ASSESSMENT OF FOOD SECURITY AMONG HOUSEHOLDS IN NORTH CENTRAL NIGERIA

BY

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DECLARATION

I, Blessing Oluwaseun FADEYI, an M.Sc. Agricultural Economics student in the Department of Agricultural Economics and Extension, Landmark University, Omu-Aran, hereby declare that this thesis entitled "Assessment of food security among households in North central Nigeria", submitted by me is based on my original work. Any material(s) obtained from other sources or work done by any other persons or institutions have been duly acknowledged.

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CERTIFICATION

This is to certify that this thesis has been read and approved as meeting the requirements of the Department of Agricultural Economics and Extension, Landmark University, Omu-Aran, Nigeria, for the Award of M.Sc. Agricultural Economics.

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DEDICATION

This research work is dedicated to God Almighty who has given me the grace to walk through this path to fulfilling purpose.

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ABSTRACT

Nigeria as a country is endowed with immense human and natural resources that, if efficiently utilized, can feed its people and export its abundance to other nations; yet, the country is enduring a recurrent food crisis in terms of both its quantity and quality. This study assessed the food security among households in north central Nigeria. The specific objectives were to examine the household consumption pattern, assess household food security status, analyze the determinants of household food security and analyze the determinants of household food expenditure. The study used secondary data obtained from 2012/2013 and 2015/2016 General Household Survey Panel year (GHS-Panel 2012/2013 and 2015/2016). These data contributed to a better understanding of how agriculture affects households' wellbeing over time. It allows for a more in-depth look at how households increase human and physical capital, how education affects incomes, and the impact of government policies and programs on poverty, among other things. A subset of 801 households from the urban and rural sectors in the north central region was used for this study. The findings showed that cereals and root tubers are the dominants food being consumed in the study area because of their high calorie content. The finding also established that there was a high level of food insecurity in both sectors but household in the rural sector are more food secured than household in the urban sector mainly because production of the food crops is in the rural areas. Also, the finding also showed that the major determinants of food security status are age, education, household size and income, while the determinants of food expenditure are education, household size and income. The study recommends that policy makers should seek to improve the quality of education, government should provide ambience that will encourage high level of Peri-urban farming and agribusiness in urban sector, farming households in the study area should reduce their household size by engaging appropriate family planning regime and young folks whose age

are between 21 and 49 years should be gainfully and productively engaged in Nigeria thereby increase the food security status in the country.

Keywords: *food security, households, consumption pattern, food expenditure, North central*

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CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Food is the most basic and necessary need in life, and it must be met before any other emerging need, it is very essential for human survival (World Bank, 2002; Osuji, Ehirim, Balogun, & Onyebinama, 2017). Generally, whatever is consumed to provide energy and nourishment for the human body for an active and healthy life is termed food (Okolo, 2004; Otunaiya *et al*, 2014), despite this, more than 820 million people worldwide do not have access to it (FAO, 2019).

Food security is a multifaceted notion that has changed through time and location. Concerns over food security arose in the mid-1970s as a result of international food difficulties that arose as a result of a bigger global economic crisis. Food security has been defined as a scenario in which all people, at all times have physical and economic access to sufficient, safe, and nutritious food that fits their dietary needs and food preferences for an active and healthy life (Idachaba, 2006; Duffuor, 2011; FAO, 2012).

Food availability, food accessibility, food utilization, and food stability are the four steps toward achieving food security (FAO, 2013). To begin with, sufficient quantities of food must be available on a continuous and consistent basis. The word relates to a region's food supply and production, as well as its capacity to import food from other regions. It represents a household's, a community's, and the nation's overall food sufficiency. Second, individuals must

be able to receive food on a daily basis, whether through domestic and local farming or through imports. Food access refers to having enough means to purchase nutritious food without relying on emergency help or other coping techniques. Hence, food access is the ability to obtain sufficient food of guaranteed quality and quantity to meet nutritional requirements of all people in a nation. Food should be accessible in various location every time, and people must have the financial state or buoyancy to acquire sufficient and healthy food. Third, there must be full use of the food available (including storage, processing, preservation, cooking, and consumption) as well as it been accessible to people without waste. Lastly, stability of food has to do with the maintenance and consistent access of people to nutritional food. A household is considered food secured when its people do not live-in hunger or fear of starvation (Parvathamma, 2015).

Malnutrition is widespread in the entire country, despite the potential wealth of the country in Agriculture. About 70% of the Nigeria population living in the rural areas whose primary occupation is farming are critical to chronic food shortages, malnutrition, unbalanced nutrition, irregular food supplies, low food quality, high food costs, and even total food scarcity (Isaac, 2009). For whatever reason, a nation that is fortunate to have both human and natural endowment has the potential to establish a stable economy and provide the fundamental requirements of all its people. Nigeria, on the other hand, continues to be one of the world's poorest and most malnourished countries. Furthermore, the impact of poverty and hunger has rendered the majority of the people despondent, since more than 70% of impoverished households' discretionary money is spent on meeting food demands, despite the fact that 31.5 percent of children under the age of five are malnourished (Nurudeen *et al*, 2019).

The actual amount spent to meet the fundamental needs of an household, such as food, clothes, lodging, transportation, and so on in order to go about their everyday lives is referred to as household consumption expenditure (Zehiwot *et al*., 2019). Household spending is the primary driver of economic growth, accounting for more than half of GDP in most industrialized nations. As their wealth develops, households' buying habits change quickly, and a wide range of new commodities enter the consumption basket (UNIDO, 2018). It is because of its relevance in determining aggregate demand that consumer choice is crucial for short-run analysis. Consumption refers to the goods and services purchased by households in various commodity categories. Two-thirds of GDP is being accounted for by consumption, therefore changes in consumption are a key component of the economic cycle's booms and busts. It is because of the role its play in economic growth, that consumption choice is also important for long-term analysis.

GDP is made up of the following components: household spending expenses, savings, government expenditures, and net export. Consumption spending are factored into macroeconomic policies for fiscal forecasting, because of their large portion of GDP. Policymakers attempt to forecast how consumers would act in the face of income volatility. The purchasing of food by households is a microeconomic problem since it concerns individual economic units. It does, however, have an impact on the overall economy since aggregate household demand drives the economy's behavior in both the short term and long term. An analysis of food consumption patterns and how they are anticipated to vary when income and relative prices change is useful in analyzing food security-related policy challenges in the agricultural sector. With high economic growth, the country's average per capita income rises, while per capita consumption of staple foods falls. According to Engel's law, this reduction

reflects an improvement in wellbeing. Diversification of the food basket as a result of urbanization increases the quality of life by improving the population's nutritional state and wellbeing (Kumar, 1997; Rao, 2000; Surahbi, 2010).

Food consumption is critical to the economic growth and development of both developed and developing countries. It has a major impact on the cyclic flows of revenue in the economy, which means it has a major impact on a country's economic activity, increase in agricultural productivity have a positive relationship with the amount of food consumption expenditure, the size of disposal income, and the share of net income preserved by farmers (Sunday *et al*., 2013). Food consumption is one human life aspect that cannot be neglected, despite the notion that consumption is one of the most important components in total economic activities, economists disagree on the consumption hypothesis, which describes consumer behavior. Consumption may be measured in a variety of ways, according to various schools of thought. The most widely utilized of all schools of thought is the Permanent Income Hypothesis which states that individuals will spend money at a level that is consistent with their expected long-term average income.

1.2. Statement of Research Problem

Globally, certain groups of people are more vulnerable to food insecurity than others. Food insecurity is a problem in many households in developing world including Nigeria (Idachaba, 1991; ladychampionz, 2018). Many poor households lack access to food in the right quantities and qualities at all times and therefore are described as food insecure (FAO, 1999; 2001). Nigeria has a country endowed with immense human and natural resources that, if properly harnessed, can feed its people and export surpluses to other nations; yet, the country is enduring a recurrent food crisis in terms of both quantity and quality (Otaha, 2013; Eden *et al*., 2021).

Malnutrition and undernutrition cases are increasing by the day. The bulk of Nigerians' food consumption requirements have fallen considerably short of the international level (ladychampionz 2018). It is apparent that chances for expansion exist in Africa's agriculture industry. Smallholder farmers, without a doubt, stand to profit much from a favorable operating climate. Smallholder farmers are the primary producers of food for Nigerians' tables. According to one study, smallholder farmers account for more than 80% of all farmers, including medium and large farms (Akinsuyi, 2011). They are the backbone of Nigeria's agriculture industry and deserve all the help they can get to produce more food, cultivate more raw materials for the agro-industrial sector, and contribute to the elimination of food insecurity. Scarcity of production resource is one of the major problems facing farmers in rural areas. Putting emphasis on the importance of sustainability in the use of scarce factors of production will put farm households on the path of attaining food security; Sustainable rural livelihoods can only be achieved if resources are themselves used in sustainable ways (Otunaiya *et al*., 2014). The sustained productivity of the agricultural sector is crucial in combating the scourge of rural poverty and unemployment in the country. Unfortunately, sustained productivity cannot be achieved in the sector without improved farmers' welfare which is directly linked to farmers' food consumption expenditures. Food expenditure among farming household can be described as unsatisfactory based on the poverty index of rural dwellers in the country. This is evident in the decline of farmer's ability to provide for their consumption expenses as well as basic necessities (Sunday *et al*., 2013). Food insecurity or a lack of access to a nutritionally appropriate food in a home or country can manifest itself in a variety of ways. Chronic food insecurity, for example, develops when food resources are consistently insufficient to meet the nutritional needs of all persons. Transitory food insecurity arises when there is a transitory

decrease in availability to enough food due to food production insecurity, food price rises, or income deficits (Omonona *et al*., 2007; Otunaiya *et al*., 2014). Food insecurity is identified with health of the public issue; in which among the developing countries, there is a widespread food insecurity and mortality that actually affect millions of people. Despite the notion that a broad and proportionate diet is critical for minimizing the risk of malnutrition, food instability jeopardizes nutritional intakes. Children are the most vulnerable because of their high nutritional needs for growth. Poor child nutrition relates to poor school enrolment, absenteeism, early abandonment and poor academic achievement all resulting in decreased productivity among adults (Drammeh, Hamid, and Rohana, 2019).

The most significant consequence of food instability is malnutrition. Going forward from the previous decade in Sub-Saharan Africa, the number of malnourished children rose from 5.5 million to 30 million, leading to more over 3.5 million children under five years of age dying from poor food consumption. In 2008, there were 8.8 million deaths of children under the age of five worldwide, with Africa and Asia accounting for 93% of them. In Sub-Saharan Africa, a large proportion of these fatalities occurred. Africa has the world's largest underweight child and infant/child death rate in 2012, with Sub-Saharan African countries accounting for 60% of all fatalities among children under the age of five (Drammeh *et al*., 2019). Hunger and malnutrition adversely affect the livelihood and well-being of a massive number of people and inhibiting the development of many poor countries (Gebremedhin, 2000). According to the World Health Organization, it was proposed that each individual should take 65-86 g of crude proteins a day and between 2500 and 3400 Kcal of energy, of which 35g (or 40 percent) must be animal protein. (Babatunde and Qaim, 2010). Many Nigerians consume significantly less energy than the minimum recommended daily per capita consumption, and the mechanisms

behind this are unknown, exposing individuals to the dilemma of food insecurity (Otunaiya *et al*., 2014).

Food security is an issue of poverty. Therefore, food shortages are caused not only by the insufficient method of obtaining food but as much by the brief drop in food production efficiency in Nigeria. This means that higher food prices when in shortage will deteriorate households' buying power and finally lead to extreme poverty and hunger. (Ibrahim, Uba-Eze, Oyewole, & Onuk, 2009; Olsson, Opondo, Tschakert, Agrawal, & Eriksen, 2014).

1.3. Research Questions

i. What is the household consumption pattern?

ii. What is the household food security status?

iii. What are the determinants of household food security?

iv. What are the determinants of household food expenditure?

1.4. Objectives of the Study

The main objective is to assess the food security among households in North-central, Nigeria. Specifically, the study is designed to:

I. examine and describe household consumption pattern

II. assess household food security status

III. analyze the determinants of household food security

IV. analyze the determinants of household food expenditure

1.5. Significance of the Study

Given the significance of agriculture in the Nigerian economy, food insecurity and poverty may be connected to poor agricultural performance, resulting in food supply and accessibility difficulties at the household and national levels (Akinsanmi *et al*., 2005; Ifeoma *et al*., 2014). In other words, the sector's poor performance directly causes supply shortages and indirectly causes demand shortages by denying families access to sufficient income. This study therefore aims to contribute to knowledge, how assessment of food security can enhance more productivity and improve the standard of living of household in the food producing geopolitical zones of the country.

It will also help to provide useful materials for policy decision making, useful resource materials for future researchers, useful literature for individuals interested in knowing more about food insecurity and how to tackle it.

CHAPTER TWO

REVIEW OF LITERATURE

2.1. Theoretical Framework

2.1.1. Concept of Food security

Based on a Conference on world food in 1974, where these challenges of food crises, hunger and famine were thoroughly debated, the complex notion of food security has garnered continuous attention and economic relevance (United Nations, 1974). Despite variations across time, food security has been described as 'a state in which all people have, at all times, access to enough, safe, and nutritious foods suitable for active and healthy living' in terms of their physical, social and economic conditions (FAO, 2002). That is, a condition in which "everyone is always hunger free" (WFP, 2012).

This multi-dimensional notion is built on four pillars: availability of or adequacy of food, affordability or accessibility, utilization and consistency of supply without shortages or seasonal changes (Applanaidu *et al*., 2014). In layman's terms, a country is food secure when the majority of its people has access to food in sufficient quantity and quality to sustain a good living standard every time (Reutlinger, 1985; Idachaba, 2004). This definition implies that food needs to be available and accessible to people to the level that it meets certain nutritional standards in terms of calories, protein, and minerals that the body requires; the people's possession of the means to acquire (i.e., access); and reasonable continuity and consistency in its supply (Davies, 2009). Food security is a problem at all levels, from the individual to the global: it is an individual concern, yet policies to address it primarily at the national level, and its assessment is (at best) at the household level, to accommodate food choices (see Fig. 1).

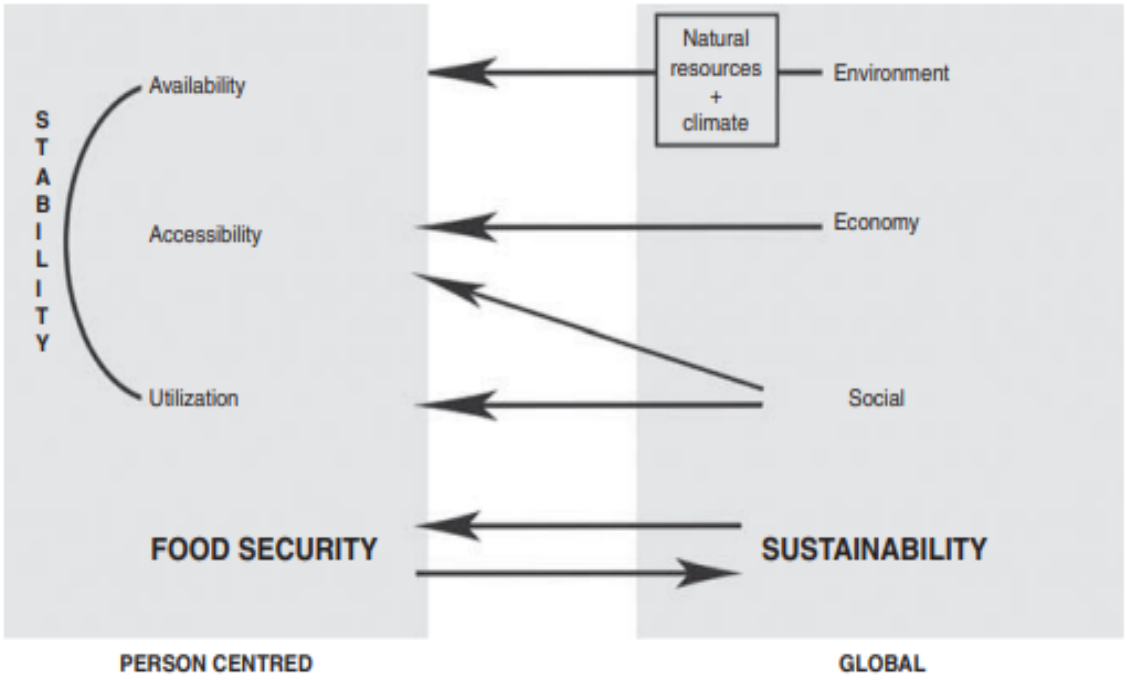

Fig. 1: The interrelationship between food security and sustainability

2.1.2 Food security understanding from pillars to pathways

Food security is better seen as a cause-related path from production to consumption via distribution to processing, as recognized in several areas, instead of as four "pillars" (Berry, Dernini, Burlingame, Meybeck, & Conforti, 2015). At the World Food Security Summit 2009, for the first time, the summit adopted the phrase "four pillars of food security" which represents four dimensions: availability, accessibility, utilization and stability of food security (Grainger, 2010). The depiction of pillars does nevertheless provide a somewhat deceptive picture of the notion, since the four dimensions are certainly linked and interconnected, rather than static and distinct. The pillars do not show the connection between food security elements. The four-dimension weighting is another difficulty facing the four-pillar visualization, which results in an average 25 percent weighting perception for each of these four measurements.

However, not all food security aspects are as important as the analogy of the pillar. Its weights are specific to country and their circumstance (Berry *et al*., 2015). Accessibility relies, for example, on transit infrastructure in many poor nations, which can limit access to food; while economic access in developed countries is the major obstacle to food security. The availability, accessibility, use and stability are all important concerns following a natural disaster such as an earthquake. The weights of four dimensions should certainly not be the same in these diverse circumstances. Instead of pillars, the relationships between the four aspects of food security is described with a better comparison. This comparison is used to demonstrate the linkages from food production (availability) to households (accessibility) to individuals (utilization) by The State of Food Insecurity in the World 2013 (FAO, WFP and IFAD, 2013). The physical (transport, infrastructural) and economic resources (food purchasing power) of accessibility

are provided. It includes social and cultural access and preferences and their health consequences and the significance of social welfare (HLPE, 2012). Stability therefore highlighted the need, while short-term, of adding a temporal component to food security (Anderson, 2018b).

In addition to a one-way pathway, food security may also be regarded as circular, because there is a retrofit from use to availability, as human capital depends on the optimum nutritional conditions of farm workers and other production sectors (Berry *et al*., 2015). These principles may be seen in Fig. 2. The relevance of food losses (from agriculture, post-harvest and distribution) and food waste (from processing and consumption in the household and community) are a significant insight of this figure. These may account for one-third of the food accessible worldwide and are an evident objective to improve food security (HLPE, 2014).

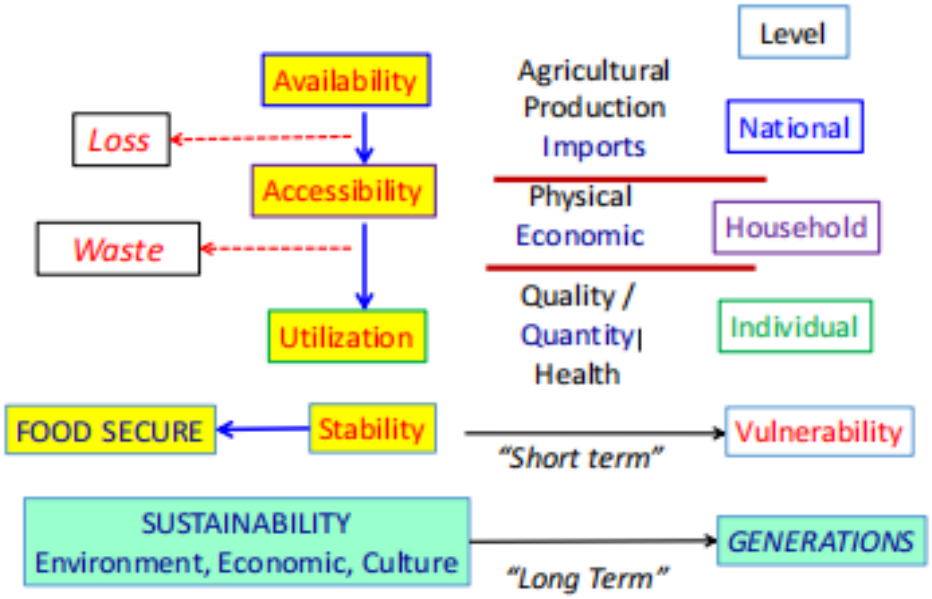

Fig. 2: The pathway of the dimension of Food Security

Source: Berry *et al.,* (2015).

2.1.3. Food Security in Nigeria

Nigeria did not have to deal with the issue of food insecurity in the 1940s and early 1950s. The mechanism was able to feed her population while also exporting surplus food goods. Every section of the country specialized in one or two primary crops, whether food or cash crops, and the country as a whole was largely self-sufficient in food production. Nigeria was known for its pyramids of groundnut in the north, plantations of cocoa in the west, oil palm and kernel piles in the east, and plantations of rubber in the mid-west (Ojo *et al*., 2012). However, when oil was found in 1956 and exports began in 1958, things began to change gradually, and then furiously. It was like announcing a hoe and machete holiday. As oil prices rose, interest in agriculture dropped, signaling the start of the country's descent into the abyss. The nation's economy is bearing the burden of the increased cost of food, particularly staple foods, as a result of the drop, as is the case in certain other nations across the world. Significantly, the price of rice has increased by over 100 per cent since 2006. It is worth noting that Nigeria requires 2.5 million metric tons of rice per year, whereas local rice output is less than half that amount. (Ojo *et al*., 2012). Consequently, Nigeria started experiencing a domestic production shortage that turned the nation into a net importer of numerous agricultural commodities like palm oil, rice, wheat and maize from a food adequate net exporter of food items (Ogen 2007; Oluwaseyi, 2017)

2.1.4. Determinants of household food security

Food security aspects have been thoroughly examined at the province, district, village, family and individual levels on a global, national, regional or sub-regional basis. Identifying the drivers of food security necessitates an examination of the elements that contribute to the major food security features. The aspects of food availability and access are essential to be

investigated: the two most researched components of household food insecurity. Variables governing food availability are determined by the demand side, whereas variables influencing food access are determined by the supply side. Consequently, factors that lead to variations in both food and supply demand would also impact food availability and access, respectively. This finally leads to either food security or food insecurity.

Poverty, low income, education levels, size of household, working class status, age, household heads (gender inclusive) and food prices are all factors that influence food security at the household level. Understanding the features and drivers of household food security is critical for establishing strategies that address the issues of family hunger and food insecurity. Figure 3 depicts the household food security conceptual model, taking into consideration the four components and the factors which affect the food security of households. Production, education, household head's age, food aids and trading have all been acknowledged as factors of the availability component of household food security. The determinants of the access component include home income and distribution, the size of household, the cost of food and the state of work. Intake of food, nutritional security, gender and cleanliness determines the utilization component, whereas the stability component is determined by price volatility, seasonality, weather conditions, and government policies.

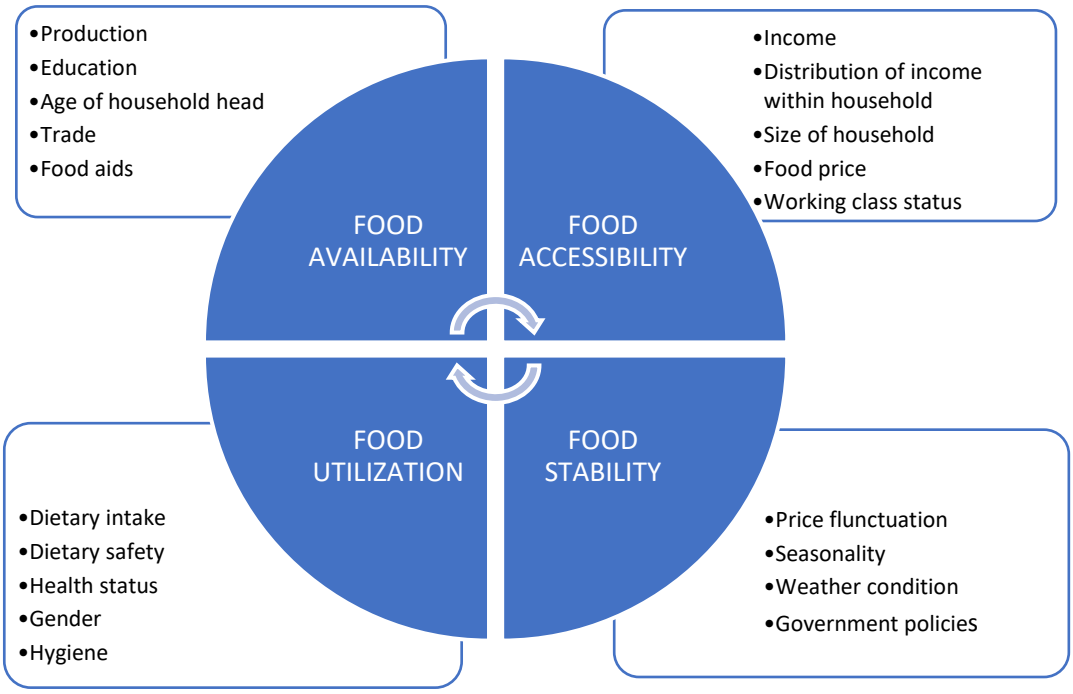

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Fig 3: Determinants of Household Food Security

2.1.5. Consumption Theory

In most economies, consumer spending accounts for between 50% and 70% of total consumption. Not unexpectedly, the most extensively researched of the aggregate spending connection is the consumption function and it has been a critical component of all macroeconomic model development efforts (Klein *et al*., 1995, Fernandez-Corugedo, 2004). For policy makers, aggregate consumption is a key variable. There is no single consumption theory that can explain consumption behavior in all economies. Economists must therefore investigate what they think explains consumption in their country (Fernandez-Corugedo, 2004). These are key theories of consumption:

The Permanent Income Hypothesis (PIH)

This notion was first and foremost established as a price winner in 1976 at the University of Chicago. Friedman's view (1972) is that the traditional idea of current income in favor of permanent income is rejected. The permanent income of a household over a given year does not in any way indicate that it has long gains from the current income for a number of years to come. This permanent income is to be regarded, according to Friedman (1972), as the mean income of the consumer unit in question that depends on it, as permanent. In any year, a household may have less or more than their permanent income as measured or observed. Friedman separated the household's measured annual earnings into permanent and temporary earnings, which depending on the overall positive and negative parts of temporary income, are greater or less than permanent income. The measured consumption is split equally into permanent and transient components. Goods purchased because of the appealing sales price or ordinary purchases which have been delayed because the product is unavailable are both positive and negative temporary consumption.

The Life Cycle Hypothesis (LCH)

It is similar to the hypothesis of permanent income which states that consumption of an individual in any period of time doesn't largely depend on the incomes of that individual, but on the value of the predicted income. The theory of the life cycle is that the consumption rate in every specific time is part of a plan that spans its entire life cycle despite its total difference during the same year. According to him, the population aging structure is a major predictor of the purchasing patterns of different households in the economy. Consumption cannot exceed a person's life-term income unless that person is born rich, in which case the cost of consumption is backed by lifetime income and wealth according to Franco (ASRJETS 2019). Retirement is a major reason why income fluctuates during a person's life. They do not, however, desire a significant decline in their level of living, as indicated by their consumption. People must save during their working years in order to maintain consumption after retirement. According to the life cycle theory, whether a household's income rises or falls has minimal influence on consumption.

Absolute Income Hypothesis (AIH)

The Keynes psychological rule, sometimes known as the Absolute Income Hypothesis, was proposed by Keynes (AIH). Under the Act, current consumption expenses are based on current disposable income, and consumption expenses are also increasing while income is rising, albeit at a slower rate. In his opinion, the marginal propensity to consume (MPC) is lower than the average propensity to consume (APC), and APC is reduced as wealth increases. The assertion of Keynes can thus be set up as follows:

i. The MPC is positive, but not enough i.e it is less than one

ii. The APC decreases with increasing income

The insufficiency of Keynes' argument prompted more research into the determinants of consumer expenditures.

Relative Income Hypothesis (RIH)

The relative income theory was proposed by Duesenberry (RIH). According to the idea, A family's APC is defined by the family's income compared to the community's income in which they belong to. The notion is that if a household with a particular income lives in a comparatively high-income neighborhood, it spends more on consumption. This is most likely due to the family's desire to stay up with other families in the neighborhood. As a result, Consumption is governed by the income and average income of the group to which the household belongs. Furthermore, Duesenberry stated that current spending is affected not just by current income but also by income history. Individuals typically create a consumption standard that is geared toward their highest level of income. As a result, when income falls, the acquired consumption level is not instantly surrendered. This phenomenon is known as the "Rachet effect," which is built on two facts.

i. The consumer behavior of one individual is not behaviorally independent of each other
ii. Over time, consumer relationships are irreversible.

In short, RIH asserts that the consumption behavior of its neighbor or surroundings influences his own consumption.

The Inter temporal Choice model

Irving Fisher, an American economist, created the Intertemporal Choice model. Following the collapse of the Keynesian model in the 1940s, the theory took shape. In contrast to Keynes' premise that current income has the greatest impact on current spending, In a model, Irving Fisher describes how reasonable customers decide to spend now and save for the future to maximize utility. He observed that individuals want to consume more but are limited by their finances. As a result, their financial constraints prevented them from consuming as much as they desired. He then compared the decisions made by customers on how much they spend today with how much they can save in relation to the overall available resources. This is called the Intertemporal Budget Constraint or limit

2.1.6. Food Consumption Pattern

According to Gerbens-Leenes *et al*., (2002), food consumption pattern is the repeated arrangements of consumption, characterized by types and quantities of food items and their combination in dishes and meals. Factors such as preferences, habits, availability, tradition, culture and income influence these patterns. For example, individuals spend more money on food as income grows. Food intake relates to food consumption and the nutritional content of food is significant in terms of macronutrients, fats, carbohydrates and proteins since they give energy and are needed for the activities of the human body. Humans may obtain energy from various macronutrient combinations. This flexibility adds to discrepancies between food consumption patterns and macronutrient composition of nutrition.

2.1.7. The Engel curves

Ernst Engel developed this notion and examined the relation between household spending and income and chose that food spending grew at increased income and family size, and food budget shares fell at reduced earnings. His discoveries also resulted in the formation of Engel's law, which states that household with lower earnings spend more on food than households with middle and upper income. According to Engel, food spending is extremely significant and household income decreases might encourage people not to spend money on non-essential items, while the effect of a rise could be inverse. As a result, bigger households spend a greater proportion of income on food than households of lesser size. But the impact of the price adjustments on food expenses was not recognized by Engel and the changes of consumption of individuals were not explained.

2.2. Empirical Framework

According to available literature, knowing the determinants of food security may account for an important part in addressing the issues of food insecurity. Fawole, Ozkan & Ayanrinde (2016) and Zhou *et al*. (2017) further identified the need to understand determinants because they differ from one global, national and household to another at different levels. Additionally, the determinants of food security which have been investigated in various contexts of developed and developing countries moreover varies at the global, national, and household levels (Gezimu, 2012; Applanaidu *et al*., 2014; Ahmadi & Melgar-Quionez, 2019). While Kopnova and Rodionova (2018) discovered the major factors of food security are population increase and foreign help using time series data, studies which examined household data in different rural and urban contexts has identified social and demographic and economic status as the main drivers of food security or insecurity, among other variables. (Amaza, Umeh,

Helsen, & Adejob, 2006; Arene & Anyaeji, 2010). Specifically, Harris-Fry *et al*. (2015) employed a multinomial logistic regression in identifying household wealth status, increased household size, women's literacy and freedom to access market as the dominant factors influencing food security in Bangladesh. Meanwhile, Ngema, Sibanda & Musemwa (2018) whose study employed a binary logistic regression approach also identified the level of education, income, infrastructural support and credit availability as a crucial driver of food security. Zhou *et al*., (2019) used a regression similar to Ngema *et al*. (2018) noted that remittances, inflation, gender, assets, unemployment, age and diseases are the determinants of food insecurity in Pakistan. More recently, Sisha (2020) found that a high level of education, increased wealth status, proximity to service centres and residing in an urban area minimizes the risk of food insecurity whereas households with a high dependency ratio and households that experienced shocks are at a higher risk of experiencing food insecurity.

Gujarat (2009) examined changes in consumption patterns in Addis Ababa, Ethiopia, taking the function of working low demand as an explanatory variable, per capita income and other demand parameters as an independent variable, such as ratio of dependency, age and family size. He used both primary and secondary information sources. According to his findings, aging has a detrimental impact on food demand. The demand for valuable food products (e.g., meat, milk, vegetable and fruit) is rising with increased wealth. They are also a costly energy source. It is therefore unlikely that disadvantaged household will have access to it. This is partly because disadvantaged households give priority to meet their basic energy needs to prevent hunger. This is mostly due to the fact that high-value food is a costly source of energy for them. Households with subsistence income consume a lot of grains and starchy staples and very little fruits, vegetables, meat, milk, and milk products. Consumer preferences, on the other

hand, have an impact on whether or not a consumer consumes (ASRJETS, 2019). Poor household have no choice but to rely on low-cost energy sources like grains and starchy staples until their physiological needs for hunger are met. Households begin to broaden their meals after covering their basic energy needs by including animal food sources, dairy products, and fruits and vegetables.

The relationship between household expenditure and income was explored by (Donkoh, Alhassan, & Nkegbe 2014). Food expenditure grows with increasing income and the number of family members, whereas food budget portions decrease as income declines, according to research which was consistent with Engel's results. The researchers discovered that low-income households spend a considerable part of their income on consumption, and that every increase in family income leads to increased food spending. The authors use the budget proportion of food spending as the dependent variable.

Onyemauwa (2010) analyzed household consumption expenditure of cassava products in South-East Nigeria. His findings revealed that household size, household income and cost of substitutes were important variables that affect the consumption of cassava products in the area. Odusina, Akinsulu, & Ijagun (2011) observed that household size and spending on replacements influence protein consumption in rural household in Oyo State, Nigeria. Tan, Zhang, Wen, Zhang, & Zhan (2017) examined the distribution for products and services of living expenditures using the quadratic almost ideal demand system (QUAIDS), and discovered that food expenditures had a significant impact on other living expenses. Using QUAIDS, Abdulai (2002) found that fruit and herbs, other foods and non-foods are more than a unit of own-price elasticity. However, the price is inelastic for bread, cereals, meat, fish, dairy, cheese and eggs. The non-linear QUAIDS model was also used by Obayelu *et al*. (2009)

to assess the pricing and elasticity of Nigerian food items. Their findings revealed that inelastic cost of own-price elasticity exists for cereal products, fruit, vegetables and oil. Furthermore, in Tanzania, the own-price elasticities of the majority of food categories are near to one, demonstrating a strong sensitivity to quantities needed for food cost fluctuations (Abdulai and Aubert, 2004). On the other hand, it was discovered that the price cross elasticities between the open market and their rationed equivalents for oil and sugar were almost zero (Hosni and Ramadan, 2018). Furthermore, Lasarte, Rubiera, & Paredes (2014) conducted a study on the consumption behavioral patterns of families at regional level and different city sizes in the context of a developed nation utilizing QUAIDS. The research confirmed that the size of the city in which a household resides has a comparable significant and important influence on spending habits as the degree of family income. Furthermore, the study indicated that household location, particularly in urban or rural regions, influences consumption habits.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

This research focuses on states in North-Central zone of Nigeria. These states include Kogi, Kwara, Niger, Nassarawa, Plateau, Benue and the Federal Capital Territory (FCT). The North Central geopolitical zone is endowed with agricultural potential as well as enormous quantities of natural resources, making it one of the most economically viable zones, particularly in terms of agriculture. The zone is one of two that produce the majority of Nigeria's food.

3.2 Type and Sources of Data

The 2012/2013 and 2015/2016 General Household Survey Panel year (GHS-Panel 2012/2013 and 2015/2016) were used and the data were gotten from the World Bank's official website. GHS-Panel is a useful instrument for determining how agriculture affects household's well-being over time. It enables a more in-depth examination of how household increase their human and physical assets, how education affects incomes and how government policies and programs affect poverty, among other things. The GHS-Panel is a nationally representative sample of 5,000 households, often covering the geographical zones (both at urban and rural level). The second wave of the GHS-Panel took place in two visits (post-planting visit in September – November 2012 and post-harvest visit in February-April 2013). The households of the GHS panel visited two times during the third wave: one after the season (post-plantation) in 2015 from September to November and the other in 2016, between February and April, after the season of harvest (post-harvest). The survey phase of households who moved from their former locations in Wave 1, Wave 2 or between visits 1 and 2 in Wave 3, following the

respective visits in 2015 from October-November and 2016 from April-May. The Panel data households are a subset of the entire household survey sample.

3.3 Instrument for Data Collection

Questionnaire administration was adopted to collect data from both rural and urban households. For each of the two visits, the GHS-Panel Wave 2 and 3 was made up of three questionnaires. The questionnaire has been distributed in the sample to all households. The agricultural questionnaire was distributed to all farming households, such as livestock farming, crop growing and other related agriculture operations. In order to collect the socioeconomic variables of the sample households in the enumeration regions, the questionnaire survey for community was sent to the entire community. Household GHS-Panel Questionnaire: Household Questionnaire provides demographic data, education, health (including anthropometric assessment of children and child immunization), labor and labor data collection options, food and non-food expenditure, income-generating household activities, food safety and shocks, safety nets, housing conditions, assets, information and communications technology, and other household income sources. The household's location is geo-referenced, allowing the data of the GHS-Panel to be connected to other accessible geographic data sets afterwards. The Household Questionnaire's labor module added four different variants to test the sensitivity of the labor statistics to how the labor modules are designed.

The information was collated by teams, in which the teams constitute of a supervisor, two to four interviewer and an operator of a data entry. The teams' number was depended on the size of the sample or number of Enumeration Areas (EAs) selected in each state. The crews rode and data collection for each post plantation and post-harvest trip took approximately 20-30 days.

3.3.1. Sample Size and description

Both the General Household Survey and the Panel Survey employed a multi-stage stratified sampling design. The GHS sample consists of 60 Primary Sampling Units (PSUs) or Enumeration Areas (EAs) from each of Nigeria's 37 states, totaling 2220 regional EAs. Each EA adds ten households to the GHS sample, bringing the total to 22,200. In wave 1, 5,000 of the 22,000 households were chosen for the component of the panel from 500 EAs, and 4,916 completed their interviews. Because of the survey's panel format, some of the households had moved and were unable to be included in the survey by the time of the Wave 3 visit, resulting in a slightly smaller sample size of 4,581 households for Wave 3, with 1469 urban and 3112 rural households. This study used a subset of 801 households from the urban and rural sectors in the north central region.

3.4 Analytical Techniques

To ascertain the objectives of the study, the following analytical tools were used

Objective 1

The consumption pattern of the household was analyzed using descriptive statistics which include; Mean values, percentages and standard deviation.

Objective 2

The food security status of the household was analyzed using food insecurity index. Based on the food security line, the food insecurity index (Ayinde, Akerele, & Adewuyi, 2006; Orewa *et al*., 2009; Akerele, Momoh, Aromolaran, Oguntona, & Shittu, 2013) was used to assess the status of the household food security. The household analysis used a food security line of an adult equivalent daily intake which is 2550 kcal (Claro, Levy, Bandoni, & Mondini, 2010). Food-insecure households are those that fall below the food security line, while food-secure households are those that fall at or above the food security line. The daily per capita calorie consumption and intake of

each household were calculated by dividing by the size of household adjusted for adult equivalents and applying the age–sex consumption factor.

Hence, the food security index is given thus;

FSI= $\frac{H_D}{R_D}$----------Eqn. 1

Where;

FSI = Food security index

HD = Households daily per capita calorie intake

RD = Recommended daily per capita calorie requirement

The calorie content of the household will be calculated using a food nutrient composition table of commonly consumed foods in North Central, and then converted to kilograms. In addition, the food insecurity gap index (FIG), food surplus gap index (FSG), and the food security headcount ratio (HCR) will be calculated based on the food security index for the sample households. The food insecurity gap will determine how far food insecure households' trip beneath the line of food security on average, whereas the food surplus gap will determine how far households who are food secure exceed the line of food security on average. The headcount index will determine whether or not the sampled households are food insecure or secure. As adopted by (Ibok, Bassey, Atairet, & Oto-obong, 2014), the head count ratio, food insecurity gap, and food surplus gap are determined as follows:

Food insecurity index $F_{\propto}= \frac{1}{M}\sum_{i=1}^{n}\left(\frac{Z-Yi}{Z}\right)^{\propto}$ ---------- Eqn. 2

Where Fα = household's food insecurity index (FISI).

When α=0, it is a measure of the incidence of food insecurity. It determines the percentage of households with per capita adult equivalent calorie consumption below the bare minimum. When the value of α=1, it measures of the food insecurity depth, indicating how secure. When α=2, the

"severity of food insecurity" is measured; n = total number of households with calori equivalent daily for adults' per capita consumption below the level of food insecurity; M = total households' number. Z = the food security line, which is the lowest recommended calorie intake

Objective 3

The determinants of household food security status were analysed using a random-effect probit regression model. To determine the factors of food insecurity among households, the random-effect probit regression model was applied. As a result, the regression model is written as follows.;

$Z^*_{it} = \emptyset X_{it} + \delta + \vartheta \overline{X}_i + v_i + e_{it}$ ……Eqn. 3

$Z_{it} = 1(Z^*_{it} > 0)$

$e_{it}|(X_{it}, v_i) \sim N(0,1)$

Z_{it} = the food security status of the ith household (1 = food insecure, 0 if otherwise)

$v_i =$ The unobserved household specific heterogeneity assumed to be uncorrelated with the time-varying components of X_i

$e_{it} =$ The idiosyncratic shocks assumed to be serially uncorrelated.

X= matrix of explanatory variables which could be time-varying or time-constant.

The explanatory variables included in the model are:

X_1 = Rural-Urban dummy

$X_2 =$ Marital status of household head (Married=1, Otherwise=0)

$X_3 =$ Sex of household head (Female=1, Male=0)

X_4 = Age of household head less than 30 (years)

X_5 = Age of household head between 30-49 (years)

X_6 = Age of household head between 50-69 (years)

X_7 = Primary educational status of household head

X_8 = Completed secondary educational status of household head

X_9 = Uncompleted secondary educational status of household head

X_{10} = Tertiary educational status of household head

X_{11} = Household size (number of household)

X_{12} = Per capita expenditure(₦) as proxy for income

Objective 4

The determinants of household expenditure were analysed using a fixed effect regression model.

Hence, the regression model is expressed thus;

$Y_{it} = \beta X_i + \alpha_i + \cup_{it}$------ Eqn. 4

Where:

Y_{it} = The household expenditure observed for household ith at time t

β = Vectors of the parameter estimates

α_i= The unobserved time-invariant individual effect

$\cup_{it}$= The error term

X_i = The explanatory variables as defined before

The explanatory variables included in the model are as stated in objective 3

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. The description of household consumption pattern

Presented in Table 1 are results of household food consumption patterns in rural and urban areas of North Central Nigeria. The dominant crops that were consumed are cereals and tuber crops. There was barely a variation in the pattern of spending share for cereals and tuber crops consumption across both waves in the urban and rural sectors. This might be because of its high preference over other food stuffs and people derive energy mainly from carbohydrate. According to Gopalan *et al*., (2009), cereals are one of the best sources of energy and provide essential nutrients to the body, but they lack certain micro-nutrients such as vitamins and minerals. The consumption of white tuber root was higher than other food stuffs among the rural households, this might be due to its massive production in the rural area and high level of energy derived from it when consumed to enable them carry out their day-to-day activities, since their main occupation in the rural area is farming.

The consumption pattern of vegetables was consistent across in the two periods under review. There was a low consumption of vegetable in the rural area in 2012/2013 compared to 2015/2016, this might be due to low production of it in that season. The consumption pattern of fruits was consistent across both waves in urban and rural sector except from urban sector in 2015/2016 where there was higher consumption, this might be due to its availability and accessibility to the households in that season.

The consumption pattern of meat in comparison with other protein sources was higher in the urban sector during the 2012/2013, this might be due to higher purchasing power of the urban

households and its availability in that season compared to other seasons. The consumption pattern of eggs was consistent in the urban sector in both waves but there was a variation in its consumption pattern in the rural sector, this might be due to their low purchasing power and lack of knowledge about the nutrients derivable from egg consumption. Fish consumption pattern was consistent across both waves in the urban and rural sector, this might be due to the fact that fish is a readily available source of animal protein that is likely less expensive and probably cheaper than other protein sources especially meat. In 2012/2013, legumes consumption by urban households (8.3%) was higher than that of rural households while in 2015/2016 legumes consumption was higher in rural areas. This pattern might not be unconnected with availability and accessibility of legumes to rural households. The consumption pattern of milk was higher in the rural sector in 2012/2013.

There was invariably no change in the consumption pattern of oil and fats in both waves across the rural and urban sector. There was invariably no change in the consumption pattern of sweets in both waves across the rural and urban sector. This might be because they are fast foods and they have a low-calorie content and nutritional value to the body. The consumption pattern of spices in the urban sector at both waves were higher than that of the rural sector. This might be because of the knowledge gap between both sectors on the important of spices in food and also the availability and accessibility of it to the households. This finding is consistent with Gujarat (2009), who claims that as wealth rises, there is also an increase in demand for high value-added food products such as beef, milk, vegetables and fruit.

Table 1: Description of Household Consumption Pattern

Food Stuffs	URBAN				RURAL			
	WAVE 2 (2012/2013)		WAVE 3 (2015/2016)		WAVE 2 (2012/2013)		WAVE 3 (2015/2016)	
	Mean	Percentage (%)	Mean	Percentage (%)	Mean	Percentage (%)	Mean	Percentage (%)
Cereals	1593.130	24.5	1692.496	24.2	1619.570	24.4	1783.359	26.2
Tuber roots	1247.374	19.2	1333.839	19.1	1670.948	25.1	1750.936	26.0
Vegetables	360.023	5.6	358.578	5.1	268.405	4.0	383.734	5.6
Fruits	104.987	1.6	263.794	3.8	111.497	1.7	107.229	1.6
Meat	913.284	14.0	784.311	11.2	744.503	11.2	717.566	10.4
Eggs	69.553	1.1	62.920	0.9	22.600	0.4	17.531	0.8
Fish	530.525	8.2	762.070	10.9	609.378	9.2	608.875	9.0
Milk	37.705	0.6	26.611	0.4	83.054	1.3	27.822	0.4
Legumes	539.913	8.3	471.286	6.8	444.990	6.7	488.336	7.2
Oil and fats	411.144	6.3	422.499	6.1	379.171	5.7	367.654	5.4
Sweets	295.832	4.6	298.564	4.3	206.919	3.1	189.584	2.8
Spices	410.679	6.3	519.577	7.4	502.523	7.6	360.561	5.3

4.2. Assessment of Household Food Security Status

The results in Table 3 shows that households who are in rural area are more food secured compared to household in urban area. This might be because the predominant occupation of people in the rural area is farming, production of food is constant, thereby giving them the edge to have more agricultural produce directly from the farm which will definitely lead to increase in consumption of food and more access to higher calories intake than people in the urban sector. However, the food insecurity level in both sectors was on the high side compared to their level of food security. This finding is in line with previous research by Sultana *et al*., (2011) and Babatunde *et al*. (2007), who used the function of Cost of Calorie (COC) propagated by Greer and Thorbecke (1986) to determine the status of food security and a logit model to determine its determinants and found that households living in the rural areas of Pakistan and Kwara State, Nigeria, are more food secure than urban households. The results might be attributed to the large amount of food consumed in rural regions rather than the quality. Also, Ibrahim *et al*. (2009) found that households in the urban areas are more food secure than households in the rural areas, contrary to (Arene and Anyaeji, 2010).

The observed characteristics show the variation in the food security status of household in 2012/2013 and 2015/2016. The result shows that the food insecurity incidence was 77.5% in the urban sector and 70.8% in the rural sector in 2012/2013. This means that 77.5% and 70.8% of household in the urban and rural sector respectively actually fell in the food insecurity state, that is, they were unable to get the minimal recommended calorie for livelihood. The food insecurity gap which is a measure of the depth of food insecurity, pointed out that each food insecure household needed 32.4% and 30% of the daily caloric requirement to bring them up

to the recommended daily caloric requirement level in the urban and rural sector respectively in 2012/2013. The food insecurity severity appears to be fairly the same in urban and rural sector in 2012/2013. The food insecurity incidence in 2015/2016 was 74.9% and 70.4% in urban and rural sector respectively, the food insecurity depth was 32.2% and 26.6% in urban and rural sector respectively, the household food insecurity severity appears to be fairly the same in urban and rural sector respectively. From the result, household were more food secured in both waves in the rural areas compared to the urban areas. However, there is a high level of insecurity in both sector in 2012/2013 and 2015/2016.

Table 2: Assessment of household food security status

Food Insecurity	**URBAN**		**RURAL**	
	WAVE 2 (2012/2013)	**WAVE 3 (2015/2016)**	**WAVE 2 (2012/2013)**	**WAVE 3 (2015/2016)**
Incidence (F0)	0.775	0.749	0.708	0.704
Depth (F1)	0.324	0.322	0.300	0.266
Severity (F2)	0.172	0.169	0.159	0.130

4.3. The Determinants of Households' Food Security Status

The result of the probit regression is presented in Table 4. Four out of the seven variables analyzed are significant determinants of food security status among households in the study area. The significant variables are age, education, household income and household size. The age is categorized for the purpose of analysis so that the effects of each category of age group can be more vivid. According to the findings, age less than 30 years and age group 30-49 years had a substantial and negative influence on the food insecurity status of the households in the research region. At 5% and 10% probability levels, ages less than 30 years and 30-49 years are significant, respectively. This means that as one gets older, the likelihood of a household's food security situation improves. This conclusion contradicts the findings of Arene *et al*. (2010), who discovered that households led by elderly people are doing so well in terms of food security than households led by younger people. This could be related to the fact that younger households are more likely than older households to be able and willing to work non-farm jobs to supplement their income.

Education has a significant and negative relationship with household food insecurity, with a significant coefficient at the 5% probability level. This finding suggests that as the number of households with uncompleted secondary education rises, food insecurity will decrease. This result contradicts the *a priori* expectation that education investment is important in reducing poverty and, as a result, can improve food security; the rationale is because exposure to education enhances one's ability and capacity to take new and improved technologies to quickly improve food production, storage and selection, leading to expanded opportunities for food security, this school of thought is consistent with (Zhou *et al*., 2014; Ibok *et al*., 2014).

Uncompleted education might lead to food insecurity probably because they drop out to take menial jobs that can increase their purchasing power.

The household size coefficient is significant at P<0.01 and positive (0.246). This means that having a large household size will exacerbate their food insecurity. This finding was consistent with Nurudeen *et al*. (2019) observation that food security is foreseen to deteriorate with growing households' number, owing to the increasing number of individuals who have to be fed, but he also stated that this could be an opportunity for new workers to be proactive which might lead to having a positive impact on food supply.

Income coefficient was negative (-0.649) and significant at P<0.01. This implies that an increase in income will lead to a decline in their food insecurity because they will have more purchasing power to have access to nutritious food. This result is consistent with Babatunde *et al*. (2010) discovery that when household head's income improves, the household's chances of food security rise as food supply and access to quality and quantity of good food improve.

Table 3: Determinants of the food security status

Independent Variable	**Coefficient**	**S.E.**	**Z**	**P> |Z|**
Rural-urban dummy	-0.151	0.494	-0.31	0.760
Marital status	-0.013	0.168	-0.08	0.938
Sex	-0.105	0.460	-0.23	0.820
Age of household head (years)				
Less than 30	-0.706**	0.288	-2.45	0.014
30-49 years	-0.458*	0.233	-1.96	0.050
50-69	-0.274	0.203	-1.35	0.177
Education of household head				
Primary	-0.249	0.184	-1.35	0.177
Secondary Uncompleted	-0.372**	0.168	-2.21	0.027
Complete Secondary	-0.155	0.169	-0.92	0.359
Tertiary	0.026	0.207	0.13	0.898
Household Size	0.246***	0.054	4.53	0.000
Income	-0.649***	0.074	-8.77	0.000

4.4. The Determinants of Household Food Expenditure

The result of the fixed-effects (within) regression is presented in Table 5. Three out of the seven variables analyzed are significant determinants of food expenditure among household in the study area. These variables include: Education when secondary level is uncompleted having a positive coefficient (0.102) and significant at ($P<0.05$) and when secondary level is completed having a positive coefficient (0.080) and significant at ($P<0.10$). This implies that education has positive relationship and will lead to an increase in household food expenditure. This is consistent with Doan (2014) and Parappurathu *et al*. (2015) findings that education level is important to make people diversified their food intake and people who have higher education level have good knowledge about nutrition and tend to prepare and consume nutritious food.

The household size coefficient was positive (0.080) and significant ($P<0.01$). This means that the bigger the family size, the greater the household food expenditure. This result is consistent with Firdaus *et al*. (2017) who reported that the larger the household size, the greater the amount that was spent on food.

The third significant determinant of food expenditure in the study area is household income, which is significant at ($P<0.01$). The positive sign of the coefficient indicates that an increase in the income of the household will lead to an increase in the food expenditure of the household, this further establishes that household's purchasing power is an important factor for food accessibility. This finding is in consonance with (Bamiro, 2012; Firdaus *et al*., 2017). A positive and significant relationship between the earnings of the household and

food security has been identified in Kuwornu *et al*. (2013), Arene and Anyaeji (2010), Babatunde *et al*. (2007), Adenegan and Adewusi (2007), who have used cost of calories (COC) intakes for the classification of food security status of their respondents and logit models for the determination of factors influencing their status.

Table 4: Determinants of Household Food Expenditure

Independent Variable	**Coefficient**	**S.E.**	**Z**	**P>|Z|**
Rural-urban dummy	-0.199	0.156	-1.27	0.203
Marital status	0.059	0.047	1.25	0.211
Sex	0.151	0.120	1.26	0.207
Age of household head				
Less than 30	0.010	0.072	0.19	0.852
30-49	-0.027	0.061	-0.45	0.654
50-69	-0.037	0.055	-0.66	0.507
Education of household head				
Primary	0.056	0.054	1.03	0.301
Secondary Uncompleted	0.102**	0.049	2.07	0.039
Complete Secondary	0.080*	0.049	1.64	0.100
Tertiary	0.049	0.059	0.83	0.408
Household Size	0.080***	0.013	6.32	0.000
Income	0.325***	0.019	16.84	0.000
Constant	5.265	0.236	22.29	0.000

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This study assessed the food security among households in North Central Nigeria. To achieve this objective, the study used secondary data obtained from 2012/2013 and 2015/2016 General Household Survey Panel year (GHS-Panel 2012/2013 and 2015/2016). These data contributed to a better understanding of how agriculture affects household's wellbeing over time. It allows for a more in-depth look at how households increase human and physical capital, how education affects incomes, and the impact of government policies and programs on poverty, among other things. The finding of the study is summarized in this chapter, conclusion drawn from the findings and recommends policies aimed at enhancing food security among households.

5.1. Summary

The study revealed that the dominant food that were consumed are cereals and white tubers root in the urban and rural sector and this is mainly because of the high calorie content that can be obtained from these food stuffs. The incidence of food insecurity (i.e., households that were not able to meet up with the recommended food security line) was 77.5% and 70.8% of household in the urban and rural area respectively in 2012/2013 and 74.9% and 70.4% of household in the urban and rural area respectively in 2015/2016. The depth of food insecurity (i.e., the calorie required by the household to bring them up to the recommended calorie) was 32.4% and 30% of household in the urban and rural area respectively in 2012/2013 and 32.3% and 26.6% of household in the urban and rural area respectively in 2015/2016. The severity of food insecurity (i.e., the level of food insecurity of households) was 17.2% and 15.9% of

household in the urban and rural area respectively in 2012/2013 and 16.9% and 13% of household in the urban and rural area in 2015/2016. The result of the random effect probit regression analysis indicates that an increase in age, education and income will lead to a decline in their food insecurity while an increase in household size will lead to an increase in their food insecurity. The result of the fixed effects (within) regression analysis indicates that an increase in education, household size and income will lead to an increase in their food expenditure.

5.2. Conclusion

The study showed that cereals and root tubers are the dominants food being consumed in the study area because of their high calorie content. It was also discovered that there was a high level of food insecurity in both sectors but household in the rural sector are more food secured than household in the urban sector mainly because production of the food crops is in the rural areas. Also, it was found that the major determinants of food security status are age, education, household size and income while the determinants of food expenditure are education, household size and income.

5.3. Recommendations

Based on the findings of this study, the following policy recommendations are suggested to enhance food security of households.

1. Education is an area to be given adequate attention. This study has revealed that an increase in education will lead to an increase in food security and food expenditure. It is therefore, recommended that more attention should be focused on educating members of poor households. Policy makers should seek to improve the quality of education and also create

educational opportunities for rural households thereby increasing the literacy rates of household members in North Central Nigeria and by extension Nigeria as a whole.

2. This study revealed that households in the rural area are more food secured than households in the urban area mainly because of farming activities despite the high food insecurity in both sectors. Therefore, government should provide ambience that will encourage high level of Peri-urban farming and agribusiness in urban sector.

3. Household size increases food expenditure. This means that households in both rural and urban sector have high marginal propensity to consume and low marginal propensity to save. It is therefore necessary for farming households in the study area that they reduce their household size by engaging in appropriate family planning regime.

4. Age group influences food security status. Young folks between whose age are between 21 and 49 years should be gainfully and productively engaged in Nigeria thereby increasing the food security status in the country.

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