate.

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CERTIFICATION

This is to certify that this research study titled "Prevalence and determinants of food insecurity among households in Benin City" was carried out by Otomfon-Abasi Godwin Akpan (MED1807366) and Enakpodia Mamuyovwi Akpodono (MED1807367) under the supervision of Prof. Vivian Omuemu in the Department of Public Health and Community Medicine, College of Medical Sciences, University of Benin as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) degree.

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LIST OF ABBREVIATIONS

APP	Agriculture Promotion Policy
ATA	Agricultural Transformation Agenda
ATASP-1	Agricultural Transformation Agenda Support Program Phase One
BIPOC	Black, Indigenous and People of Colour
CAADP	Comprehensive Africa Agricultural Development Programme
CAPIBUS	Computer Assisted Personal Interviewing
ECOWAP	ECOWAS Agricultural Policy
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization
FCS	Food Consumption Score
FIES	Food Insecurity Experience Scale
FCT	Federal Capital Territory
HFIAS	Household Food Insecurity Access Scale
HFSSM	Household Food Security Survey Module
IFAD	International Fund for Agricultural Development
LGA	Local Government Area
NBS	National Bureau of Statistics
NEEDS	National Economic Empowerment and Development Strategy
NGOs	Non-Governmental Organizations
NSPFS	National Special Programme for Food Security (NSPFS)

OFN	Operation Feed the Nation
SES	Socioeconomic Status
SDG	Sustainable Development Goals
SNAP	Supplemental Nutrition Assistance Programme
UBTH	University of Benin Teaching Hospital
UNICEF	United Nations Children's Fund
WAAPP	West Africa Agriculture Productivity Programme
WFP	World Food Programme
WHO	World Health Organization

DEFINITION OF TERMS

Food access: refers to the ability of individuals or households to obtain sufficient quantities of nutritious food.

Food availability: refers to the physical presence of sufficient quantities of food within a region, which includes both the food produced locally and food imported from other areas.

Food insecurity: the condition of not having access to sufficient food to meet ones basic dietary needs.

Food security: when all people at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Food stability: the consistent availability and access to food over time.

Food utilization: refers to the proper use of food, which includes the body's ability to absorb and make use of the nutrients from food.

Moderate food insecurity: the condition wherein, people uncertain of their ability to obtain food are forced to reduce, at times over the year, the quality and/or quantity of food they consume due to lack of resources.

Severe food insecurity: the condition in which, individuals, likely to run out of food, experience hunger and, at the most extreme have gone for days without eating, putting their health and well-being at serious risk.

ABSTRACT

BACKGROUND: Food security is essential for human survival, encompassing consistent access to sufficient, safe, and nutritious food. It is defined by four key dimensions: availability, access, utilization, and stability, all of which must be met simultaneously. Food insecurity arises when these dimensions are compromised, leading to inadequate food access. Globally and in Nigeria, its prevalence remains high, driven by factors such as poverty, population growth, and environmental challenges. Food insecurity is associated with adverse health outcomes, including malnutrition and chronic diseases, and negatively impacts education, productivity, and economic growth.

AIM: The study aimed to assess the prevalence, determinants, knowledge and perception of food insecurity among households in Benin City, Nigeria and the coping strategies adopted.

METHODS: This study employed a community-based descriptive cross-sectional design conducted in Benin City, Edo State, Nigeria, among 500 heads of households. A multistage sampling technique was used to select participants. Data were collected using a pretested, interviewer-administered questionnaire adapted from validated tools, including the Food Insecurity Experience Scale and the Coping Strategies Index. Data analysis was performed using IBM SPSS version 27. Descriptive statistics were presented as frequencies and percentages, while associations were tested using Chi-square or Fisher's exact tests. Logistic regression was used to identify predictors of food insecurity, with significance set at $p < 0.05$. Results were presented in prose, tables and bar charts.

RESULTS: The mean age of respondents was 51.9 ± 11.9 years, with majority within the 45–54 years age group. The majority 403 (80.6%) were males. The prevalence of food insecurity

among households was 383 (76.6%). Food insecurity was higher among respondents aged ≥65 years (86.4%; p = 0.010), married respondents (85.7%; p = 0.004), those with primary education (95.3%; p < 0.001), retired respondents (94.3%; p = 0.017), and those with skill level 2 (85.8%; p < 0.001). It was also higher in households with monthly income ≤ ₦180,000 (84.1%; p < 0.001) and monthly food expenditure ≤ ₦100,000 (82.5%; p < 0.001), and among respondents with good perception of food insecurity (81.5%; p = 0.008). Married respondents had higher odds of food insecurity (OR = 2.135; p = 0.008). Higher education (OR = 0.272; p = 0.017), employment (OR = 0.210; p = 0.012), higher skill level (OR = 0.458; p = 0.001), and home ownership (OR = 0.592; p = 0.040) were associated with lower odds, while increasing number of children increased the odds of food insecurity (OR = 1.236; p = 0.047). Overall, 57.2% of respondents had good knowledge of food insecurity, and 52.0% had a good perception of food security. Knowledge of food insecurity was associated with marital status, where a higher proportion of respondents who were not married had good knowledge (66.4%; p = 0.020). Higher proportions of respondents with monthly household income ≤ ₦180,000 (63.3%; p = 0.003) and those who spent ≤ ₦100,000 on food (61.7%; p = 0.010) had good knowledge of food insecurity. Marital status was associated with lower odds of good knowledge (OR = 0.505; p = 0.007). Higher education increased the odds of good knowledge (OR = 2.351; p = 0.005), while higher skill level reduced the odds of having good knowledge (OR = 0.657; p = 0.036). Perception of food insecurity was associated with level of education, where a higher proportion of respondents with tertiary education had good perception (55.7%; p < 0.001). A higher proportion of respondents with access to a nearby food market also had good perception (55.0%; p < 0.001). Higher education increased the odds of good perception (OR = 3.380; p < 0.001), while access to a nearby food market increased the odds of good perception (OR = 2.777; p < 0.001). Food

insecurity status (OR = 1.880; p = 0.004) and good knowledge of food insecurity (OR = 0.515; p = 0.013) were also associated with good perception of food insecurity. The most common coping strategies included consumption of less preferred foods (64.4%), reduction in portion sizes (57.2%), and reduction in the number of meals per day (54.2%).

CONCLUSION: The study found that about three-quarters of households were food insecure. Marital status, education, employment, skill level, income, food expenditure, number of children, and housing tenure were important determinants. More than half of respondents had good knowledge and about half had good perception, but many households still used coping strategies such as reducing meal frequency and consuming less preferred foods. The findings reflect widespread food insecurity among households in the study area.

KEYWORDS: Food Insecurity, Households, Prevalence, Determinants, Coping Strategies, Knowledge, Perception.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Food is a fundamental necessity for sustaining human life, as it provides energy and nutrients required for cellular metabolism, tissue growth, and overall health. Adequate nutrition ensures the optimal functioning of bodily systems, including the immune system, cardiovascular health, and neurological processes.[1] Food security is defined as a condition that exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.[2] This definition emphasizes not just the availability of food, but also its accessibility, sufficiency and safety. Hence, the concept of food security includes four primary dimensions that are essential for ensuring reliable access to sufficient and nutritious food. These dimensions are: availability, access, utilization, and stability.

Nationally, food availability is determined by a combination of domestic agricultural production, commercial food imports and exports, food aid, and existing food reserves. At the household level, food sources can be either self-produced or purchased from local markets.[3] Food access refers to the ability of individuals or households to purchase or otherwise obtain food, taking into account factors such as income, prices, and social status. [4] Food utilization involves the effective use of accessible food by individuals or households, influenced by factors like food preparation, storage, and hygiene practices.[5] Food stability refers to the ability of households to maintain consistent and reliable access to sufficient, safe, and nutritious food over time, without

significant disruptions.[6] Simply put, it is the stability of the other three dimensions over time. Acquiring food security requires simultaneous fulfillment of all four dimensions.

Food insecurity occurs when individuals or households face limitations in accessing sufficient, nutritious, and safe food in a manner that is culturally and socially acceptable.[7]According to a 2024 report by FAO, approximately 9.2% of the global population is undernourished as of 2023 with about 24% of the global population estimated to be facing moderate or severe food insecurity.[8]According to a regional report on food and nutrition carried out in 13 countries in West Africa, approximately 35.3 million people faced high levels of acute food insecurity in March- May 2024.[9] In 2023, approximately 17.7 million persons across 26 states and the Federal Capital Territory (FCT) were in a crisis to emergency situation of food and nutrition insecurity with 454,444 of them resorting to emergency coping strategies in order to meet their minimum food needs.[10]

Food insecurity is linked to a higher risk of developing chronic health conditions, such as diabetes, obesity, cardiovascular disease, mental health disorders, and chronic diseases.[11] It has also been shown to have a profound impact on children's health, leading to malnutrition, acute respiratory infections, poorer overall health and increasing the risk of developing chronic conditions such as asthma and depression.[12]

Food insecurity also has effects that extend beyond the individual, affecting socioeconomic participation, educational development, and overall economic growth.[13] It can lead to lower engagement in social and economic activities, causing children to miss school and extracurricular activities, which can hinder their educational development.[13]

At the tertiary level, students facing food insecurity are more likely to defer their education due to financial constraints, limiting their ability to obtain qualifications and secure stable employment. It can also impair an individual's ability to engage socially and economically, leading to increased reliance on emergency relief services and reduced productivity.[13, 14]

Furthermore, it can lead to a reduction in purchasing power, diminishing overall economic activity and potentially hindering economic growth.[14] Lastly, food insecurity can threaten political stability within a country.[14] Social unrest and instability can arise when a significant portion of the population faces a lack of access to adequate food, highlighting the potential for widespread societal impact.[14]

The root causes of food insecurity in developing countries like Nigeria are multifaceted. Key factors include: poverty which limits access to food, insufficient national food supplies, political instability, war, trade disruptions, urbanization, environmental degradation and exponential population growth.[15] These interrelated factors exacerbate food insecurity, making it challenging for vulnerable household populations to access nutritious food.

The alarming rise in food insecurity demands swift and robust interventions to mitigate the crisis that is food insecurity and malnutrition nutrition of affected communities. To mitigate food insecurity, the government should implement food and agricultural programs that can ensure year-round availability of nutritious food, as well as invest in initiatives that enhance vulnerable households' access to food and basic needs.[16] Other ways the incidence of food security could be reduced include: provision of essential amenities like clean water and electricity to curb rural-urban migration, population control; provision of processing and storage facilities for agricultural products to ensure year-round food availability, boosting farmers' income and reducing poverty;

and abolition of trade barriers.[17] Food insecurity poses a significant security threat, not only to individual households but also to the country as a whole. Therefore, it is imperative to ascertain the prevalence and determinants of food insecurity among households in Benin City so as to develop strategies to combat this issue.

Several organizations and programs address food insecurity at both global and local levels. Key organizations include: World Health Organization (WHO) which focuses on nutrition and health issues globally, providing guidelines and support for reducing malnutrition; the World Food Programme (WFP) which provides emergency food and nutrition assistance to vulnerable populations and implements programs to combat chronic hunger; International Fund for Agricultural Development (IFAD) which focuses on reducing rural poverty and improving food security through agricultural development projects, particularly in developing countries; Food and Agriculture Organization (FAO) which plays a central role by developing tools like the Food Insecurity Experience Scale (FIES) to measure food insecurity globally this is used to improve food security resource allocation and policy making; and the United Nations Children's Fund (UNICEF).[8,18,19]

Since the 1970s, Nigeria has introduced several key agricultural policies to tackle food insecurity.[20] Major initiatives include "Operation Feed the Nation" (1976), the "Green Revolution" (1982), National Economic Empowerment and Development Strategy (NEEDS) (2004), the Agricultural Transformation Agenda (2011), and the Agriculture Promotion Policy (2016), all aimed at boosting food production, reducing imports, and encouraging private sector involvement.[20,21] The National Special Programme for Food Security (NSPFS) was launched in January 2002 with the objective of increasing food supply, reducing variability in yearly production at national and household levels, and improving access to food.[21] Programs like the

Growth Enhancement Scheme improved input distribution to smallholder farmers, while investments focused on modernizing farming practices, storage, and irrigation. Nigeria also aligns with regional efforts like ECOWAS Agricultural Policy (ECOWAP) and Comprehensive Africa Agricultural Development Programme (CAADP), which promote agricultural growth and increased budget allocation to agriculture.[22]

These organizations work under the Sustainable Development Goals (SDGs) framework, aiming to eradicate hunger and promote sustainable agriculture.[23] The SDG that is directly involved in food security is SDG 2, which is titled 'Zero Hunger'. This goal aims to end all forms of hunger and malnutrition by 2030.[23,24] The targets and indicators within SDG 2 'Zero Hunger' specifically address various aspects of food security, including universal access to safe and nutritious food and ending all forms of malnutrition.[23,24]

1.2 STATEMENT OF THE PROBLEM

Food insecurity remains a global issue with significant consequences, impacting the health and socio-economic stability of households. Globally, food insecurity is a growing concern, with nearly 690 million people suffering from hunger, most of who reside in low- and middle-income countries. In Sub-Saharan Africa, one of the most food-insecure regions, approximately 58% of the population faces food insecurity.[25] In East Africa; urban households are increasingly vulnerable to food insecurity, despite being located in economically active areas, due to poor food distribution and high food prices.[26] At the regional level, food insecurity in Sub-Saharan Africa continues to be influenced by poverty, poor infrastructure, and economic instability. In Rwanda, food insecurity during the COVID-19 pandemic reached alarming levels, particularly among pregnant women, with urban households experiencing heightened food access

challenges.[27] Studies in Nigeria have shown that food insecurity is prevalent across the nation, with urban areas being increasingly affected as the population grows and economic pressures intensify.[28] In Benin City, the prevalence of food insecurity among households has worsened due to the combined effects of rapid urbanization, high food prices, and poor infrastructure. Many households, particularly those in low-income groups, struggle to meet their daily food needs.[28] Studies have shown that in Nigerian urban centers, food insecurity is rising as the cost of living and unemployment rates continue to climb.[18,28] Food insecurity is driven by a variety of factors that affect households' ability to access sufficient and nutritious food. Key determinants include economic vulnerability, poverty, unemployment, inflation, and poor access to food markets.[28] At the global level, food insecurity is often tied to economic instability, with rising food prices and poor market access affecting households' purchasing power.[25] Environmental factors such as climate change also contribute significantly, especially in agricultural regions where crop yields are vulnerable to changing weather patterns.[16] In Sub-Saharan Africa, rural and urban food insecurity is influenced by socio-economic factors, including income inequality and limited access to education.[29] In East Africa, poverty and poor infrastructure, alongside rising food prices, exacerbate food insecurity, especially in urban households that rely on markets for food access.[30]

In Nigeria, the primary determinants of food insecurity in urban areas are poverty, unemployment, and limited income. A study highlights that low-income households in urban areas are particularly vulnerable, as they lack the financial capacity to purchase nutritious food.[30] Additionally, the informal nature of food markets and poor food distribution systems in urban areas hinder access to affordable, high-quality food. In Benin City, households often face a dual burden of food insecurity: not only do they struggle with access to sufficient food, but they also

consume low-quality diets that lack essential nutrients.[28] The consequences of food insecurity are far-reaching, with malnutrition being one of the most significant outcomes. Child malnutrition, including stunting and wasting, is a direct result of inadequate food intake.[29] These conditions not only impact physical growth but also cognitive development, leading to long-term educational and health consequences for children. In Benin City, food insecurity also leads to increased vulnerability to diseases, as malnourished individuals have weaker immune systems.[28] Knowledge of food insecurity, both in terms of understanding the problem and awareness of its broader implications, varies significantly across global, regional, and local contexts. Globally, awareness of food insecurity has grown due to international campaigns and efforts by organizations like the FAO. However, many households still lack a clear understanding of what constitutes food insecurity and its far-reaching consequences.[25] In many rural areas, food insecurity is often perceived as merely a lack of food, without considering the nutritional quality or the long-term impacts on health and well-being. In Sub-Saharan Africa, there is a growing recognition of the links between food insecurity and poor health, but knowledge about the full scope of food insecurity remains limited in many communities. Studies have shown that while there is awareness about food shortages, the understanding of food insecurity as a multi-dimensional issue (including nutrition, affordability, and access) is still lacking.[29] In Benin City, there is a general lack of awareness about the extent of food insecurity, as many urban households do not consider themselves food insecure, despite struggling with poor diets.[29] A study notes that misconceptions about food security—such as assuming that access to food is solely about quantity—result in an underestimation of the severity of the issue.[30] The knowledge gap in Benin City contributes to the lack of effective interventions and underreporting of food insecurity issues by both households and local authorities.[28]

Perception of food insecurity varies widely between global, regional, and local levels. Globally, food insecurity is often perceived as a crisis, particularly in the context of emergency situations like famine or droughts. However, in many low-income regions, food insecurity is perceived as a persistent, underlying issue that affects daily life but is often normalized by those who experience it. In Sub-Saharan Africa, food insecurity is frequently viewed as a rural issue, with urban food insecurity being underestimated despite increasing rates in cities.[26] In Nigeria, food insecurity is often perceived as an issue primarily faced by rural communities, with urban food insecurity being largely invisible. Many urban dwellers, including those in Benin City, may not view their struggles with food access as a serious problem, particularly if they are able to obtain some form of food each day, even if it is nutritionally inadequate.[28] This perception can hinder efforts to address food insecurity, as both households and policymakers may not fully recognize the severity of the issue.

Households facing food insecurity often adopt coping strategies to mitigate the impact of limited resources. These strategies may include reducing food intake, diversifying diets, substituting expensive foods with cheaper alternatives, and even skipping meals.[30] In Sub-Saharan Africa, coping strategies also include seeking assistance from family members or relying on informal food markets. While these strategies can provide temporary relief, they often have negative long-term effects on health and nutrition.[29] In Benin City, coping strategies are largely shaped by the informal food systems and limited social support networks available to urban households. Many low-income households rely on informal markets for food, where prices fluctuate unpredictably.[66] Some households may engage in unhealthy coping mechanisms, such as purchasing low-quality, nutrient-poor foods, or skipping meals to save money.[28] These coping

strategies, while adaptive in the short term, do not address the underlying causes of food insecurity and can exacerbate long-term health problems.

1.3 JUSTIFICATION OF STUDY

Food insecurity is a significant global and regional challenge, and understanding its root causes and effects is crucial for formulating effective interventions. As Nigeria continues to grapple with food insecurity, local contexts such as Benin City provide an important lens through which to examine the dynamics of this issue. The justification for studying food insecurity among households in Benin City is based on several factors, ranging from the socio-economic conditions of urban households to the lack of comprehensive local data on the drivers and consequences of food insecurity.

Globally, food insecurity affects millions, with a disproportionate burden on low-income and rural communities, but urban areas, particularly in sub-Saharan Africa, are increasingly experiencing high levels of food insecurity.[26] In Benin City, the capital of Edo State in Nigeria, food insecurity is a growing concern. The city's urban poor, including informal workers, face challenges such as economic instability, high unemployment, and limited access to affordable nutritious food. Understanding the scope of food insecurity in this urban context is vital because many studies focus primarily on rural areas, neglecting the unique challenges faced by urban households.[31]

In Nigeria, food insecurity is driven by multiple factors including low household income, unemployment, inflation, and climate-related issues such as flooding and drought.[30] As the cost of living continues to rise in urban centers like Benin City, food security becomes an even greater challenge. Given the Increasing prevalence of food insecurity in urban Nigeria, it is

critical to assess how these factors specifically affect households in Benin City, as they may vary from those affecting rural populations. Research in urban areas, including studies on pregnant women and vulnerable populations, has shown that factors such as household income, education level, and access to food markets significantly contribute to food insecurity.[28,32] In particular, food insecurity has direct consequences on maternal and child health, making it essential to understand these dimensions at the household level. Furthermore, the perception of food insecurity in urban areas like Benin City is often shaped by the fluctuations in food prices and limited access to quality food sources. Many residents may not fully recognize the severity of food insecurity, often perceiving it only as a temporary issue, which affects their coping strategies and ability to seek long-term solutions.[29] Moreover, Benin City faces particular challenges in terms of inadequate infrastructure and transportation, which impact food distribution and availability. The growing urban population, coupled with inefficient food distribution systems, exacerbates the food insecurity problem in the city.

Previous studies on food insecurity in Nigeria and sub-Saharan Africa have largely focused on rural settings, such as the Kano River Irrigation Project[30] or on broader national trends. The dearth of focused research on food insecurity in urban centers like Benin City highlights the need for a localized study that can address the unique socio-economic and environmental challenges of the city. This gap in knowledge prevents policymakers and local stakeholders from formulating tailored solutions to address food insecurity in urban Nigeria.

Furthermore, understanding the coping strategies employed by households in Benin City is critical in this context. Coping strategies, such as relying on informal markets, reducing food consumption, or shifting to less nutritious diets, can often exacerbate the long-term consequences

of food insecurity.[29] Identifying these strategies is crucial to addressing both the immediate and long-term impacts of food insecurity on health and nutrition.

This study aims to address this knowledge gap by investigating the prevalence and determinants of food insecurity among households in Benin City. The findings of this study will provide valuable insights for policymakers, practitioners, and other stakeholders seeking to improve food security and nutrition outcomes in Benin City. Specifically, this study will provide estimates of the prevalence of food insecurity among households in Benin City, identify the socioeconomic and demographic determinants of food insecurity among households in Benin City, assess knowledge and perception of food insecurity among households and investigate the coping strategies adopted by households in Benin City to address the problem of food insecurity. The findings of this study will contribute to the development of evidence-based policies and interventions to address food insecurity in Benin City. Ultimately, this study aims to improve the food security and nutrition outcomes of households in Benin City, and contribute to the achievement of the Sustainable Development Goals (SDGs 2,3&12) related to food security and nutrition.

1.4 RESEARCH QUESTIONS

1. What is the prevalence of food insecurity among households in Benin City?
2. What are the determinants of food insecurity among households in Benin City?
3. What is the knowledge of food insecurity among households in Benin City?
4. What is the perception of food insecurity among households in Benin City?
5. What are the coping strategies adopted by households in Benin City?

1.5 RESEARCH OBJECTIVES

1.5.1 General Objectives

To assess the prevalence and determinants of food insecurity among households in Benin City

1.5.2 Specific Objectives

1. To assess the prevalence of food insecurity among households in Benin City
2. To ascertain the determinants of food insecurity among households in Benin City
3. To assess the knowledge of food insecurity among households in Benin City
4. To assess the perception of food insecurity among households in Benin City
5. To ascertain the coping strategies adopted by households in Benin City

CHAPTER TWO

LITERATURE REVIEW

Understanding the concept of food insecurity involves moving beyond a narrow focus on food production to encompass a more comprehensive understanding of the multiple pillars that determine whether individuals and households have consistent access to sufficient, nutritious food.[2] The FAO definition of food security rests on four pillars: food availability, food access, food utilization, and food stability over time.[2] These pillars and the factors that affect them are important in assessing and addressing food insecurity.[33] Food availability refers to the physical presence of food in a given area, region, or country.[3] It is determined primarily by domestic agricultural production, food imports, food aid, and the functioning of food distribution systems.[3] Food availability in rural areas rely heavily on the productivity of the smallholder farmers which is often hindered by limited resources such as seeds and fertilizers.[33] National agricultural policies, investments in rural infrastructure, and access to global markets influence the scale and efficiency of food production and distribution.[33] Food availability alone does not ensure food security as countries may have sufficient aggregate food supplies but still face widespread household food insecurity due to unequal access or poor food distribution. In many low- and middle-income countries, post-harvest losses, inadequate storage facilities, and inefficient transportation networks can significantly reduce the effective availability of food, especially in remote and rural areas.[3,33] Additionally, climate change has emerged as a critical threat to food availability, with changing rainfall patterns, increased frequency of extreme weather events, and rising temperatures undermining crop yields and livestock productivity.[33]Food access encompasses both economic and physical dimensions of the ability to acquire sufficient food.[34] Economic access refers to the purchasing power of individuals and households, which is

influenced by income levels, employment opportunities and food prices.[34] Physical access includes the geographic and infrastructural factors that determine whether individuals can reach markets or food distribution points.[34] Food price volatility disproportionately affects low income households, who lack the financial buffers to absorb sudden increases in the cost of staple foods.[33,34] Rural households may face additional barriers due to underdeveloped road networks or lack of public transportation.[33] Food utilization refers to the biological use of food by the body, which depends not only on dietary intake but also on an individual's health status, sanitation conditions, and knowledge of food preparation and nutrition.[5] A household may have access to sufficient quantities of food, but if that food lacks diversity, essential nutrients, or is contaminated, it may not support adequate nutritional outcomes.[35] Under nutrition and micronutrient deficiencies are often a consequence of poor food utilization, particularly among children and pregnant women.[35] Furthermore, diseases such as diarrhea, intestinal parasites, and respiratory infections can impair nutrient absorption and exacerbate the effects of food insecurity.[35] Food safety is another important component of utilization as inadequate refrigeration, unsafe storage, and unhygienic cooking practices can lead to foodborne illnesses, which reduce the body's ability to derive energy and nutrients from food.[35] Food stability underscores the importance of having consistent access to food over time.[6] A household or population may be food secure at a given period but vulnerable to future food insecurity due to external shocks, chronic stressors, or seasonal fluctuations.[6] Stability is affected by factors such as economic volatility, climate variability, political instability, and conflict.[36] Wars and political crises disrupt food production, displace populations, destroy infrastructure, and restrict humanitarian access. Similarly, climate-related disasters such as droughts and floods can have lasting effects on food systems and stability.[36]

The pillars of food security are influenced by a wide range of determinants, which can be broadly categorized as economic, environmental, and socio-political.[37] Economic factors such as poverty, unemployment, and inflation are among the most significant drivers of food insecurity, primarily affecting the access dimension.[37] High food prices reduce purchasing power, especially for low-income households that spend a significant portion of their income on food.[37] Environmental factors including climate change, land degradation and water scarcity affect food availability and stability.[36] Agricultural yields are particularly sensitive to extreme weather events such as droughts and floods, which are becoming more frequent and intense due to climate change.[36]

Measuring food security is challenging due to its multidimensional nature. Different tools have been developed to assess each of the pillars at the individual, household, and national levels.[38] At the household level, commonly used tools include: the Household Food Insecurity Access Scale (HFIAS), which assesses access-related experiences such as anxiety about food supply, dietary diversity, and food shortages over a recall period.[39] The Food Insecurity Experience Scale (FIES), developed by the FAO, uses a set of standardized questions to capture individuals' experiences of food-related hardship.[40] The Coping Strategies Index (CSI), which measures the frequency and severity of behaviors that households adopt when they do not have enough food or money to buy food.[41] The Household Dietary Diversity Score (HDDS), which captures the number of food groups consumed over a reference period and reflects the quality and variety of diet.[42] At the individual level, anthropometric indicators such as stunting, wasting, and underweight in children under five years are widely used to assess nutritional outcomes.[38] The Minimum Dietary Diversity for Women (MDD-W) is also employed to evaluate micronutrient adequacy among women of reproductive age.[43]

Food insecurity is a global issue with far-reaching implications for health, economic development, and social stability. Over the years, various international and national policies have been formulated to address this challenge.[24] At the global level, initiatives such as the UN SDG 2 (Zero Hunger), the FAO's strategies, and the CAADP have guided efforts to reduce hunger and promote food security through coordinated agricultural development, nutrition improvement, and poverty reduction strategies.[23] The Food Insecurity Experience Scale (FIES) is a method developed by the UN FAO to provide an internationally comparable estimate of the severity of food insecurity.[44] It is used as the specified measure for a Sustainable Development Goal indicator.[44]

The FIES consists of eight questions about respondents' access to adequate food in the last 12 months due to a lack of money or other resources.[44]The number of positive responses given by an individual is used to classify them into four categories of food security experience: food secure, mildly food insecure, moderately food insecure, and severely food insecure.[19, 44] This scale allows for meaningful comparisons of food insecurity between countries.[19, 44]

In Nigeria, successive governments have implemented multiple policies aimed at enhancing food availability, access, and affordability.[20] Key programs such as OFN, the Green Revolution, ATA, and APP have focused on increasing agricultural productivity, strengthening value chains, and reducing dependence on food imports.[20] Additionally, Nigeria's participation in regional initiatives like the ECOWAS Agricultural Policy (ECOWAP) further underscores its commitment to tackling food insecurity through multi-sectorial collaboration.[22]

OFN aimed to boost food production by encouraging individuals to engage in farming activities.[45] The policy sought to reduce dependence on food imports and achieve self-

sufficiency.[45] While it raised awareness about agriculture, its impact was limited due to inadequate infrastructure and support for farmers. [45]

The Green Revolution Programme focused on increasing food production through mechanized farming and the use of high-yield crop varieties to ensure food security in Nigeria.[46] Despite its ambitious goals, the program faced challenges such as poor implementation and lack of continuity, leading to suboptimal outcomes. [46]

ATA aimed to revitalize Nigeria's agriculture by promoting value chain development, improving market access, and encouraging private sector investment.[47] The Agricultural Transformation Agenda Support Program Phase One (ATASP-1) was part of this initiative, focusing on enhancing food and nutrition security, creating jobs, and improving rural infrastructure.[47]

The APP, also known as the Green Alternative, aimed to build on the successes of ATA by addressing gaps such as input supply, storage, and transportation.[24]The policy focused on improving productivity, reducing post-harvest losses, and enhancing market access for farmers. [24]

At the regional level, Nigeria is a signatory to ECOWAP, which seeks to promote agricultural development and food security across West Africa.[48] Key programs under ECOWAP include: West Africa Agriculture Productivity Program (WAAPP) which is aimed at improving agricultural productivity through research and technology dissemination; ECOWAS Rice Offensive which is focused on increasing rice production to achieve self-sufficiency in the region by 2025 as well as the ECOWAS Regional Food Security Reserve which was established to provide food assistance during crises, enhancing the region's capacity to respond to food emergencies.[48]

This chapter aims to review existing literature on the prevalence and determinants of food insecurity. It explores global and national perspectives, including the policies and strategies that have been implemented to address food insecurity. The chapter also highlights key findings from previous studies and identifies gaps that this research seeks to address.

2.1 PREVALENCE OF FOOD INSECURITY AMONG HOUSEHOLDS

A cross-sectional study was conducted in February 2019 to assess the prevalence of food insecurity in the United Kingdom using the FIES. This study involved 2000 adults. The data was collected through face-to-face Computer Assisted Personal Interviewing (CAPIBUS). The sampling method used was a form of random location sampling, designed to ensure geographical spread and demographic representation to achieve a nationally representative sample. The study showed that severe food insecurity was reported by 3% of the sample population and the indication of some degree of food insecurity was reported by 14.2%. The study employed the UN FAO Food Insecurity Experience Scale, which is a significant strength as it provides internationally comparable estimates of food insecurity. The use of the Rasch model further ensures the reliability and validity of the measure.[44]

A multi-site analysis study was conducted to assess the prevalence of food security over different United States study sites throughout the COVID-19 pandemic in 2020 and 2021. This study was carried out across 15 states and nationally over the first year of the COVID-19 pandemic and the sample size was 27,168. The study utilized three different sampling methods which include convenience sampling (in partnership with community organizations, social media, and news media), quota sampling (administered by Qualtrics) and quota or convenience sampling (targeting high-risk populations such as low-income individuals). Data collection was via a validated survey instrument, known as the NFACT Survey Version and 2.0 which included

questions on food access, food security, food purchasing, food assistance program participation, dietary intake and socio-demographic characteristics. Overall, the results showed that the prevalence of food insecurity was higher since the COVID-19 pandemic compared to before the pandemic. Food insecurity prevalence across study sites during the COVID-19 pandemic ranged from 10.8% in a Central/Upstate New York convenience survey to 73.9% in a New York City high-risk survey. The prevalence of Black, Indigenous and People of Colour (BIPOC) food insecurity during the COVID-19 pandemic was 40.2% for convenience surveys and 55.1% for high-risk surveys. Food insecurity increased among households with children with the overall highest prevalence of 69.3% food insecurity among households with children in an Utah survey focused on Supplemental Nutrition Assistance Programme (SNAP) participants. The online administration of surveys may have introduced selection bias. By limiting respondents to those with computer skills and internet access, the study might have underrepresented certain vulnerable populations, such as some elderly individuals, low-income households, and those living in rural areas with unreliable internet access.[49]

A systematic review study was carried out between March 2020 and October 2022 across 12 countries in Sub-Saharan Africa to assess the prevalence of household food insecurity in Sub-Saharan Africa (SSA) during the COVID-19 pandemic. The countries in the study include: Benin, Ghana, Uganda, Mali, Liberia, Kenya, Rwanda, Ethiopia, Nigeria, Namibia, Tanzania and Zimbabwe. The systematic review included a total of 29 publications from 12 countries. The sample sizes of the individual studies included in the review ranged from 113 to 14,942 participants with The FIES and the Household Food Insecurity Access Scale (HFIAS) being the most frequently used instruments for assessing food insecurity. The results of this systematic review indicate that household food insecurity is a significant issue in Sub-Saharan Africa with

the prevalence of household food insecurity ranging from 11.2% to 98.8% with the average rate of 53.7% across the studies. Based on two FAO reports, the rates of food insecurity for 2020 and 2021 were 56.8% and 66.2% respectively. Results also showed that there was a notable difference in food insecurity levels between rural (46.6%) and urban (63.9%) dwellers between 2020 and 2022. The study employed a systematic review methodology with clear inclusion and exclusion criteria for selecting papers allowing for a comprehensive overview of the prevalence and associated factors of food insecurity in SSA during a specific period.[50]

A community-based cross-sectional study was implemented in Ghana using in-person data collection from household heads in 2022 to assess household food insecurity, living conditions, and sense of security among Burkina Faso refugees currently residing in the Upper East region of Ghana. Study data was collected from 498 refugee households. The data collection tools used included adapted questionnaires and the validated USAID HFIAS module. The results of the study revealed that 100% of the surveyed households experienced food insecurity. Of these, 95.2%, were defined as experiencing moderate or severe food insecurity, and 70.4% were classified as having severe food insecurity. The study considered various factors beyond just food availability, including living conditions and sense of security, offering a more holistic understanding of the situation. The data collection process appears to have been conducted with sensitivity towards the vulnerable population as survey questions were verbally administered in the local dialect to accommodate low literacy rates.[51]

A systematic review was carried out in 2023 to assess scientific research papers that claim to examine food insecurity in Nigeria and present a broad picture of the prevalence and severity of food insecurity in Nigeria as highlighted in these scholarly articles. The location of the studies included in the review covered various parts of Nigeria, across its six regions. Notable states

with the highest number of food insecurity studies using primary data were Oyo, Ogun, and Enugu. Seventy-nine studies were reviewed. Eighteen used the HFIAS module to investigate food insecurity status; thirteen used the recommended daily calorie requirement approach; twelve employed the Household Food Security Survey Module (HFSSM); ten used the food insecurity index; seven used the FIES; two used the Food Consumption Score (FCS); and the others employed focus group discussions and key informant interviews. The reported prevalence of food insecurity varied widely across the studies, ranging from 12% to 100%, depending on the instrument and the population group studied. Some studies reported very high prevalence rates, with eight studies indicating food insecurity above 90%. A significant weakness identified by the review is the diversity and lack of standardization in the tools used to measure food insecurity. This inconsistency makes it challenging to compare findings across different studies and to obtain a clear and accurate national picture of food insecurity.[52]

A cross-sectional study was carried out in Ibadan in 2023. The aim of the study was to assess the prevalence of household food insecurity among households with under-five children in slum communities in Ibadan, Nigeria. The study involved a sample of 1,027 under-five children and their caregivers in urban and rural slums in Ibadan. The data collection tools used included an electronic interviewer-administered and semi-structured questionnaire. The study utilized the WHO modified cluster sampling technique to select houses in the slum areas. The study showed that 19.0% of households had food insecurity, while 81.0% had food security. This difference was statistically significant (Chi-square = 103.364, $p < 0.001$). Food insecurity was more prevalent in urban slums (93.2%) compared to rural slums (68.3%). The study utilized a large sample size of 1,027 under-five children and their caregivers, which enhances the generalizability of the results to the slum population in Ibadan.[53]

A cross-sectional study was conducted to determine the prevalence and factors associated with household food insecurity in Egor Local Government Area, Edo State, Nigeria in 2012. The data was collected using the HFIAS through interviewer-administered questionnaires. The sample size comprised 416 households selected via a multi-stage systematic random sampling method. The study found that the prevalence of food insecurity among the households studied was 61.8%. Further breakdown using the HFIAS showed the distribution across different categories of severity: 38.2% of the households were classified as food secure, 7.9% were mildly food insecure, 12.8% were moderately food insecure and 41.1% of the households were classified as severely food insecure. The study utilized a descriptive, cross-sectional design which is suitable for determining prevalence and identifying associations at a specific point in time.[54]

2.2 DETERMINANTS OF FOOD INSECURITY AMONG HOUSEHOLDS

A cross-sectional study conducted in China in 2020 sought to assess household food insecurity city of Wuhan during the COVID-19 epidemic period and investigate its determinant factors. The study collected valid data from 653 households in Wuhan via an online interview questionnaire which consisted of six parts, including a modified HFIAS. It assumes that the pattern of dissemination of the questionnaires was similar to a random or snowball sampling technique. The study highlights that pre-existing socio-demographic factors such as housing ownership (which 77% of households had) and local household registration (which 74% of households had) played a protective role against food insecurity. Conversely, the lockdown duration (affecting the entire surveyed population) and negative income shocks (experienced by 50% of households) were significant factors contributing to increased food insecurity. The study comprehensively investigated a range of socio-demographic characteristics, lockdown-related

factors, expenditure patterns, and food purchase methods as potential determinants of household food insecurity.[55]

A cross-sectional study was done to analyze the factors that determine food insecurity in households in the rural area of the Paute River Basin, Ecuador between 2018 and 2020. The data was collected using a survey questionnaire applied directly to households and the sample size was 321 households. The sampling technique used was stratified random sampling. The research identified several factors influencing food insecurity. Larger housing size (odds ratio = 0.7846) and access to food security information (odds ratio = 0.5714) were associated with lower odds of food insecurity. Conversely, consuming saved seeds was linked to higher odds. Older age of the head of household was also a protective factor. In terms of employment, being a self-employed agricultural worker (odds ratio = 2.5998) correlated with higher odds of food insecurity, while cultivating corn (odds ratio = 0.5048) was associated with lower odds. Having primary education (odds ratio = 0.3737) or secondary education (odds ratio = 0.3401) also suggested lower odds of food insecurity compared to no education.[56]

A cross-sectional study was conducted in Botswana and South Africa in 2021 to investigate the state and determinants of household food security in South Africa and Botswana. The primary data collection tool was a semi-structured questionnaire and data was collected from 2063 households in total: 506 in Botswana and 1557 in South Africa. The sampling technique employed was a stratified random sampling procedure. The results showed that female-headed households (73.1%) were found to be more food insecure than male-headed households (58.3%). Based on race, the study showed that 69.7% of black households, 59.5% of coloured households and 4.3% of white households were severely food insecure. On education of household head, it showed that higher educational qualifications of the household head increased the chances of

being food secure compared to having no formal education (75.7% of households whose heads had no education were severely food insecure). Higher total income was also significantly associated with increased household food security. A larger household size was found to be a significant determinant of increased food insecurity in both Botswana and South Africa. The linear regression analysis showed that for South Africa, a one-unit increase in household size was associated with a 0.129 increase in the HFIAS score (indicating greater food insecurity). For Botswana, a one-unit increase in household size was associated with a 0.127 increase in the HFIAS score. Better access to socio-economic infrastructure was associated with reduced food insecurity in both countries. In South Africa, a one-unit increase in SEI access was associated with a -0.450 decrease in the HFIAS score (indicating greater food security). In Botswana, a one-unit increase in SEI access was associated with a -0.319 decrease in the HFIAS score. The limitation of this study is the sampling technique which does not provide detailed criteria for how households were categorized as 'poor', 'better off', and 'developed'. This lack of clarity could introduce some subjectivity in the sampling process. Additionally, in South Africa, the majority of participants in the Buffalo City metropolitan municipality resided in informal settlements. While this provides valuable insight into food insecurity in these vulnerable urban areas, it might not be fully representative of the food security situation across all urban settings in South Africa.[57]

A repeated cross-sectional study was conducted to analyze the determinants of food insecurity in households in Uganda during the COVID-19 lockdown between March 2020 and December 2021. The data was collected using high-frequency phone surveys (HFPS) applied to households, and the sample size was 15,032 households. The sampling technique used was not specified. The study showed that households that did not produce enough food saw an increase of 9.20

percentage points in the likelihood of reporting not having enough food to eat, the inability to buy food increased the likelihood of not having enough food by 3.58 percentage points, a reduction in household income contributed an increase of 1.06 percentage points for households whose income was reduced, limited ability to access food markets increased the probability of food insecurity by 2.22 percentage points and the inability to stock enough food increased the rate of food insecurity by 3.59 percentage points. For households with over 8 persons, the food insecurity indicator related to 'ate few kinds of food' increased by 0.68 percentage points. In female-headed households, the indicator 'ran out of food' increased by 4.07 percentage points. The analysis is based on a substantial sample of 15,032 households, providing a comprehensive view of food security during a critical period. While the study covers a diverse sample, findings may not be directly generalizable to other contexts or regions in Uganda outside the sample. Regional differences in agricultural practices, cultural norms, and socioeconomic conditions could impact food security differently.[58]

A cross-sectional study was conducted to investigate household food security and its determinants in agrarian communities of Southeastern Nigeria. The study was carried out in January 2020, specifically within Imo and Anambra States, focusing on four local government areas: Ohaji/Egbema, Oguta, Ogbaru, and Anambra East. The data was collected using structured questionnaires administered to household heads, and the sample size consisted of 400 households. The sampling technique used was a combination of stratified and random sampling methods to ensure representation across different categories within the communities. Unmarried households were found to be more food secure (coefficient: -0.347). Higher education levels were positively associated with food security (coefficient: 0.540). Increased monthly income significantly improved food security (coefficient: 1.719). A lower number of dependents in the household

enhanced food security (coefficient: -3.385). Increased distance to markets negatively affected food security (coefficient: -0.880). While the findings provide valuable insights for Southeastern Nigeria, the results may not be applicable to other regions of Nigeria or countries with differing socio-economic conditions and agricultural practices.[59]

A cross-sectional study was conducted to investigate food insecurity and its drivers in agrarian communities of rural Oyo State, Nigeria. The study was carried out from January to March 2020, specifically focusing on five local government areas: Egbeda, Ona-Ara, Ido, Afijio, and Oyo East. The data was collected using structured, interviewer-administered questionnaires which were interpreted to Yoruba for the respondents, and the final sample size consisted of 211 farming households. The sampling technique used was a multi-stage sampling procedure involving purposive sampling of Oyo State, random selection of the five LGAs, selection of 13 villages, and finally, random selection of farming households. Results showed that a unit increase in age of the household head increased the likelihood of the household being food secure by 0.3%, mildly food insecure by 0.1%, or moderately food insecure by 0.5%. Conversely, it reduced the likelihood of the household being severely food insecure by 0.89%. Being male headed increased the probability of the household being food secure, mildly food insecure, or moderately food insecure but reduced the probability of the household being severely food insecure by 27.96%. A unit increase in access to health care services reduced the probability of the household being food secure by 6.2%, mildly food insecure by 2.6%, or moderately food insecure by 0.9%, consequently increased the probability of the household being severely food insecure by 19.7%. A unit increase in farm size increased the likelihood of the household being food secure by 2.6 percent, mildly food insecure by 1.1 percent, or moderately food insecure by 4.5 percent, while reducing the probability of the household being severely food insecure by 8.2

percent. The study recommends promoting nutrition training (especially for women), prioritizing education, increasing non-farm income opportunities, improving extension service delivery, and providing rural infrastructural facilities. These recommendations align with the need for multi-faceted interventions to address the complex issue of food insecurity.[60]

A cross-sectional study was conducted to determine the prevalence and factors associated with household food insecurity in Egor Local Government Area, Edo State, Nigeria in 2012. The data was collected using the HFIAS through interviewer-administered questionnaires. The sample size comprised 416 households selected via a multi-stage systematic random sampling method. The study showed that lower education status was a significant factor (P = 0.001). 70.0% of households with heads having no formal education were severely food insecure, compared to 25.8% of those with heads having tertiary education. Multiple regression analysis further supported this, showing that higher educational status was significantly associated with food security [adjusted odds ratio = 2.68 (95%CI = 1.26 to 4.38), P=0.004]. Lower household income was also a significant determinant (P = 0.001). Households with lower income levels were significantly associated with being severely food insecure. The proportion of food secure households significantly increased with rising monthly income, from 13.3% among those earning less than ₦20,000 to 83.6% among those earning over ₦100,000. Correspondingly, the highest proportion of severely food insecure households was among those earning less than ₦20,000 (63.3%). Multiple regression analysis confirmed that higher household income was significantly associated with food security [adjusted odds ratio = 10.89 (95%CI = 3.36 to 81.50), P=0.001]. The study utilized a descriptive, cross-sectional design which is suitable for determining prevalence and identifying associations at a specific point in time.[54]

2.3 KNOWLEDGE OF FOOD INSECURITY AMONG HOUSEHOLDS

A cross-sectional online questionnaire survey using convenience sampling and snowball sampling technique done in 2021 investigated how socio-demographic factors influence consumers' knowledge, attitude, and perception of food security and its relation to the COVID-19 pandemic's impact on household food security from 237 consumers from 9 Caribbean Small Island Developing States (CSIDs) including Trinidad and Tobago, Barbados, Jamaica, Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines. The study found that 84.8% of consumers in Caribbean Small Island Developing States demonstrated a high level of knowledge about food security, with socio-demographic factors such as female sex, higher education, and higher household income influencing knowledge, attitude (51.3% positive), and perception (55.7% positive) of food security during the COVID-19 pandemic. This study fills a gap in the existing literature by investigating food security in CSIDs during the COVID-19 pandemic. However, its findings are limited by its cross-sectional design, reliance on self-reported data, and non- representative sampling methods, which may restrict generalizability and causality inferences.[61]

In a 2019 cross-sectional survey that assessed household food security among 400 urban households in Lagos State, Nigeria, using a random sampling technique and a structured questionnaire, found a significant proportion of households were food insecure despite the region's economic prosperity, with limited knowledge of food insecurity's long-term effects and coping strategies. While this study provides valuable insights into urban food insecurity, its limitations include a cross-sectional design, urban focus, reliance on self-reported data, and lack of detailed demographic information, ultimately contributing to understanding food insecurity in urban Nigeria and informing interventions to improve food security in the region.[62]

The dearth of knowledge especially at the local level regarding food insecurity persists due to complex causes, severe consequences, and significant knowledge gaps, necessitating rigorous research, improved data collection, policy strengthening, and collaboration to effectively address this pressing global issue.[52]

2.4 PERCEPTION OF FOOD INSECURITY AMONG HOUSEHOLDS

In a cross-sectional study which was conducted in 2021 in two medium-sized Brazilian municipalities, Ouro Preto and Mariana, with 475 households using a telephone survey and a questionnaire that included the Brazilian Food Insecurity Scale (EBIA) to assess the perception of the food environment and its association with food insecurity in households of Brazilian schoolchildren during the COVID-19 pandemic, the study found that a negative perception of the quality and price of fruits and vegetables was associated with moderate or severe food insecurity, and food-insecure households face more obstacles in accessing healthy foods, particularly in terms of affordability. The study provided insights into food insecurity and its association with the food environment during the COVID-19 pandemic and it used a validated instrument (EBIA) to measure food insecurity as well as highlighting the importance of affordability and accessibility of healthy foods in reducing food insecurity. However, the cross-sectional design limits the ability to establish causality between the perceived food environment and food insecurity, the study relies on self-reported data, which may be subject to bias, the sample size may not be representative of the entire Brazilian population, limiting the generalizability of the findings and the study did not assess physical accessibility to food stores, which may be an important factor in food insecurity. Overall, the findings emphasize the need for policies and interventions that promote affordable and accessible healthy food options to reduce food insecurity.[63]

In a 2016 cross sectional survey using Osun and Oyo states, Nigeria, as representative samples of the South West States, using interviewer-administered structured questionnaire to collect primary data from 161 households selected through multistage random sampling, aiming to investigate food insecurity risks perception and management strategies among households, found that 87.6% of households experience food insecurity risks, with exceptional price hikes (95%) and lack of cash to buy food (72.2%) being significant risks, while household size, food market distance, number of unemployed members, and total household monthly income significantly influence food insecurity risks perception. The study's key strengths include providing valuable insights into food insecurity risks perception and management strategies among Nigerian households, informing policies and programs to address food insecurity and highlighting the importance of understanding underlying factors contributing to household food insecurity. The study's limitations include a relatively small sample size that may limit generalizability, a focus on specific Nigerian states that may not be nationally representative, a cross-sectional design that fails to capture the dynamic nature of food insecurity, and potential biases in sampling or data collection that could impact finding validity.[64]

2.5 COPING STRATEGIES ADOPTED AMONG HOUSEHOLDS

In 2017, a cross-sectional study design in Edo and Delta States, Nigeria, among farming households aimed to assess food insecurity coping strategies among 320 respondents using a multi-stage sampling technique and collecting data using a structured questionnaire found that the major coping strategies employed included borrowing to buy food (79.8%), reducing the number of meals (81.9%), and modifying cooking methods (83.4%). The study highlights the prevalence of food insecurity and the need for targeted interventions to support vulnerable

households. But it may have limitations in terms of generalizability to other populations and potential biases in self-reported data.[65]

A 2019 study using a survey research design aimed to assess dietary diversity and food insecurity coping strategies. It was carried out in Kano, Nigeria, among farming households with 360 respondents using a multi-stage sampling technique and data was collected using a structured questionnaire. The study found that the most frequent coping strategies among farming households included selling assets and livestock (severe coping strategy) in 38% of respondents and skipping meals (38%). Additionally, the study revealed that 53% of the households had high dietary diversity, consuming 8 food groups on average. The study provides valuable insights into dietary diversity and food insecurity coping strategies among farming households in Kano, Nigeria. Also, the use of a structured questionnaire allows for quantitative analysis of the data and highlights the importance of dietary diversity and coping strategies in reducing food insecurity. The study's limitations include self-reported data bias, limited generalizability, and lack of long-term impact analysis, highlighting the need for further research on effective coping strategies and interventions to improve food security among farming households.[66]

Similarly, a 2024 study using a survey research design in order to describe socio-economic characteristics; assess food insecurity; identify coping strategies adopted; determine the factors influencing food security and identify contributing factors to food insecurity in Ivo Local Government Area of Ebonyi State, Nigeria was carried out among 80 respondents using a multi-stage sampling technique. Data was collected using a structured questionnaire. The study found that 96.25% of female-headed households were concerned about what to eat, and 78.75% rationed their meals, with coping strategies including eating smaller portions (26.25%) and

consuming cheaper food alternatives (18.75%). It highlights the vulnerability of female-headed households to food insecurity and the need for targeted interventions. However, it may have limitations in terms of generalizability to other populations due to small sample size and potential biases in self-reported data.[67]

CHAPTER THREE

MATERIALS AND METHODS

3.1 STUDY AREA

The study was conducted in Benin City, Edo State, Nigeria. Edo State is located in the southern region of Nigeria, within the South-South geopolitical zone.[68] It shares borders with five other states: Kogi to the northeast, Anambra to the east, Delta to the southeast and south, and Ondo to the west and northwest.[68] The Niger River forms part of the eastern boundary of the state, enhancing its geographical importance and contributing to agricultural activities along the river basin.[68] Covering a land area of approximately 19,559 square kilometers, Edo State ranks 21st in size among Nigeria's 36 states.[69] The terrain is a mix of lowland rainforests in the south and undulating hills in the north, particularly around the Kukuruku and Somorika Hills, which rise to elevations above 550 meters.[70] Administratively, Edo State is divided into 18 Local Government Areas (LGAs).[71]

Benin City serves as the capital of Edo State in Southern Nigeria.[72] Geographically, it is situated approximately 40 kilometers north of the Benin River and about 320 kilometers east of Lagos by road.[72] Administratively, Benin City encompasses the following LGAs; Oredo, Egor, Ovia North-East, Uhunmwonde and Ikpoba-Okha.[73] Benin City serves as a significant hub in Nigeria's rubber industry and is also a major producer of palm oil, cocoa, cassava, yam, plantain, banana, maize, rice, and groundnut.[74] The city hosts various industrial and commercial establishments, including the Benin Industrial Estate, Benin City Textile Mill, and Benin City Rubber Factory.[74] Additionally, the presence of financial institutions, hotels, restaurants, and markets underscores

its economic vitality.[74] As of 2025, Benin City's population is estimated at approximately 2.04 million with an annual growth rate of around 3.6-3.7%.[75]

3.2 STUDY DESIGN

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

3.3 STUDY POPULATION

The study population consisted of heads of households in Benin City.

3.4 SELECTION CRITERIA

3.4 1 Inclusion criteria

1. Household heads capable of communication.

2. Respondents aged 18 years or older.

3. Respondents who were willing to participate.

3.4 2 Exclusion criteria

1. Households that recently (less than 6 months) relocated into Benin City.

3.5 DURATION OF STUDY

The study spanned for 16 months, from December 2024 to April 2026. The timeline is represented in the Gantt chart in the appendix.

3.6 SAMPLE SIZE DETERMINATION

Sample size was calculated using the Cochran's formula for descriptive study.

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

Where,

n = minimum sample size

Z = standard normal deviation = 1.96 at 95% confidence interval

p = prevalence

q = 1-p

d = degree of precision desired, set at 0.05

P = 82.6% based on a study on the prevalence of food security in among households in Nsukka Local Government Area of Enugu State, Nigeria.[76]

q = 1 – p

= 0.174

Thus,

$$n = \frac{1.96^2 \times 0.826 \times 0.174}{0.05^2}$$

$n = 220.85$

$n = 221$

Non-Response Rate

10% non-response rate was added to the sample size utilizing the formula of non-response rate

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

Where;

n_f = Final Minimum Sample Size

n = Minimum Sample Size

nr = Non response rate at 10% = 0.1

Thus;

$$nf = \frac{221}{1 - 0.1}$$

= 246

Using a design effect of 2,

n*f*= 2 x 246

n*f*= 492

Thus, the final minimum sample size used for this study was 500

3.7 SAMPLING METHOD

For this study, a multistage sampling technique was used to select respondents.

STAGE 1: SELECTION OF LOCAL GOVERNMENT AREA

Benin City is divided into five Local Government Areas (LGAs): Egor, Ovia North-East, Ikpoba-Okha, Uhunmwonde and Oredo. One LGA was selected through simple random sampling (balloting), resulting in the choice of Egor LGA for this study.

STAGE 2: SELECTION OF THE WARD

Egor LGA comprises ten wards: Otubu, Oliha, Ogida/Use, Egor, Uwelu, Evbareke, Uselu I, Uselu II, Okhoro, and Ugbowo. Ugbowo was randomly selected using simple random sampling (balloting).

STAGE 3: SELECTION OF CLUSTERS

Using the Lagos – Benin expressway, Ugbowo was divided into two clusters, and one of the clusters was selected using simple random sampling technique (balloting).

STAGE 4: SELECTION OF STREETS

All major streets within the selected ward were enumerated. Using systematic sampling, half of these streets were selected to participate in the study.

STAGE 5: SELECTION OF HOUSES

Houses on the selected streets were enumerated, with only those occupied by long-term residents included. Half of the eligible houses were selected using systematic sampling.

STAGE 6: SELECTION OF RESPONDENTS

From each selected house, the head of household was then selected to participate in the study. Where there are two or more households, one eligible head of household was selected by simple random sampling.

3.8 METHOD OF DATA COLLECTION

Data was collected through the use of pretested, interview-administered questionnaires. The questionnaire was designed and adapted from validated instruments and similar studies, including the Food Insecurity Experience Scale and the Coping Strategies Index.[40,41] The questionnaire consists of five sections (A–E), corresponding to the specific objectives of the study.

Section A: This section consists of 15 items describing the demographic and socioeconomic characteristics of the study participants.

Section B: This section consists of 8 items adapted from the Food Insecurity Experience Scale.[40]

The Food Insecurity Experience Scale (FIES) is an experience-based metric of severity of food insecurity that relies on people's direct responses to a series of questions regarding their access to adequate food. The FIES typically uses a 12-month reference period to account for different environmental and climatic zones and improve comparability. It focuses broadly on reported food-related behaviours associated with food insecurity due to limited access. The parameter it measures involves three core domains, found to be common across cultures: uncertainty and worry about food, inadequate food quality, and insufficient food quantity. The FIES classifies respondents along a continuum of food insecurity severity using the Rasch model. This method measures food insecurity level from yes/no responses to questions. The FIES categorizes food insecurity into three levels based on the types of experiences reported:

Mild food insecurity: This level reflects initial stages of food access constraint. Experiences include:

a) Worry about running out of food due to lack of money or other resources
b) Being unable to eat healthy and nutritious food because of resource limitations
c) Eating only a few kinds of foods (limited variety) due to lack of money or other resources.

Moderate food insecurity: This indicates more significant compromises in food access. Experiences include:

a) Having to skip a meal because there was not enough money or other resources for food
b) Eating less than one thought they should due to lack of money or other resources
c) Household ran out of food because of lack of money or other resources.

Severe food insecurity: This is the most acute level, indicating experiences of hunger. Experiences include:

a) Feeling hungry but not eating because there was not enough money or other resources for food.
b) Going without eating for a whole day due to lack of money or other resources.[40]

Section C: This section assesses respondents' knowledge of food insecurity using 10 items related to the general understanding of food insecurity.

This section is adapted from a study published in 2023, [61] aimed to investigate how socio-demographic factors influenced consumers' knowledge of food security. It was designed to assess consumers' knowledge of various dimensions of food security. Respondents will be asked to indicate their knowledge by responding "yes" or "no" to a series of statements covering

different aspects of food security. This assessment aims to capture the respondent's awareness of what constitutes or influences food security.

Section D: This section explores participants' perceptions of food insecurity with 10 items, focusing on beliefs about the severity of the issue in Benin City, its impact on vulnerable groups, and opinions on government efforts.

Section E: This section contains 13 items adapted from the Coping Strategies Index.[41]

The Coping Strategies Index (CSI) is designed to ascertain coping strategies. It is a tool for the rapid measurement of household food security that works by measuring the strategies people adopt when they cannot access enough food. These strategies fall into four main categories of consumption coping: dietary change, short-term measures to increase household food availability, short-term measures to decrease numbers of people to feed, and rationing strategies. The CSI then ascertains how often these specific coping behaviours are used. [41]

3.9 PRETESTING

Pretesting was conducted at Ovia North East Local Government Area using 10% of the final sample size (50). This was done to ensure accuracy of the questionnaire.

3.10 DATA ANALYSIS

The collected data was analyzed using IBM SPSS version 27 software. The analysis process involved several steps. Firstly, univariate analysis was done to examine the socio-demographic variables, which are presented as frequencies and percentages. Bivariate analysis was done to determine associations between socio-demographic characteristics and variables related to prevalence, knowledge, perception, and coping strategies of food insecurity. The Chi-squared

statistical test or Fischer's exact test was used to determine these associations. Furthermore, associations between determinants such as income, education, and occupation, and food insecurity status were also examined. Multivariate analysis was conducted using logistic regression to identify significant predictors of food insecurity while controlling for confounding variables. Crude and adjusted odds ratios were computed with corresponding 95% confidence intervals to determine the strength of associations. The level of significance for all statistical associations was set at $p < 0.05$. Finally, the data was presented in prose, frequency tables, and charts to facilitate understanding and interpretation of the results. This analysis framework provided insights into the prevalence and determinants of food insecurity among households in Benin City, including knowledge, perception, and coping strategies.

OCCUPATIONAL CLASSIFICATION

The occupations of respondents were coded into skill levels based on the International Labour Organization (ILO) classification, with modifications to suit the study's context.[77] It includes the following:

Skill level 1: Unskilled workers (e.g., laborers, cleaners, messengers)

Skill level 2: Semi-skilled workers (e.g., artisans, drivers, sales assistants)

Skill level 3: Skilled workers (e.g., nurses, teachers, technicians)

Skill level 4: Professionals (e.g., doctors, lawyers, engineers)

This classification helped analyze the relationship between occupation and food insecurity among households in Benin City.

SOCIOECONOMIC STATUS CLASSIFICATION

Socioeconomic status (SES) of households was assessed using a composite index based on occupation, education, and household income.[78]

Occupation of the household head was classified according to the ILO skill level classification, and scores were assigned as follows;

Skill levels 1: 1; Skill levels 2–3: 2; Skill level 4: 3

Educational level of the household head was categorized as follows:

Primary or no formal education: 1; Secondary school completed: 2; Tertiary education: 3

Monthly household income was grouped into three categories:

<₦70,000: 1; ₦70,000–₦139,999: 2; ≥₦140,000: 3

For each household, the scores from occupation, education and income were summed to generate a composite SES score, with a minimum of 3 and a maximum of 9.

Households were then classified into three socioeconomic categories based on the composite SES score:

Score 3–4: Low SES

Score 5–6: Middle SES

Score 7–9: High SES

SCORING FOR PREVALENCE OF FOOD INSECURITY

The prevalence was assessed with scores for each question as follows: No = 0, Yes = 1. The scores were summed to get a total FIES score (range 0–8).

0: Food Secure

1–3: Mild Food Insecurity

4–6: Moderate Food Insecurity

7–8: Severe Food Insecurity

The total scores were used to calculate the proportion of households in each category as well as the mean FIES score for the study population, to provide an overall assessment of the prevalence of food insecurity.

SCORING FOR KNOWLEDGE OF FOOD INSECURITY

For the ten statements used to assess knowledge, responses were numerically scored as follows; Yes = 2 No = 1. [61] These individual scores were then combined to calculate an overall knowledge score for each respondent. Since there were 10 statements, the total knowledge score ranged from a minimum of 10 to a maximum of 20.

The mean score for the respondents was determined (mean = 19.06) and used as a cut-off to categorise knowledge levels into:

Poor knowledge of food insecurity: total score < 19.06

Good knowledge of food insecurity: total score ≥ 19.06

SCORING FOR PERCEPTION OF FOOD INSECURITY

The perception of food insecurity was assessed using a series of 10 statements measured on a five-point Likert scale: Strongly Agree (5 points), Agree (4 points), Neutral (3 points), Disagree (2 points), and Strongly Disagree (1 point). To maintain scoring consistency, negatively worded items were reverse-scored. In these cases, responses of Strongly Agree were scored as 1, and Strongly Disagree as 5, so that higher scores consistently reflected more positive perceptions. The negatively worded items included: "Food insecurity only affects lazy or jobless people," and

"It is embarrassing to admit one is food insecure."

After reverse scoring where necessary, the individual scores for each item were summed to obtain a total perception score for each respondent. The minimum possible score was 10 (indicating a strongly negative perception), and the maximum possible score was 50 (indicating a strongly positive perception).

The mean score for the respondents was determined (mean = 38.4) and used as a cut-off to categorize perception levels into:

Poor perception of food insecurity: total score < 38.4

Good perception of food insecurity: total score ≥ 38.4

3.11 ETHICAL CONSIDERATIONS

Ethical approval for the study was obtained from the Ethics and Research Committee of the University of Benin Teaching Hospital (UBTH). Permission was also secured from the relevant Local Government authorities and community leaders in the study area.

The study was conducted in accordance with established ethical principles. Participants were provided with clear and adequate information regarding the purpose, procedures, potential risks, and benefits of the study, after which written informed consent was obtained prior to data collection. Participation was entirely voluntary, and respondents were informed of their right to decline participation, withdraw at any stage, or omit any question without any consequences.

Confidentiality and privacy were strictly maintained throughout the study. Personal identifiers were not collected, and all data were anonymized and stored securely. Findings were reported in aggregate form without identifying any individual participant. The study ensured that potential risks were minimal and were outweighed by the anticipated benefits. Cultural sensitivity was maintained, and all participants were treated with respect and dignity.

Data obtained from the study were used strictly for research purposes, and any secondary use required appropriate additional approval. Vulnerable groups were protected from any form of harm or exploitation. Feedback of the study findings was also made available to the relevant communities and stakeholders.

3.12 STUDY LIMITATIONS

The study encountered a few limitations. Information obtained from respondents was based on self-report, and some participants were unable to provide completely accurate responses, leading

to possible information bias. In addition, there was a tendency for some respondents to give socially acceptable answers, particularly on sensitive issues related to household food access, which may have affected the authenticity of responses. Furthermore, some households were initially reluctant to disclose full details about their food security status, possibly due to perceived stigma or privacy concerns. To address this, efforts such as establishing rapport, assuring respondents of strict confidentiality, and emphasizing the non-judgmental nature of the study were implemented to encourage openness. Finally, as the study was conducted within a specific sociocultural setting in Benin City, the findings may not be entirely generalizable to other populations or regions with different characteristics. To minimize this, efforts were made to ensure a representative sample, and utilize standardized data collection tools, thereby enhancing the comparability and potential applicability of the findings to similar settings.

3.13 STUDY STRENGTHS

By examining key socio-economic and demographic factors such as income, education, and household size, the study offered valuable insights into the patterns and drivers of food insecurity within this urban setting. The relatively large sample size enhanced the reliability of the findings and allowed for meaningful analysis of associations between variables. The use of a cross-sectional analytical design made it possible to assess multiple factors simultaneously, thereby providing a comprehensive snapshot of the burden of food insecurity and the coping strategies adopted by affected households. This study will contribute to the existing body of academic knowledge by generating context-specific data on household food insecurity in Benin City, an area with limited documented evidence on the subject. The findings will add to the growing literature on food insecurity in urban Nigerian settings and help to bridge existing knowledge gaps. Furthermore, the results will serve as a useful resource for policymakers, public health

practitioners, and non-governmental organizations in designing targeted interventions and informing policy decisions. The study will also provide a foundation for future research, including longitudinal studies and intervention-based approaches aimed at addressing food insecurity among households.

CHAPTER FOUR

RESULTS

This chapter presents the findings of the study on food insecurity among households in Benin City, Edo State, Nigeria. Five hundred (500) respondents participated in the study with a response rate of 100%. The results were divided into sections as follows:

Section A: Socio-demographic characteristics of respondents

Section B: Prevalence of food insecurity among households

Section C: Knowledge of food insecurity among respondents

Section D: Perception of food insecurity among respondents

Section E: Coping strategies adopted by households

SECTION A

SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 1a: Socio-demographic characteristics of respondents

Variables	Frequency (n=500)	Percent
Age group (years)		
25-34	55	11.0
35-44	59	11.8
45-54	164	32.8
55-64	156	31.2
≥65	66	13.2
Mean ±SD = 51.9±11.9		
Sex		
Male	403	80.6
Female	97	19.4
Marital Status		
Single	119	23.8
Married	339	67.8
Widowed	35	7.0
Divorced	7	1.4
Tribe		
Benin	152	30.4
Esan	129	25.8
Igbo	74	14.8
Yoruba	68	13.6
Urhobo	65	13.0
Others*	12	2.4
Religion		
Christian	440	88.0
Muslim	40	8.0
African Traditional Religion	20	4.0

Others*: Efik (7), Hausa (3), Ogoja (1), Igede (1)

The majority of participants fell within the 45-54 age bracket 164 (32.8%), followed by those aged 55-64 156 (31.2%). Respondents aged 65 years and older accounted for 66 (13.2%), while those in the 35-44 and 25-34 age groups represented 59 (11.8%) and 55 (11.0%), respectively. The mean age of respondents was 51.9±11.9 years. Male respondents were 403 (80.6%), with females constituting 97 (19.4%). The largest proportions of respondents were married 339

(67.8%), followed by single individuals 119 (23.8%). Widowed respondents constituted 35 (7.0%), while divorced individuals made up the smallest group 7 (1.4%). The Benin ethnic group was the most represented 152 (30.4%), followed by the Esan 129 (25.8%), Igbo 74 (14.8%), Yoruba 68 (13.6%), Urhobo 65 (13.0%), and other ethnic groups accounting for 12 (2.4%). The majority of respondents identified as Christians 440 (88.0%), followed by Muslims 40 (8.0%), with those practicing African Traditional Religion were 20 (4.0%).

Table 1b: Socio-demographic characteristics of respondents

Variables	Frequency(n=500)	Percent
Level of Education		
No formal education	38	7.6
Primary education	23	4.6
Secondary education	80	16.0
Tertiary	359	71.8
Employment Status		
Unemployed	3	0.6
Employed	462	92.4
Retired	35	7.0
Skill Level		
1	9	1.8
2	204	40.8
3	190	38.0
4	97	19.4

Respondents who held tertiary-level qualifications were 359 (71.8%), Secondary education accounted for 80 (16.0%), followed by those with no formal education 38 (7.6%) and those with primary education alone 23 (4.6%). The majority of respondents were employed 462 (92.4%), while 35 (7.0%) were retired and 3 (0.6%) were unemployed. Skill level 2 formed the largest group 204 (40.8%), followed by skill level 3 190 (38.0%) and skill level 4, 97 (19.4%). Skill level 1 represented the smallest category 9 (1.8%).

Table 2: Household characteristics of respondents

Basic Characteristics	Frequency (n=500)	Percent
Household size		
≤5	231	46.2
>5	269	53.8
Mean ±SD = 1.5±0.5		
Number of children		
0	44	8.8
1-2	92	18.4
3-4	216	43.2
≥5	148	29.6
Monthly household income (₦)		
≤180,000	270	54.0
>180,000	230	46.0
Median {IQR} = 180,000.0 {220,000.0}		
Average amount spent on food (₦)		
≤100,000	308	61.6
>100,000	192	38.4
Median {IQR} = 100,000.0 {90,000.0}		
Housing tenure status		
Rent	205	41.0
Own	295	59.0
Access to a nearby food market		
No	62	12.4
Yes	438	87.6
Household ownership of a garden or a farm		
No	238	47.6
Yes	262	52.4

Majority of households had more than five members 269 (53.8%), while 231 (46.2%) had five or fewer members. The mean household size was 1.5±0.5. Majority of the respondents had three to four children 216(43.2%), 148 (29.6%) had five or more and 44 (8.8%) had no children. The

largest proportion of respondents earned at least ₦180,000 per month 270 (54.0%), while 230 (46.0%) earned above ₦180,000. The median income earned was ₦180,000.0 with an interquartile range of ₦220,000.0. Food expenditure patterns revealed that 308 (61.6%) of households spent less than ₦100,000 and 192 (38.4%) spent more than ₦100,000. The median amount spent on food was ₦100,000.0 with an interquartile range of ₦90,000.0. More than half of respondents owned their homes 295 (59.0%), while 205 (41.0%) rented. The majority of respondents also reported having access to a nearby food market 438 (87.6%), while 62 (12.4%) did not. More than half of the households had a garden or farm 262 (52.4%).

SECTION B

PREVALENCE OF FOOD INSECURITY AMONG HOUSEHOLDS

Table 3: Domains of food insecurity among households

Domains	Frequency (n=500)	Percent
UNCERTAINTY ABOUT FOOD		
Worried about not having enough food due to lack of money/ resources		
Yes	306	61.2
No	194	38.8
COMPROMISED FOOD QUALITY		
Unable to eat healthy food due to lack of money/ resources		
Yes	242	48.4
No	258	51.6
Ate only a few kinds of foods due to lack of money/ resources		
Yes	285	57.0
No	215	43.0
REDUCED FOOD QUANTITY & DISRUPTED EATING		
Skipped a meal due to lack of money/ resources		
Yes	239	47.8
No	261	52.2
Ate less than required due to lack of money/ resources		
Yes	246	49.2
No	254	50.8
Household ran out of food due to lack of money/ resources		
Yes	210	42.0
No	290	58.0
EXPERIENCING HUNGER		
Experienced hunger but did not eat due to lack of money/ resources		
Yes	196	39.2
No	304	60.8
Went without food for a whole day due to lack of money/ resources		
Yes	130	26.0
No	370	74.0

Respondents who worried about not having food due to lack of money or resources were 306 (61.2%). This was followed by those who reported eating only a few kinds of foods due to resource constraints 285 (57.0%). Nearly half of all respondents reported eating less than they felt they should 246 (49.2%), being unable to eat healthy and nutritious foods 242 (48.4%), and

skipping meals 239 (47.8%) due to financial limitations. About 210 (42.0%) reported that their household ran out of food due to lack of money, 196 (39.2%) indicated that they went hungry but could not eat because of insufficient resources, and 130 (26.0%) went an entire day without eating due to a lack of money or other resources.

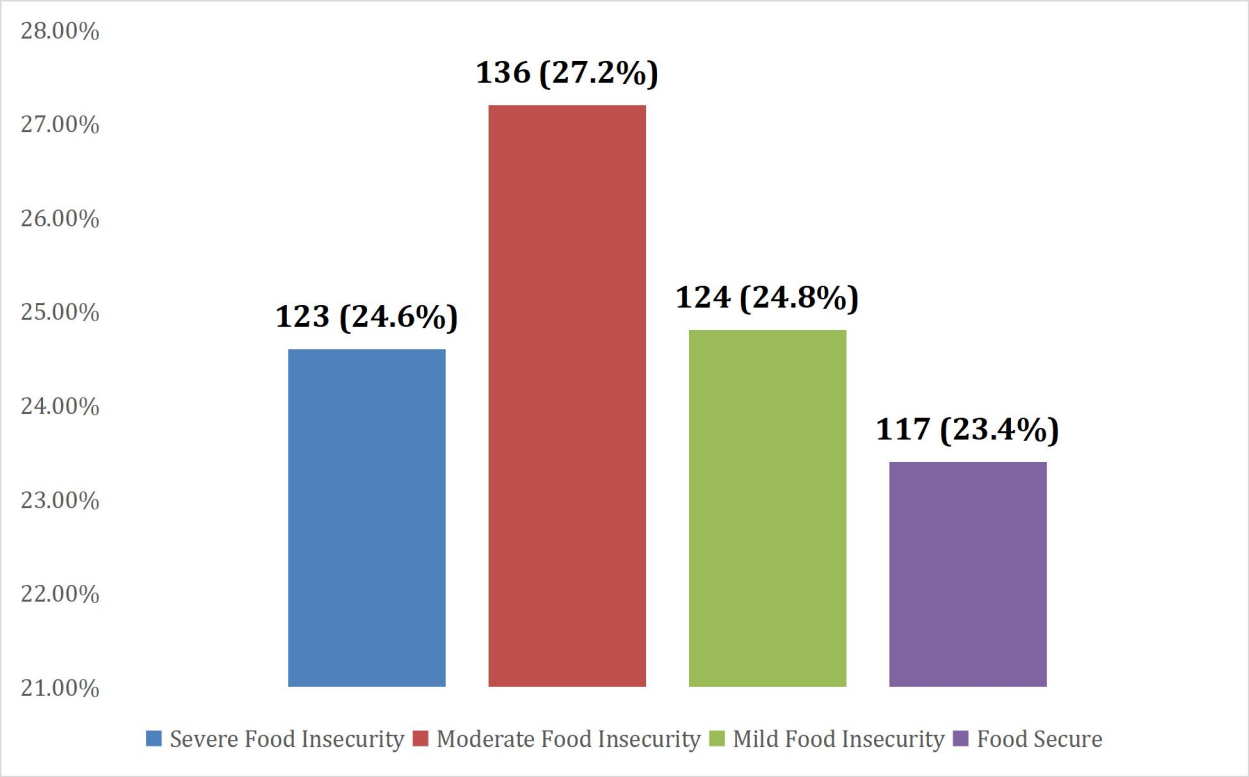

Figure 1: Food security status among households (n=500)

The prevalence of food insecurity among households was 383 (76.6%). Of these, 124 (24.8%) were mildly food insecure, 136 (27.2%) moderately food insecure, and 123 (24.6%) severely food insecure, while 117 (23.4%) were food secure.

Table 4: Association between respondents' socio-demographic characteristics and status of food security

Variables	Status of food security		χ^2	p-value
	Food secure (n = 117) Freq (%)	Food insecure (n = 383) Freq (%)		
Age				
25-34	10 (18.2)	45 (81.8)	13.268	**0.010**
35-44	15 (25.4)	44 (74.6)		
45-54	53 (32.3)	111 (67.7)		
55-64	30 (19.2)	126 (80.8)		
≥65	9 (15.4)	57 (86.4)		
Sex				
Male	96 (23.8)	307 (76.2)	0.206	0.691
Female	21 (21.6)	76 (78.4)		
Marital Status				
Married	17 (14.3)	102 (85.7)	7.238	**0.004**
Not Married	100 (26.2)	281 (73.8)		
Tribe				
Edo Indigenes	65 (23.1)	216 (76.9)	0.026	0.915
Edo non-indigenes	52 (23.7)	167 (76.3)		
Religion				
Christian	103 (23.4)	337 (76.6)	<0.001	>0.999
Others	14 (23.3)	46 (76.7)		
Level of Education				
No formal education	3 (7.9)	35 (92.1)	24.618	**<0.001**
Primary education	1 (4.3)	22 (95.7)		
Secondary education	8 (10.0)	72 (90.0)		
Tertiary	105 (29.2)	254 (70.8)		
Employment Status				
Unemployed	1 (33.3)	2 (66.7)	7.959*	**0.017**
Employed	114 (24.7)	348 (75.3)		
Retired	2 (5.7)	33 (94.3)		
Skill Level				
1	2 (22.2)	7 (77.8)	21.850*	**<0.001**
2	29 (47.7)	175 (85.8)		
3	49 (25.8)	141 (74.2)		
4	37 (38.1)	60 (61.9)		

***Fisher's exact**

A greater proportion 57 (86.4%) of respondents aged ≥65 years were food insecure compared to other age groups. The association between age and food insecurity status was statistically significant ($\chi^2 = 13.268$; $p = 0.010$). A higher proportion 76 (78.4%) of female respondents were food insecure compared to males. The association between sex and food insecurity status was not statistically significant ($\chi^2 = 0.206$; $p = 0.691$). A greater proportion 102 (85.7%) of married respondents were food insecure compared to those who were not married. The association between marital status and food insecurity status was statistically significant ($\chi^2 = 7.238$; $p = 0.004$). A higher proportion 216 (76.9%) of Edo indigenes were food insecure compared to Edo non-indigenes. The association between tribe and food insecurity status was not statistically significant ($\chi^2 = 0.026$; $p = 0.915$). A greater proportion 46 (76.7%) of other religions were food insecure compared to Christian respondents. The association between religion and food insecurity status was not statistically significant ($\chi^2 < 0.001$; $p > 0.999$). A greater proportion 22 (95.3%) of respondents with primary education were food insecure compared to those with higher levels of education. The association between level of education and food insecurity status was statistically significant ($\chi^2 = 24.618$; $p < 0.001$). A greater proportion 33 (94.3%) of retired respondents were food insecure compared to employed and unemployed respondents. The association between employment status and food insecurity was statistically significant ($p = 0.017$). A greater proportion 175 (85.8%) of respondents with skill level 2 were food insecure compared to those with other skill levels. The association between skill level and food insecurity status was statistically significant ($p < 0.001$).

Table 5a: Association between household characteristics and status of food security

Variables	Status of food security		χ^2	p-value
	Food secure (n = 117) Freq (%)	Food insecure (n = 383) Freq (%)		
Household size				
≤5	60 (26.0)	171 (74.0)	1.587	0.244
>5	57 (21.2)	212 (78.8)		
Number of children				
0	9 (20.5)	35 (79.5)	5.823	0.122
1-2	30 (32.6)	62 (67.4)		
3-4	49 (22.7)	167 (77.3)		
≥5	29 (19.6)	119 (80.4)		
Monthly household income (₦)				
≤180,000	43 (15.9)	227 (84.1)	18.293	**<0.001**
>180,000	74 (32.2)	156 (67.8)		
Average amount spent on food (₦)				
≤100,000	54 (17.5)	254 (82.5)	15.406	**<0.001**
>100,000	63 (32.8)	129 (67.2)		
Housing tenure status				
Rent	40 (19.5)	165 (80.5)	2.930	0.087
Own	77 (26.1)	218 (73.9)		
Access to a nearby food market				
Yes	106 (24.2)	332 (75.8)	1.264	0.261
No	11 (17.7)	51 (82.3)		
Household ownership of a garden or a farm				
Yes	58 (24.4)	180 (75.6)	0.238	0.625
No	59 (22.5)	203 (77.5)		

A greater proportion 212 (78.8%) of respondents from households with >5 members were food insecure compared to those with at most 5 members. The association between household size and food insecurity status was not statistically significant ($\chi^2 = 1.587$; $p = 0.244$). A higher proportion 119 (80.4%) of respondents with five or more children were food insecure compared to other categories of number of children. The association between number of children and food insecurity status was not statistically significant ($\chi^2 = 5.823$; $p = 0.122$). A greater proportion 227 (84.1%) of respondents with monthly household income ≤ ₦180,000 were food insecure compared to those with higher income. The association between monthly household income and food insecurity status was statistically significant ($\chi^2 = 18.293$; $p < 0.001$). A greater proportion 254 (82.5%) of respondents who spent ≤ ₦100,000 monthly on food were food insecure compared to those who spent >100,000. The association between average amount spent on food and food insecurity status was statistically significant ($\chi^2 = 15.406$; $p < 0.001$). A greater proportion 165 (80.5%) of respondents who rented their housing were food insecure compared to those who owned their homes. The association between housing tenure status and food insecurity status was not statistically significant ($\chi^2 = 2.930$; $p = 0.087$). A greater proportion 51 (82.3%) of respondents with no access to a nearby food market were food insecure compared to those with access. The association between access to a nearby food market and food insecurity status was not statistically significant ($\chi^2 = 1.264$; $p = 0.261$). A greater proportion 203 (77.5%) of respondents without a household garden or farm were food insecure compared to those who had one. The association between household ownership of a garden or farm and food insecurity status was not statistically significant ($\chi^2 = 0.238$; $p = 0.625$).

Table 5b: Association between household characteristics and status of food security

Variables	Status of food security		χ^2	p-value
	Food secure (n = 117) Freq (%)	Food insecure (n = 383) Freq (%)		
Knowledge level				
Poor knowledge	41 (19.2)	173 (80.8)		
Good knowledge	76 (26.6)	210 (73.4)	3.754	0.053
Perception level				
Poor perception	69 (28.7)	171 (71.3)	7.370	**0.008**
Good perception	48 (18.5)	212 (81.5)		

A greater proportion 173 (80.8%) of respondents with poor knowledge of food insecurity were food insecure compared to those with good knowledge. The association between knowledge level and food insecurity status was not statistically significant ($\chi^2 = 3.754$; $p = 0.053$). A greater proportion 212 (81.5%) of respondents with good perception of food insecurity were food insecure compared to those with poor perception. The association between perception level and food insecurity status was statistically significant ($\chi^2 = 7.370$; $p = 0.008$).

Table 6a: Predictors of food insecurity among households

Predictors	β coefficient	Odds Ratio	95% Confidence Interval		p-value
			Lower Limit	Upper Limit	
Age	0.010	1.010	0.993	1.028	0.258
Sex					
Male*		1			
Female	0.124	1.132	0.663	1.932	0.650
Marital Status					
Not Married*		1			
Married	0.759	2.135	1.217	3.745	**0.008**
Tribe					
Edo Indigenes*		1			
Edo non-indigenes	-0.034	0.966	0.637	1.466	0.872
Level of Education**					
Lower level education*		1			
Higher level education	-1.300	0.272	0.094	0.790	**0.017**
Employment Status					
Not Employed*		1			
Employed	-1.551	0.21	0.063	0.708	**0.012**
Skill Level					
1-2*		1			
3-4	-0.782	0.458	0.285	0.735	**0.001**

***Reference category**

****Lower level of education: no formal education and primary education**

Higher level of education: secondary and tertiary education

Age was not a significant predictor of food insecurity. As age increased, respondents were 1.010 times more likely to experience food insecurity (OR = 1.010, 95% CI: 0.993–1.028, p = 0.258). Sex was not a significant predictor of food insecurity. Female respondents were 1.132 times

more likely to experience food insecurity compared to male respondents (OR = 1.132, 95% CI: 0.663–1.932, p = 0.650). Marital status was a significant predictor of food insecurity. Married respondents were 2.135 times more likely to experience food insecurity compared to those who were not married (OR = 2.135, 95% CI: 1.217–3.745, p = 0.008). Tribe was not a significant predictor of food insecurity. Edo non-indigenes were 0.966 times as likely to experience food insecurity compared to Edo indigenes (OR = 0.966, 95% CI: 0.637–1.466, p = 0.872). Level of education was a significant predictor of food insecurity. Respondents with higher education were 0.272 times as likely to experience food insecurity compared to those with lower education (OR = 0.272, 95% CI: 0.094–0.790, p = 0.017). Employment status was a significant predictor of food insecurity. Employed respondents were 0.21 times as likely to experience food insecurity compared to unemployed respondents (OR = 0.21, 95% CI: 0.063–0.708, p = 0.012). Skill level was a significant predictor of food insecurity. Respondents with skill levels 3–4 were 0.458 times as likely to experience food insecurity compared to those with skill levels 1–2 (OR = 0.458, 95% CI: 0.285–0.735, p = 0.001).

Table 6b: Predictors of food insecurity among households

Predictors	β coefficient	Odds Ratio	95% Confidence Interval		p-value
			Lower Limit	Upper Limit	
Household size	-0.083	0.920	0.756	1.119	0.403
Number of children	0.212	1.236	1.003	1.524	**0.047**
Housing tenure status					
Rent*		1			
Own	-0.524	0.592	0..359	0.976	**0.040**
Access to a nearby food market					
Yes	-0.390	0.677	0.325	1.411	0.298
No*		1			
Household ownership of a garden or a farm					
Yes	0.268	1.308	0.816	2.095	0.265
No*		1			

***reference category**

Household size was not a significant predictor of food insecurity. As household size increased, the odds of food insecurity decreased (OR = 0.920, 95% CI: 0.756–1.119, p = 0.403), but this was not statistically significant. Number of children was a significant predictor of food insecurity. As the number of children increased, the odds of food insecurity increased (OR = 1.236, 95% CI: 1.003–1.524, p = 0.047). Housing tenure status was a significant predictor of food insecurity. Respondents who owned their housing were 0.592 times as likely to experience food insecurity compared to those who rented (OR = 0.592, 95% CI: 0.359–0.976, p = 0.040). Access to a nearby food market was not a significant predictor of food insecurity. Respondents with access to a nearby food market had lower odds of food insecurity compared to those without access (OR = 0.677, 95% CI: 0.325–1.411, p = 0.298), but this was not statistically significant. Household

ownership of a garden or farm was not a significant predictor of food insecurity. Respondents with ownership of a garden or farm had higher odds of food insecurity compared to those without ownership (OR = 1.308, 95% CI: 0.816–2.095, p = 0.265), but this was not statistically significant.

SECTION C

KNOWLEDGE OF FOOD INSECURITY AMONG RESPONDENTS

Table 7: Knowledge of food insecurity among respondents

Variables	Frequency (n=500)	Percent
The ability to purchase food is one dimension of food security.		
Yes	431	86.2
No	69	13.8
Transport and market infrastructure contribute to food security		
Yes	449	89.8
No	51	10.2
Domestic production of food is part of food security.		
Yes	461	92.2
No	39	7.8
The ability to import food can influence a country's food security		
Yes	422	84.4
No	78	15.6
Food aid can help improve food security		
Yes	463	92.6
No	37	7.4
Securing and maintaining adequate food stocks is part of food security		
Yes	463	92.6
No	37	7.4
Access to safe food is a component of food security		
Yes	468	93.6
No	32	6.4
Weather and climate changes can affect food security		
Yes	457	91.4
No	43	8.6
Political factors that affect a country's stability can influence food security		
Yes	459	91.8
No	41	8.2
Price fluctuations can affect food security		
Yes	455	91.0
No	45	9.0

The majority of respondents correctly identified access to safe food as a component of food security 468 (93.6%) and recognized the role of food aid 463 (92.6%) and adequate food stocks

463 (92.6%) in ensuring food security. Domestic food production was acknowledged by 461 (92.2%), and political stability as an influencer of food security was recognized by 459 (91.8%). Climate and weather changes were linked to food security by 457 (91.4%), while price fluctuations were identified as relevant by 455 (91.0%). Transport and market infrastructure were recognized by 449 (89.8%) of respondents. The items with comparatively lower correct response rates were the ability to import food as a determinant of national food security 422 (84.4%) and the role of purchasing power as a dimension of food security 431 (86.2%).

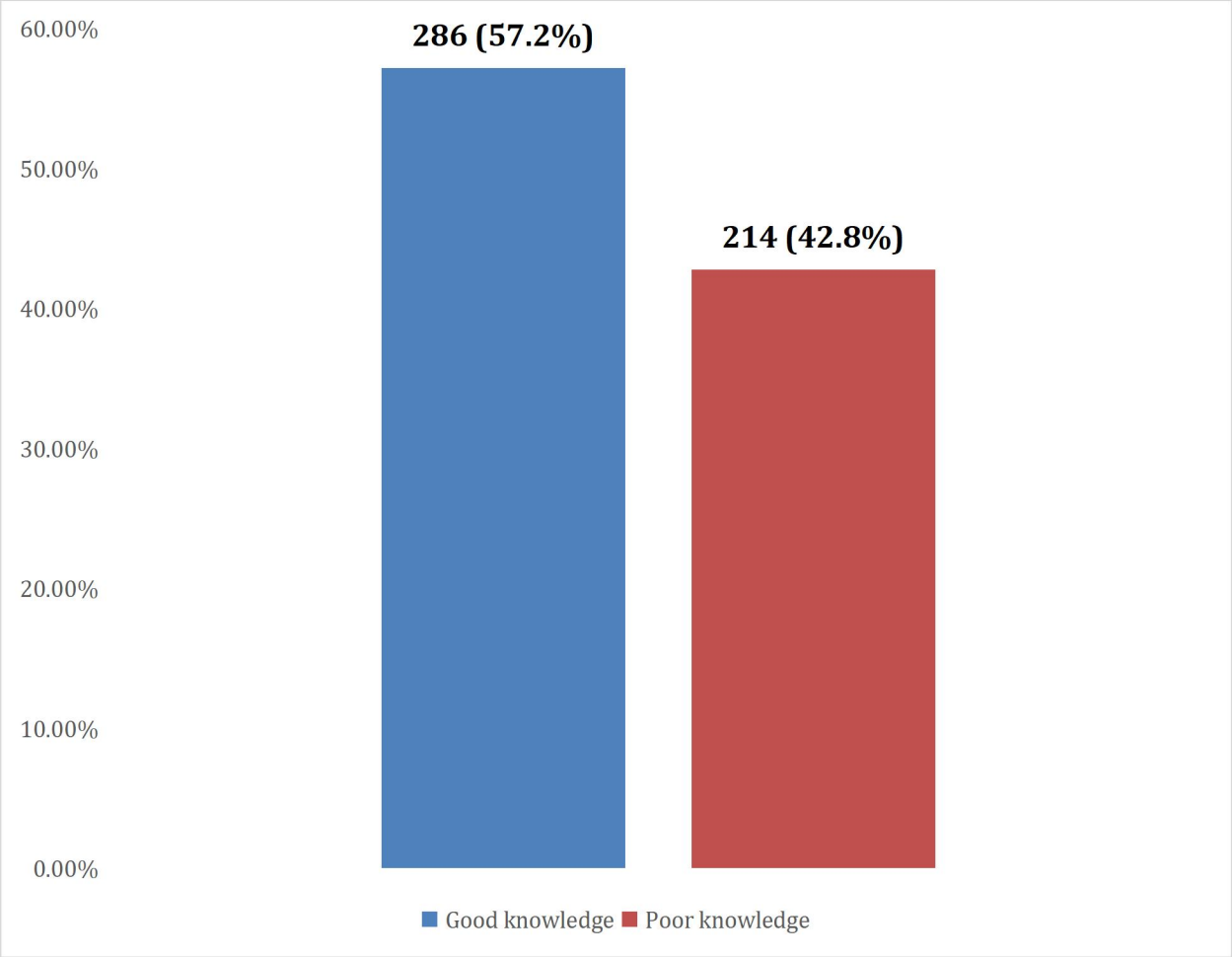

Figure 2: Level of knowledge of food insecurity among respondents

This shows that 286 (57.2%) of the respondents demonstrated good knowledge of food insecurity, while 214 (42.8%) were categorized as having poor knowledge.

Table 8a: Association between respondents' socio-demographic characteristics and levels of knowledge of food insecurity

Variables	Knowledge of food insecurity		χ^2	p-value
	Poor knowledge (n = 214) Freq (%)	Good knowledge (n = 286) Freq (%)		
Age				
25-34	21 (38.2)	34 (61.8)	5.259	0.262
35-44	29 (49.2)	30 (50.8)		
45-54	76 (46.3)	88 (53.7)		
55-64	57 (36.5)	99 (63.5)		
≥65	31 (47.0)	35 (53.0)		
Sex				
Male	169 (41.9)	234 (58.1)	0.634	0.426
Female	45 (46.4)	52 (53.6)		
Marital Status				
Not Married	40 (33.6)	79 (66.4)	5.383	**0.020**
Married	174 (45.7)	207 (54.3)		
Tribe				
Edo Indigenes	119 (42.3)	162 (57.7)	0.053	0.817
Edo non-indigenes	95 (43.4)	124 (56.6)		
Religion				
Christian	183 (41.6)	257 (58.4)	2.190	0.139
Others	31 (51.7)	29 (48.3)		

A greater proportion 99 (63.5%) of respondents aged 55–64 years had good knowledge of food insecurity compared to other age groups. The association between age and knowledge of food insecurity was not statistically significant (χ^2 = 5.259; p = 0.262). A higher proportion 234 (58.1%) of male respondents had good knowledge of food insecurity compared to females. The

association between sex and knowledge of food insecurity was not statistically significant (χ^2 = 0.634; p = 0.426). A greater proportion 79 (66.4%) of respondents who were not married had good knowledge of food insecurity compared to married respondents. The association between marital status and knowledge of food insecurity was statistically significant (χ^2 = 5.383; p = 0.020). A greater proportion 162 (57.7%) of Edo indigenes had good knowledge of food insecurity compared to Edo non-indigenes. The association between tribe and knowledge of food insecurity was not statistically significant (χ^2 = 0.053; p = 0.817). A greater proportion 257 (58.4%) of Christian respondents had good knowledge of food insecurity compared to respondents of other religions. The association between religion and knowledge of food insecurity was not statistically significant (χ^2 = 2.190; p = 0.139).

Table 8b: Association between respondents' socio-demographic characteristics and levels of knowledge of food insecurity

Variables	Knowledge of food insecurity		χ^2	p-value
	Poor knowledge (n = 214) Freq (%)	Good knowledge (n = 286) Freq (%)		
Level of Education				
No formal education	22 (57.9)	16 (42.1)	6.205	0.102
Primary education	13 (56.5)	10 (43.5)		
Secondary education	31 (38.8)	49 (61.3)		
Tertiary	148 (41.2)	211 (58.8)		
Employment Status				
Not Employed	17 (44.7)	21 (55.3)	0.063	0.802
Employed	197 (42.6)	265 (57.4)		
Skill Level				
1	6 (66.7)	3 (33.3)	7.641*	0.053
2	78 (38.2)	126 (61.8)		
3	79 (41.6)	111 (58.4)		
4	51 (52.6)	46 (47.4)		

***Fisher's exact**

A greater proportion 49 (61.3%) of respondents with secondary education had good knowledge of food insecurity compared to those with other levels of education. The association between level of education and knowledge of food insecurity was not statistically significant ($\chi^2 = 6.205$; $p = 0.102$). A higher proportion 265 (57.4%) of employed respondents had good knowledge of food insecurity compared to those not employed. The association between employment status and knowledge of food insecurity was not statistically significant ($\chi^2 = 0.063$; $p = 0.802$). A greater proportion 126 (61.8%) of respondents with skill level 2 had good knowledge of food

insecurity compared to those with other skill levels. The association between skill level and knowledge of food insecurity was not statistically significant ($p = 0.053$).

Table 9: Association between household characteristics and knowledge of food insecurity

Variables	Knowledge of food insecurity		χ^2	p-value
	Poor knowledge (n = 214) Freq (%)	Good knowledge (n = 284) Freq (%)		
Household size				
≤5	93 (40.3)	138 (59.7)	1.132	0.287
>5	121 (45.0)	148 (55.0)		
Number of children				
0	19 (43.2)	25 (56.8)	0.797	0.850
1-2	37 (40.2)	55 (59.8)		
3-4	97 (44.9)	119 (55.1)		
≥5	61 (41.2)	87 (58.8)		
Monthly household income (₦)				
≤₦180,000	99 (36.7)	171 (63.3)	9.019	**0.003**
>₦180,000	115 (50.0)	115 (50.0)		
Average amount spent on food (₦)				
≤₦100,000	118 (38.3)	190 (61.7)	6.600	**0.010**
>₦100,000	96 (50.0)	96 (50.0)		
Housing tenure status				
Rent	80 (39.0)	125 (61.0)	2.023	0.155
Own	134 (45.4)	161 (54.6)		
Access to a nearby food market				
Yes	182 (41.6)	256 (58.4)	2.245	0.134
No	32 (51.6)	30 (48.4)		
Household ownership of a garden or a farm				
Yes	119 (45.4)	143 (54.6)	1.543	0.214
No	95 (39.9)	143 (60.1)		

A greater proportion 138 (59.7%) of respondents from households with ≤5 members had good knowledge of food insecurity compared to those with more than 5 members. The association between household size and knowledge of food insecurity was not statistically significant (χ^2 = 1.132; p = 0.287). A greater proportion 55 (59.8%) of respondents with 1–2 children had good knowledge of food insecurity compared to other categories of number of children. The association between number of children and knowledge of food insecurity was not statistically significant (χ^2 = 0.797; p = 0.850). The majority 171 (63.3%) of respondents with monthly household income ≤ ₦180,000 had good knowledge of food insecurity compared to those with higher income. The association between monthly household income and knowledge of food insecurity was statistically significant (χ^2 = 9.019; p = 0.003). The majority 190 (61.7%) of respondents who spent ≤ ₦100,000 on food monthly had good knowledge of food insecurity compared to those who spent more. The association between average amount spent on food and knowledge of food insecurity was statistically significant (χ^2 = 6.600; p = 0.010). A greater proportion 125 (61.0%) of respondents who rented their housing had good knowledge of food insecurity compared to those who owned their homes. The association between housing tenure status and knowledge of food insecurity was not statistically significant (χ^2 = 2.023; p = 0.155). A greater proportion 256 (58.4%) of respondents with access to a nearby food market had good knowledge of food insecurity compared to those without access. The association between access to a nearby food market and knowledge of food insecurity was not statistically significant (χ^2 = 2.245; p = 0.134). Majority 143 (60.1%) of respondents without a household garden or farm had good knowledge of food insecurity compared to those who had one. The association between household ownership of a garden or farm and knowledge of food insecurity was not statistically significant (χ^2 = 1.543; p = 0.214).

Table 10a: Predictors of knowledge of food insecurity among respondents

Predictors	β coefficient	Odds Ratio	95% Confidence Interval		p-value
			Lower Limit	Upper Limit	
Age	0.011	1.011	0.994	1.029	0.205
Sex					
Male*		1			
Female	-0.339	0.712	0.439	1.154	0.168
Marital Status					
Not Married*		1			
Married	-0.684	0.505	0.308	0.829	**0.007**
Tribe					
Edo Indigenes*		1			
Edo non-indigenes	-0.034	0.966	0.668	1.398	0.855
Religion					
Others*		1			
Christianity	0.251	1.285	0.732	2.256	0.383
Level of Education					
Lower level education*		1			
Higher level education	0.855	2.351	1.303	4.241	**0.005**
Employment Status					
Not Employed*		1			
Employed	0.200	1.222	0.590	2.531	0.590
Skill Level					
1-2*		1			
3-4	-0.421	0.657	0.443	0.973	**0.036**

***reference category**

Age was not a significant predictor of knowledge of food insecurity. As age increased, respondents were 1.011 times more likely to have good knowledge (OR = 1.011, 95% CI: 0.994–1.029, p = 0.205). Sex was not a significant predictor of knowledge of food insecurity. Female respondents were 0.712 times as likely to have good knowledge compared to male respondents (OR = 0.712, 95% CI: 0.439–1.154, p = 0.168). Marital status was a significant predictor of

knowledge of food insecurity. Married respondents were 0.505 times as likely to have good knowledge compared to those who were not married (OR = 0.505, 95% CI: 0.308–0.829, p = 0.007). Tribe was not a significant predictor of knowledge of food insecurity. Edo non-indigenes were 0.966 times as likely to have good knowledge compared to Edo indigenes (OR = 0.966, 95% CI: 0.668–1.398, p = 0.855). Religion was not a significant predictor of knowledge of food insecurity. Christians were 1.285 times more likely to have good knowledge compared to respondents of other religions (OR = 1.285, 95% CI: 0.732–2.256, p = 0.383). Level of education was a significant predictor of knowledge of food insecurity. Respondents with higher education were 2.351 times more likely to have good knowledge compared to those with lower education (OR = 2.351, 95% CI: 1.303–4.241, p = 0.005). Employment status was not a significant predictor of knowledge of food insecurity. Employed respondents were 1.222 times more likely to have good knowledge compared to unemployed respondents (OR = 1.222, 95% CI: 0.590–2.531, p = 0.590). Skill level was a significant predictor of knowledge of food insecurity. Respondents with skill levels 3–4 were 0.657 times as likely to have good knowledge compared to those with skill levels 1–2 (OR = 0.657, 95% CI: 0.443–0.973, p = 0.036).

Table 10b: Predictors of knowledge of food insecurity among respondents

Predictors	β coefficient	Odds Ratio	95% Confidence Interval		p-value
			Lower Limit	Upper Limit	
Household size	-0.048	0.953	0.803	1.130	0.579
Number of children	0.050	1.052	0.878	1.260	0.585
Housing tenure status					
Rent*		1			
Own	-2.238	0.788	0.524	1.185	0.253
Access to a nearby food market					
Yes	0.530	1.698	0.979	2.947	0.060
No*		1			
Household ownership of a garden or a farm					
Yes	-0.205	0.815	0.549	1.210	0.310
No*		1			
Prevalence					
Food Security*		1			
Food Insecurity	-0.423	0.655	0.426	1.006	0.054

***Reference category**

Household size was not a significant predictor of knowledge of food insecurity. As household size increased, respondents were 0.953 times as likely to have good knowledge (OR = 0.953, 95% CI: 0.803–1.130, p = 0.579). Number of children was not a significant predictor of knowledge of food insecurity. As the number of children increased, respondents were 1.052 times more likely to have good knowledge (OR = 1.052, 95% CI: 0.878–1.260, p = 0.585). Housing tenure status was not a significant predictor of knowledge of food insecurity. Respondents who owned their homes were 0.788 times as likely to have good knowledge compared to those who lived in rented houses (OR = 0.788, 95% CI: 0.524–1.185, p = 0.253).

Access to a nearby food market was not a statistically significant predictor of knowledge of food insecurity. Respondents who had access to a nearby food market were 1.698 times more likely to have good knowledge compared to those without access (OR = 1.698, 95% CI: 0.979–2.947, p = 0.060). Household ownership of a garden or farm was not a significant predictor of knowledge of food insecurity. Respondents who owned a garden or farm were 0.815 times as likely to have good knowledge compared to those who did not (OR = 0.815, 95% CI: 0.549–1.210, p = 0.310). Prevalence of food insecurity was not a statistically significant predictor of knowledge of food insecurity, although it approached statistical significance. Respondents from food-insecure households were 0.655 times as likely to have good knowledge compared to those from food-secure households (OR = 0.655, 95% CI: 0.426–1.006, p = 0.054).

SECTION D

PERCEPTION OF FOOD INSECURITY AMONG RESPONDENTS

Table 11: Perception of food insecurity among respondents

Variables	SA freq (%)	A freq (%)	N freq (%)	D freq (%)	SD freq (%)
Food insecurity is a serious problem in my community	232 (46.4)	162 (32.4)	70 (14.0)	33 (6.6)	3 (0.6)
Lack of money is the major cause of food insecurity	235 (47.0)	172 (34.4)	58 (11.6)	30 (6.0)	5 (1.0)
There are times when members of my household do not have enough to eat.	131 (26.2)	156 (31.2)	89 (17.8)	71 (14.2)	53 (10.6)
Government should do more to reduce food insecurity	327 (65.4)	115 (23.0)	45 (9.0)	9 (1.8)	4 (0.8)
Food insecurity only affects lazy or jobless people	68 (13.6)	107 (21.4)	82 (16.4)	123 (24.6)	120(24.0)
Climate and environmental factors can affect household food security	204 (40.8)	207 (41.4)	63 (12.6)	18 (3.6)	8 (1.6)
It is embarrassing to admit one is food insecure	153 (30.6)	165 (33.0)	119 (23.8)	58 (9.6)	15 (3.0)
I believe that food insecurity can affect mental and physical health.	236 (47.2)	175 (35.0)	70 (14.0)	16 (3.2)	3 (0.6)
Food insecurity is more common than people think	224 (44.8)	196 (39.2)	66 (13.2)	11 (2.2)	3 (0.6)
Cultural beliefs influence food choices even during food shortage	157 (31.4)	203 (40.6)	104 (20.8)	26 (5.2)	10 (2.0)

SA= Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree

n = 500

On the statement that food insecurity is a serious problem in the community, 232 (46.4%) strongly agreed and 162 (32.4%) agreed, while 70 (14.0%) were neutral, 33 (6.6%) disagreed and 3 (0.6%) strongly disagreed. For the statement that lack of money is the major cause of food insecurity, 235 (47.0%) strongly agreed and 172 (34.4%) agreed, while 58 (11.6%) were neutral, 30 (6.0%) disagreed and 5 (1.0%) strongly disagreed. Regarding times when household members

do not have enough to eat, 131 (26.2%) strongly agreed and 156 (31.2%) agreed, while 89 (17.8%) were neutral, 71 (14.2%) disagreed and 53 (10.6%) strongly disagreed. For the statement that government should do more to reduce food insecurity, 327 (65.4%) strongly agreed and 115 (23.0%) agreed, while 45 (9.0%) were neutral, 9 (1.8%) disagreed and 4 (0.8%) strongly disagreed. On the statement that food insecurity only affects lazy or jobless people, 68 (13.6%) strongly agreed and 107 (21.4%) agreed, while 82 (16.4%) were neutral, 123 (24.6%) disagreed and 120 (24.0%) strongly disagreed. Regarding climate and environmental factors affecting household food security, 204 (40.8%) strongly agreed and 207 (41.4%) agreed, while 63 (12.6%) were neutral, 18 (3.6%) disagreed and 8 (1.6%) strongly disagreed. For the statement that it is embarrassing to admit being food insecure, 153 (30.6%) strongly agreed and 165 (33.0%) agreed, while 119 (23.8%) were neutral, 58 (9.6%) disagreed and 15 (3.0%) strongly disagreed. On the statement that food insecurity can affect mental and physical health, 236 (47.2%) strongly agreed and 175 (35.0%) agreed, while 70 (14.0%) were neutral, 16 (3.2%) disagreed and 3 (0.6%) strongly disagreed. For the statement that food insecurity is more common than people think, 224 (44.8%) strongly agreed and 196 (39.2%) agreed, while 66 (13.2%) were neutral, 11 (2.2%) disagreed and 3 (0.6%) strongly disagreed. For the statement that cultural beliefs influence food choices during food shortage, 157 (31.4%) strongly agreed and 203 (40.6%) agreed, while 104 (20.8%) were neutral, 26 (5.2%) disagreed and 10 (2.0%) strongly disagreed.

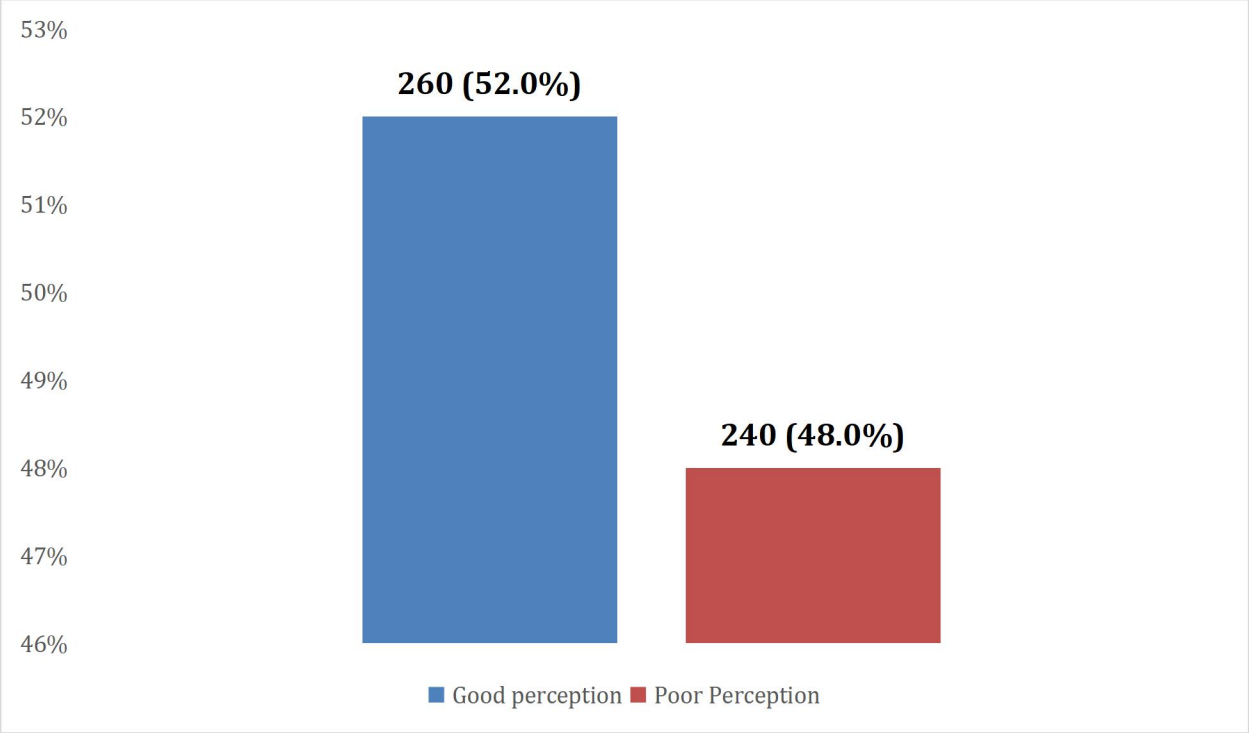

Figure 3: Level of perception of food insecurity among respondents

Out of 500 respondents, 260 (52.0%) were classified as having a good perception of their food security, while 240 (48.0%) were categorized as having a poor perception.

Table 12a: Association between socio-demographic characteristics and perception of food insecurity

Variables	Perception of food insecurity		χ^2	p-value
	Poor Perception (n = 240) Freq (%)	Good Perception (n = 260) Freq (%)		
Age				
25-34	33 (60.0)	22 (40.0)	5.114	0.276
35-44	28 (47.5)	31 (52.5)		
45-54	78 (47.6)	86 (52.4)		
55-64	67 (42.9)	89 (57.1)		
≥65	34 (51.5)	32 (48.5)		
Sex				
Male	193 (47.9)	210 (52.1)	0.010	0.921
Female	47 (48.5)	50 (51.5)		
Marital Status				
Not Married	59 (49.6)	60 (50.4)	0.156	0.693
Married	181 (47.5)	200 (52.5)		
Tribe				
Edo Indigenes	135 (48.0)	146 (52.0)	<0.001	0.983
Edo non-indigenes	105 (47.9)	114 (52.1)		
Religion				
Others	33 (55.0)	27 (45.0)	1.339	0.247
Christianity	207 (47.0)	233 (53.0)		

The majority 89 (57.1%) of respondents aged 55–64 years had good perception of food insecurity compared to other age groups. The association between age and perception of food insecurity was not statistically significant (χ^2 = 5.114; p = 0.276). A greater proportion 210 (52.1%) of male respondents had good perception of food insecurity compared to females. The association between sex and perception of food insecurity was not statistically significant (χ^2 =

0.010; p = 0.921). The majority 200 (52.5%) of married respondents had good perception of food insecurity compared to those who were not married. The association between marital status and perception of food insecurity was not statistically significant (χ^2 = 0.156; p = 0.693). A greater proportion 114 (52.1 %) of non-Edo indigenes had good perception of food insecurity compared to Edo indigenes. The association between tribe and perception of food insecurity was not statistically significant (χ^2 < 0.001; p = 0.983). The majority 233 (53.0%) of Christian respondents had good perception of food insecurity compared to respondents of other religions. The association between religion and perception of food insecurity was not statistically significant (χ^2 = 1.339; p = 0.247).

Table 12b: Association between socio-demographic characteristics and perception of food insecurity

Variables	Perception of food insecurity		χ^2	p-value
	Poor Perception (n = 240) Freq (%)	Good Perception (n = 260) Freq (%)		
Level of Education				
No formal education	29 (76.3)	9 (23.7)	17.016	**<0.001**
Primary education	15 (65.2)	8 (34.8)		
Secondary education	37 (38.4)	43 (53.8)		
Tertiary	159 (44.3)	200 (55.7)		
Employment Status				
Not employed	20 (52.6)	18 (47.4)	0.353	0.552
Employed	220 (47.6)	242 (52.4)		
Skill Level				
1	5 (55.6)	4 (44.4)	1.940*	0.587
2	103 (50.5)	101 (49.5)		
3	84 (44.2)	106 (55.8)		
4	48 (49.5)	49 (50.5)		

***Fisher's exact**

A greater proportion 200 (55.7%) of respondents with tertiary education had good perception of food insecurity compared to those with lower levels of education. The association between level of education and perception of food insecurity was statistically significant ($\chi^2 = 17.016$; $p < 0.001$). A higher proportion 242 (52.4%) of employed respondents had good perception of food insecurity compared to those not employed. The association between employment status and perception of food insecurity was not statistically significant ($\chi^2 = 0.353$; $p = 0.552$). A greater proportion 106 (55.8%) of respondents with skill level 3 had good perception of food insecurity

compared to those with other skill levels. The association between skill level and perception of food insecurity was not statistically significant ($p = 0.587$).

Table 13: Association between household characteristics and perception of food insecurity

Variables	Perception of food insecurity		χ^2	p-value
	Poor Perception (n = 240) Freq (%)	Good Perception (n = 260) Freq (%)		
Household size				
≤5	116 (50.2)	115 (49.8)	0.845	0.370
>5	124 (46.1)	145 (53.9)		
Number of children				
0	26 (59.1)	18 (40.9)	7.405	0.060
1-2	52 (56.5)	40 (43.5)		
3-4	92 (42.6)	124 (57.4)		
≥5	70 (47.3)	78 (52.7)		
Monthly household income (₦)				
≤₦180,000	137 (50.7)	133 (49.3)	1.766	0.184
>₦180,000	103 (44.8)	127 (55.2)		
Average amount spent on food (₦)				
≤₦100,000	152 (49.4)	156 (50.6)	0.586	0.444
>₦100,000	88 (45.8)	104 (54.2)		
Own or rent house				
Rent	96 (46.8)	109 (53.2)	0.191	0.716
Own	144 (48.8)	151 (51.2)		
Access to a nearby food market				
Yes	197 (45.0)	241 (55.0)	12.931	**<0.001**
No	43 (69.4)	19 (30.6)		
Have a garden or a farm				
Yes	128 (48.9)	134 (51.1)	0.161	0.720
No	112 (47.1)	126 (52.9)		

The majority 145 (53.9%) of respondents from households with more than 5 members had good perception of food insecurity compared to those with ≤5 members. The association between household size and perception of food insecurity was not statistically significant ($\chi^2 = 0.845$; p = 0.370). A greater proportion 124 (57.4%) of respondents with 3–4 children had good perception

of food insecurity compared to other categories of number of children. The association between number of children and perception of food insecurity was not statistically significant ($\chi^2 = 7.405$; $p = 0.060$). A greater proportion 127 (55.2%) of respondents with monthly household income > ₦180,000 had good perception of food insecurity compared to those with lower income. The association between monthly household income and perception of food insecurity was not statistically significant ($\chi^2 = 1.766$; $p = 0.184$). A greater proportion 104 (54.2%) of respondents who spent > ₦100,000 on food monthly had good perception of food insecurity compared to those who spent less. The association between average amount spent on food and perception of food insecurity was not statistically significant ($\chi^2 = 0.586$; $p = 0.444$). A greater proportion 109 (53.2%) of respondents who rented their houses had good perception of food insecurity compared to those who owned them. The association between housing tenure status and perception of food insecurity was not statistically significant ($\chi^2 = 0.191$; $p = 0.716$). The majority 241 (55.0%) of respondents with access to a nearby food market had good perception of food insecurity compared to those without access. The association between access to a nearby food market and perception of food insecurity was statistically significant ($\chi^2 = 12.931$; $p < 0.001$). A greater proportion 126 (52.9%) of respondents without a household garden or farm had good perception of food insecurity compared to those who had one. The association between household ownership of a garden or farm and perception of food insecurity was not statistically significant ($\chi^2 = 0.161$; $p = 0.720$).

Table 14a: Predictors of perception of food insecurity among respondents

Predictors	β coefficient	Odds Ratio	95% Confidence Interval		p-value
			Lower Limit	Upper Limit	
Age	0.014	1.014	0.997	1.032	0.111
Sex					
Male*		1			
Female	0.055	1.056	0.655	1.704	0.822
Marital Status					
Not Married*		1			
Married	0.006	1.006	0.626	1.617	0.980
Tribe					
Edo Indigenes*		1			
Edo non-indigenes	0.069	1.072	0.743	1.546	0.710
Religion					
Others*		1			
Christianity	0.193	1.213	0.686	2.142	0.507
Level of Education					
Lower level education*		1			
Higher level education	1.218	3.380	1.804	6.334	**<0.001**
Employment Status					
Not Employed*		1			
Employed	0.471	1.601	0.779	3.293	0.200
Skill Level					
1-2*		1			
3-4	-0.056	0.945	0.645	1.387	0.774

Age was not a significant predictor of perception of food insecurity. As age increased, respondents were 1.014 times more likely to have good perception of food insecurity (OR = 1.014, 95% CI: 0.997–1.032, p = 0.111). Sex was not a significant predictor of perception of food insecurity. Female respondents were 1.056 times more likely to have good perception compared to male respondents (OR = 1.056, 95% CI: 0.655–1.704, p = 0.822). Marital status was not a significant predictor of perception of food insecurity. Married respondents were 1.006 times more likely to have good perception compared to those who were not married (OR = 1.006, 95% CI: 0.626–1.617, p = 0.980). Tribe was not a significant predictor of perception of food

insecurity. Edo non-indigenes were 1.072 times more likely to have good perception compared to Edo indigenes (OR = 1.072, 95% CI: 0.743–1.546, p = 0.710). Religion was not a significant predictor of perception of food insecurity. Christians were 1.213 times more likely to have good perception compared to respondents of other religions (OR = 1.213, 95% CI: 0.686–2.142, p = 0.507). Level of education was a significant predictor of perception of food insecurity. Respondents with higher education were 3.380 times more likely to have good perception compared to those with lower education (OR = 3.380, 95% CI: 1.804–6.334, p < 0.001). Employment status was not a significant predictor of perception of food insecurity. Employed respondents were 1.601 times more likely to have good perception compared to unemployed respondents (OR = 1.601, 95% CI: 0.779–3.293, p = 0.200). Skill level was not a significant predictor of perception of food insecurity. Respondents with skill levels 3–4 were 0.945 times as likely to have good perception compared to those with skill levels 1–2 (OR = 0.945, 95% CI: 0.645–1.387, p = 0.774).

Table 14b: Predictors of perception of food insecurity among respondents

Predictors	β coefficient	Odds Ratio	95% Confidence Interval		p-value
			Lower Limit	Upper Limit	
Household size	0.040	1.041	0.876	1.237	0.645
Number of children	0.049	1.050	0.876	1.260	0.596
Housing tenure status					
Rent*		1			
Own	-0.239	0.787	0.523	1.186	0.252
Access to a nearby food market					
Yes	1.022	2.777	1.543	4.998	**<0.001**
No*		1			
Household ownership of a garden or a farm					
Yes	-0.054	0.948	0.638	1.408	0.790
No*		1			
Prevalence level					
Food secure*		1			
Food insecure	0.631	1.880	1.229	2.876	**0.004**
Knowledge level					
Poor knowledge*		1			
Good knowledge	0.457	0.515	1.100	2.267	**0.013**

Household size was not a significant predictor of perception of food insecurity. As household size increased, respondents were 1.041 times more likely to have good perception (OR = 1.041, 95% CI: 0.876–1.237, p = 0.645). Number of children was not a significant predictor of perception of food insecurity. As number of children increased, respondents were 1.050 times more likely to have good perception (OR = 1.050, 95% CI: 0.876–1.260, p = 0.596). Housing tenure status was not a significant predictor of perception of food insecurity. Respondents who owned their houses were 0.787 times as likely to have good perception compared to those who

rented (OR = 0.787, 95% CI: 0.523–1.186, p = 0.252). Access to a nearby food market was a significant predictor of perception of food insecurity. Respondents who had access to a nearby food market were 2.777 times more likely to have good perception compared to those without access (OR = 2.777, 95% CI: 1.543–4.998, p < 0.001). Household ownership of a garden or farm was not a significant predictor of perception of food insecurity. Respondents who owned a garden or farm were 0.948 times as likely to have good perception compared to those who did not (OR = 0.948, 95% CI: 0.638–1.408, p = 0.790). Prevalence of food insecurity was a significant predictor of perception of food insecurity. Respondents who were food insecure were 1.880 times more likely to have good perception compared to those who were food secure (OR = 1.880, 95% CI: 1.229–2.876, p = 0.004). Knowledge level was a significant predictor of perception of food insecurity. Respondents with good knowledge were 0.515 times as likely to have good perception compared to those with poor knowledge (OR = 0.515, 95% CI: 1.100–2.267, p = 0.013).

SECTION E

COPING STRATEGIES ADOPTED BY HOUSEHOLDS

Table 15: Coping strategies adopted by households in the past 30 days

Coping strategies	Frequency (n=500)	Percent
Rely on less preferred, less expensive foods	322	64.4
Limit portion size at mealtimes	286	57.2
Reduce the number of meals eaten in a day	271	54.2
Restrict consumption by adults so small children can eat	228	45.6
Used food items that were originally meant for sale or kept for future planting	220	44.0
Purchase food on credit	214	42.8
Borrow food or rely on help from friends/relatives	188	37.6
Ration money and buy prepared food instead of cooking	188	37.6
Skip entire days without eating	124	24.8
Send household members to eat elsewhere	122	24.4
Feed only working household members at the expense of others	108	21.6
Collected leftover foods from surrounding areas	95	19.0
Send household members to beg	88	17.6

The most common strategy was relying on less preferred, less expensive foods, reported by 322 households (64.4%). Limiting portion size at mealtimes was used by 286 households (57.2%), while 271 households (54.2%) reduced the number of meals eaten in a day. Restricting consumption by adults so that small children could eat was reported by 228 households (45.6%), and 220 households (44.0%) used food items that were originally meant for sale or kept for future planting. Purchasing food on credit was adopted by 214 households (42.8%), and 188 households (37.6%) either borrowed food or relied on help from friends and relatives, as well as rationed money and bought prepared food instead of cooking. Other less common strategies included skipping entire days without eating, reported by 124 households (24.8%), and sending

household members to eat elsewhere, reported by 122 households (24.4%). Feeding only working household members at the expense of others was adopted by 108 households (21.6%), while 95 households (19.0%) collected leftover foods from surrounding areas. Sending household members to beg was the least common strategy, reported by 88 households (17.6%).

Table 16: Frequency of coping strategies adopted by households

Coping strategies	Never n (%)	<1 day n (%)	1-2 days n (%)	3-6 days n (%)	Everyday n (%)
Rely on less preferred, less expensive foods	178 (35.6)	128 (25.6)	124 (24.8)	41 (8.2)	29 (5.8)
Borrow food or rely on help from friends/relatives	312 (62.4)	103 (20.6)	63 (12.6)	16 (3.2)	6 (1.2)
Purchase food on credit	286 (57.2)	120 (24.0)	68 (13.6)	22 (4.4)	4 (0.8)
Collected leftover foods from surrounding areas	405 (81.0)	48 (9.6)	36 (7.2)	10 (2.0)	1 (0.2)
Used food items that were originally meant for sale or kept for future planting	280 (56.0)	113 (22.6)	67 (13.4)	31 (6.2)	9 (1.8)
Send household members to eat elsewhere	378 (75.6)	65 (13.0)	42 (8.4)	11 (2.2)	4 (0.8)
Send household members to beg	412 (82.4)	43 (8.6)	32 (6.4)	8 (1.6)	5 (1.0)
Limit portion size at mealtimes	214 (42.8)	127 (25.4)	114 (22.8)	27 (5.4)	18 (3.6)
Restrict consumption by adults so small children can eat	272 (54.4)	98 (19.6)	86 (17.2)	26 (5.2)	18 (3.6)
Feed only working household members at the expense of others	392 (78.4)	46 (9.2)	49 (9.8)	8 (1.6)	5 (1.0)
Ration money and buy prepared food instead of cooking	312 (62.4)	90 (18.0)	66 (13.2)	23 (4.6)	9 (1.8)
Reduce the number of meals eaten in a day	229 (45.8)	127 (25.4)	92 (18.4)	31 (6.2)	21 (4.2)
Skip entire days without eating	376 (75.2)	61 (12.2)	42 (8.4)	15 (3.0)	6 (1.2)

n=500

The most commonly adopted coping strategy measured by those who used it at least once was relying on less preferred or less expensive foods, reported by 322 (64.4%) of respondents at

varying frequencies: 128 (25.6%) used it less than once a week, 124 (24.8%) used it 1–2 days per week, 41 (8.2%) used it 3–6 days, and 29 (5.8%) used it every day, while 178 (35.6%) never used it. Limiting portion size at mealtimes was also widely practiced 214 (42.8%) never did it, while 127 (25.4%) did so less than once a week, 114 (22.8%) did so 1–2 days per week, 27 (5.4%) for 3–6 days, and 18 (3.6%) every day. Similarly, reducing the number of meals eaten in a day was practiced by 271 (54.2%) of households at some frequency, with 127 (25.4%) doing so less than once a week, 92 (18.4%) 1–2 days, 31 (6.2%) 3–6 days, and 21 (4.2%) every day, while 229 (45.8%) never used this strategy. Restricting adult consumption so children could eat was reported by 228 (45.6%) of households, with 98 (19.6%) doing so less than once a week, 86 (17.2%) for 1–2 days, 26 (5.2%) for 3–6 days, and 18 (3.6%) every day; 272 (54.4%) never adopted this strategy. Less commonly used strategies included sending household members to eat elsewhere 378 (75.6%) never did this, with 65 (13.0%) doing so less than once a week, 42 (8.4%) for 1–2 days, 11 (2.2%) for 3–6 days, and 4 (0.8%) every day. Skipping entire days without eating was reported by 124 (24.8%) at some point, while 376 (75.2%) never did so. Sending household members to beg was the least commonly used strategy, with 412 (82.4%) never resorting to it; only 43 (8.6%), 32 (6.4%), 8 (1.6%), and 5 (1.0%) reported doing so at increasing frequencies. Collecting leftover foods from surrounding areas was similarly rare, with 405 (81.0%) never using this approach. Feeding only working household members at the expense of others was practiced occasionally by 108 (21.6%) of respondents, while 392 (78.4%) never did so. Purchasing food on credit was reported by 214 (42.8%) of households, while 286 (57.2%) never used this strategy. Using food items originally meant for sale or future planting was practiced by 220 (44.0%) of respondents, with 280 (56.0%) never having done so. Rationing money to buy prepared food instead of cooking was used by 188 (37.6%), with 312 (62.4%)

never adopting this approach. Borrowing food or relying on help from friends and relatives was reported by 188 (37.6%) of respondents, while 312 (62.4%) never used this strategy.

CHAPTER FIVE

DISCUSSION

This study aimed to assess the prevalence and determinants of food insecurity among households in Benin City, with specific objectives focusing on the prevalence of food insecurity, the determinants influencing food insecurity, households' knowledge and perception of food insecurity, and the coping strategies adopted by households in response to food insecurity. The findings are expected to provide insight into the burden of food insecurity, the factors associated with it, the level of awareness and perceptions among households, and the coping mechanisms used within the study population.

The study population was mainly middle-aged, with about two-thirds of respondents between 45–64 years and a mean age of 51.9±11.9 years, indicating that most were in their economically active years. This is similar to a study conducted in Oyo State, Nigeria, in 2020 which reported that most respondents were within the economically active age group.[60] This may be because household surveys tend to capture individuals responsible for family decision-making and economic activities.

Males constituted about four-fifths of respondents, while females made up about one-fifth. This is in contrast to a study conducted in Botswana and South Africa in 2021, where a higher proportion of female respondents were recorded.[57] This may be due to cultural norms in Nigerian settings where males are commonly identified as household heads.

The majority were married, accounting for about two-thirds of the sample. This is similar to a study conducted in Edo State in 2012, where married respondents formed the largest proportion

of the sample.[54] This could be because marriage is strongly associated with household formation and responsibility in some African settings.

Almost nine-tenths were Christians, while Muslims and traditional worshippers made up smaller proportions. The predominance of Christians in this study is similar to a study conducted in Ibadan, Nigeria in 2023 on household food insecurity among households, which also reported a majority Christian sample. [53] This may be due to the religious composition of southern Nigerian populations where Christianity is dominant.

More than two-thirds of respondents had tertiary education, while about one-sixth had secondary education and smaller proportions had primary or no formal education. This is in contrast to a study conducted in Oyo State, Nigeria, where most respondents had lower levels of education.[60] This may be explained by differences in study settings, with more urban or semi-urban areas having better access to education and employment opportunities.

Over nine-tenths were employed, with only a small proportion being unemployed or retired. The high employment rate among respondents is similar to a study conducted in Ecuador between 2018 and 2020, where most respondents were economically active individuals.[56] This may be because household surveys often target working age adults who are more likely to be engaged in income-generating activities.

Just over half of respondents lived in households with more than five members, while about two-fifths had three to four children. This is similar to a study conducted in Botswana and South Africa in 2021, which also reported a high proportion of large households in their sample.[57] This may be because of higher fertility rates, cultural preferences for larger families in Nigeria and extended family living arrangements.

About half earned ₦180,000 or less monthly, while slightly less than half earned above this amount. This is similar to a study conducted in Edo State, Nigeria in 2012, where a substantial proportion of respondents were also within lower income categories.[54] This may be due to the economic structure of Nigerian communities where low- to middle-income earners predominate.

More than half of respondents owned their homes, while about two-fifths rented. This is in contrast to a study conducted in Uganda carried out between 2020 and 2021where a larger proportion of respondents were renters or in unstable housing arrangements.[58] This may be because Nigerian households are more likely to reside in family-owned or inherited homes compared to more transient housing arrangements seen in some other settings.

Overall, although most respondents were educated, employed, and had access to food markets, a considerable proportion still had large household sizes, moderate to low income, and relatively low food expenditure, which may still predispose households to food-related challenges.

The study found that more than three-quarters of households were food insecure. This indicates that food insecurity is highly widespread in the study population. Among the food-insecure households, moderate food insecurity accounted for just over one-third, while mild and severe food insecurity each accounted for about one-third in similar proportions. This is in contrast to a study conducted in Ibadan, Nigeria in 2023 on household food insecurity among households with under-five children in slum communities, which reported that 19.0% of households were food insecure while 81.0% were food secure.[53]

Probable reasons for this high prevalence of food insecurity may be explained by the observed bivariate associations between food insecurity and several socio-demographic and economic characteristics. Older respondents (≥65 years) were more food insecure, which may be attributed

to reduced earning capacity, retirement, and dependence on fixed or limited incomes. Marital status also showed a similar pattern, with married respondents being more affected, probably due to increased household responsibilities and a higher dependency burden. A similar trend was observed with education, where respondents with only primary education were more food insecure. This may be due to limited access to employment opportunities and reduced earning potential associated with lower educational attainment. Employment status and skill level further demonstrated this pattern, as retired respondents and those with lower skill levels were more affected. This may be linked to reduced or unstable income sources and engagement in low-paying occupations. Respondents with lower monthly income and lower monthly food expenditure were more food insecure and this may be due to educed purchasing power and limited ability to consistently access adequate food. A similar pattern was observed with perception of food insecurity, where respondents with good perception were more likely to be food insecure, possibly due to lived experience of food scarcity. The high burden of food insecurity may also be attributed to widespread economic hardship and rising cost of food items.

The high prevalence of food insecurity in this study increases the risk of malnutrition, micronutrient deficiencies, and diet-related diseases across all age groups. It can also contribute to poor child growth and development, increased susceptibility to illness, reduced productivity, and poorer overall quality of life.[11, 12] Policies should prioritize improving household financial capacity and ensuring affordable access to food. Programs that enhance household awareness and perception of food security should also be implemented, alongside broader poverty alleviation and food price stabilization strategies.

Multivariate logistic regression analysis identified several independent determinants of food insecurity among households.

Marital status was a significant predictor of food insecurity, with married respondents exhibiting higher odds of food insecurity compared with those who were not married. This finding is consistent with a study conducted in Ogun State in 2024, which reported that marital status significantly influenced household food security status, with married households being more vulnerable due to increased dependency burden that places additional pressure on income and food resources. [79] Married respondents may experience higher food insecurity due to increased household responsibilities and larger household sizes, which raise food consumption needs and financial pressure on available resources.

Respondents with higher education were less likely to experience food insecurity compared to those with lower levels of education. This is consistent with findings in a study done in Botswana and South Africa study in 2021, which reported that individuals with higher educational qualifications were more likely to be food secure than those without formal education, highlighting the protective role of education in improving household resilience.[57] Lower educational attainment may contribute to food insecurity because it limits access to skilled employment and higher-income opportunities, reducing household earning capacity.

Employment status was also a significant predictor of food insecurity, as employed respondents were less likely to experience food insecurity compared with unemployed respondents. This aligns with results from a study carried out in the Paute River Basin, Ecuador between 2018 and 2020, where employment type was identified as a key determinant of food security, with certain forms of employment, particularly self-employment in agriculture, associated with increased vulnerability.[56] Unemployed individuals are more likely to experience food insecurity due to lack of stable income, which reduces their ability to purchase adequate and nutritious food.

Skill level was a significant determinant of food insecurity, with higher skill acquisition associated with reduced likelihood of food insecurity. This finding is similar to a study carried out in Imo and Anambra states in 2020, which reported that improved livelihood capacity and income-generating ability enhanced household food security, underscoring the importance of skills in strengthening economic resilience.[59] Low skill levels may lead to limited job opportunities and low-paying work, reducing household income and increasing vulnerability to food insecurity.

The number of children in a household significantly influenced food insecurity, with larger numbers of children increasing the likelihood of food insecurity. This is consistent with findings from a Ugandan study carried out between 2020 and 2021, which showed that larger household size was associated with multiple indicators of food insecurity.[58] Households with more children face higher dependency burdens and increased food demand, which can strain limited household resources and increase the risk of food insecurity.

Housing tenure status was significantly associated with food insecurity, as home ownership was linked to lower odds of food insecurity compared with renting. This finding agrees with evidence from a study in China in 2020, which showed that housing ownership was identified as a protective factor against food insecurity during the COVID-19 period, likely due to reduced financial strain on households.[55] Renting households may experience higher food insecurity because a portion of household income is allocated to rent, leaving less disposable income available for food purchases.

The determinants of food insecurity reflect underlying socioeconomic inequalities such as low education, unemployment, low skills, large household size, and housing insecurity. These factors

increase vulnerability to poor dietary intake, malnutrition, and related health conditions, while also contributing to psychological stress and reduced productivity.[12, 14] The Federal, State, and Local Ministries of Agriculture, Health, Education, and Social Welfare, should focus on strengthening food and social support programmes, creating employment opportunities, improving access to education and skills acquisition, promoting family planning services, and expanding affordable housing schemes to reduce household vulnerability to food insecurity.

The findings of this study show that the majority of respondents demonstrated good knowledge of food insecurity. Most participants correctly identified key components such as access to safe food, the role of food aid, maintenance of adequate food stocks, domestic food production, and the influence of political stability, climate change, and price fluctuations. However, comparatively fewer respondents recognized purchasing power and food importation as important dimensions, indicating some gaps in understanding the economic and macro-level determinants of food security. The high level of knowledge may be attributed to increasing public awareness driven by rising food prices, economic instability, and frequent discussions around food access in Nigeria. Exposure to media, public discourse, and lived experiences of economic hardship may have enhanced respondents' understanding of food security concepts. The observed gaps, particularly regarding purchasing power and importation, may stem from the fact that these are less direct or less visible aspects of food security, often requiring a broader economic or policy-level understanding, which many households may not fully grasp. This finding contrasts with a study in 2019, done in Lagos, which reported limited knowledge of food insecurity and its long-term effects among urban households, despite high levels of food insecurity.[62] The difference may reflect variations in study populations, time period, or increased awareness over time. It is also possible that respondents in Benin City have had more direct

exposure to food insecurity challenges, thereby improving experiential knowledge. Among socio-demographic factors, marital status showed a significant association with knowledge, with unmarried respondents demonstrating better knowledge than married individuals. Other variables such as age, sex, tribe, religion, education, employment status, and skill level did not show statistically significant associations. However, marital status remained a significant predictor, with married respondents being less likely to have good knowledge. Higher level of education significantly increased the likelihood of good knowledge. Higher skill levels were associated with reduced likelihood of good knowledge, and monthly income and amount spent on food were significantly associated with knowledge, with lower-income households and those spending less on food demonstrating better knowledge. Other factors such as household size, number of children, housing status, market access, and farm ownership were not significant predictors of food insecurity. These findings may be due to the fact that education enhances access to information and critical understanding of socio-economic issues. The finding that lower-income households had better knowledge may reflect greater exposure to food insecurity, making them more aware of its causes and implications through lived experience. The inverse relationship with marital status could be due to competing responsibilities among married individuals, limiting time or attention to broader conceptual issues. The finding regarding higher skill levels may suggest that individuals in higher-skilled categories may not engage with food-related vulnerabilities directly, or it could reflect contextual occupational dynamics. These findings are consistent with a study in Osun and Oyo States, in 2016 which identified income, household size, and market access as important determinants of perception of food insecurity. [64] While the present study did not find household size and market access statistically significant, the role of

income aligns with existing evidence. The differences may be due to variations in study design, sample size, and geographic context.

The findings from this study indicate that respondents demonstrated good perception of food insecurity, with more than half classified as having good perception. A higher proportion of respondents strongly agreed or agreed that food insecurity is a serious problem in their community, that lack of money is a major cause, and that government intervention is necessary. Additionally, most respondents acknowledged the roles of climate and environmental factors, as well as the impact of food insecurity on mental and physical health. These findings suggest that respondents possess a broad and socially informed understanding of food insecurity, particularly regarding its causes, consequences, and societal relevance.

This high level of perception may be attributed to increasing exposure to food-related challenges, including rising food prices, inflation, and economic instability in Nigeria. Frequent public discourse, media coverage, and lived experiences of food scarcity may have heightened awareness, making food insecurity a visible and relatable issue among households. The strong agreement that lack of money is a major cause further highlights that respondents perceive food insecurity largely through an economic lens, emphasizing affordability as a central determinant.

However, some perceptual gaps were observed. A proportion of respondents either agreed or remained neutral on the statement that food insecurity affects only lazy or jobless individuals, suggesting the persistence of stigmatizing beliefs. Similarly, a number of respondents reported that it is embarrassing to admit food insecurity, indicating the presence of social stigma and underreporting tendencies. These findings imply that, despite good perception, misconceptions and cultural attitudes may still influence how food insecurity is understood and expressed.

Regarding socio-demographic factors, level of education emerged as a significant determinant of perception, with respondents who had higher education being over three times more likely to have good perception. This finding aligns with the expectation that education enhances access to information, critical thinking, and awareness of socio-economic issues. In contrast, variables such as age, sex, marital status, tribe, religion, employment status, and skill level were not statistically significant predictors, suggesting that perception of food insecurity may be widely distributed across different social groups.

Among household characteristics, access to a nearby food market was a significant predictor, with respondents having such access being three times more likely to have good perception. This may reflect the role of physical proximity to food systems in shaping awareness, as individuals who frequently interact with markets are more likely to observe food price fluctuations, availability issues, and supply challenges. Additionally, respondents who were food insecure were significantly more likely to have good perception, indicating that direct experience enhances awareness and understanding of food insecurity.

Knowledge level was also a significant predictor, suggesting an inverse relationship with the outcome, indicating that higher knowledge was associated with reduced odds of the outcome. This relationship highlights the complex interaction between knowledge and perception, where having factual knowledge does not always translate into accurate or favorable perception.

These findings are consistent with a study conducted in 2016 in Osun and Oyo States, Nigeria, which reported that household income, market access, and economic constraints significantly influenced perception of food insecurity risks.[64] In both studies, financial limitations and access to food markets emerged as key factors shaping perception, reinforcing the importance of

economic access and food environment in understanding food insecurity. However, while the Osun and Oyo study identified household size and market distance as significant determinants, the present study did not find household size statistically significant. This discrepancy may be due to differences in study design, sample size, and geographic context, as well as variations in urban versus semi-urban populations. Overall, the findings suggest that while respondents exhibit a good perception of food insecurity, this perception is influenced by education, economic realities, and direct experience, with some remaining gaps related to stigma and misconceptions. These insights emphasize the need for public health interventions and policies that not only improve food access but also address social attitudes and enhance community-level understanding of food insecurity.

The study shows that households adopt various coping strategies in response to food insecurity. Such strategies include reducing meal size, skipping meals, purchasing cheaper food alternatives, and relying on social support systems. The probable reasons for this may be due to economic constraints, rising food prices, and inadequate household income. Households tended to adopt short-term, survival-based strategies that may compromise nutritional quality in order to maintain caloric intake. The findings are consistent with previous studies, as a 2017 Edo/Delta study which reported households commonly resorting to reducing meals, borrowing money, and modifying cooking methods[65]; a 2019 Kano study which found skipping meals and selling assets as common strategies[66]; and a 2024 Ebonyi study that reported meal rationing and consumption of cheaper food alternatives, especially among vulnerable households.[67]

Thus, there is a clear pattern across Nigeria, showing that households predominantly rely on coping mechanisms that may have negative long-term nutritional and economic consequences.

CONCLUSION

This study provides insight into the prevalence and determinants of food insecurity among households in Benin City, as well as their knowledge, perception, and coping strategies.

A high proportion of households experienced food insecurity, with more than three-quarters affected and many experiencing moderate to severe levels.

Marital status, education, employment, skill level, number of children, income, food expenditure, and housing tenure were identified as key determinants of food insecurity. Married respondents, those with lower education, unemployment, lower skill levels, higher number of children, low income, and rented housing were more affected, showing the strong influence of socioeconomic and household factors.

More than half of respondents had good knowledge of food insecurity, although gaps were observed in understanding broader economic aspects such as purchasing power and food importation. Higher education and income were associated with better knowledge, while marital status and skill level also influenced knowledge levels.

Just over half of respondents had a good perception of food insecurity. Higher education and access to nearby food markets were associated with better perception, while knowledge and actual food insecurity experience also influenced how respondents perceived food security.

Households adopted various coping strategies in response to food insecurity, including reducing meal size, skipping meals, and consuming less preferred foods.

RECOMMENDATIONS

The following recommendations are based on the findings of this study, with the expectation that proper implementation will improve knowledge of food insecurity, promote healthier coping strategies, and enhance household food security among residents of Benin City.

RECOMMENDATIONS FOR THE GOVERNMENT

1. Develop and Implement Food Security Awareness Programs

The government should initiate sustained national and state-level awareness campaigns to educate households on the multidimensional nature of food security, including economic access, nutrition, and food safety.

2. Strengthen Social Protection Schemes:

There is a need to expand and strengthen social safety net programs such as conditional cash transfers, food subsidies, and targeted assistance for low-income households to reduce vulnerability to food insecurity.

3. Support Local Food Production

The government should invest in agriculture through provision of subsidies, improved seedlings, fertilizers, and access to credit facilities for small-scale farmers to boost local food production and availability.

4. Improve Market and Transport Infrastructure

Policies should focus on improving rural and urban market systems, road networks, and food distribution channels to ensure affordability and accessibility of food.

5. Stabilize Food Prices and Strengthen Food Policies

The government should implement policies aimed at controlling inflation and stabilizing food prices, as well as strengthen national food reserve systems to cushion the effects of economic shocks.

6. Integrate Nutrition and Food Security into Primary Healthcare Services

Primary healthcare workers should be trained to provide nutrition education and identify households at risk of food insecurity, with appropriate referral systems for support services.

RECOMMENDATIONS TO THE COMMUNITY

1. Promote Community-Based Food Security Education:

Community leaders and local organizations should organize sensitization programs to improve understanding of food security, particularly its economic and nutritional dimensions.

2. Encourage Community Farming Initiatives:

Communities should promote cooperative farming, community gardens, and shared agricultural practices to improve food availability and reduce dependency on market purchases.

3. Strengthen Community Support Systems:

Local groups, religious institutions, and associations should develop food banks or support schemes for vulnerable households.

4. Engage Influential Community Leaders:

Traditional rulers, religious leaders, and opinion leaders should be actively involved in promoting awareness and supporting interventions aimed at reducing food insecurity.

5. Promote Nutrition-Sensitive Practices:

Communities should encourage healthy eating habits, dietary diversity, and efficient food utilization practices among households.

RECOMMENDATIONS TO HOUSEHOLDS/INDIVIDUALS

1. Adopt Improved Food Planning and Budgeting Practices:

Households should be encouraged to plan meals effectively, prioritize nutritious foods, and manage available resources efficiently.

2. Engage in Household Food Production:

Families should be encouraged to practice home gardening or small-scale farming where feasible to supplement food supply.

3. Seek Nutrition and Food Security Information:

Households should actively participate in educational programs and utilize available information sources to improve their understanding of food security.

4. Adopt Positive Coping Strategies:

Rather than relying on harmful coping mechanisms such as skipping meals, households should explore healthier alternatives such as food substitution and community support systems.

5. Utilize Social and Community Networks:

Households should leverage support groups, cooperatives, and local associations for access to food resources and financial assistance.

6. Advocate for Improved Food Policies:

Individuals and households should engage with community leaders and policymakers to advocate for better food security policies and interventions.

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APPENDIX I

INFORMED CONSENT FORM

TITLE OF STUDY

Prevalence and determinants of food insecurity among households in Benin City.

INSTITUTION

Department of Public Health and Community Medicine, College of Medical Sciences, University of Benin, Benin City.

PRINCIPAL INVESTIGATORS

Otomfon-Abasi Godwin Akpan

Enakpodia Mamuyovwi Akpodono

SUPERVISOR

Prof. V. O. Omuemu

FINANCIAL SPONSORSHIP

This research work is financially sponsored by the principal investigators.

PURPOSE OF RESEARCH

The purpose of this research work is to assess the prevalence and determinants of food insecurity among households in Benin City.

PROCEDURES

Participants (household heads) will be asked questions regarding the prevalence and determinants of food insecurity.

CONFIDENTIALITY

All information collected would be kept confidential and stored securely. Data collected would be anonymized and only accessible to the research team.

COMPENSATION

Participants will not receive any compensation for their participation.

VOLUNTARY PARTICIPATION

Your participation in this study is voluntary. You may withdraw from the study at any time without any consequences.

RISKS

There are no risks associated with participation in this study.

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 prevalence and determinants of food insecurity among households in Benin City.

CONTACT INFORMATION

If you have any questions or concerns regarding this research work please contact.

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Ethics and Research Committee,

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IF THERE IS ANY PORTION OF THIS CONSENT AGREEMENT THAT YOU DO

NOT UNDERSTAND, ASK THE FIELD WORKER OR INVESTIGATOR BEFORE SIGNING.

Please, sign below if you have agreed to participate in the study.

CERTIFICATION OF CONSENT

I, _____ having full capacity to consent for myself do thereby consent to my participation in the research study.

The methods and means by which the study will be conducted have been explained to me by Ethical Committee. I have been given the opportunity to ask questions concerning this investigational study, and any such questions have been answered to my full and complete satisfaction.

I understand that I may at any time during the course of this study revoke this consent and withdraw myself from the study without prejudice.

Participant's Signature: _____

Date: _____

APPENDIX II

QUESTIONNAIRE ON PREVALENCE AND DETERMINANTS OF FOOD INSECURITY AMONG HOUSEHOLDS IN BENIN CITY

Dear Respondents,

We are 600L medical students of the University of Benin, Benin City, conducting a research project on the prevalence and determinants of food insecurity among households in Benin City. Please answer all questions accurately. If you are unsure about any question, you may leave it blank or provide your best estimate. Information given will be treated with utmost confidentiality. Thank you.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENT

1. Age of household head (as at last birthday): _____
2. Gender: ☐ Male ☐ Female
3. Marital status: ☐ Single ☐ Married ☐ Widowed ☐ Divorced
4. Tribe: Bini: ☐Esan ☐Igbo ☐Urhobo ☐Yoruba ☐Hausa ☐ Others please specify _____
5. Religion: Christian☐ Islam ☐ African traditional religion☐ Others specify _____
6. Level of education: ☐ No formal education ☐ Primary ☐ Secondary ☐ Tertiary
7. Employment status: ☐ Employed ☐ Unemployed ☐ Retired
8. Occupation: _____
9. Household size: _____
10. Number of children: _____
11. Monthly household income(in naira): _____
12. Average amount spent on food monthly (in naira): _____
13. Do you own or rent your house? ☐ Own ☐ Rent
14. Do you have access to a nearby food market? ☐ Yes ☐ No
15. Does your household have a garden or a farm? ☐ Yes ☐ No

SECTION B: PREVALENCE OF FOOD INSECURITY

During the last 12 months, was there a time in your household when:

1. You were worried you would run out of food because of a lack of money or other resources? ☐ Yes ☐ No
2. You were unable to eat healthy and nutritious food because of a lack of money or other resources? ☐ Yes ☐ No
3. You ate only a few kinds of foods because of a lack of money or other resources? ☐ Yes ☐ No
4. You had to skip a meal because there was not enough money or other resources to get food? ☐ Yes ☐ No
5. You ate less than you thought you should because of a lack of money or other resources? ☐ Yes ☐ No
6. Your household ran out of food because of a lack of money or other resources? ☐ Yes ☐ No ☐
7. You were hungry but did not eat because there was not enough money or other resources for food? ☐ Yes ☐ No ☐
8. You went without eating for a whole day because of a lack of money or other resources? ☐ Yes ☐ No ☐

SECTION C: KNOWLEDGE OF FOOD INSECURITY

1. The ability to purchase food is one dimension of food security. ☐ Yes ☐ No
2. Transport and market infrastructure contribute to food security. ☐ Yes ☐ No
3. Domestic production of food is part of food security. ☐ Yes ☐ No
4. The ability to import food can influence a country's food security. ☐ Yes ☐ No
5. Food aid can help improve food security. ☐ Yes ☐ No
6. Securing and maintaining adequate food stocks is part of food security. ☐ Yes ☐ No
7. Access to safe food is a component of food security. ☐ Yes ☐ No

8. Weather and climate changes can affect food security. ☐ Yes ☐ No
9. Political factors that affect a country's stability can influence food security ☐ Yes ☐ No
10. Price fluctuations can affect food security ☐ Yes ☐ No

SECTION D: PERCEPTION OF FOOD INSECURITY

Please tick the option that best reflects your opinion.

Scale: Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly Disagree (SD)

S/N	Statement	SA	A	N	D	SD
1	Food insecurity is a serious problem in my community.	☐	☐	☐	☐	☐
2	Lack of money is the major cause of food insecurity.	☐	☐	☐	☐	☐
3	There are times when members of my household do not have enough to eat.	☐	☐	☐	☐	☐
4	Government should do more to reduce food insecurity.	☐	☐	☐	☐	☐
5	Food insecurity only affects lazy or jobless people.	☐	☐	☐	☐	☐
6	Climate and environmental factors can affect household food security.	☐	☐	☐	☐	☐
7	It is embarrassing to admit one is food insecure.	☐	☐	☐	☐	☐
8	I believe that food insecurity can affect mental and physical health.	☐	☐	☐	☐	☐
9	Food insecurity is more common than people think.	☐	☐	☐	☐	☐
10	Cultural beliefs influence food choices even during food shortage.	☐	☐	☐	☐	☐

SECTION E: COPING STRATEGIES

In the past 30 days, if there were times when you did not have enough food or money to buy food, how often has your household had to do the following?

Coping Strategy	Never (0 days)	<1 day/week	1–2 days/week	3–6 days/week	Every day
1. Rely on less preferred, less expensive foods	☐	☐	☐	☐	☐
2. Borrow food or rely on help from friends/relatives	☐	☐	☐	☐	☐
3. Purchase food on credit	☐	☐	☐	☐	☐
4. Collected leftover foods from surrounding areas	☐	☐	☐	☐	☐
5. Used food items that were originally meant for sale or kept for future planting	☐	☐	☐	☐	☐
6. Send household members to eat elsewhere	☐	☐	☐	☐	☐
7. Send household members to beg	☐	☐	☐	☐	☐
8. Limit portion size at mealtimes	☐	☐	☐	☐	☐
9. Restrict consumption by adults so small children can eat	☐	☐	☐	☐	☐
10. Feed only working household members at the expense of others	☐	☐	☐	☐	☐

Coping Strategy	Never (0 days)	<1 day/week	1–2 days/week	3–6 days/week	Every day
11. Ration money and buy prepared food instead of cooking	☐	☐	☐	☐	☐
12. Reduce the number of meals eaten in a day	☐	☐	☐	☐	☐
13. Skip entire days without eating	☐	☐	☐	☐	☐

APPENDIX III

GANTT CHART

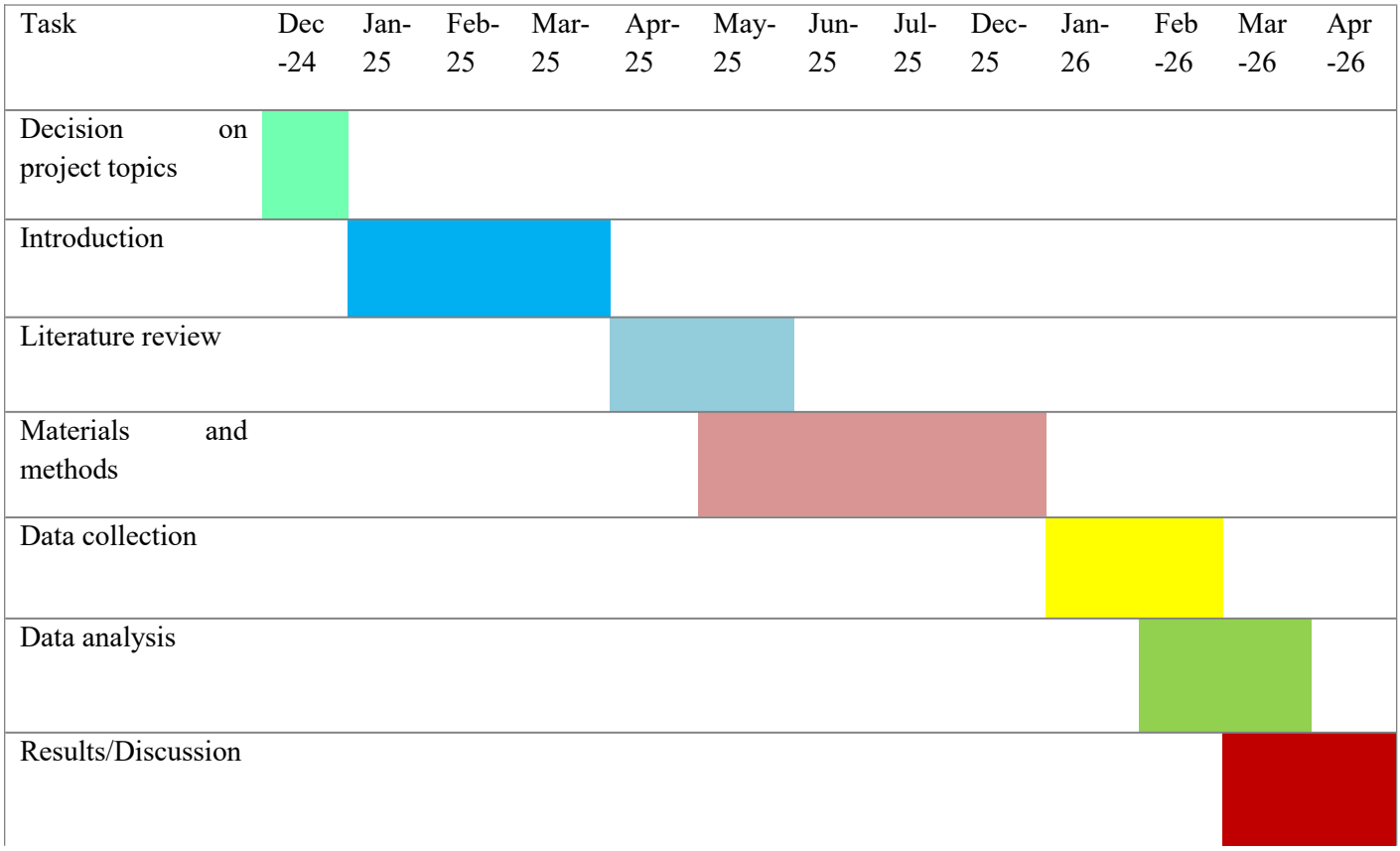
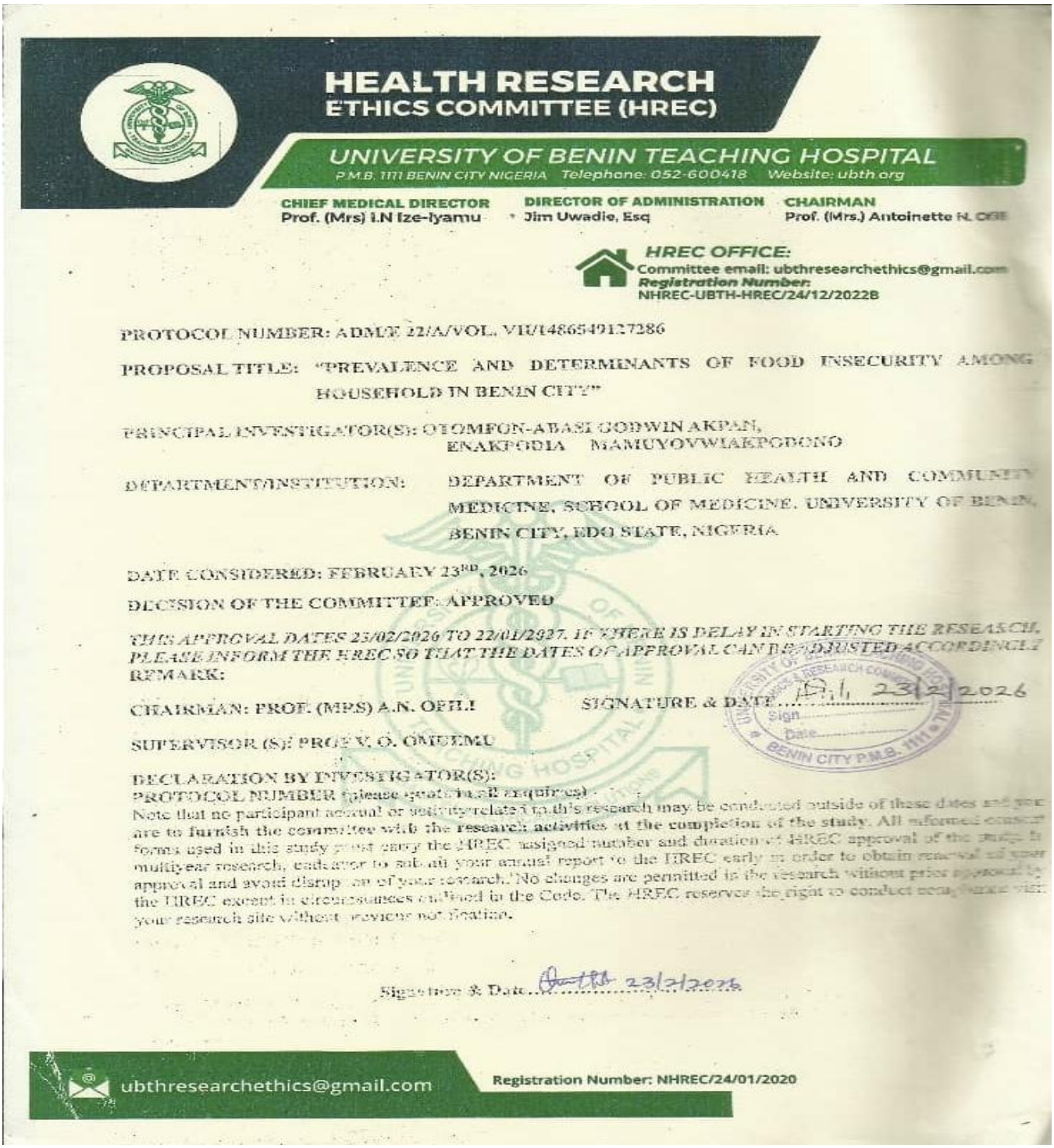


Figure 4: Gantt chart showing the work plan of the one-year project

APPENDIX IV

ETHICAL CLEARANCE FORM



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. (Mrs) I.N Ize-Iyamu
DIRECTOR OF ADMINISTRATION Jim Uwadie, Esq
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Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADMIN 22/A/VOL. VII/1486549127286

PROPOSAL TITLE: "PREVALENCE AND DETERMINANTS OF FOOD INSECURITY AMONG HOUSEHOLD IN BENIN CITY"

PRINCIPAL INVESTIGATOR(S): OTOMFON-ABASI GODWIN AKPAN, ENAKPODIA MAMUYOVWIAKPODONO

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

DATE CONSIDERED: FEBRUARY 23RD, 2026

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 23/02/2026 TO 22/01/2027. 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 23/2/2026

SUPERVISOR (S): PROF V. O. OMUEMU

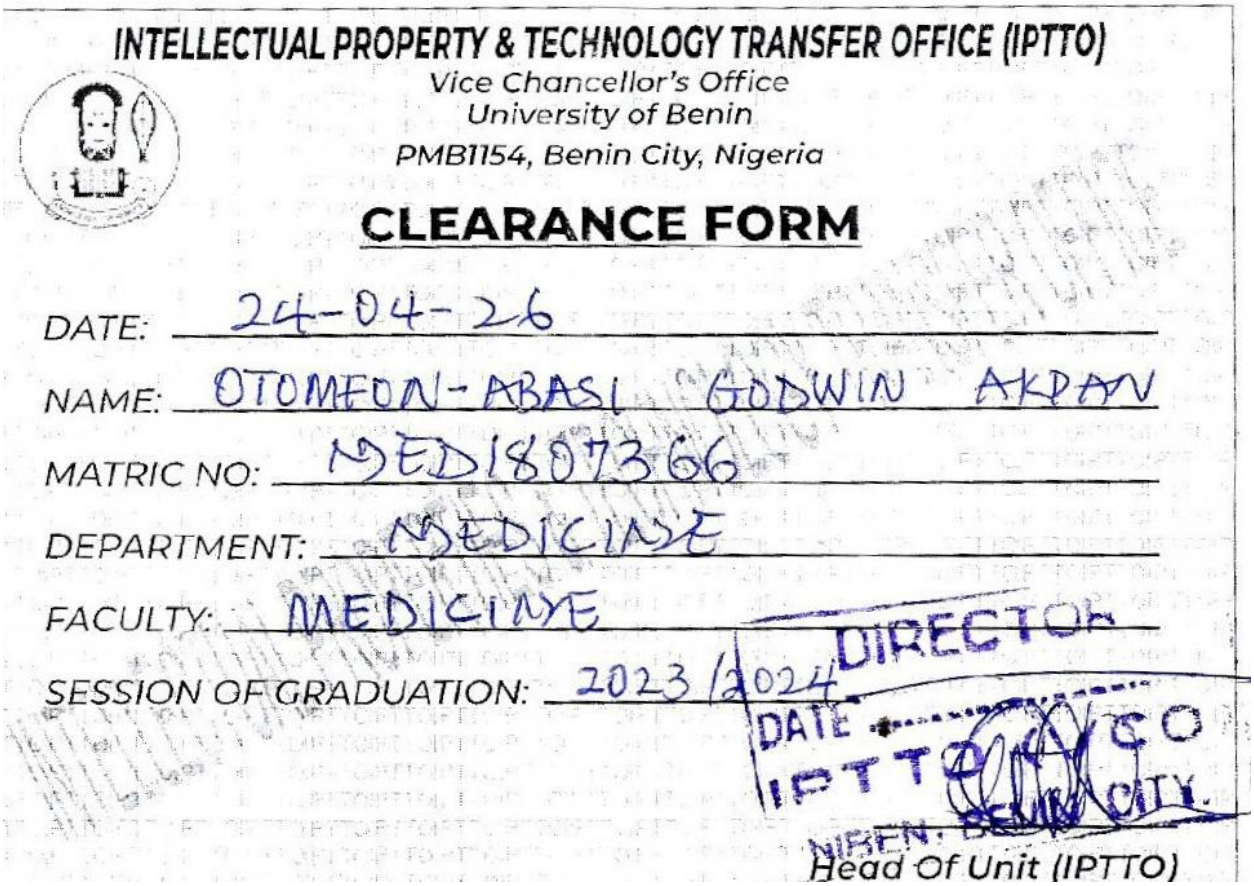
DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates and you are to furnish the committee with the research activities at the completion of the study. All informed 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 sub all your annual report 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 random visit to your research site without previous notification.

Signature & Date 23/2/2026

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

APPENDIX V

PLAGIARISM CLEARANCE



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