HOUSEHOLD POVERTY AND FOOD SECURITY- A CASE STUDY EXPLORING RURAL AND URBAN FOOD SYSTEMS IN ANAMBRA STATE NIGERIA

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Abstract

Household poverty and food insecurity persist in Anambra State, Nigeria. Considering rural and urban food systems, this PhD study examines how food security can be improved in the study location and the mediating influence of household poverty and household decision-making in the study location, Anambra State, Nigeria. This study used the FAO construct of the four pillars of food security: availability, accessibility, utilisation and sustainability to frame the study. Using a pragmatic mixed method approach, rural and urban food systems were explored through two surveys. The surveys with 240 respondents (consumers n=120; farmers n=120) captured quantitative and some qualitative information. These surveys were supplemented by two group case interviews and other individual one to one interview sessions (n=3) that enabled discussions with farmers, food marketers, policy makers and agricultural extension providers in rural and urban areas. Findings show that in the urban location household poverty (low household income; and household decision-making (gender inequality) and weak infrastructural development are strong factors of influence on food security. In rural areas, household poverty and gender inequality (access to capital), weak infrastructural development; and inadequate extension services impact on food security. An additional pillar emerged in the study "food acquirability" as a socio-economic concept, and its impact on food security, is conceptualised, positioned and critiqued in this study. The inadequacies found within rural and urban food systems has implications for food security within and between food systems including the flow of agricultural commodities, other goods and services, and information to and from the rural and urban communities. Policy implications include that public and private investment is required for infrastructural development, both in rural and urban areas. There needs to be improvements in household incomes, promotion of gender equality, and enhancement of the national extension scheme, and research into effective urban food waste management schemes.

STUDENT DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed: …… Date: ……

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LIST OF ACRONYMS AND ABBREVIATION

ACGS	Agricultural Credit Scheme
ADP	Agricultural Development Project/Programme
AGRO	Agriculture /or Agricultural
ANS-NEWMAP	Anambra State - Nigeria Erosion and Watershed Management Project
ATA	Agricultural Transformation Agenda
APP	Agricultural Promotion Policy
BLP	Better Life Programme
BMN	Bang-Mae Nang Sub-District
CA	Content Analysis
CBA	Community Based Adoption
CBARDA	Community Based Agricultural and Rural Development Approach
CBA-RDP	Community Based Adoption and Rural Development
CBN	Central Bank of Nigeria
CIA	Central Intelligence Agency
CS	Case Study
DFRRI	Directorate of Food, Road and Rural Infrastructure
EWS	Electronic Wallet System
FAO	Food and Agricultural Organisation of the United Nations
FEAP	Family Economic Advancement Programme
FFS	Farmers Field School
FIES	Food Insecurity Experience Scale
FIS	Food Insecurity Score
FMARD	Federal Ministry of Agriculture and Rural Development
FSP	Family Support Programme
GAP	Good Agricultural Practice/Policy
GAIN	Global Alliance for Improved Nutrition
GCI	Group Case Interview
GDP	Gross Domestic Product
GES	Growth Enhancement Scheme
GMP	Guaranteed Minimum Price
GR	Green Revolution
GRFC	Global Report on Food Crisis
HYVs	High-Yielding Crop Varieties
IFAD	International Fund for Agricultural Development
JFFLS	Junior Farmer Field and Life School
LGA	Local Government Area
LSADA	Lagos State Agricultural Development Authority
MDG	Millennium Development Goals
MLR	Multinomial Logistic Regression

MSW	Municipal Solid Waste
NAEP	National Agricultural Extension Policy
NAFPP	National Accelerated Food Production Project
NAFDAC	National Agency for Food and Drug Administration
NBS	National Bureau of Statistics, Nigeria
NCDs	Non-Communicable Diseases
NEEDs	National Economic Empowerment and Development Strategy
NFDP	National FADAMA Development Project
NGO	Non-Governmental Organisation
NLDA	National Land Development Authority
NHGSFP	National Home-Grown School Feeding Programme
NLPs	National Longitudinal Phone Survey
NRDC	National Resource Defence Council
NSAS	Non-Staphylococcus Aureus
NSPFs	National Special Programme for Food Security
OBJ	Objective
OECD	Organisation for Economic Co-operation & Development
OFN	Operation Feed the Nation
RBDA	River Basin Development Authority
RES	Research
RO	Research Objective
RTEP	Root and Tuber Expansion Programme
SCPZ	Staple Crop Processing Zone
SDG	Sustainable Development Goals
SHEP	Smallholder Horticulture Empowerment Promotion
SON	Standard Organisation of Nigeria
SPFS	Special Programme for Food Security
SSA	Sub-Saharan African
TFP	Thrifty Food Plan
T&V	Training and Visit
UN	United Nations
UK	United Kingdom
USA	United States of America
USDA	United States Department of Agriculture
USDA-ERS	United States Department of Agriculture - Economic Research Service
US	United States
WEAI	Women's Empowerment in Agriculture Index
WFP	World Food Programme
WHO	World Health Organisation

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CHAPTER 1

1 GENERAL INTRODUCTION

1.1 THE CHALLENGE OF FOOD SECURITY IN NIGERIA

Food security has continued to be a major developmental challenge in Nigeria, thus subverting the health, survival and productivity of its people (Adebayo et al., 2016). Nigeria has an abundance of natural and human resources. However, despite these significant resources, the majority of its citizens are living in abject poverty (Amaka et al., 2016). According to OECD (2012), the population of Nigeria is 193.3million making the country the most populous nation in Africa. As the population increases, the country's food demand increases, while the propensity to produce food declines because of pressures from the increasing population and net migration to urban centres (Abdullahi et al. 2009; Olajide, 2013; and Amaka et al. 2016). Amaka et al., (2016) reveal that the food production index and population growth of Nigeria shows an increasing trend with population growth rising faster than food production (Table 1.1). Indeed, the World Bank data shows that Nigeria's food production index as of 2018 stood at 101.9 and growing at annual rate of 3.07% (The World Bank, 2022).

Table 1. 1: Nigeria's Food Production Index and Population Growth

Year	Food Production Index	Population (Million)
1990	48.23	-
1991	-	98.08
2013	114.93	-
2014	-	177.82

Source: (Amaka et al., 2016)

This demonstrates that the food supply and demand situation in Nigeria is not balanced, and food availability is not secure. This problem has been attributed to an increasing population combined with low agricultural productivity which causes a shortfall in domestically produced food in Nigeria. In order to supplement the shortfall in food production domestically, food importation is essential to meet the supply/demand deficit.

Intense soil utilisation allied to poor agricultural practices diminishes soil resources (Abdullahi et al., 2009; Nicolas & Nnaji, 2011), more so, because natural complications such as climate change and erosion in some areas further threatens food production and supply levels. An increase in population does not only affect food availability, but it also results in higher numbers in the available workforce, or those seeking work, leading to a downward pressure on wages, potentially causing household incomes to drop or for there to be out-migration from rural areas having a dual impact on food insecurity in both urban and rural areas (Amaka, et al. 2016). In economic terms, migration to urban areas should result in higher demand for rural labour and less supply, hence improved wages. However, as the Nigerian strategy is to fill the food supply deficit with imported food, then the response to these drivers is inelastic.

Historically, the term food security first came to prominence at the World Food Conference in 1974 and was defined in terms of food supply as: the **availability** at all times of food supplies in **good quality and quantity** to sustain a steady expansion of food consumption and to balance fluctuations in production and prices (FAO, 2006). More simply, food security occurs when all people, at all times, have access to sufficient, safe and nutritious food both physical and economic, which meets their dietary needs and food choice for an active and healthy life (FAO, 2006). Food **availability**, **affordability, accessibility**, **utilisation** and **sustainability** are the essential elements of food security which also reflect a wide range of interrelated economic, social and environmental factors that challenge the ability to deliver food security at any given point in time, especially in Nigeria (Omonona & Agoi, 2007; Fudjemdjum et al., 2019).

Household poverty interacts with being food insecure and is driven primarily by low-income growth and inadequate price controls of common staples. This is a common phenomenon in Africa and around the world (Adebayo et al., 2016). Though Nigeria is one of the largest and fastest growing economy in Africa with over 219.5million people, as estimated by the CIA Factbook (2021), data shows that the country's national prevalence of poverty within the population as of 2010 was 69%. In comparison, the NBS data for 2019, states that the level of poverty in Nigeria was 40% of the overall population, with approximately 83million people affected (World Bank, 2020). This highlights the challenges faced by Nigeria over the last decade, especially in attaining availability and affordability of food.

In Nigeria specifically, multiple factors contribute to the prevalence of food insecurity. They include low food production, seasonality in food availability, increased post-harvest losses, increases in the price of food, a rise in the rate of unemployment, poor health care facilities, poor nutrition education, and poor extension service delivery; this is further confounded by local taboos and cultural factors (Aworh, 2015; Okpala et al., 2021). In Nigeria, household food security can be characterised by the uninterrupted access to food (available and affordable) for households either through their own farm production or from market supply. On the one hand, whilst access to food for rural dwellers may seem secure through the presence of production activities and local market supply, on the other hand, access also depends on individuals having adequate economic resources. In the urban context too, food access and utilisation mainly depend on having adequate economic resources to purchase food from local markets and shops, though there may be some instances of urban food self-production. In both contexts however, both physical access (infrastructure) and access to economic/market channels are important aspects of food security i.e., access to sufficient food for a nutritious diet (Offiong et al., 2016).

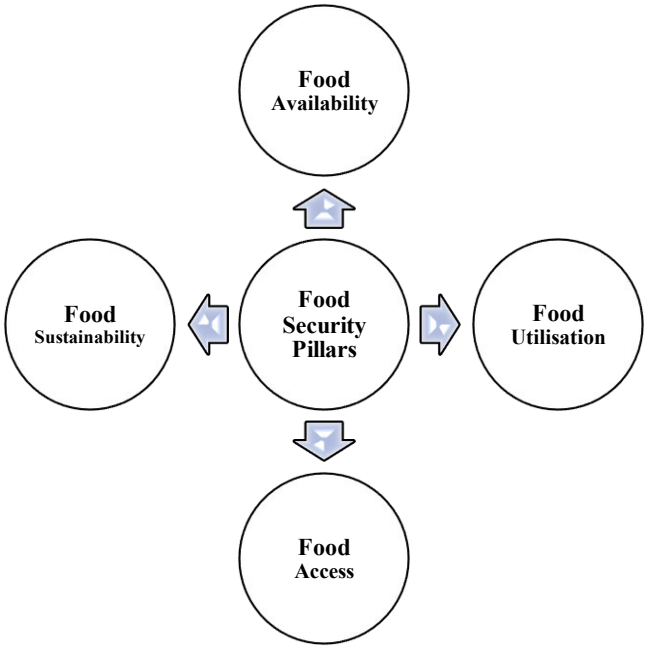
Infrastructural access, however in rural and urban settings remains a challenge. Nigeria formerly experienced moderate industrialisation which equated with rapid urban growth. At the same time, the country's neglect of agriculture resulted in many rural dwellers migrating to cities in pursuit of work and higher paying jobs (Nwose, 2013). These trends have led to unplanned developments around, and within, urban cities and increasingly this has depopulated the countryside. This situation compounds the problem of access to food in urban areas influenced by overcrowding, unemployment, infrastructural decay, and a decline in urban services (Nwose, 2013). As a result of industrialisation and urbanisation trends, rural communities have suffered too from a two-edged sword of the lack of investment in production and poorly developed market access, especially in the case of the local urban markets (Tolu & Oluwatoin, 2011). Developing this argument further, food security in Nigeria can be considered firstly in relation to rural and urban communities, individually and their specific problems, and secondly, in respect of their interactions around food production, supply and consumption. The challenge, therefore, is to address those factors that contribute to poverty and impact negatively on food security and identify interventions to enhance the livelihoods of rural and urban communities through a better understanding of the rural and urban communities individually and in terms of their interactions. Developing a greater understanding of these interactions will help to foster stronger, more resilient urban and rural food systems. However, before providing

insight into the Nigerian context in more detail in this introduction, food security as a concept is further explained and definitions provided in the next section.

1.2 FOOD SECURITY: CONCEPT AND DEFINITION

The Food and Agriculture Organisation of the United Nations in 2001 defined food security as "a phenomenon that occurs when people have access physically and economically at all times to safe, nutritious and enough food to meet their dietary requirement for a healthier life" (FAO, 2002). This definition illustrates the different concepts of food security at the household level where, it considers both food availability and its affordability (Offiong et al., 2016). In addition, this definition can be scaled up to communities, state and country level.

Figure 1. 1: The Four Main Pillars of Food Security



Food security consist of four major pillars/or dimensions/or elements (Figure 1.1) namely: availability, accessibility/affordability, utilisation and sustainability**.** While **food availability** reflects the physical presence or proximity of food, **food access** implies the ability to physically or financially access food in the right proportion, **food utilisation** indicates food sufficiency in both quality and quantity and **sustainability, [**or **stability** in some sources**],** refers to the uninterrupted access, at all times to food (Omonona & Agoi, 2007). These four elements of food security form the pillar of the definition used in this thesis. There are also definitions of food insecurity, as presented in the next paragraph.

What is food insecurity?

According to FAO (2021), food insecurity occurs when a person lacks consistent access to safe and nutritious food that is sufficient for normal growth and development for a healthy and active life. The FAO further note that this condition "food insecurity" maybe the result of food unavailability and/or the lack of resources required to purchase food. With food insecurity, experienced at different severity levels, the FAO measures food insecurity on the basis of the "Food Insecurity Experience Scale (FIES)" having the following components:

a. Uncertainty on the ability to obtain food – *these group of people are food secure with possibility of having **mild** food insecurity.*
b. Compromise on food variety and food quality - *these group of people have **moderate** conditions of food insecurity.*
c. Skipping meals and dropping food quality - *these group of people have **moderate** conditions of food insecurity.*
d. No food for a day or more than one day - *these are people with **acute** condition of food insecurity.*

Although, the FIES has been published and used since 2014 (see: FAO, 2022), it was captured in the literature after the field data collection phase for this study, hence it did not support the theoretical framing of the data collection but has been used within the interpretivist elements of the work conducted during data analysis to position food insecurity in the context of the study location.

The FAO further highlight that people experiencing moderate food insecurity have less than the quality and quantity of food required, with clear uncertainty about their ability to obtain food due to the lack of resources or money. This trend can increasingly affect a person's exposure to certain forms of malnutrition e.g., stunting in children and obesity in adults. Acute food insecurity is synonymous with people who have no food or who have run out of food and have lived for days without eating, these individuals are said to be "hungry" (FAO, 2021). Table 1.1 emphasis the key differences between food insecurity positioned as a chronic case and food insecurity positioned as a transitory case. While Figure 1.2 highlights potential causative links between poverty and events of food insecurity, hunger and malnutrition which are linked then to poor physical and cognitive development and low productivity in a 'vicious cycle'.

Table 1. 2: Positioning of Two Types of Food Insecurity (chronic and transitory)

	FOOD INSECURITY (CHRONIC)	FOOD INSECURITY (TRANSITORY)
What it is ……	Persistent, continuous or long-term.	Usually temporary or short-timed.
This occurs when ….	People are constrained in meeting their minimum food requirement within a sustained time period.	There is a sudden shock (i.e., a drop) in food production or people's ability to access food that enable a good nutritional status.
Resulting from ….	Pro-longed periods of poverty, poor infrastructure/assets and an inadequate access to financial and productive resources.	Short periods of food availability and food access shocks and fluctuations. This may include the variations in domestic food production, household income and food price which occur from year to year.
Can be overcome with measures such as ……	Long term development measures which may also address poverty, this includes education, access to production resources (e.g., credits) etc.	Transitory food insecurity occurs relatively unpredictably and could suddenly emerge. This makes planning and programming more difficult, as such interventions may include early warning and safety net programmes.

Source: FAO-E.C, (2008)

Figure 1. 2: Causative Link Between Poverty and Food insecurity



Source: FAO-E.C, (2008)

Food security problems vary across countries, entailing different elements of influence. These may include: the lack of available food, linked to the lack of technical knowledge in

production, storage and distribution. The affordability of food and the inputs needed to produce food, linked to income. While environmental or natural elements may affect both food availability and accessibility (physical access) (Oyebanjo et al., 2013). In Nigeria, it has been noted that per capita food production has not been sufficient to meet the demands of the ever-growing population (Kormawa, 1999; Oyebanjo et al., 2013). In other words, production is not keeping up with demand. Furthermore, Nigeria's economic development over recent decades is predicated on oil resources and, as a result, agriculture has been largely neglected. As such, food security is addressed largely through food trade and net food imports (Sekumade, 2009), a trend that has now become unsustainable. The food security policy interventions that have been developed and implemented within Nigeria are now considered in the next section.

1.3 FOOD SECURITY POLICY INTERVENTIONS IN NIGERIA

In Nigeria, one major challenge is that food security has often been misconceived as solely a rural problem. But food insecurity also persists in urban areas as well. Over the years, the policy focus has been on rural food security, where the problem is greatest with most interventions targeting rural dwellers by trying to enhance their food production capacity (Adepoju & Oyegoke, 2018). For instance, the study by Jerome, (2012) noted that food insecurity is a disturbing trend in many developing countries across the world. Basic necessities of life constitute three main attributes: food, shelter and clothing. It is for these three attributes that governments (across the world) formulate policies and strategies to create roadmap(s) geared towards the provision of these basic necessities for the citizenry of any given country (Jerome, 2012). Policies and strategies are represented in programmes running in various sectors such as agriculture; industry; education; health; and housing (Olawumi, 2009). Some operate at the regional, or national level and some at the international policy level, described here as high-level programmes.

One such high-level programme was the Millennium Development Goals (MDGs) which was an agenda put together by world leaders who assembled in New York under the sponsorship of the United Nations (UN) in 2000 to deliberate on the challenges of the new millennium and to afterwards formulate policies as well as strategies that would attempt to resolve key challenges that the programme identified (United Nations, 2015). At the 2000 Summit, world leaders committed to addressing challenges of hunger, poverty, illiteracy, disease, water availability, urban and rural development, and environmental degradation within

a given time frame 2000-2015. This policy operated under the framework of 8 goals, 18 targets and 48 indicators. This approach failed to address these problems and nearly two decades later these issues still persist. The MDGs, in terms of high-level programmes were then succeeded by the Sustainable Development Goals (SDGs). These seventeen goals are considered within the thesis as a measure of sustainable development and for their focus on alleviating hunger and poverty.

At the national level, Jerome (2012) reviewed Nigerian agricultural policies dating back to its independence (which was in 1960). During this era, Jerome noted that the Nigerian Government paid more attention to policies on industrialisation than agriculture owing to the discovery of crude oil. Evidence of this was seen in the first National Development Plan of 1962-1968 which focused on industrialisation and the exploitation of Nigeria's abundant resources to improve the living standards of the population as against the agricultural sector which had a gross domestic product (GDP) growth targeted at 4% per annum (Federal Ministry of Economic Development, 1983). In essence, investing in the agricultural sector was clearly not the focus of the Nigerian government at that time rather the provision of infrastructure (e.g., roads) was the pivotal development plan of the country. Jerome (2012), further noted that as a result of the events of the Nigerian civil war which led to hardship and food shortage, the second National Development Plan between 1970-1974 targeted the development of the agricultural sector in order to encourage food production. Shimada (1999) challenges this viewpoint, stressing that the government of Nigeria showed pretence towards the development of the agricultural sector as budgetary allocation made available for agriculture in this time only received 7.7% of the budget allocation in comparison to the transport sector which had a 23.1% portion of the budget. Shimada (1999) concludes that the Nigerian government invested more in food importation rather than in strengthening the country's capacity to produce its own food.

The National Accelerated Food Production Project (NAFPP), that began in 1974, purely focused on assisting the supply of agricultural input resources and education of farmers, the project failed to achieve its objective because of poor planning and the un-timeliness: of the provision (Okuneye, 1992) and of the extension service to farmers (Jerome, 2012). Okuneye (1992) noted that the failure of this programme led to the unveiling of the Agricultural Development Programme (ADP) in 1975 which had a better approach to agricultural development compared to the NAFPP. The ADP programme resulted in the setting up of 470 agro-service centres across the country by 1985 in order to attempt to resolve the challenges

faced in the extension service system which had experienced difficulty in the time of NAFPP (Okuneye, 1992). While the ADP was scattered across rural areas, other agricultural programmes created were (a) Operation Feed the Nation (OFN) in 1976, and (b) the Nigerian Green Revolution in 1980 and these arose within the Nigerian agricultural policy in the third National Development Plan (1975-1980) (Okuneye, 1992). The shift in these policies led to the issuance of various types of subsidies and incentives to farmers for the improvement of food production (Okuneye, 1992). Shimada (1999) opines that the provision of subsidies and incentives was a mirage based on bad governance (corruption) and the ad-hoc nature of planning.

Jerome (2012) points out that in 1986 the Nigerian government created the Directorate of Food, Road and Rural Development for the implementation of the rural development plan. This newly created office was focused more on the aspect of rural road rehabilitation, rather than the development of the agricultural sector for increased food production. After this time (1962-1986) the Nigerian government made concerted efforts in the promotion of the agricultural sector through fiscal plans in order to enhance sustainable investment in agriculture. This approach was via commercial banks providing lending support to farmers at a reduced interest rate, tax reduction and the subsidisation of agro-inputs by government agencies such as the Federal Ministry of Agriculture and Rural Development.

Policy on strengthening the extension services is particularly important in terms of food security. Albert & Isife, (2009) note that in the past, the Nigeria agricultural system has been structured and restructured with several policies, one of which is the National Agricultural Policy approved in 1988. The goal of this policy was to structurally transform Nigerian rural areas in terms of socio-economic development, with its specific objective of targeting self-sufficiency in basic food commodities by rural dwellers as well as increased production of raw material for agricultural activities, fighting environmental threats to food security and combining the development of rural areas and the agricultural sector in general. This policy was said to also focus on increased food production, environmental conservation, agro-industrial development, agricultural credit and insurance schemes, poverty alleviation, agricultural mechanisation as well as the agricultural information and communication management. At the same time the agricultural research institutes, colleges and universities of agriculture were created/established in a bid to promote modern agricultural practice, and to establish within the agricultural sector modern techniques/technologies in resolving agricultural challenges as well as to also ensure the adequate supply of man-power (Albert &

Isife, 2009). The dynamic nature of rural (farmers) education has brought about some level of change to the Nigerian agricultural sector, but more needs to be done. The effectiveness of the Nigerian agricultural system has been questioned over time and much could be blamed on the absence of an adequate, articulated extension policy as a pivot for agricultural development which is clearly lacking in the Nigerian agricultural sector (Albert & Isife, 2009). Since 1988, there have been further policy reforms that have impacted the agricultural sector and rural and urban food systems. More on Nigerian policy reform is presented in the literature review of this study.

1.4 FOOD SECURITY AND URBANISATION IN NIGERIA

In developing countries including Nigeria, the population in cities and suburbs (urban) is anticipated to increase from 1.9 billion in 2000 to 3.9 billion in 2030 (Abdullahi et al., 2009). This is driven in part by rural-urban migration which can be characterised by the dichotomous planning and development of urban areas in many developing countries (Abdullahi et al., 2009). This development process reflects the perceived duality of the rural deprived and the urban endowed. This narrative translates in the Nigerian context to perceptions of improved economic opportunities and facilities in the urban areas when compared with the rural areas, thereby neglecting the factors responsible for urban food insecurity (Adepoju & Oyegoke, 2018). However, a good understanding of rural and urban food security will help to deliver better strategies for successful policy, intervention and aid provision in Nigeria, and more widely (Abdullahi et al., 2009). In reality, many rural to urban migrants do not find gainful employment and often reside in shanty towns and slums creating a rise in the population of the global urban poor (UN-Habitat, 2017). UN Habitat (2017) reports that over 60% of urban dwellers will be living in shanty towns and subsisting largely on unregulated street food. Indeed, the rising trend of urbanisation and commercialisation makes agricultural activities more synonymous with rural dwellers residing where land and natural resources are anticipated to be in abundance (UN-Habitat, 2017).

Significantly, the level of urban poverty is continuously rising. According to Olakunle (2003), the urban poor and urban low-income earners in Nigeria are more likely to utilise high proportions of their income on the procurement of food. This clearly positions food security and insecurity from an affordability (financial access) perspective, especially if other household costs are rising to compete for the household income. Nigeria's high rate of unemployment means that only a fraction of people living in urban areas have a steady income and income reserves, and as such the remainder are vulnerable and repressed from attaining

access to sufficient/adequate food to meet their dietary requirement which includes a food preference for a healthy and active life (Adepoju & Oyegoke, 2018). Even with a consistent income source, the urban poor financially live 'hand-to-mouth' and lack the infrastructure to support food storage. This means they often purchase food in small quantities as they cannot benefit from the advantage of economies of scale by buying food in bulk to access price discounts and reduce food expenditure over a given period of time. At the same time, urban dwellers often cannot afford other basic necessities (Adepoju & Oyegoke, 2018), such as electricity, rent or travel expenses. More so, urban households in developed countries are affected by rising inflation on indispensable consumer goods and other services, and in addition to this reducing disposable income, it has promoted the inability of many urban households to achieve quality diets (Connor et al., 2016).

Food access by Nigerians in many urban settlements has been limited to include formal markets (which are centrally located in most cases), informal markets, subsistence urban food production and street food vendors (Nwose, 2013). This creates a duality where the urban food system may offer food through global supply to supermarkets with high food safety and quality standards for the well-to-do urban dwellers while the urban poor have to mainly rely on informal food markets and street food vendors where food safety and quality criteria may be lower, and this depicts their narrow range of localised coping strategies to address food insecurity (Nwose, 2013).

1.5 LINKING URBAN AND RURAL COMMUNITIES THROUGH FOOD SUPPLY

Agriculture and agri-food systems will unarguably be under pressure in coming decades due to increasing food demand allied to uncertainties over production linked to the phenomenon of climate change and global population growth. Both rural areas and urban areas of the emerging and developing world are undergoing economic and social changes which are transforming production and consumption patterns and the dynamics of future food systems (Vorley et al., 2015). This is leading to a modern-day narrative that realises the critical interdependence between urban and rural development and the importance of leveraging on urban-rural linkages for regional and national development (Vorley et al., 2015). Growing urban cities may need the synergy of surrounding rural areas especially in terms of the flow of agricultural food produce, labour and ecosystem stability. Urbanisation is known to strongly

influence food demand, with more people now living globally in urban rather than rural settings (Thronton et al., 2011). It is anticipated, as previously described, that in the next decade urban areas will experience more growth especially in African and Asian countries. Therefore, urbanisation will greatly influence future patterns of food consumption (Philip et al., 2011; Chukwu & Unya, 2019).

According to Forster et al., (2015), it has been projected that two thirds of the World's population is expected to transform into urban settlements by 2050. Policy makers are continuously concerned about the ways in which urbanisation will change the dynamics of societies and the wider economy (Bloch et al., 2015). However, little attention is currently being paid to the interaction between rural to urban and urban to rural movements of food, materials, information and people. These interactions occur as a result of contemporary food systems which forms a major synergy between both natural and man-made environments and urban and rural settlements (Forster et al., 2015).

Urban-rural linkages have been defined as the symbiotic flow of goods, services, people, economic transactions and environmental services with many of these linkages relating directly or indirectly to food systems. There are some attributes of food systems that affect rural-urban linkages which include: reduction in the number of traditional markets allied to more supermarket formats, changes in global diets, and continuous increases in the availability of highly processed and pre-packed foods which are not available to their rural counterparts in Nigeria (Forster et al., 2015). This is gradually causing a shift in the agricultural production systems from on-farm low input production mostly for self- consumption to a more advanced agribusiness value chain model (Philip et al., 2011), based on higher levels of agricultural inputs e.g. fertilisers and crop protection products. However, because of the embedded cost structures in such value addition e.g. the cost of agricultural inputs and the processing infrastructure, such developments will likely only service higher income urban consumers and higher value chain food traders.

As a result of these food system changes, especially increased food importation for urban areas, many urban and rural areas have become less interdependent. Paradoxically, perceptions of the strength of local rural-urban food supply chains exist, but the localised sourcing of food has not been fully actualised in many cases (Tacoli & Vorley, 2015). The potential for rural and urban communities connecting through food systems needs to be considered if Nigeria is to achieve a more resilient food system that does not rely on food

importation. This resilient food system must be based on sustainable urbanisation and sustainable rural communities through a more balanced rural-urban development framework potentially using agriculture and food supply as a tool in driving this change (Tacoli & Vorley, 2015). Experience from developed regions of the world has shown that by enhancing the linkage between rural and urban settlements via the food system, it is possible to create an effective relationship that translates into increased harmony between rural and urban dwellers, and a reduced development gap between both areas, as well as leading to a significant drop in the level of rural-urban migration (Forster, 2015). The next section addresses food nutrient, waste management and recycling in more depth as post-harvest food loss and food waste strongly impact on the pillars of food security.

1.6 FOOD NUTRIENT, WASTE MANAGEMENT, AND RECYCLING

Globally, in 2011, the human population generated up to 2 billion tons of Municipal Solid Waste (MSW) (Amoo & Fagbenle, 2013), an element of which is food waste. Over the next decade, the annual total of MSW generated is estimated to have further increased due to urbanisation, industrialisation and population growth. According to the Intergovernmental Panel on Climate Change (IPCC, 2006), food waste makes a significant contribution to overall MSW, between 25% and 70% depending on the location. The remainder of MSW is generally composed of plastics, textile, wood, rubber, leather, metal, glass, paper and household chemicals. In addition to this, waste can contain other toxic elements if industrial wastes are included (IPCC, 2006) or hospital or clinical wastes. An estimate of 1.3 billion tonnes of food produced annually for human consumption all over the world is wasted in the supply chain (Pham et al., 2014). Food waste can be categorised into ***pre-consumer waste*** (i.e., waste generated from agricultural production (food loss), food processing, food distribution and retail), and ***post-consumer waste*** (i.e., waste generated from domestic/outdoor meal preparation and consumption) (Pham et al., 2014).

From a global perspective, the National Resources Defence Council (NRDC) reported that in the United States of America (USA) approximately 40% of food produced is wasted during processing and distribution by food retailers, consumers and restaurants (Huang et al., 2021). A similar trend is noted in the United Kingdom (UK) and Japan where food discarding ranges between 30-40% on annual basis (Kosseva, 2009). In South Africa, food waste was estimated to be 9 million tonnes per annum (Oelofse & Nahman, 2013). In many of these cases,

wastes consist of reduced levels of suspended solids and reduced concentration of dissolved materials, which can not only cause physical and visual discomfort, but also result in adverse environmental impacts such as toxic-leaching from landfill locations (Pham et al., 2015). This phenomenon leads to a waste of productive and economic resources which in a less wasteful or a more resource-circular economy, could otherwise be used in the intensification of food production and distribution. These resources include land, water, fertiliser, pesticides, energy, capital and labour (Pham et al., 2014). Currently, most food waste, especially domestic food waste, may be reclaimed and recycled into animal feed and compost (Lin et al., 2013). The remaining food wastes are often incinerated or disposed of into landfill resulting in the increased emissions of methane (CH_4), and carbon dioxide (CO_2) both of which are greenhouse gases that contribute to climate change (Pham et al., 2014).

It has also been shown globally that food waste is an unexploited resource with a high potential for energy generation. Thus, energy recapture from food waste is a creative way of opening an additional option to humanity through clean energy generation, composting for increased organic conditioning of soil for food production, and as a result employment creation (Pham et al., 2014). For this reason, various technological research has been on-going to help re-harvest valuable energy from food waste in order to reduce environmental damage and ecosystem imbalance. These processes further, reduce the depletion of natural resources and can reduce waste-health related risks (harm) to humans (Pham et al., 2014). Some of these technologies that have been used in food-waste-energy conversion include biological anaerobic digestion and fermentation, along with thermal and thermochemical technologies of incineration, gasification and hydrothermal oxidation (Pham et al., 2014). However, the use of food waste to produce energy, in locations where there are high or extreme levels of food insecurity, is a challenging consideration, though environmentally beneficial, but the inherent wasteful processes, if not mitigated could contribute to food shortage and hunger.

This PhD study will consider food waste at the household, market and farm level, and further explore what happens to wasted food thereafter, e.g., from the markets there are opportunities for waste picking, composting etc. Waste picking is considered here as a coping strategy adopted by socio-economically insecure individuals or groups of people often in an urban location (De Aguiar & Manning, 2020) Nutrient recovery is a major topic of interest and how it interrelates with the food insecurity challenges facing Nigeria today is of key importance.

1.7 RESEARCH AIM AND SCOPE OF STUDY

The primary aim of this PhD study is to examine how food security can be improved in the study location and the mediating influence of household poverty and gender inequality in the study location, Anambra State, Nigeria. Following on from this, the scope of the study is to examine household poverty and food security in the study population, and to explore the factors of influence in the rural and urban households in Anambra State, Southeast Nigeria, as a case in point.

The rationale behind the aim and scope of this thesis is defended as follows: I have grown up in Nigeria and worked in Nigeria as a civil servant (under the Federal Ministry of Agriculture and Rural Development) and seen the poor state of affairs in Nigeria, especially when it comes to poverty and food insecurity, despite the country's richness in oil reserves and fertile soil that is suitable for the cultivation of crops. This inspired me to self-fund my PhD study to gain more insight as to why Nigeria is in this position in 2019 when this work commenced. Early investigations highlighted that an estimated 25.5% of the Nigerian population (about 170 million people) are said to be seriously food insecure (FAO, 2016; Mukhtar, 2019) and FAO, IFAD, & WFP (2015) point out that one of the key drivers of food insecurity is poverty. It is for these few reasons, I decided to carry out this research focused on the interactions between poverty (at the household level) and food insecurity in my home State, Anambra, State, Nigeria.

1.7.1 RESEARCH STRATEGY

This section of the thesis seeks to show why a pragmatic mixed methodological approach is best suited to address the objectives of this research. In view of the mixed methodological research approach, Denzin (2012) notes that pragmatic research is a doctrine of meaning, it is also a theory of truth which rests on the argument that the outcome/meaning of an event cannot be told or given in advance of experience. The pragmatic paradigm also focuses on the consequence and meaning of a social action or event (Denzin, 2012). This rests on the claim that the mixed method approach involves qualitative methods which reflects constructivism and the quantitative methods that connect to post-positivism (David, 2013). In all cases, there may be links between paradigms and the different methods that exists, however in the pragmatic approach there is no deterministic connection that forces the utilisation of a particular paradigm with any particular set of methods (David, 2013). More so, the argument

here reveals that the pragmatic approach can serve as a philosophical approach for any or most social science research regardless of whether it is used as a mixed method or stand-alone in either the qualitative or quantitative forms of research (Guba & Lincoln, 2005; Lincoln, 2010). The pragmatic research approach aligns with social science research in the views of ontology, epistemology and methodology which makes it best suited for this study (Lincoln, 2010). The approach herein is structured to demonstrate the broader value of pragmatism, a system of philosophy, and is of value because of its practicality for the different types of research design that exist (Lincoln, 2010; David, 2013).

With recourse to other research paradigms which form an aspect of the pragmatic approach, the positivist paradigm remains strong as the scientific technique, which is associated with the means of establishing truth and objective reality particularly in relation to the natural sciences and environment. Positivism was originally critiqued by Auguste Compte as a stern empirical approach which claimed that knowledge is based directly on experience (and experimentation); it signifies facts and explains the reason behind certain behaviours (Bogdon & Biklen, 2003). Post-Positivism portrays the researcher as a constructer of knowledge, rather than one who passively notes the laws of nature (Crotty, 1998). Crotty (1998; p.40) explains that regardless of how faithful a researcher adheres to scientific research methods; the research results or outcomes are not totally objective or surely certain. Previous experiences in Nigeria, before this research commenced mean that the position taken was that the researcher will naturally shape both subjective and objective elements of the study. It is for this reason that this research work uses the pragmatic paradigm to guide the research process, since the study is expected to highlight emergent and iterative findings and as a result make an original contribution to the existing body of knowledge.

Based on the selected research approach (deductive informing inductive), the mixed method approach will be used to address the research objectives. Therefore, both quantitative and qualitative research techniques for data collection and utilisation will be adopted. The advantage of the mixed method research is that it promises stronger utility of the research resources (data) and practices (Sandelowski et al., 2006). A negative attribute of the mixed methods approach, however, is that it is more time consuming due to the nature of the different types of data to be collected, analysed and interpreted (Courtney, 2017).

Acknowledging this, my positionality as the researcher tends towards interpretivist, which allows the data from this study to tell the story and gives room for new ideas/theme that

could give the research a stronger outcome and contribution. However, since the study takes on both the deductive and inductive approaches, it will involve drawing variables (especially in the deductive case) from the review of existing literature and testing these variables through the case in point to define those factors that are important and have the most influence. After analysis, data on its own has no meaning, so the secondary element of the interpretivist approach allows the researcher to engage with stakeholders and to provide a narrative that explains the analysed data in order to draw inference based on the research objectives in question.

1.8 THESIS STRUCTURE

This chapter introduces the background and context of the research with an initial discussion on the different area of focus, and these will be more extensively discussed in subsequent chapters. Hence, this chapter sets the scene, it also encompasses the research aim, as well as delivering the philosophical overview of the research and method employed. From this introduction, the thesis is made up of the following chapters:

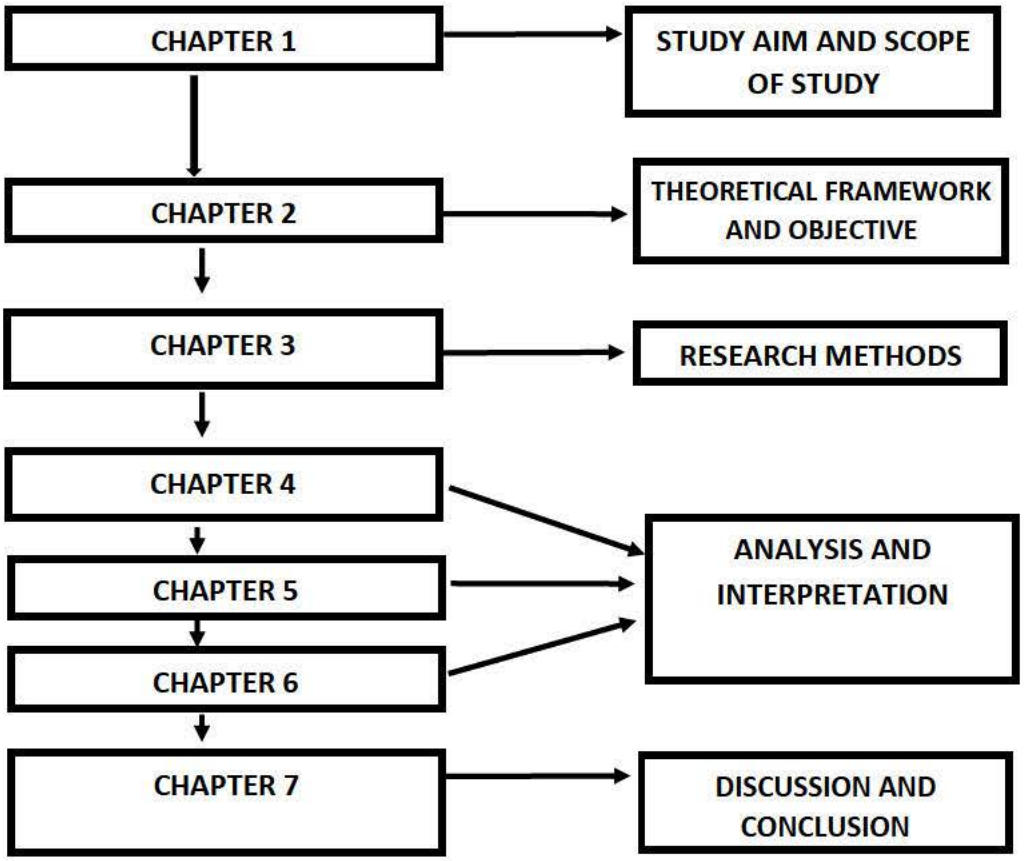
- **Chapter 2:** A literature review chapter that focuses on the socio-economic factors that contribute to household poverty and food insecurity from the global perspective through to the narrower Nigerian context. This chapter also focuses on providing insight into past and present policies that have contributed, or been a barrier to, food availability and accessibility in the agri-food system in Nigeria, with key concepts such as food production, supply and market systems (i.e., the Nigerian agricultural marketing system) in particular, gender in agriculture and at the household level (i.e., the food decision making process) and food waste management.
- **Chapter 3**: The methodology that introduces the case study area of Anambra State and the capital city Awka (this includes the supermarket and the local market within the capital city), as well as the rural communities included in this study. This section also outlines the research strategy more fully for this thesis specifically including the type of data and method (s) of collection, the sample size, and the analytical methods used.
- **Chapter 4:** The first results chapter presents the analysis for the quantitative element of this study. This section outlines the results of the urban food systems component (food consumers) of the study in relation to household poverty and food insecurity.
- **Chapter 5:** forms another result chapter presenting quantitative data that focuses on the findings on household poverty and food insecurity on the rural food system and the

agricultural production element of the study, in particular the mediating effect of gender in agriculture in the rural (Omor community) farming community.

- **Chapter 6:** the results chapter, focuses on the analysis of the qualitative element of this study, from both the rural and urban food systems as well as stakeholders with emphasis that considers potential linkage between rural food systems and urban food systems in the study area.
- **Chapter 7:** the study's discussion and conclusion section, presents the findings of this study; the contribution of this research, and also proposes a holistic programme of interventions as well as policies that can potentially address household poverty and food insecurity in the study location.

Figure 1.3 outlines the study strategy and the interconnection of the different chapter.

Figure 1. 3: Research Strategy



1.9 SUMMARY

This chapter introduced the concept of food security and food insecurity, and policies around rural food systems and urban food systems in the context of Nigeria. This chapter sets the scene for the PhD study by outlining the economic, physical and social challenges faced by both rural and urban communities in Nigeria to realise a more secure food future and how addressing these challenges could improve rural food systems, urban food systems and the linkage between them.

This chapter also introduces the research aim, scope and strategy for this PhD study. In chapter 2 academic and grey literature, that captured the socio-economic factors that contribute to household poverty and food insecurity and the functioning of rural and urban food systems, and their interconnection is explored. Household poverty, food poverty and food security are considered from the global perspective through to the narrower Nigerian context, while other factors that influenced rural food systems and urban food systems (infrastructure, migration, extension services etc.,) are also drawn together and reviewed.

CHAPTER 2

2 LITERATURE REVIEW

This chapter reviews the different socio-economic factors that contribute to household poverty and food security as well as rural and urban food systems independently and the linkage, or not, between them. These factors are considered first from the global perspective, down to the narrower Nigerian context. This approach is in order to see whether the challenges facing Nigeria are typical of the global challenges or whether the challenges rural and urban Nigerians face are regional or unique to the country. While poverty on its own is a broad topic, this study specifically focuses on household poverty and its interrelationship with food security. Moreover, the relationship between urban communities, who are increasingly the majority of food consumers, and rural communities who are the principal food producers in a given country is considered in the context of rural food systems and urban food systems, and the potential linkage between them. This chapter explores concepts described in the literature including poverty, food security, household food decision making, the level of infrastructural development, extension services, rural-urban linkage, marketing systems, food waste, livelihood strategies and rural-urban migration. Additionally, this chapter considers the Nigerian agricultural farming systems and the challenges, which was further emphasised through several policy reforms implemented towards improving the functioning of the agricultural sector. Food production is an essential element of any food system that ensures food availability and food accessibility. The Nigerian food system is generally categorised (in this thesis) into components that include food interactions from production to consumption which occurs between the rural areas (mostly production) to the urban settlement (mostly consumption). This is considered in this thesis as the rural and urban food systems that are examined as single entities and then together to identify/understand/and clarify the possible linkage between the two communities. Hence, this chapter draws literature together from key concepts, in order to provide context, and identify gaps and opportunities for the purpose of this study.

2.1 GLOBAL PERSPECTIVES ON POVERTY, FOOD POVERTY AND FOOD SECURITY

Poverty has conventionally been viewed as a consequence of insufficient income for individuals and households and as a result an inability to secure basic goods and services that realise some level of satisfaction and fulfilment of need (Olatomide, 2012). Others perceive poverty, as a function of income, education, health, life expectancy etc. factors which are often used in identifying the poor within a given society, using various criteria to rank consumption and expenditure of people, societies and nations (Olatomide, 2012). Poverty reflects the inability to afford or meet the minimum needs that are classified as reasonable human requirements, based on the nature of the society that people find themselves in (Goulden & D'Arcy, 2014). This definition implies poverty is relative, and that both basic goods and services must align with social participation or inclusion of people; further, within any social setting the standard of living may vary based on (a) the availability or provision of goods and services (b) the price of food and other forms of goods, and (c) social norms or societal expectations (Goulden & D'Arcy, 2014). More simply, Anger (2010) noted that poverty is the state or condition of being "poor".

Poverty continues to be a threat to the human race, it is complex, multidimensional, multifaceted and it reveals its challenges in economic, social, political and environmental aspects of human existence (Danaan, 2018). Bhalla and Lapeyre (2016) associate poverty with the concept of social exclusion as a new phenomenon in both the advanced and advancing country context. Bradshaw and Main (2016) consider child poverty; and how poverty influences the welfare of children. Room (2016) evaluate poverty emerging in the European context and Connor et al., (2016) analyse the meaning of food poverty, specifically with Shah (2016) linking poverty to gender issues. Food poverty in this case is often seen as a proxy measure for individual and household poverty.

A term that has emerged into the academic literature, policy and popular culture is ***food poverty***. Food poverty is defined as the incapacity to access, afford, make/prepare food (London Assembly Health & Environment Committee, 2013; Mwatsama & Stewart, 2005). It is caused by factors which are inter-related and can be categorised into financial, physical, and social phenomena. According to Smith (2018), food poverty is often experienced as a result of a **shock** or a more prolonged **squeeze** situation in food supply leading individuals to become food poor. **Shocks** represent a sudden situation that leads to food poverty, for example the

impact of the Covid-19 pandemic, war or conflict, a weather or catastrophic environmental event or benefit sanctions resulting in the need to source or rely on food aid from international agencies, or food banks and supplies available locally. **Squeeze** situations indicate the presence of long-term food insecurity and food poverty being experienced, an example of such a situation includes prolonged low level of income/or family funds which hinders families from accessing resources to prepare meal(s) (Smith, 2018). i.e., they live 'hand-to-mouth' and have no resources or financial savings to fall back on.

Financially-related poverty is the common or primary cause of food poverty, it occurs as a result of sudden, or long-term unemployment, or underemployment, low income as a result of low wages and debt (Mwatsama & Stewart, 2005). Financially driven poverty can lead to both shock and squeeze situations. Problems associated with social benefits in some countries where social protection (welfare) measures exist, may lead to food poverty. These include sanctions, delays or benefit changes where households lack the financial resilience to overcome the change in their circumstances (Trussell Trust, 2017). According to Jitendra et al., (2017) in the United Kingdom (UK) there are growing concerns over welfare reforms that over time have worsened the food poverty situation of people. Some of these reforms include: the rollout of universal credit, and the effect of a six-plus week waiting period for the issuance of the initial universal credit payment. The Trussell Trust, the largest UK food bank provider nationwide, reports that full universal credit rollout has recorded an average 16.58% increase in referrals to food emergency providers which has more than doubled the national UK population seeking food aid, being 6.64% in 2017 (Jitendra et al., 2017).

In the United States of America (USA), hunger remains a serious challenge in the lives of many, with the hunger situation in the USA often linked to economic disadvantage among many citizens (David, 2017). In reality, stigma, isolation and shame conceal hunger within the household, leaving affected citizens out of public reach (David, 2017). According to the United States Department of Agriculture (USDA, 2017) statistics on household food insecurity within the USA, revealed that people in the USA are suffering from varying levels of food insecurity. In addition to this, the USDA Economic Research Service (ERS) in 2016 conducted a survey via food security supplements released to the US Census Bureau's current Population Survey, that shows that 12.6% of households, equivalent to 15.6 million households or 41.2 million individuals, were food insecure sometimes, or all the time (Coleman et al., 2017).

It is important to note that three terms have been used in this section of the literature: hunger, food poverty and food insecurity. They are not used to imply that the three terms mean the same thing, but to reflect the terminology usage in the literatures cited.

David (2017) noted that food insecurity in many developed and developing economies is closely linked to illness, often called non-communicable diseases (NCDs), such as diabetes, obesity and heart disease. The experience of illness associated with food insecurity also results in financial loss owing to increased healthcare expenditure and decreased work ability. This implies a vicious circle can arise between poverty, unemployment, poor diet, and/or ill-health, which then reinforces poverty and unemployment again.

The physical causes of food insecurity i.e., poor accessibility to good quality and affordable food is a major cause of food poverty (Smith, 2018). The concept of a **food desert;** denotes geographical locations with infrastructural issues that lead to poor access to healthy and affordable food. This situation, occur mostly in areas described as having high deprivation, where limited food access is predominant together with the broader socio-economic inequalities that often exist is societies today (Cooper & Dumpleton, 2013). These locations are also often linked to minority communities within a country where the situation is confounded through inequalities and cultural or religious beliefs and sanctions linked to food (Cooper & Dumpleton, 2013). Access to food depends on geographical and social factors: i.e., cost of food, access to transportation etc. (London Assembly Health & Environment Committee, 2013). Generally, in a UK setting, large supermarkets are able to sell food at a lower or discounted price compared with small convenience shops, often the only food source available in local areas, especially for people who face travel challenges (transportation or disability) further preventing them from accessing low-cost, often nutritious, food items in big/large supermarkets (Smith, 2018). It should be noted that in the developing world, the reverse may be the case and low-cost foods are not the preserve of the supermarket supply chain, but instead the street and informal markets.

Social causes of food poverty can include the lack of skills in household food budgeting or food preparation (Smith, 2018). Careful sourcing of ingredients can be achieved through budgeting by low-income families, while confidence in food preparation can provide lower cost food compared to pre-prepared and bought meals. Such strategies can help low-income vulnerable households by preventing the habit of buying ready-to-eat foods, while encouraging the preparing of food to save cost (Smith, 2018). However, very low incomes which are

generally insufficient for basic food needs can often reflect food poverty regardless of the individual's skill set in food preparation or budgeting, resulting in an inadequate food access (Smith, 2018). Several studies have discussed food poverty/and food insecurity, and consequently these are presented here to understand the reason why these issues still persist around the world today.

In the UK, Connor et al., (2016) considered food poverty and used an explanatory approach (qualitative analysis) to critically review literature sources from academia, governmental and non-governmental establishments. The study identified several themes linked to food poverty as follows:

- ***Economic access:*** low-income consumers see price as the major determinant in the purchase of food, other factors that support their findings are (market location, lifestyle and behavioural attributes).
- ***Adequate quantity and quality:*** consumers cut down on food expenditure and skip meals due to inadequate household income. This is a common trend amongst retirees and mothers who skip meals to ensure that their children would have enough to eat. More so, food products which are more affordable for low-income consumers usually constitute low nutritional quality with higher amounts of starch and fats but less protein and essential micro-nutrients. This can lead to poverty induced obesity.
- ***Duration:*** insufficient diet over a given period of time could affect health, as poor diet balancing is synonymous with overweight in many countries and other forms of food insecurity conditions e.g., underweight especially in developing countries; however, overnutrition versus undernutrition is confounded by the factors above.
- ***Social Dimension:*** The researchers found that certain factors govern UK consumers' purchase of food. These factors include education, cooking skill, convenience, personality, choice, lifestyle and cultural acceptability.

Further studies in the UK by Smith (2018) consider food poverty in Camden and Islington (understanding the local urban picture) using secondary data sources, geographical mapping of physical access to food sources and qualitative interviews. Findings were broken down into four different themes which are as follows:

- ***Levels of need:*** food poverty exist in high levels in Camden and Islington. Research figures showed that over 19,000 people in Islington and 20,000 in Camden experience moderate levels of food insecurity. This research further indicates that at-least 1 in

every 10 children in London go to bed without food, with an average of every 1 in 5 parents in London skipping meal(s) to make sure their children eat. General numbers of referrals to food banks showed increased need for emergency aid, at local and national levels. In Camden between 2015-2016 the Trussell Trust food bank dispatched over 4,539 parcels of food and 2,770 parcels of food in Islington and Camden respectively.

- ***Experiences by Residents of Food Poverty:*** A qualitative response by residents and key professionals reveals the experience of local residents. These range from long-term food insecurity issues to high hunger levels within the scope of food poverty; both having a negative impact on health, quality of life and wellbeing. The main reason food poverty is experienced in the study area is financial i.e., low income, weak social protection (financial support benefits), and food availability. This information gathered through qualitative engagement with professionals and residents is evidenced in the local-service data on the number of food bank referrals (aforementioned). Other reasons for food poverty they cite include household priorities that put food purchase in a competing position with fuel costs, poor food access (affordability), low budgeting/food preparation skill and a lack of adequate food storage facilities (infrastructure).
- ***Food environment:*** supermarkets were geographically mapped in the study area and show that areas of high deprivation are often far from discount or large supermarkets. This trend was found to be a particular problem in Islington. Further mapping activities showed that some big supermarkets exist outside the affordability price bracket for residents at risk of food poverty. Both Camden and Islington boroughs have high concentrations of hot food take away outlets, what in some developed communities could be called street food albeit in a physical outlet, i.e., ready to go cooked food. These premises are particularly present along transport routes and in a few areas of high deprivation.
- ***Services:*** mapping of support services scheduled to address food poverty show an intense network of services across Camden and Islington. The study explains that there are areas of outstanding practice but some gaps in service were found to exist across most boroughs. Other challenges identified include: the lack of funding of schemes such as meals on wheels, child support centres and support for breakfast clubs and holiday meals. Professionals in food banks and beneficiaries indicated that it is

important to raise awareness and improve on the networking channels available locally, in order to access/activate more action in the improvement of services and to reduce food poverty.

This section presents a clear distinction between food poverty and food insecurity. While food poverty is used as a concept in several literatures highlighted in this section, it explains that; food poverty (which is synonymous with developed countries such as the United Kingdom and the United States of America) has to do with a person's inability to meet their minimum food needs as described by (Goulden & D'Arcy, 2014) in section 2.1 of this chapter. Food security which is defined in chapter one of this thesis by FAO (2006) to imply that a person is food secure if he/she has physical and economic access to safe and sufficient food, that meets their dietary needs for a healthy life. According to FAO (2021), food insecurity occurs when a person lacks consistent access to safe and nutritious food that is sufficient for normal growth and development for a healthy and active life (see section 1.2). This further explains that food insecurity can either have a mild, moderate or acute effect on affected persons or individuals.

The key linking concept in the interpretation of the definitions of food poverty, food security or food insecurity is "food access". In view of the literature in this section food access is described here mostly from the economic or financial (income, employment etc.) perspective, then physical (infrastructure, markets etc) and social perspective (benefits, health care etc)

The next sub-section (2.1.1) discusses the global food crisis between 2007-2008 that affected several countries across the World including in Africa.

2.1.1 INFLUENCE OF THE GLOBAL FOOD CRISIS 2007-2008 ON FOOD SECURITY

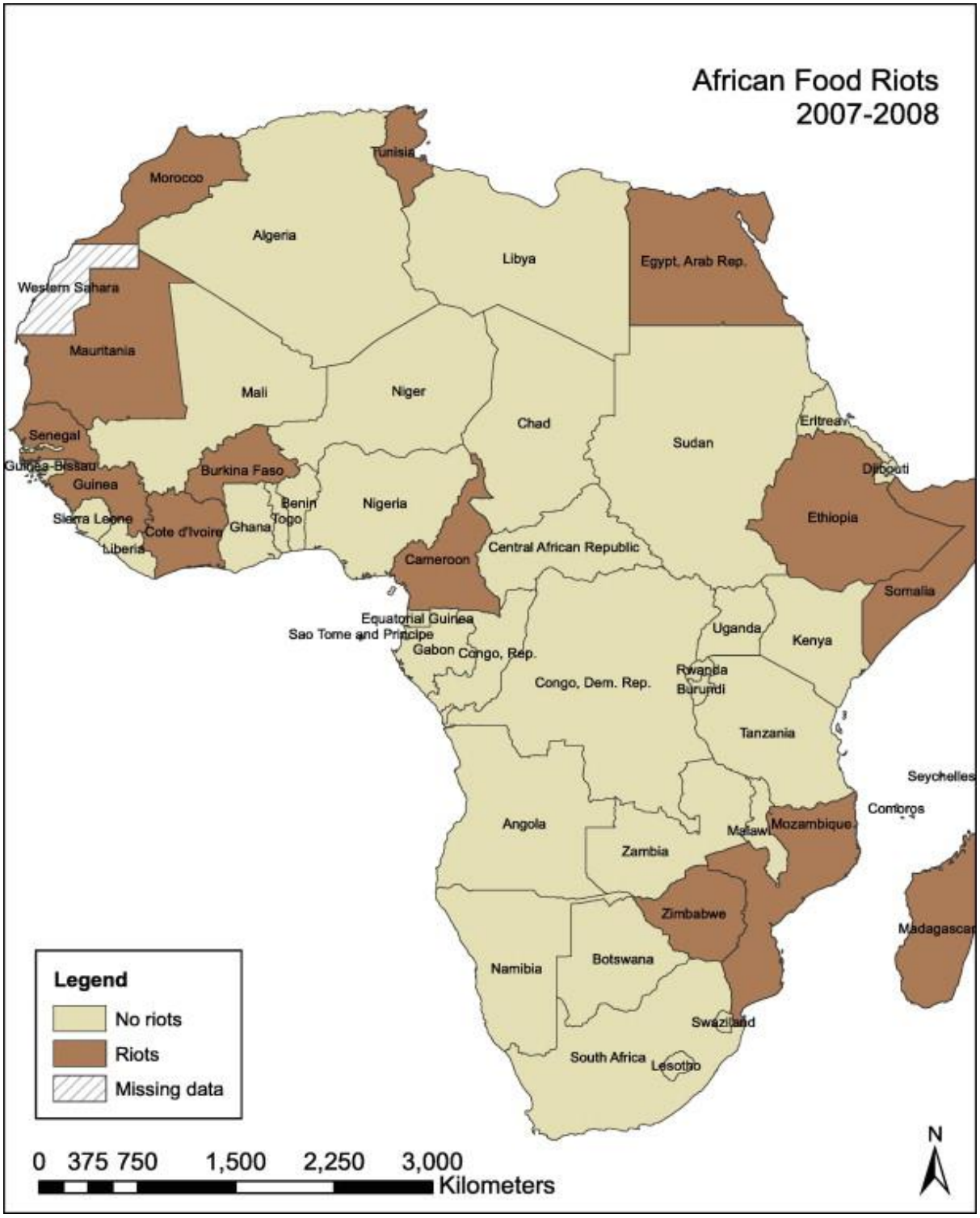
Between the year 2006-2008, the global price of various food items, crude oil and other basic commodities increased drastically, this hike in price in many cases doubled within a few months (Demeke et al., 2009). As a result, 74 low income and 71 middle income countries (including those in the United States of America, Asia & Africa) were affected by the rise in food and oil prices globally (Berazneva & Lee, 2013). This crisis and its effect had some level of impact on the prevalence and depth of food insecurity felt by the affected countries (Headey & Fan, 2008). The rise in global price of crude oil & food commodities had its negative footprint on economic growth, macroeconomic stability and political tension across the many countries affected, which often led to violent street protests especially between late 2007 and early 2008 (Beraznera & lee, 2013). In Africa, the growing tension caused riots that swept across the continent, from Madagascar & Mozambique in the South to Burkina Faso and Senegal in the West and then Egypt and Tunisia in the North (see figure 2.1: Map of Africa). The crisis confirmed the inherent volatility of the international commodity market, reinforcing the level to which the food and crude oil markets have increasingly become inter-dependent on each other (Beraznera & Lee, 2013).

In view of the foregoing problem, by December 2008, 33 countries adopted short-term measures (trade-oriented and market-based policy) to alleviate the crisis (Demeke et al., 2009). A good example was with Ethiopia, the country sold wheat to the urban poor from its grain storage/reserve. Similarly, Nigeria reduced import (Customs) duty on rice from 100% to 2.7% to be able to cope with the crisis (Beraznera & Lee, 2013). Although, safety net measures were very uncommon at that time, Beraznera & Lee (2013) noted that only 9 out of 33 countries initiated the cash transfer scheme or encouraged the food access programmes (meals or food tickets). Hence, it was recorded that the food crisis pushed many African governments to act and take cognisance of the effect of food insecurity among their populace (Demeke et al., 2009).

Additionally, nearly all agricultural commodities experienced the price rise trend in the mid-to-late 2000s (Beraznera & Lee, 2013). Between the year 2004 & 2008, the price of rice across the world rose by 25.5%, maize and wheat price also rose by 80-90% causing concerns for food insecurity in the affected areas (Headey and Fan, 2008). The extent of the price surge varied significantly across countries which were reflected in local markets based on several

factors that include: trade policies, transportation costs, domestic market structure and the prevailing exchange rate (Von Braun et al., 2008; Heady & Fan, 2010).

Figure 2. 1: African Food Riots



Source: (Beraznera & Lee, 2013)

Although, Nigeria was not primarily affected by this crisis (see figure 2.1), this may be because Nigeria is an oil producing nation that could trade-off crude oil for income sufficient to keep the economy stable at the time of the crisis. It could also be that there were strong policies in place (as stipulated earlier in this section) e.g., the drop in customs duty tax that supported food importation at that time. This mitigated against the food crisis and stabilised the functioning of the economy at that time (2006-2008). Interestingly, in recent times, the war in Ukraine has also systemically affected food prices and caused food scarcity in many countries across the World (including the UK and Nigeria). With oil prices going up as a result of sanctions on Russia, the ripple effect is now termed "the cost-of-living crisis" that is affecting many countries across the world in recent times. For instance, Balana et al., (2022) noted that in 2020, Nigeria imported wheat worth $2.15 billion (US dollars), with Russia her second main source of wheat, after the United States of America (America $518 million, Russia $401 million). The implication for Nigeria is the scarcity of or rise in the price of wheat from Russia owing to the war in Ukraine. As a result, the Russia-Ukraine war in the context of this study have resulted in both food poverty and food insecurity felt across the world today.

Having considered the global perspective on food poverty and food insecurity with particular focus on situations in the UK and US, and the global food crisis that affected several nations across the world, the next sub-section (2.1.2) focuses on the Nigerian perspective.

2.1.2 SOCIO-ECONOMIC FACTORS AFFECTING POVERTY AND FOOD SECURITY IN NIGERIA

Maxwell and Wiebe, (1998; pg 1) stated that food security is the state of having secure and sustainable access to adequate food for an active and healthy life. Since the World Conference of 1974, it has been emphasised that for most people the main problem of food insecurity is a lack of access to food rather than an aggregate shortage in food supply, so the emphasis on enabling food security switched from being a national and global phenomenon to consideration of household and individual driven perspectives (Maxwell & Wiebe, 1998). An examination of food availability and accessibility in Nigeria (Okolo & Obidigbo, 2015) employed an ordinary least square regression method and graphical trend analysis to test two hypotheses: **Ho1**: Food and agricultural policies have not impacted significantly on food availability in Nigeria, and **Ho2:** Nigerians have not sufficiently accessed available food.

The study reveals that commercial bank lending to agriculture, agricultural credit guarantee scheme fund loans and foreign exchange utilisation for food has a significant effect on the availability of food in Nigeria. Hence, their study concludes that Nigerian national policies on food and agriculture significantly influenced food availability (Ho1). In essence, the study explains that good agricultural policies (GAP) especially on farmers' incentives (e.g., credit schemes) would significantly encourage farmers to produce more, thereby ensuring food availability. The study states that the analysis of the growth rate of key variables together with the analytical comparison of population food availability index, consumer price index and per capita gross domestic product (GDP) shows that food price in Nigeria is to a large extent higher than what the average Nigerian could pay, even in the year that showed increased food availability and falling growth in population size. This implies that, given the rising prices of food and the overall income level, Nigerians cannot adequately access the food available (Ho2) (Okolo & Obidigbo, 2015).

Additionally, Adebayo et al., (2016) consider social crisis, terrorism and food poverty dynamics in Northern Nigeria, and use a probit regression model to investigate the effect of social crisis in relation to food poverty in the study area. The study reveals that the majority (84.85%) of Northern households in Nigeria are food poor. The overall study population had more male respondents (95.45%) who are food poor compared to their female counterpart (4.52%); additionally, 83.44% of this population resides in rural areas as against 16.56% who live in urban settlements; and more than half of the study population 57.48% had no formal education. Hence, the average per capita expenditure on food within the study area in 2016 was 25,524.36 naira ($128.23) – [approximately $200 exchange rate] annually or 0.35 USD/person per day. Similarly, Abiodun et al., (2019) examined the rising cases/rate of child poverty in the Northern part of Nigeria (an implication for National Food Security), their study employed the use of both the primary and second data to identify the factors responsible for the continuous increase in child poverty cases. Factors identified included: the decline in productive growth of the Nigerian economy, poor industrial capacity utilisation and inflation. Other factors were discussed in themes:

- ***The uneven distribution of income:*** the study concludes that this phenomenon has resulted from the differential access by individual citizens to societal benefits, infrastructure and amenities noting that the situation strongly originates from the composition of the Nigerian economy especially with the oil sector employing only a

fraction of the Nigerian population and the agricultural sector on the other hand employing about 90% of the rural population.

- ***Civil and ethnic clashes:*** the study explains that with the return of civil rule in 1999, there are rising cases of militants majorly from religious and ethnic groups. This unrest has its roots in poverty, economic and political competition leading to human impact, while escalating the problem of poverty in the nation.
- ***Political instability:*** the study indicates there is an absence/lack of a strict regulatory and monitoring system at government level, which has given room for unrestrained corruption.
- ***Illiteracy:*** in terms of education, considering female children in Nigeria as a proxy, enrolment rates for the different parts of Nigeria displayed patterns of inequality. The enrolment rate for Southeast Nigeria was 85%, Southwest 85% and the South-South 75%. In comparison, it was observed that enrolment rate for girls in the Northeast of Nigeria was 20% and the Northwest 25%. Consequently, the study concludes that education of people has direct effect on their standard of living and based on the proxy presented above, northern Nigeria is far behind global standards when it comes to child education. More so, the study further explains that northern Nigeria is the area with the largest incidence of poverty and 'out of school' children. The Millennium Development Goal (MDG) (2000-2015) agenda, put together by World leaders under the umbrella of the United Nations, in the meeting held in New York on the 15th of September 2000, ensured education was an important agenda at the meeting, amongst other challenges in various sectors (agriculture, health and industry) also discussed (Jerome, 2012). Nigeria operated its national programmes in line with the MDG programme, and now the SDGs, but more needs to be done across affected sectors (not just education) in order to encourage greater participation in child education and reduce the incidence of child poverty and subsequently hunger in the nation.
- ***Neglect of rural infrastructure:*** the study notes that rural poverty has continued because of the absence of good roads, piped borehole water, hospitals and educational facilities (see section 6.6 and sub-sections 2.3.5; & 7.3.6 for more insight into this themes).
- ***Continuous rise in the population of Nigeria:*** As the population of Nigeria increases, an increased pressure tends to exist on already limited resources, also causing

environmental problems which have a consequence for food production, availability and affordability.

- ***Bad governance and corruption:*** the authors reveal that poverty is primarily caused by bad leadership and corruption, which generally involve the diversion of state resources for selfish justifications. This trait leads to poor agricultural administration, and poor land tenure system. In wider society, it results in civil unrest, political conflicts and poor infrastructural development etc.

The study by Eme et al., (2014) on the "Challenges of Food Security in Nigeria: Option before Government", uses a qualitative method of analysis to answer the research question: 'Will a person ever have to worry about his or her next meal (food)?' They conclude that the main cause of food insecurity in developing countries is poor economic access to food which results from widespread unemployment and poverty, that greatly affects the purchasing of food by consumers and subsequently prevents guaranteed access to food. In terms of government policies, the study further reveals that, despite efforts by the Nigerian government, through its various agriculture reform programmes/policies, agriculture has experienced setbacks due to challenges such as rural-urban migration. This supports the findings of Abdullahi et al., 2009; Olajide, 2013; Kanu and Ukonze, 2018 who argue that unstable policy formulation, agricultural policy implementation, poor input distribution systems, insufficient infrastructural support, food pricing system, increased focus on the oil economy, high dependence on rain-fed system of farming, poor utilisation of capacity, the poor socio-economic status of Nigerian farmers, environmental degradation, poor credit schemes, poor technology transfer system, corruption and low implementation commitment to agricultural policies, contributes to food insecurity.

In terms of education and how it contributes to food insecurity situations in Nigeria, Sanusi et al., (2006) adopt a descriptive and cross-sectional design approach to consider the food security status of households headed by teachers or where teachers oversee purchase and preparation of meals or are in charge of family budget i.e., they are the household food decision-maker. Key findings from the two cities (Lagos and Ibadan), both in the urbanised southwestern part of Nigeria, reveal that three quarters of households were found to be food insecure and 30.6% were found to be food insecure with hunger in the study area. Food insecurity in these selected Nigerian States was viewed to be high, owing to inadequate dietary intake that has come about because of low household income and living below an adequate income level. However, the study shows that households of secondary school teachers were more food secure when compared to the households of teachers in primary schools" (Sanusi et

al., 2006). The educational status of household heads played a significant role in influencing household income planning (i.e., household budgeting). However, whilst teacher(s) were the unit of observation, education as a variable was considered as a proxy for income and household budgeting. The differentiation of both cities in terms of food insecurity revealed that Lagos was more food secure than Ibadan, and this was argued to be because Lagos is one of the major commercial hubs of the country and probably better linked to food supply networks that includes imported food. Although this research is quite aged, the factors highlighted as influencing poverty and food insecurity are worthy of consideration in this PhD study.

To further understand the food insecurity factors affecting rural farming households and the urban people, the study of Abu & Soom (2016) used descriptive statistics, the food security index, surplus/food insecurity gap, factor analysis and probit models to examine the factors affecting household food security in rural and urban areas in Benue state, Nigeria. The study posed the following outcomes based on **(a)** the food security status of respondents **(b)** factors influencing the food security status of households and **(c)** the problems of household food insecurity in the study area. In view of the food security status of the respondents, the study reveals that the study area (Benue State) could be regarded as being food secure as rural households (53.3%) and urban households (62.2%) were able to meet the recommended food intake calorie measurement of 2500Kcal per capita per day. It should be noted that this definition of food security by individuals (respondents) being calorie secure, does not imply that they are nutrient secure. Conversely 46.7% of rural and 37.8% of urban households were thus classed as being food insecure, not meet the recommended daily per capita **calorie** food requirements. In terms of the factors influencing the food security status of households, the study asserts that the probability of households being food secure or insecure is determined by three major factors**: age**, **household size** and **household income**, these factors are also considered in this PhD study. Their study also confirms that both environmental and economic factors contribute to food insecurity in the study area. The environmental factors or components of influence include limited land availability for the expansion of agricultural activities, unfavourable climatic and weather conditions and animal/crop disease. The economic factors included: poverty, lack of private or non-farm income generating opportunities, problems associated with processing and storage of produce, and poor access by farmers to credit. Other factors highlighted include war and crisis and **limited access for women to space or farmlands**.

Some of the factors highlighted in this section (e.g., war and civil unrest) are beyond the scope of this study. However, several other important factors such as household income, unemployment, household size, age, educational level of the household head etc. relate to the inquiry of this study, some of which will be discussed in depth in subsequent sections. The next sub-section (2.1.3) discusses food poverty and food insecurity in the context of food systems, which introduce to the concept (of food system) both at the rural and urban setting. Detailing the reasons behind rural areas being the primary space for food production, while urban areas are majorly the space where the purchase of the food (from imports and rural areas) takes place.

2.1.3 FOOD POVERTY AND FOOD INSECURITY: RURAL AND URBAN FOOD SYSTEMS

Nigeria, the most populous country in West Africa, consists of three major population settings: urban, peri-urban and rural, with the majority of people living in peri-urban and rural areas. Brook & Davila (2000), defined peri-urban settlements as that land area around metropolitan regions and cities occupied by a growing proportion of people from nearby urban and rural settlements. There has been focus on poverty and food insecurity in rural and peri-urban areas, but poverty and food insecurity also exist in urban areas (Irohibe & Agwu, 2014). Given the significance of peri-urban and rural areas and the role agriculture plays in the economy (Irohibe & Agwu, 2014), food insecurity in Nigeria can be attributed in part to the low performance of the Nigerian agricultural sector, a sector that is generally expected to resolve the challenges of food availability and food accessibility, both at the household and national level (Akinsanmi & Doppler, 2005; Irohibe & Agwu, 2014). Overall, the reduction in the performance of the Nigerian agricultural sector has created food availability gaps, filled in part by food imports. This low agricultural performance also has an indirect effect on the agricultural food supply chain and food marketing, this phenomenon has established some food market demand shortages cutting the access of rural and peri-urban farming households to sufficient income. On the other hand, rurally produced food reaching urban areas is high in price owing to the high cost of food/produce preservation and transportation. This can lead to urban households cutting down on other elements of family budgets in order to afford food (Irohibe & Agwu, 2014) as highlighted in the UK research earlier in this chapter (section, 2.1). The rural food system and the urban food system as well as its interconnection is also impacted by a number of factors including labour migration, infrastructure provision, and extension services. These are discussed further in the context of food insecurity in Nigeria (see sub-

sections 2.6.1; 2.2.1; & 2.3.5). This introduction sets the scene for the next section (2.2) which discusses in more detail food systems in relation to the level of food linkage between rural and urban areas.

2.2 FOOD SYSTEMS

Food systems are defined as the different process that occur in association with food production, distribution, sale and consumption from field to fork (Food Climate Research Network, 2015). Food systems involve the activities of different food actors and their inter-linked value chains, with value addition operations occurring during production, harvesting, aggregation, processing, distribution (transportation, marketing etc.), consumption and disposal of food produce/product (Food and Agricultural Organization, 2018).

Rural food production will unarguably be under pressure in coming decades with increasing demands for food supply owing to a range of different drivers. Urbanisation is known to strongly influence urban food demand, with more people now living in urban centres than rural settings (Delgado, 2005). It is anticipated that in the next decade urban areas will experience more growth particularly in African and Asian countries (Abdullahi et al., 2009). Notably, urbanisation greatly influences the patterns of urban food consumption (Thronton et al., 2011). Between 1950 and 2000, global per capita income increased at a yearly rate of 2.1%. With such a rise in income, food expenditure patterns have also changed, often as individuals can afford more sugar, fats and meats (Maddison, 2003). Future economic growth projections vary and to a large extent the agricultural sectors and food production are catering to an unprecedented for a variety of worldwide diets (Thronton et al., 2011). Urban retail outlets in sub-Saharan Africa (SSA) are rising at 20% per annum in most countries (Nigeria inclusive), and this growth is envisaged to be replicated over the next few decades as urban consumers demand more processed foods than their rural counterparts. This is gradually causing a shift in national food production from commodity based on-farm production and consumption to a more advanced agribusiness value chain model (Thronton et al., 2011; Berkum et al., 2017), that relies on links between rural food production and urban food consumption. More so, it is important to highlight that rural food production may not directly be linked to urban consumption as there may be other actors that interact in the middle e.g., food processing industries.

Some studies have tried to examine this critically in the international (Bangkok, Thailand) and regional (African) context. Food in urban areas is increasingly being purchased rather than being produced/cultivated by households (Warren, 2016). Hence, low household income levels limit access to the available food. In terms of food distribution, the study by Warren (2016) on urban governance and urban food systems in Africa reveals further that the key determinants of food distribution include: the availability of transport infrastructure, regulations on trade, government transfer programmes, and food storage provision. According to the study, the infrastructure for urban transportation for the movement of food and materials for processing is inadequate in many African countries. More so, the majority of vehicles that ply such roads are largely inadequate. The study notes that urban governance can greatly influence all aspects of urban food systems. Major governance activities that can affect urban food systems include: the provision of infrastructure, such as water, electricity and roads, which are essential for the processing, distribution and storage of food, and the provision of support, advice, credit, tax incentives, etc. for the production and transformation of food. The regulatory environment involves land use planning too especially for retail shop sites, shopping hours laws, labour market regulations, and advertising, health claims legislation and consumer protection (Warren, 2016). These regulations have affected where food is, or is not, produced or processed, when and where retail outlets are allowed to operate, or not operate, the kind of food that can and cannot be sold, and who is involved in producing, processing, distributing and selling of food (Warren, 2016). The study concludes that many African cities have low levels of urban agricultural activities; and many African Countries (National and Local Governments) respond negatively to urban agriculture, seeing it as incompatible with their modern reality of what an ideal city should look like. Thus, urban governance greatly influences all aspects of urban food systems.

Urbanisation refers to the growth in the proportion of a population residing/living in an urban space. Urbanisation involves the movement of people from rural area(s) to urban centres in a given geographical location (Jiboye, 2011). To aid a better understanding of food security and food systems, the study by Kazuaki et al., (2015) selected Bang Mae Nang sub-district (BMN), a location in Northwest Bangkok. Their research shows that traditional food retailing systems continue to be vital even in the phase of rapid urbanisation in a peri-urban area; and that wet-markets function as the vital hub for consumers and producers of vegetables and fruits within and around BMN. Moreover, their study does not distinctly show the significance of modern food systems, perhaps because urbanisation as an ongoing change is still in its initial stage in BMN, and as a result the buying of fruits and vegetables from

supermarkets is not yet common, or alternatively that the migrants cannot afford food from supermarkets.

Further findings based on their geographical analysis, in the study area (BMN) highlight that wet markets have the better advantage of accessibility when compared to supermarkets. Even though supermarkets are located in more urbanised areas in BMN, many households primarily select visiting wet markets for their fruit and vegetable purchasing. Household interviews indicate that there is heavy dependence on nearby wet markets and outdoor meal consumption by non-farming households, as against that of farming households who depend on their self-grown products and provision of produce from neighbours and mobile vendors. These distinguishing features show that urbanisation has brought about different changes in food purchasing behaviour as well as encouraging higher dependence on wet markets amongst the non-farming households.

The phenomenon of urban planning pushes agriculture and its related activities to less developed rural parts of the country increasing the transportation cost and thus the cost of food. Urban families have to pay additional costs for food, to cover additional transport, affecting the strength and reach of their household budgets. However, it is interesting to note that there is research material on food systems at the International and Regional (Africa) level, but there is little literature that relates food systems to food security in Nigeria (at the national level). Considering this gap, the empirical study described in the thesis aims to consider urban food systems and rural food systems in Nigeria, which will contribute to the existing body of knowledge. Posthumus et al., (2019) considers factors that enhance food systems in Nigeria, noting that the Nigerian food system is driven by key socio-economic trends some of which include: a high number of people living in situations of poverty, high population growth rate, poor agricultural production rate, and rapid urbanisation.

As a result of the factors described here in the literature review, development and investment in the agriculture sector is minimal, translating to underdeveloped rural infrastructure (roads, processing, and storage facilities), and in addition to this the lack of agricultural advisory service (extension service) that would ordinarily support farmers with access to inputs and finance for their development. Posthumus et al., (2019) states that in Nigeria the underlying institutional downturn affecting food systems development includes: weak linkage between science and practice, and poor quality of education and inadequate transparency in marketing, resulting in high costs and increased investment risks despite the high rate of food demand by the urban community. Poor investment in rural development and

agriculture, results in low food production. In a similar way, owing to the high urban food demand which is not usually met, Nigeria over the years has settled for cheap food imports which invariably decreases the propensity to invest in the agricultural sector (Posthumus et al., 2019). Many of these themes have been identified in other research explored in this literature review, showing the common challenges in developing rural-urban food linkage. Other factors that affect the urban food system and rural food system in Nigeria include environmental trends such as climate change, deforestation, soil degradation, water scarcity, rise in urban population, and poor infrastructural development leaving little or no room for agricultural activities (Posthumus et al., 2019). Specifically, the uneven distribution of natural resources (pasture for grazing) or its scarcity is the major cause of conflict amongst crop farmers and pastoral farmers i.e., nomadic cattle farmers (Posthumus et al., 2019).

Drawing this range of literature together suggests that the significance of rural-urban food and information linkages in poverty reduction cannot be over emphasised (Global Monitoring Report, 2013). Poverty reduction strategies rely on enhancing consumer and producer economic capabilities, and intervention in rural-urban labour migration ratio, and on/off farm employment may help stabilise the food related interactions between the two locations (Cali & Menon, 2013). Measures taken to reduce poverty and to foster economic development both in the rural and urban setting in rural areas, agriculture, labour and natural resource management; and in urban areas management of manufacturing, service, and infrastructural resources (Akkoyunlu, 2015). The important interactions that exist between rural and urban economies are often ignored. The growth of the agricultural industrial sector in both rural and urban settings can be associated with forward interactions includes sending raw materials for processing, and manufacturing of agricultural raw material derived product; and backward interactions mainly providing the inputs to improve agricultural production yields, agricultural input sourcing policy, and information on standards for produce processing on farm and in other stages of the supply chain (Akkoyunlu, 2015).

Evans (1990) argues that any meaningful development policy needs to consider rural-urban connections in order to maintain a sustainable economy. In this context, the economy can be considered at three levels: micro (the individual); meso (the community) and macro (national or international factors).

- At the *micro-level*, rural-urban linkage/or interactions mirror peoples' complex livelihood strategies which are often reflected in: migration, food mobility, distant family remittance, income diversification and employment (Akkoyunlu, 2015). Young

and unmarried individuals especially in rural and peri-urban areas, combine farming with off farming activities resulting in occupational diversification and income generation (Mayer et al., 2016).

- At the *meso level*, community economic growth is depicted by collective assets ownership, cooperative formation, produce aggregation and partnerships either for storage, marketing and transportation to urban markets (Akkoyunlu, 2015).
- At the *macro level*, food demand is driven by the market and most significantly the urban market which connects international and regional markets to rural agricultural food producers (Tacoli, 2006). The obvious demand pressure on agricultural produce from urban markets influences the continuous drive for increased food production by rural settlements.

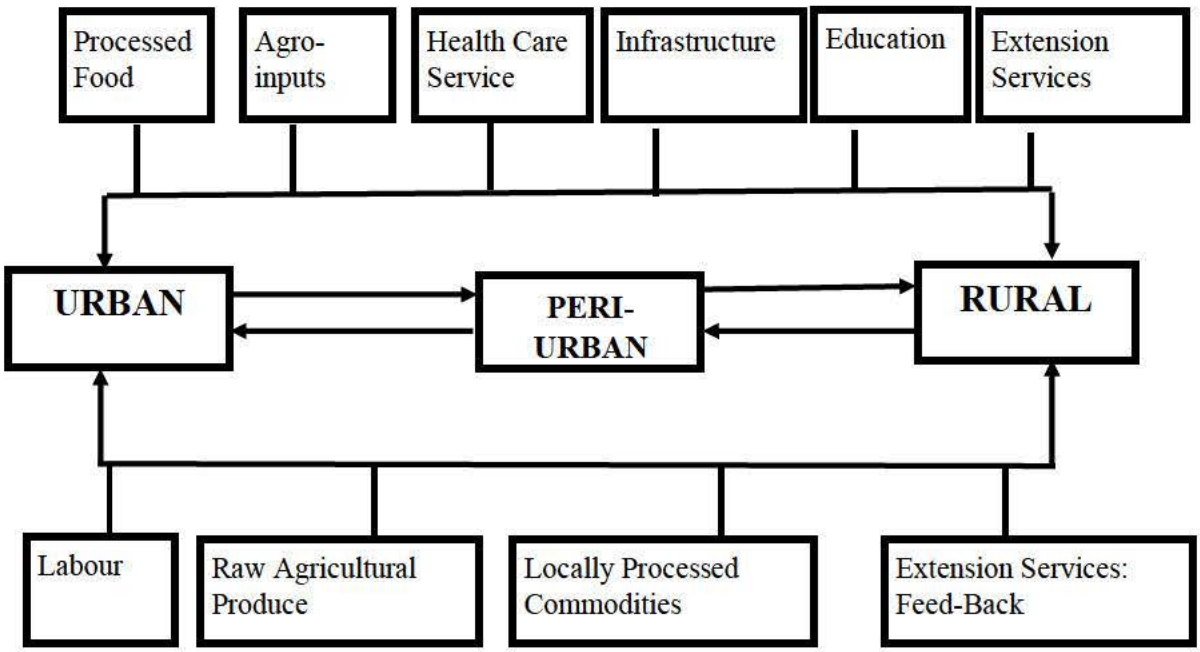
Thus rural-urban linkage reflects the symbiotic relationships between rural and urban settlements and between rural and urban food systems; and as food demand rises in urban locations there is an expectation that rural production will step up to fill the food gap, while the urban centres can also extend several services to rural areas e.g., health, education, infrastructural development etc. (Okpala Don, 2003).

In this regard, rural-urban linkage/interaction is the reciprocal movement of people, services, goods, money and environmental services between cities and surrounding areas. This synergy involves administrative boundaries that cut across several rural settlements, towns and small-and-medium cities which forms the urban-rural functional areas. The words linkage or interaction are not used here to confer the same meaning, but rather are used to mean the connections, transaction or relationships in the rural-urban context (UN-HABITAT, 2019).

The middle-men (section 2.4) in the agricultural produce market tend to play a big role in the rural food system and urban food system and the interactions that exist between rural areas and urban cities (Abebe et al., 2016). By serving as the intermediary between rural producers and urban markets, these middle-men create opportunities for themselves and strong incomes. Interestingly, most manufacturers and processing industries in urban/peri-urban areas structure their own food supply chains through the aid of aggregators, collecting agricultural produce from farmers who they may or may not have a contract or business understanding with, thereby adding some level of financial improvement to the livelihood of farmers and encouraging increased production by guaranteeing farmers a stable/steady market for their produce (Abebe et al., 2016).

Thus, the interaction between rural food systems and urban food systems is wider than the concept of the linkage within a food supply chain. Figure 2.2 illustrates the flow of goods and services from the urban areas to the rural areas and back. This flow also cuts across the peri-urban settlements which sit between the rural and urban areas. Many of these interactions will be considered in this PhD study as part of its empirical research.

Figure 2. 2: Rural-Urban Linkage



Source: OKPALA, E.F

Some studies have examined the linkage or interactions that exist between rural and urban areas. Mayer et al., (2016) consider rural-urban linkage as well as regional development and the role of entrepreneurs in linking peripheral locations and urban centres using exploratory results from qualitative interviews with entrepreneurs in rural areas (via a snowball sampling method). The study determines that rural entrepreneurs that possess rural-urban ties or linkage becomes more aware or have a distinctive drive for core market trends and demands, they estimate the capacity of their rural assets, and increase their sense for innovation by combining rural-urban knowledge through their entrepreneurial activities. The study concludes that rural entrepreneurs who interact with urban settlements have some level of influence on the sustainability of the economic relationships between urban and rural areas.

Akkoyunlu (2015) examines the potential relationships between rural-urban settlements for sustainable trade and development, investigating trade barriers, infrastructural

problems and institutional constraint that hampers rural-urban synergy as well as preventive measures on rural empowerment and economic development. This study concludes that such interactions between rural-urban areas could play a key role in reducing poverty in developing counties (such as Nigeria). Bosworth & Venhorst (2018) too considered the economic synergies that exists between urban and rural regions, with the research question: what is in it for rural settlements? The study adopts the use of a qualitative analytical method by reanalysing the diagrammatic framework proposed by Overman, Rice & Venable (2010) to reflect on its application for better understanding of the interactions between rural-urban settlements. The study notes that the spread effect of people between rural and urban communities does not adequately represent contemporary dynamic societies because the movement/spread of people via migration alone does not lead to a rise/spread of relative economic activities.

This PhD study considers food systems in the rural and the urban context, focusing on food production in rural areas and food consumption mainly in the urban settlement and what happens in the middle with processing industries as well as the circular flow of goods and services between the rural and urban areas. Owing to the movement of food, other goods and services between the rural and urban areas, certain factors were identified that interact with the system these, include infrastructure such as road and bridges; communication for information sharing; capacity of extension service providers as well as healthcare providers; the actions of middlemen and industry actors in sourcing raw materials for the market and industry manufacturing. Rural-urban linkage/interaction is thus potentially an important component of change in relation to poverty alleviation (i.e., via job creation) and food insecurity reduction. Between the rural and urban areas, the interaction that involve the movement of people, food, services and information can greatly contribute to the growth of both communities (rural-urban). The lack of literature that covers rural-urban linkage in the Nigerian context reveals a gap this study has tried to consolidate. The next sub-section (2.2.1) explores infrastructural development in more detail.

2.2.1 INFRASTRUCTURAL DEVELOPMENT

Infrastructural development is known to play an important role in poverty alleviation, empowerment, and economic development (Olakojo, 2017). Nigeria is characterised by inadequate and low infrastructure development especially in terms of road, electricity, health care facilities, educational facilities etc. and significantly so in the rural parts of Nigeria (United Nations, 2011). This challenge has not been addressed a decade later. This phenomenon affects

the welfare of Nigerians, consequently, influencing poverty levels, and also causing hardship. Several studies have investigated the reason(s) behind the infrastructural weaknesses in Nigeria especially in the rural parts of the country.

Olagunju et al., (2017) consider Nigeria's welfare impact on rural infrastructural development in "a case study of Oyo state" using descriptive statistics, inferential statistics and a probit regression model. The study reveals that over 77% of rural households in the study area were classified as poor households, as a result of a lack of livelihood diversity, occupational experience level (farming), good road networks, access to educational amenities, presence of agro-processing facilities, provision of health care facilities and the availability of electricity. Further, the dilapidated state of rural infrastructure and lack of service delivery requires capital investment. To further understand the infrastructural issues faced by Nigeria Ogunleye et al., (2018) examine the influence of road transportation on the development of the Nigeria agricultural sector using data from the Central Bank of Nigeria (CBN, 2013) and National Bureau of Statistics (NBS, 2013). The study reveals that road transport infrastructure has a significant positive impact on the development of the Nigerian agricultural sector ($p<0.05$). They propose that the provision of good quality road infrastructure would lead to a reduction in food waste on Nigerian roads and improve farmers' access to the necessary agricultural inputs (equipment, seeds, seedlings, and labour) at the appropriate cropping period. Infrastructure is key to local, national and regional development. Its presence or absence has implication for agricultural production and food security. Thus, infrastructure is an important component of consideration in this study. The next sub-section explores the power dynamics within the household in relation to food decision making among the gender heads of the household and the influence children have on decision making processes.

2.2.2 GENDER INFLUENCE ON HOUSEHOLD FOOD DECISION MAKING

Households constitute one of the key influencers in consumer decision making (Chikweche et al., 2012), especially the roles of the father and mother within the household (Marcus, 2019). Consumer behaviour research by Marcus (2019) described the shift from individual consumers to the role the family plays as a consumption unit when it comes to their food choices and their purchase decisions. The decision to purchase certain household items (in this case food) are made within the household. The decision is usually vested on spouses (father and mother) who also bring their perspectives to bear in the purchase decision process

(Marcus, 2019). This does not mean that children's or siblings' views are disregarded in the decision-making process (Chikweche et al., 2012). Su et al., (2003) note that different household members play different roles in influencing the food decision making process. These roles are dynamic, changing with time, based on different factors of influence that include occupation, household size, income, health of household members etc. Engel et al., (1973) identified five major roles that influence decision making within the household, and they include: the initiator or gate keepers, influencers, deciders, buyers and users. While Bourlakis & Weightman (2004) identified six key decision-making roles similar to that identified by Engel et al., (1973), these roles are elaborated in section 4.6 of this study in interpreting the study findings. The role adopted by the different members of the household are (as earlier identified) often determined by several economic and social constraints which requires family members to adopt these roles when it comes to the decision on food purchased by the household (World Bank, 2008). On a general note, gender does play its role in influencing who emerges among spouses within a household as the main food decision maker. This trend has been identified in the study of Langat (2016) [a study conducted in Kenya], and by Marcus (2019) [a study conducted in Anambra State, Nigeria]. Both studies noted that the household food decision making process is mainly dominated by male (husband, father) rather than female (wife, mother). Christain & Chika (2021) in their study use both quantitative and qualitative techniques to examine the behaviour of family members with regards to the factors that influence their purchase decisions. Household purchase decision making was considered to be influenced by the decisions of both husbands and wives in the study. 400 participants, all Igbo married couples in the Anambra-south senatorial zone of Anambra State, Nigeria were interviewed. Findings reveal that the age and income of respondents had a significant effect on product information exploration/search at the final decision-making phase, but no significant effect on the need identification phase. Secondly, respondents' occupation had a significant influence on spousal purchase decision making at the three main decision phases (i.e., need/product identification, information exploration and the final decision phase). Education of respondents only significantly influences spousal decision on need/product identification but had no effect on spousal decision making with regards to information exploration and final decision phase. This PhD study also considers household food decision making, similar to the work of Christian & Chika (2021). Specific variables (age, income, employment & education) are of interest in this study.

Additionally, the roles of children in the household food purchase decision making process are of value to study (Kaur & Singh, 2006). Previous research on the decisions of children within a family unit with respect to general purchase decision making has largely been confined to certain types of products, including snacks, toys, school bags, children's clothes and family holiday (Geuens et al., 2002; Gram, 2007). These are items that are important to children may not necessarily contribute to household food security (Chikweche et al., 2012). Hence, children's role in household decision making is restricted to products that impact directly on them (Kim & Lee, 1997), implying that children may influence parents on a whole range of purchasing issue pertinent to them (Kim & Lee, 1997). More so, family consumption patterns of family this may or may not translate to the type of market (retail, wholesale or wet-market) they visit, use or buy from (Chikweche et al., 2012).

The household food decision maker was selected as a response variable of choice because it underpins gender in the food decision making process and the power dynamics within the household that demonstrates all other factors that are known to influence food insecurity e.g., who makes the decision for food purchase within the household?, is it the father, mother or siblings; what is the income level of the household or the person making the food decision, educational status, household size; and what kind of decision encompasses the food need of the whole family or individual family members. This may not be considered in-dept by the food insecurity score (FIS), which was taken into consideration in the literature after the data for this study was collected."

In essence, food purchase decision making in a typical household/or family is either mediated by the father, mother and/or their children. Several factors that influence this decision-making process are cited: household size, income, employment or occupation, health of household members, consumption pattern etc. The food consumption pattern of household units is sometimes determined by the type of market the "buyer" in the household identifies influenced by the decision-maker (see: Bourlakis & Weightman, 2004; Marcus, 2019). The next section (2.3) is on farming systems discussing the different aspects of food production. This relates to the first pillar of food security "food availability". Its sub-sections also focus on government's investment in the oil sector, policies that have encouraged food production, gender and its influence on food production, and extension service provision.

2.3 FARMING SYSTEMS

The human population depends on farming as a source food, livelihoods and economic development (World Bank, 2007). Yet, farming systems that support the agricultural sector differ between countries (Dixon et al., 2014). Additionally, farming systems are not only important for economic productivity, they are also affiliated with political, cultural and social dimensions (Dixon et al., 2014). Farming systems are defined as the processes that connects farming with human and management components (Keating & McCown, 2001). Farming systems can be characterised by crop production and management, techniques and practices, climate and environment, off-farm activities, principles and natural resources-based activities (Dixon et al., 2001; Behera & Sharma, 2007). Some of these farming systems and human processes, include restructuring farming processes, close monitoring of climate change, policies that supports agriculture, and on farm techniques that support a better farming culture (Dixon et al., 2014). Farming systems can take the form of (a) single system of farming (monoculture), and (b) an integrated farming system.

Farmers in sub-Saharan Africa (including Nigeria) have specific cultivation techniques and practices in the production of food. Adopted farming systems include a wide range of traditional agricultural techniques and practices owing to generations of experience, informal experiments, learning and understanding of their environment (Olanrewaju et al., 2018). Many of these cultural approaches include, but not limited to shift cultivation, minimum tillage, mixed cropping/inter-cropping and agro-forestry (Olanrewaju et al., 2018). The farming systems practiced by farmers in Nigeria are perceived to be sustainable, as the systems play a key role by enhancing food security and maintaining the survival culture of such farming communities (Ogbonna, 2019).

Farming systems in Nigeria differ based on geographical locations (Akano et al., 2018). The system of farming in Nigeria varies between the North and South of the country with major emphasis on climate change/precipitation patterns which adversely affect farming and crop distribution around the country (Lebael & Ali, 2009; Akano et al., 2018). As a result, there have been rising cases of severe crop failure due to incessant dry spells in rainfall and early rainfall stoppage during the planting season (Akano et al., 2018). Additionally, crop flooding, rising temperature and pest infestation have all caused farmers to adopt different systems/pattern of farming as well as technologies that would help promote their level of output (Adejuwon, 2008). In the case of pest control which represents one of the persistent constraints

to crop production, farmers in Nigeria and other sub-Saharan countries have adopted indigenous/traditional means of pest control some of which includes: bush burning, timely planting and harvesting, ridging, cropping pattern, weeding, and the cultivation of resistant crop varieties (Ogbonna & Okoroafor, 2003; Ogbonna, 2019).

Several studies have discussed some of the benefit of adopting indigenous farming systems and technology in promoting food security across Nigeria and other Sub-Saharan countries. Kehinde et al., (2018) studied the effect of farmers access to credit and membership of cooperatives on the adoption categories in cocoa-based farming systems based on the improved technologies available. The study used descriptive statistics, adoption index and multinomial logit regression model to analyse data. The results show variations in the level of adoption that exist in the study area, influenced by household size, farming experience and farm size. The average adoption level of improved farm techniques/technologies was just under half (49%), with full adopters (51%), partial adopters (41.5%), and non-adopters (7.5%). The multinomial logit estimates show that gender, number of extension visits, farm size and access to credit all had significant effects on the partial adoption of improved technologies. While, education, number of extension visits, farm size, access to credit and membership of an association significantly influenced the full adoption of improved technologies. The study concludes that an agricultural development programme that ensures efficient and effective credit access should be established in rural areas, at the same time farmers' cooperatives need to be properly established, encouraged and strengthened for increased uptake of improved cocoa cultivation technologies.

Ezeaku et al., (2015) examine the integration of crop-livestock farming systems for sustainable agricultural production in Nigeria, using a qualitative (review of past studies) analytical approach. They note that the integrated crop-livestock approach in farming is perceived as promising in increasing food production capacity as well as improving soil fertility, owing to its various synergistic benefits which particularly suit the Savannah region of Nigeria, where livestock production is predominant. Although the integrated crop-livestock production system was observed to have been in existence in the west African region in the past, ordinarily with the cereal-based livestock system being operated, the results show the improvement of soil fertility with the introduction of legumes to form a cereal-legume-livestock system. The study reveals that incorporating leguminous cowpea into the crop-livestock system will improve food productivity, ensure sustainable soil fertility by building nitrogen, improve food security and boost farmers income in Nigeria.

In Ghana, Asante et al., (2016) consider the integrated farming systems (crop livestock) using the Cragg two-step regression model. They show that the decision to diversify and the degree of diversification are promoted by different sets of factors that include access to extension services; farm level factors (quantity of fertiliser and the use of tillage equipment); land/space availability; the positive effect of fertiliser subsidy; negative effect of access to good road networks, family labour; gender; and age. More so, the effect of such sets of factors also varies across the 3 categories of farming system (crop, livestock and crop-livestock) examined. The study concludes that household access to tillage equipment, credit, fertilisers and market information promotes farmers' food production capacity. It is imperative to emphasise the importance of good farming systems to food production. In summary, having a successful farming system depends on several factors including the farmer's personal skills, the crops and livestock in the chosen farming system, land quality, weather condition and the impact (quality) of the extension service delivery (not just the number of visit and access to extension services as captured later on in the literature). Undertaking the literature review to provide context on farming systems based on the type of production technique farmers employ, access to resources etc. has informed the design of the questionnaire that supports the collection of farmer data in the Omor community in this PhD study. The next section (2.3.1) will now discuss the effect of the oil sector on the ability of the Nigerian agricultural sector to flourish in Nigeria.

2.3.1 THE ADVENT OF OIL AND ITS EFFECT ON NIGERIAN AGRICULTURE

In the year 1964-1965, Nigeria's agricultural production accounted for 65-70% of employment and an overall GDP of 55% (Malton, 1981). In 1970, Nigeria exported crops such as groundnut, palm oil and kernel, cotton, cocoa and rubber which accounted for about 65-75% of the country's foreign exchange earnings. This also provided the federal and state governments with a new means of revenue generation through export and sales tax (Ekundare, 1973). However, the Nigerian civil war that took place from 1967-1970 occurred in tandem with the crude oil boom, resulting in heavy exploration and exportation of petroleum and crude products (Odupitan, 2017). This phenomenon made Nigeria neglect its formidable agricultural sector, for an industrial sector with heavy economic dependence on crude oil, as it created around 97% of export revenue generation and 80% of federal income earnings (United States Department of State, 2005). Nigeria's crude oil dependency created large exchange earnings

for the country, but since the year 1970, crude oil exploration has had an adverse effect on Nigeria's ability to develop the non-oil sectors of the economy (including the agricultural sector) and make it productive. The production and exportation of many agricultural commodities, which were Nigeria's traditional source of income before the advent of oil, has been discouraged over the years (Odupitan, 2017).

As outlined in the introduction, the Nigerian agricultural sector has endured years of mismanagement, inconsistency in government policy and regulations, as well as poor infrastructural development (Ekundare, 1973; Tiri et al., 2017). A decade ago, the agricultural sector accounted for 40.6% of the Country's GDP, and up to 65% of the countries employment (Sekumade, 2009). According to the CIA-World Fact Book (2021) & Sekumade, (2009) between 2008 to 2009, Nigeria declined from being a major exporter of agricultural crops and commodities such as cocoa, rubber, groundnut etc. to a major importer of food. The totality of agricultural exports crashed from over 70% in 1960 to less than 2% in 2008 (Sekumade, 2009) with a low industrial growth rate of 2.2% in 2017. However, a high proportion of the country's population (40.1% in 2018) living below poverty levels (i.e., where income is below a set level, making it difficult for households to meet their basic requirements) see chapter 4 (section 4.3.8) and CIA-World Fact-Book (2021). Though Nigeria has derived significant economic wealth from the exportation and sales of crude oil, it still emerges as one of the world's poorest nations, with over 70% of the country's population living in poverty (Sekumade, 2009). Despite the Nigerian economy greatly depending on the oil sector, the increased exploration and exportation of crude oil since the 1960s has coincided with the country being plunged into deprivation, violence, socio-cultural and socio-economic crisis (Oyeranmi, 2020). The Nigerian crude oil situation reflects the case of the Dutch Disease (explained in the next paragraph):

Dutch Disease

The "Dutch Disease" is a term first used to depict the then economic situation of the Netherlands, when the manufacturing sector of the country was feared to be at the brink of packing up due to the discovery of crude oil in the 1960's (Laguda, 2019). The theory of the Dutch disease originated in the 1960's after the Netherlands explored and found large amounts of natural gas resources in the North-sea, which led to the rapid rise in capital, this meant that the Netherlands had more capital inflow from increased export revenue generation that in turn caused the Dutch exchange rate to rise (Laguda, 2019). Apparently, the rise in the Dutch exchange rate made it difficult for the country's domestic manufacturing sector to compete in

international markets (Benkhodja, 2014). Hence, the Dutch disease theory, holds reference to a situation where an oil rich country exports its oil and then experiences a boom in the export sector which affects the production or functioning of other sectors due to an increase in the prices of the non-oil sector (Laguda, 2019). Thus, this economic response hurts the rest of the non-oil sectors (Bature, 2013). Cases of corruption are likely to be on the rise, and might affect the credibility of many government entities, leading to mismanagement of the revenue(s) generated from the sales of crude oil (Laguda, 2019). This may result in poor economic performance as in the case of Nigeria (Cavalcanti et al., 2011).

Although the Nigeria economy still depends on crude oil. The question remains whether the government of Nigeria should show more interest in the Agricultural sector? What reforms have been brought in or put in place to change the narrative? Have such reforms or policies that were focused on the agricultural sector had an impact? If not, what are the common and differentiated reasons hindering the sector's (agriculture) improvement? The next section hopes to address these questions.

2.3.2 AGRICULTURAL POLICY REFORMS IN NIGERIA

One major role of the government in economic management, is the formulation and practical implementation of economic policies with a view to improve a sector (agriculture in this case), that in turn strengthens the economy (Udoh, 2011). In more recent times, several countries across the world (this includes developed countries) have adopted measures to protect agriculture especially via subsidies and strategies, some of which incur heavy cost to the rest of the economy (Olowa & Olowa, 2014). Agricultural sector' reform is aimed at improving efficiency, while trying to reduce the cost of heavy public spending (Olowa & Olowa, 2014). Some factors that determine or shape policy in agriculture include regulatory standards, international trade, market driven reforms etc. (Olowa & Olowa, 2014). Private sector policy reforms in agriculture are typically geared towards research and development (R&D), training and retraining of sector-actors, stakeholder participant in key government policy development, advisory serves or strategy that is needed to attain efficiency in the agricultural sector (Udoh, 2011).

In the 60's (i.e., 1960's), agriculture was the bedrock of the Nigerian economic, with the nation being self-sufficient in the production of different livestock and crops (Ifeoma, 2019). Owing to the oil boom in the late nineteen seventies, things changed for Nigeria (Ifeoma, 2019). This change caused Nigeria to switch from a self-sufficient agricultural nation to one

dependent on importation, spending billions of dollars on importation annually (Shimada, 1999). Hence, several policies on agriculture have been formulated over the years (see. Section 1.3 for some of these policies and their impact on the Nigerian agricultural sector). A range of policies are detailed by Adebayo (2010) and Iwuchukwu & Igbokwe (2012). In 1972, the national accelerated food production programme (NAFPP); in 1974, the agricultural development projects (ADP); in 1976, operation feed the nation (OFN); in 1980, the green revolution (GR); in 1987, better life programme (BLP); in 1992, the national FADAMA development project (NFDP). in 1996, the family support programme (FSP) as well as the family economic advancement programme (FEAP); in 1999, the national economic empowerment and development strategy (NEEDs); in 2002, the national special programme for food security (NSPFs), and in 2003, the root and tuber expansion programme (RTEP). In essence, efforts to re-boost the agricultural sector and enhance food access and availability through such policies have repeatedly failed resulting in a sector where smallholder farmers are bottled in poverty, this translated into a nation suffering from severe food deficit with huge dependence on food importation at a cost to the economy (Ifeoma, 2019). The next sub-sections consider some of the policies (past and present) and their impacts and flaws in delivering food security in Nigeria.

FADAMA I, II, III

The National FADAMA Development Project-NFDP (FADAMA is a Hausa name for Irrigable Land) was created (in 1992), followed by the subsequent failure of the large-scale irrigated scheme, in the last two decades, to deliver the anticipated rise in food production despite the level of funds sunk into the project (Ariyo et al., 2021). The NFDP is being implemented in all 36 States in Nigeria, including the FCT (Federal Capital Territory). The project is established by the Nigeria government via the pool of World Bank funds used to finance FADAMA land through the introduction of small-scale irrigation (Ariyo et al., 2021). The NFDP is established in different phases (FADAMA I, II, & III), phase 1 & II of the project have assisted rural farmers raise income by 63%. While the objective of phase III, the current phase of the project, is to raise farmers' income, increase food security, reduce rural poverty and contribute or support the Sustainable Development Goals or SDGs (Bansal, 2017). Bansal (2017) identified six main components of the NFDP III as follows: (a) local governance and communication, (b) small-scale community owned infrastructure (c) advisory services and input support development (d) support to the agricultural development programs (e) asset

acquisition for individual FADAMA users' groups and (f) project management, monitoring and evaluation.

Just as with any other project the NFDP have been bedevilled by several constraints. Much FADAMA lands remain undeveloped or uncultivated due to physical accessibility challenges i.e., the remoteness of such area (Akinbile & Ogedenbe, 2006). Also, marshy lands and swamps, that are difficult to operate, have made the overall development and management of FADAMA costly (Oladoja & Kola, 2008). Baba & Singh (1998) stressed the lack of post-harvest technology, bad road network, poor management, and poor preservative techniques for produce constitutes a major flaw to the FADAMA programme (Ariyo et al., 2021). Other constraints to the NFDP are the pest infestation, insects and diseases e.g., quelea birds, grasshoppers, army worm and migrant locusts (Ariyo et al., 2021). Even though the NFDP is still functioning, several policy reforms are advised based on the different problems identified here.

Agricultural Transformation Agenda (ATA)

Another policy in focus, is the Agricultural Transformation Agenda (ATA) initiated by the administration of President Goodluck E. Jonathan (2011-2014), which was implemented by the Federal Ministry of Agriculture and Rural Development (FMARD) in an attempt to correct the anomaly of previous agricultural policies (FMARD, 2013). This policy by the Federal government, was an effort to revamp the economy across all sectors by ensuring food security diversification, job creation and foreign exchange earnings (FMARD, 2013). ATA had three main components that include: (a) Infrastructural Development; (b) Programme Management; and (c) Commodity Value Chain Development (FMARD, 2013). The ATA targets rural communities especially youths, women and farmers cooperatives. It was also aimed at improving rural institutions and infrastructure, while the commodity value chain developments were geared towards the provision of inputs such as fertilisers and seeds (through the Growth Enhancement Scheme (GES)). This enabled the subsequent rise in production and productivity (Obiora & Emodi, 2013). ATA was structured to create more than 3.5 million jobs from the agricultural value chains of rice, sorghum, cassava and cotton, and other value chain crops were expected to follow as implementation progressed (Akinwunmi, 2012). ATA further aimed to promote Nigeria to become a net exporter of food as against its 'food importer' status (FMARD, 2013). ATA transformed the agricultural sector into a business project rather than a development project, that aimed at projecting private sector investment in agriculture. ATA

reduced post-harvest losses by improving the linkage between production (typically in the rural area) to processing (which could either be in the rural or urban areas), thereby creating a rural-urban nexus or connection that worked effectively (FMARD, 2013). The ATA programme promoted food security in Nigeria by raising the production of key staples by at-least 20million tons: with rice estimated to rise to at-least 2-million tons; cassava 17million tons; sorghum to rise by 1 million tons during the life span of the program (Akinwunmi, 2011).

In areas of high agricultural food production, ATA through the crop processing zones (SCPZ) implemented a cluster-based value chain strategy, that pulled in private sector investors to set-up food processing plants in such areas (Akinwunmi, 2011). This action created jobs, enhanced rural-urban linkage and raised the fiscal investment on infrastructure in such areas (Akinwunmi, 2011). The programme also used the guaranteed minimum price (GMP) to stabilise food prices in the market, and it encouraged the production and absorption of excess production in a manner that benefited all stakeholders involved in the value chain process (Akinwunmi, 2011). Within their first 90days in office, the then Honourable Minister of Agriculture and Rural Development: Dr. Akinwunmi Adesina (who championed the ATA policy), directed that traditional procurement and disbursement of seeds and fertilisers to farmers be expunged, putting an end to four decades of corruption that have bedevilled the agricultural sector (FMARD, 2013). The GES programme which is built on an electronic wallet system (EWS) was created using mobile phones. This gave support for purchasing seed and fertiliser to 20million farmers in four years; delivering seeds virtually at no cost to farmers, with 50% subsidy on fertiliser to over 10million farmers (FMARD, 2013). The dispensation of these inputs ensured that farmers in Nigeria were registered, and their biometric data captured, which had never been done in the past (FMARD, 2013).

Ifeoma (2019) noted that; unlike every other project, ATA was faced with several challenges, some of which are listed below:

1. Inadequate government and private sector funding.
2. Corruption and inefficiency among public sector offices.
3. Bad leadership: After the tenure of President Goodluck E Jonathan, the subsequent government did not deem the programme fit to keep running, hence the creation of a new policy; the Agricultural Promotion Policy- the Green Alternative 2016-2020.
4. Poor private sector investment, and
5. Insurgency.

In essence, the ATA programme was successful, enabling the agricultural sector to thrive during its time of implementation. The majority of its sub-programmes were put in place to support rural farmers, enabling them to produce better yields with the inputs provided for them by the government almost at no cost. This created a stable market (price) and processing units for produce, promoting value chain activities. Additionally, the policy generally projected a functioning rural-urban linkage, that enabled rural production and urban processing of agricultural produce, creating synergy between rural and urban areas, also through the supply of productive inputs. However, the *gap* here is that the policy (FADAMA I, II, & III; & ATA) did not ultimately favour gender inclusion in agricultural food production.

The National Home-Grown School Feeding Programme (NHGSFP)

The national home-grown school feeding programme (NHGSFP) is an educational policy introduced by the Federal government of Nigeria geared towards improving the excellence of education in Nigeria, with the aim of increasing primary school enrolment (Jacob & Musa, 2021). The policy (NHGSFP) was launched in 2016 under the administration of President Buhari for public primary schools (primary: years 1-3), The programme ensured that school pupils get one quality meal a day, with a view to improving enrolment, learning outcomes and reducing the drop-out rate considerably (Jacob & Musa, 2021). The objective of the NHGSFP was as follows:

- To improve school enrolment, retention, completion and a reduction in drop-out rate in primary schools in Nigeria.
- To improve on the nutrition and health of primary school pupils in Nigeria.
- To enhance local agricultural production and boost the income of rural (local) smallholder farmers through food supply that is locally grown, and
- To foster job creation for community members, in order to improve their finances by their involvement in the programme through catering, processing and food handling jobs (Bosh et al., 2019).

The policy further stipulated that; while the Federal government feeds school pupils from primary levels 1 to 3, the State government then has the responsibility for feeding primary school pupils from level 4 to 6. So far about 56,000 pupils across 35 states in Nigeria have benefited from the programme (Shittu, 2020). Additionally, Oyero (2020) noted that the Federal government revealed that 300 million meals have been dispatched to over 7.5million pupils in 46,000 public schools (primary) across 30 states in Nigeria since 2016. Overall, the

objective of the NHGSFP is said to have been achieved. Okolo-obasi & Uduji (2022) state there was an average increase in enrolment of primary school pupils in the North (68%) and in the South (65%), concluding that the NHGSFP has been shown to directly improve the educational outcome and nutritional status of school pupils within its coverage.

This policy by the Federal government of Nigeria contributed to the fight against food insecurity, at the same time creating jobs for cooks and local processors, as well as a ready market for local farmers involved in the programme. Quite importantly, this programme was drafted to foster local production (agricultural production) of food that is supplied locally to cooks who would then use the raw materials to prepare food for school pupils within their purview. Although, one of the goals of the NHGSFP is to resolve food insecurity challenge (with respect to nutrition), the programme was not structured to accommodate regional trade or the regional movement of food (i.e., rural-urban food interactions) even though it gives local farmers a ready market and steady income for their effort (Jacob & Musa, 2021). In view of some of the challenges the programme faced, Jacob & Musa (2021), identified the key challenges as poor funding, lack of data, delay in fund disbursement, corruption and insecurity.

The advantages in terms of gender involvement in the programme among farmers was not identified as farmers were generalised in the programme regardless of gender. The next sub-section (2.3.3) considers agricultural production in Nigeria in view of the gender of farmers and their ability to acquire productive resources, and the capability of farmers to produce food based on the system of farming (large, medium or small scale) they operate.

2.3.3 THE EFFECT OF GENDER IN NIGERIAN AGRICULTURE

Agricultural activities (farming) have been in existence since the beginning of human civilisation (Abdullahi, 2017). Agriculture is perceived as a labour intensive yet fulfilling vocation, an occupation of choice and a cost effective, even lucrative means of generating incomes to sustain household and economic livelihoods, food security, and self-sufficiency (Abdullahi, 2017; Ojeleye, 2018). Nigeria is largely blessed with natural resources (e.g., land availability, good soil condition, labour and forestry) which can contribute to the promotion of agricultural activities (Daud et al., 2018). Agricultural activities encompass crop production, livestock production, fishing and forestry which typically involves cultivation of cash crops e.g., yams, cassava, maize, cocoa, groundnut and oil palm which have high export potential (Daud et al., 2018). In the past, Nigeria solely relied on agriculture for food and income

generation until the discovery of petroleum product. The agricultural sector (which entails primary and secondary production i.e., food production and processing) is very important to the Nigerian economy providing employment for 70% of its population (Ojeleye, 2018). Nigeria's agricultural production is however struggling to keep pace with national population growth especially over the past three decades (Central Bank of Nigeria (CBN), 2003; Abdullahi, 2017). Generally, agricultural production and processing activities in Nigeria operate at a small-scale capacity, with low levels of innovation, linked to the poor availability of production inputs, weak distribution channels and poor market access (Nwuneli, 2010). The majority of people engaging in agricultural activities appear to be operating subsistence-based operations and are uneducated with little or no access to a guaranteed markets or price (Nwuneli, 2010).

All over the world, gender equality is an important aspect of economic growth and poverty alleviation (Jayachandran, 2015). Indeed, it is the focus of one of the SDGs (goal No. 5). Improvements in equitable access for women in rural areas enables them to become economically efficient actors and to produce/acquire the food, energy, water and social amenities/service needed by their families (FAO, 2010). The level of care mothers give to their children and other household members reflects on the health and productivity of the entire household, and the community at large, which translates into improved prospects for future generations (FAO, 2010). According to Abali et al., (2014), sex has to do with the biological differences that clearly exists between males and females, while gender refers to those social attributes linked to being female or male, as well as the opportunities that exist and can vary between women and men, also girls and boys. In ensuring that agricultural productivity achieves its potential in Nigeria, gender issues related to agricultural productivity cannot be over-emphasised. Women have been the central focus of gender related problems (setbacks) in agriculture. "Gender issues" have been used to describe the disparity women face in the Nigerian agricultural sector (Nduka et al., 2019). Gender disparity in agriculture greatly affects the distribution of productive resources, as well as equitable access to appropriate agricultural technologies and information (United Nations, 2010; Simonyan et al., 2011). FAO-News-Room (2008) note that in the course of agricultural food production, women represent more than half of the agricultural labour force, yet women are still regularly subject to discrimination, poverty and hunger. Simonyan et al., (2011) further report that women unlike men, especially those from marginal farming families, carry out about 60% of most on-farm activities in SSA forming the major driving force in the economic and social fabric of rural farming communities

in Africa, contributing to both agricultural (food production) and non-agricultural (processing and marketing) endeavours.

Agricultural production is understood to be a fundamental driver of economic development and a tool for poverty reduction for many developing nations including Nigeria. However, the role and contribution of men and women should be carefully examined in order to provide support and possibly drive agricultural development (Abali et al., 2014). The efforts by Government and the organised private sector in Nigeria, geared towards supporting the agriculture sector, have failed in the past, perhaps because the role of women in the sector was overlooked (Abali et al., 2014). Gender inequality does not imply that men and women should be the same in terms of physical strength and attributes, but it does mean that men and women should be subject to equal rights, equal opportunities and equal access to resources in all aspects of life (Abali et al., 2014). Gender equality is also one of the SDGs so for development to be sustainable it must enable equality. The contribution of women in economic development in countries such as Nigeria is often hard to over-emphasis (Mukasa & Salami, 2016). Shamsodini et al., (2011) note that women are involved in almost all aspect of agricultural production and service activities including clearing, ridging, hoeing, weeding, harvesting, processing, transporting, storing and marketing of farm produce and food products. Nigerian woman in agriculture form part of the active and reserved labour force, but hardly have any of their own means of production (Rahman, 2008). In Nigeria, women make significant contributions to food production; they supply between 60-80% of the labour in agricultural food production and are also solely responsible/involved in at least 80% of the processing of agricultural produce especially at the household level (Rahman, 2008). These statistics are generally supported by FAO (2006).

In view of the effect of gender on agricultural food production and the contribution of women to the sector, several studies have discussed gender with special emphasis on Nigeria and SSA. Oseni et al., (2015) explain gender differentials in the Nigerian agricultural food production process, using the Oacaca-blinder decomposition method. The study was conducted separately in the Northern and Southern regions of Nigeria. Findings indicate that female farmers in the northern part of Nigeria produce 28% less than their male counterpart, whereas in the South there were no significant gender difference. Based on operational and structural differences between the North and South, women in the North had less access to productive resources than men, which indicates that even if male and female farmers are given the same level of resources/inputs, a significant level of difference between the two-gender categories

would be observed. And in the South, the decomposition analysis results show that the endowment effect is more important than the structural effect i.e., access to inputs describes most of the gender gap in the South. Hence, if there were gender positive agricultural policies and women are given the same level of inputs as men, the gender disparity would be reduced (Oseni et al., 2015).

With focus switching to the effect of gender in livestock rearing, Abubakar et al., (2007) researched the involvement and ownership pattern of households or family members in the rearing of livestock (chicken production) in the West province of Cameroon and a given part of Borno State, Nigeria. The study adopted a quantitative approach (ANOVA) and focused on gender and its effect on the ownership and management responsibilities of their respondents. The results showed that in the west province of Cameroon women and children owned the majority of the flock (53% and 27% respectively), with men accounting for only 20% of ownership. However, in the Northern part of Nigeria Borno State, the reverse was the case as men owned (56%) of chickens then women (39%) and children (11%). In terms of responsibility for the livestock (chickens), children in the West province of Cameroon had the highest responsibility which involved the locking up of the chicken at night and letting them out in the morning, whereas in Borno State Nigeria women had the highest responsibility. The housing pattern or arrangements of the poultry birds differed between the two areas of study. In the Western province of Cameroon, farmers housed their poultry birds in their kitchen (53%), while in Borno State Nigeria, farmers adopt mud/hatch houses for housing their chicken (32%). Abubaka et al., (2007) conclude that women and children are very essential in the rearing of chicken in both regions and that engaging with women and children is the best and fastest way of channelling innovation/technological improvement in rural chicken production.

In Western Nigeria (Ogun State), Ogunnaike et al., (2019) studied the effect of gender empowerment in agriculture on the food security of farming households using descriptive statistics (Women's Empowerment in Agriculture Index, A-WEAI) and ordered probit forms analysis. In the study area, households were categorised to have "high food insecurity (5.7%), marginal food insecurity (17.6%), low food insecurity (35.8%) and very low food insecurity (40.9%). Specific gender, being middle aged, work achievement and empowerment significantly improved the food security situation of farming households in the study location. Ogunnaike et al., (2019) conclude that sustainable development in agriculture could be promoted through the gender empowerment of men and women in order to improve the food security status of farming households. Else-where in the Eastern part of Nigeria (Abia State),

Ifeanyi-obi & Ugorji (2020) examined the effect of social exclusion on female arable crop farmers on climate change adaptation, using both descriptive and inferential statistics to analyse the study data. Ifeanyi-obi & Ugorji identifies several major effects including poor access to credit facilities to boost adaptation activities, lack of land ownership for increased farm size, and poor access to important agricultural equipment and inputs for better adaptation. The study shows that a significant relationship exists between the socio-economic characteristics of arable crop farmers who are female and the level of social exclusion they suffer in the study area. Using the ordinary least square regression; the study highlights that for women, formal education, skill acquisition and women empowerment programmes, and enlightenment by extension and advisory services on the importance and implication of social exclusion were all factors that can help in the reduction of social exclusion amongst female arable crop farmers.

Many of the factors identified in this subsection are considered within this PhD study (chapter 5). The next subsection (2.3.4) is on extension service provision and how its availability supports food production and rural food systems and interactions/or linkage (if any) between rural areas and urban consumers.

2.3.4 EXTENSION SERVICES

In agricultural production, the level of productivity of farmers often depends on the efficiency or the level of effectiveness of the extension information and practices that are conveyed to farmers (Saleh et al., 2018). An agricultural extension service enables the delivery of communication about research findings as well as improved practices in agriculture to farmers (Sahel et al., 2018). According to Agoda et al., (2017), extension in agriculture involves the transfer of knowledge or best practice to farmers to educate them on better agricultural decision-making that stimulates desirable agricultural development. The extension service in Nigeria is not devoid of challenges owing to the poor level of output in terms of agricultural productivity experienced in practice. As a result, some studies have tried to identify the challenges in the Nigerian agricultural extension system. The extension service, therefore, is a process of communication that involves different participants (farmers) and stakeholders all linked together to exchange information crucial for sustainable agricultural development (Ani et al., 1997; Sahel et al., 2018).

According to Leeuwis & Van Den Ban (2004) the most crucial factor of influence with regards to farmers' agricultural productivity and practice is their perception of the level of agro-

support they can access, as well as how the community and organisations are able to support them. In many developing countries like Nigeria, smallholder farmers especially in rural locations are largely without support especially in the areas of infrastructure, primary health care, education and local processing equipment/facilities (Armando, 2009; Aderinto et al., 2016). Extension service delivery is thus an important aspect of agricultural development in Nigeria especially facilitating their efforts to solve problems as well as linking farmers to markets and other actors in the agricultural value chain (aggregators and processors) (Aderinto et al., 2016). More so, extension services bridge the farmers' practice and knowledge gaps in production by supplying them with information, skills and technology in order to improve their lives (Kristin, 2009; Aderinto et al., 2016) essentially via a "rural-urban" and "urban-rural" **information linkage** system.

The Nigerian Government provides extension services to farmers through its agricultural development programme (ADP), and private extension organisations also provide extension service to farmers through agro-input dealers and associations (Aderinto et al., 2016). Umali-deininger (1997) grouped various extension service delivery examples into three categories in Nigeria (a) public sector extension (b) private agencies (in it for benefits), and (c) private organisation non-profit sector extension services. From the viewpoint of farmers, extension services are considered a form of support/assistance to enhance their know-how, productivity, profitability and they contribute to the welfare of households, community and the society at large (Contado, 1996; Aderinto et al., 2016). In order to ensure the sustainable development of the agricultural sector in Nigeria, it is important to ensure that the Nigerian extension service system is effective and proactive in supporting the increased productivity of farmers in Nigeria.

When assessing the constraints on effective agricultural extension services delivery in Lagos, Nigeria (Agoda et al., 2017), the study revealed that the Lagos State Agricultural Development Authority (LSADA) has both good and poor linkages with other agriculture extension organisations e.g., agricultural research agencies, private sector inputs supply firms and cooperatives/consumer organisations; while it has poor linkages with agricultural universities, schools and colleges, private sector markets/exporters, NGOs, local government agencies/authorities, banks/micro-finance institutions, and other public/semi-public extension service organisations. This indicates that there is a gap between the extension services and the education system in Nigeria. Hamisu et al., (2017) used qualitative analysis in their review of different literature that considers the recent status of agricultural extension programmes in

Nigeria. Their research shows that the Nigerian agricultural extension service is important to the development and improvement of the agricultural sector as well as the general national development.

Elsewhere in South Africa, Maoba (2016) examines farmers' perception of the agricultural extension programme delivery in the Germiston region of South Africa (Gauteng Province). The study employs both quantitative (A 4- and 3- point Likert-type scale and mean score) and qualitative (structured questionnaire) approaches administered to farmers during a focus group session. In terms of the perceptions of farmers of the effectiveness of the extension services methods applied; the study highlights two methods out of ten (training and demonstration), to be the most effective in the study area. With respect to frequency of farm visits by extension advisors; the study notes that the majority of farmers (42.3%) were visited on a monthly basis; others were visited fortnightly (24.4%) and one third occasionally (33.3%). However, Maoba (2016) asserts that farm visits should be, meaningful and purposeful in order to make significant impact on the farming community. With regards to the impact of the extension programme delivery, Maoba (2016) concludes that extension activities have low impact on the rise of farm production yield and its profitability among the study group they examined. More so, the extension service had less impact in enabling farmers to discover their own problems and subsequently solve such problems themselves. Maoba (2016) attributes this to the top-down approach traditionally adopted by many extension service organisations.

In summary, agricultural extension implies a system of informal farmer information exchange, teaching and advise on new and improved ideas/technology that is expected to drive increased productivity with the view to improving the livelihoods of farmers as well as their income (Imoloame & Olanrewaju, 2014). Therefore, agricultural extension can influence change in the livelihoods of farmers through informal education and communication via information sharing and skills transfer (Maoba, 2016). The Nigerian extension system is characterised by certain challenges which include fund inadequacy and instability, poorly trained extension personnel, lack of transportation support for field staff, inappropriate technology channelled to farmers, poor extension service staff ratio to farming households, poor communication (typically the top-down approach) between extension staff and farmers, and irregular evaluation of extension programmes (Imoloame & Olanrewaju, 2014). This reflects the failure of the agricultural sector in Nigeria to take advantage of existing knowledge and skills developed through the existing public and private elements of the agricultural extension system. Whilst the development of agricultural production, extension service output should influence rural- food systems directly and urban food systems indirectly and food

security positively. As previously described, there are many factors that influence food insecurity and adequate or improved local or national supply of extension staff is only one aspect that needs to be addressed.

The next section (2.4) of the chapter focuses on the Nigerian agricultural (food) marketing system and examines food trade (especially agro-commodities), and production and processing and the transactions for food commodities in both the informal and formal markets settings.

2.4 MARKETING SYSTEM

Marketing is considered as the satisfaction of human need(s) by linking people to products at the appropriate time, place and utility (Asogwa & Okwoche, 2012). Agricultural product marketing begins after harvest at the farm gate, and informal markets of agricultural produce are characterised by the display/sale of produce often in an unauthorised or unapproved location/platform (Asogwa & Okwoche, 2012). Examples of such unauthorised locations and platforms in Nigeria include displaying of agricultural commodities on the roadside, or hawking food items from one location to another, much of this unauthorised sales activity is attributed to the high cost of shop renting or the avoidance of local taxation on the sellers' commodity (Ezirigwe, 2018).

In Nigeria, the effective functionality of the agribusiness and agricultural marketing system/sector promotes sustainable production and distribution of agricultural commodities and is essential in ensuring food security (COMCEC Coordination Office, 2017). In addition to this, the establishment and operation of a fair food and agriculture sector depends on the economic and social environment created by agricultural markets (COMCEC Coordination Office, 2017).

Agricultural produce/product(s) marketing begins from the farm when produce is harvested (Alberta Government, 2013). Ordinarily, the produce harvested cannot be directly sold to the final consumer. Produce harvested on a farm is likely to be geographically distant from the consumer or place of consumption (mostly urban areas), especially in Nigeria. Next, storage is usually required to maintain produce shelf life in order for supply to meet annual demand; and since produce when harvested rarely meets the form readily acceptable to consumers. The produce must therefore be cleaned, graded, sorted and processed to meet acceptability standards of quality for the consumers at the point of sale (Asogwa & Okwoche,

2012). Overall, upon the exchange of their produce, farmers expect payment for their effort, and on many occasions these payment(s) do not reflect the effort and resources that have been invested (Olawepo, 2010). One of the main challenges the Nigerian agricultural farmers face is in the supply of their produce, which relates to the long marketing chain farmers' products pass through to the final consumers. The marketing chain typically involves several intermediaries or actors between the farmers (producer) and final consumer (Ogbu & Usman, 2018).

Smallholder farmers, especially those in Nigeria where it is not practicable for farmers to take their product to market, depend on intermediaries, described here as middle-men, who assist the linking of farmers' produce to food processors, wholesalers (large, medium and small scaled), and then the retailers and marketers to consumers, often brokering deals that favour them (middlemen) and under-pay the farmers (Okpala Don, 2003; Abebe et al., 2016; Ogbu & Usman, 2018). Due to the actions and activities of many traders involved, the Nigerian agricultural supply chain is thought to be inefficient and slow (Ogbu & Usman, 2018). Transaction costs increase based on the number of times the agricultural product/produce exchanges hands from one intermediary to another as the marketing margin for that particular exchange is put onto the final sale price. Hence, the more intermediaries involved in the chain, and the more value that is added, the less proportion the farmers get of the final sale price. This also translates to the consumers who also have to pay high prices for the agricultural products or value-added products they purchase (Asogwa & Okwoche, 2012). Markets are now considered in more detail in the next subsections (2.4.1; 2.4.2 & 2.4.3) in terms of their formality and how they are organised to deliver different quality characteristics to consumers.

2.4.1 AGRICULTURE: INFORMAL MARKET

Informal markets and marketers themselves generally operate as an enterprise without binding official regulations or as an enterprise that operates within the official rules and regulations provided, but do not comply with payment of local dues (tax) on their productive endeavour (Onyebueke & Geyer, 2014). The ownership structure of most informal marketers in Nigeria are usually sole proprietors and are conducted with the assistance of unpaid family members as well as occasional apprentices (Oduh et al., 2008; Abumere et al., 1998). In Nigeria, most informal marketers hold basic educational qualifications e.g., secondary school-level education, and unemployment has forced many well-educated individuals (university

graduates and polytechnic graduates) to be involved in such ventures (Onyebueke & Geyer, 2014).

The informal market/sector in Nigeria operates in many different forms, often including service providers, small scale traders and small manufacturing operations as well as artisans involved in such activity (FAO, 2003). These fields of vocation in Nigeria include construction jobs, transportation, auto-mobile/electrical appliance repairs, arts and crafts and agricultural production/food products-produce marketing (FAO, 2003). In urban cities the most visible informal markets exist in activities such as catering, transportation, retail marketing of food produce/product (fresh and prepared) and include the sale of street food (FAO, 2003).

The informal food market is generally characterised by small investment capital, unavailability of financial and contractual agreements as well as the non-formal payment of tax, low linkage between producers and consumers and the lack of specialisation (FAO, 2003; Ezirigwe, 2018). In a developing economy such as Nigeria, the reduction in purchasing power because of unemployment and being under paid as employees (in the formal sector) has spurred the rapid rise and development of the informal sector, providing employment and livelihoods (income) to households (FAO, 2003). In the case of street food vendors, they often display food around schools, offices, churches, bus-stops and bus station enabling consumers easy access to food that saves time, transportation and preparation costs (FAO, 2003). More so, street food sales ensure the mitigation of the sizable distance between home and work, making food safety a huge concern, and also how food safety incidents could likely increase healthcare costs.

In Nigeria today, the changing and challenging urban lifestyle has caused people to patronise informal street food outlets and vendors, which offer ready to eat food where food safety is of major concern (Ezirigwe, 2018). The characteristics of such food vendors and street food hawkers, is that they are uneducated with little or no knowledge of food safety/hygiene, some push their food in laden food carts, others use wheelbarrows or specially designed bicycles to convey their food from one location to another exacerbate this concern (Ezirigwe, 2018). Many informal markets also operate as small restaurants. These street food seller's command low prices and attract many groups of customers, many of which are low-income earners, travellers and school pupils (Ezirigwe, 2018). These groups of people are often more interested in value for money and time saving than food safety, hygiene or quality. According to Ezirigwe (2018), approximately 200,000 persons die every year of food poisoning in

Nigeria. This phenomenon results from poor farming practice, processing, preservation, service and storage of food across Africa.

Adigun et al., (2020) examine the prevalence of indicators of the micro-organisms (*Staphylococcus aureus*, *non-S. aureus Staphylococci* (NSAS), aerobic bacteria and Coliforms) on contaminated chicken carcasses from the informal market for chicken in Gauteng's informal market in South Africa. Findings reveal that S. aureus (12% and 31%) and NSAS (64% and 41%) were prevalent in (carcass drip) and on the carcass respectively. Additionally, aerobic bacteria (85%) and *Coliforms* (62%) were detected in water used to rinse carcasses. The study suggests the major reasons for contamination are the evisceration of chicken on same location used for sale, cleaning display counter with unclean cloths/wipes, holding or putting differently sourced chicken for slaughter in the same cage, poor hand hygiene, washing knifes in the same water used for rinsing, increases in the number of daily slaughter and the length of display time of chicken carcasses. Similarly, the study by Mokgophi et al., (2021), on the antimicrobial resistance profiles of *Salmonella* on processed chickens at retailed outlets of the informal market in Gauteng Province in South Africa shows 64.9% of the 151 chickens being contaminated with *Salmonella*, and 94.9% (93/98) were serovars that showed antibiotic resistance. The study concludes that prevalence of zoonotic disease poses a risk to food consumers and workers in informal markets and with street food.

Several other factors contribute to the unwholesomeness of food in these informal markets including those food arising from improper farming practices and techniques, poor food processing activities, product alteration and adulteration (Ezirigwe, 2018). Although this study was not originally designed to address aspects of food safety in detail. The regulation of such markets and marketers needs to be accountable for the standards of operations within the market. Further, the government regulator (standards authority of the government) for such markets has an important role to play. More difference between the formal and informal market is further emphasised in the next subsection 2.4.2, which highlights the characteristics of the two types of market consumers in this study are associated with. The patronage of such market(s) may very much affect the price of food commodities that are sold and purchased.

2.4.2 AGRICULTURE: FORMAL MARKETS

While the informal market is characterised by sellers striving to remain anonymous from trade regulations and tax, the formal market is the complete opposite. Marketing operations are completed in accordance with regulatory protocols; paying the appropriate tax or local dues required as well as maintaining the safety and quality standards of the product sold (Anbarci et al., 2012). The distinguishing features of the formal market compared to the informal market include tax payments, quality assurance on products, compliance with regulations, a risk of crime if equipment or produce is left unattended, zero opportunity for bargaining, and the hygienic and physical maintenance of premises standards i.e., the surrounding environment of the enterprise (Anbarci et al., 2012). Bargaining is synonymous with the informal market, while price posting is common in the formal market, with the main difference in both practices being the information provided. In the formal markets products are labelled to include the price and nutrient content of such product (Scull & Fuller, 1967; Bloom, & Hinrichs, 2011; Anbarci et al., 2012). The provision of information in a formal market setting usually takes the form of product advertising with the aim of attracting buyers. The information provided is observed not only by potential customers/buyers but also by competitors and regulatory authorities (Anbarci et al., 2012).

The ownership or rent of shop/store space in shops and supermarkets provides a physical distinguishing feature between the formal and informal food market in Nigeria (Bloom & Hinrichs, 2011). More so, the operators of a formal location usually sell different lines of a given commodity (i.e., sales diversification) in order to realise more profit and enable the payment of bills (tax, shop rent etc) (Bloom & Hinrichs, 2011). A number of attractive retail food outlets operating in Nigeria are driven by the fast-changing lifestyle and demographics, resulting from growing consumer preference for convenience including the purchase of processed or partly processed packaged foods, also encouraging consumers patronage in the drive to enjoy safe and nutritious food (GAIN REPORT, 2011).

In formal food markets, foreign goods imported into Nigeria have continued to outweigh the marketing and the sales of locally produced/processed food products due to consumers' choice for assured food safety, the unreliability of energy (electricity supply), weak urban infrastructure and inconsistency in government policies (GAIN REPORT, 2011). Consumer food choice behavioural patterns have changed over time (Onuoha & Nnenanya, 2017) from basing purchase decisions on intrinsic product content or its attributes, to being more flexible towards other elements and product attributes raising the retail supermarkets'

advantage beyond the product's price, place and promotion (Onuoha & Nnenanya, 2017). The retail outlet's layout is one vital element that stimulates continuous consumer patronage (loyalty). Overall, a good retail layout can bring about greater advantage in terms of promoting sales, rising profitability and ultimately keeping consumer loyalty (Onuoha & Nnenanya, 2017). This trend is completely opposite to the agricultural produce marketers who sell informally along the roadside or hawk produce from one place to another. They are often faced, as previously highlighted in this thesis (section 2.4.1), with multiple challenges. The formal market described in this subsection mirrors the opposite events found in the informal food market. Both the formal and informal markets are considered in the enquiry of this study together with food consumer's socio-economic situations to better understand which market they buy from and why?

The next subsection (2.4.3) is on the supermarket as an exemplary case of the formal market in urban areas and how this type of market shapes consumer's buying pattern. The differentiation between the informal and formal market that influence consumer buying patterns are also considered in this thesis in both chapter 4 and 6.

2.4.3 GROWTH OF SUPERMARKETS AND THE EFFECT ON CONSUMER PURCHASE PATTERN

Supermarkets in developing countries are becoming more important in the food retailing business and have continuously been transformed, much of the changes recorded by the food supply chain in the retail structure is attributed to the continuous growth of supermarkets (Reardon & Hopkins, 2006; Humphrey, 2007; Peyton et al., 2015). Supermarkets gradually gained more ground and are rising fast in terms of geographical coverage in developing countries like Nigeria (Weatherspoon & Reardon, 2003; Reardon & Hopkins, 2006; Humphrey, 2007). In many SSA countries, the growing trend of reliance on supermarkets otherwise known as "supermarketisation" is happening fast (Therien, 2017). Historically, the growth of supermarkets expanded very slowly in Africa, and they are mostly found in large cities or areas occupied by wealthy households/consumers (Reardon & Hopkins, 2006). The growth of supermarkets in many SSA countries (Nigeria included) is triggered by a couple of factors which includes income, urbanisation and motorisation (Reardon & Hopkins, 2006). Other factors of influence that have led to the continuous rise of supermarkets in such countries

also include electricity and refrigeration (Therien, 2017), essential infrastructure for supermarkets to flourish.

A rise in population, increased income, growth in the transportation sector, the gradual growth of middle-class citizens, changes in consumption pattern (diets), the ability of such retail outlets to make selected foods available and economic transformation also greatly influences the growth and operation of retail supermarkets in SSA countries. Supermarkets have developed efficient management and effective procurement procedures that give them the leverage to be able to sell food produce and product at lower prices (D'Haese & Huylenbroeck, 2005). Battersby and Peyton (2014) explain that supermarket expansion is driven both by demand (consumer) and negotiated supply side determinants. Other drivers of the urban supermarket culture include the safety and hygiene of food supplied in shelves of such stores, with good price negotiation to give consumers the best deals. This is the complete opposite of some 'illegal' food items sold on the streets by vendors, for which the hygiene standards are in serious question.

Supermarkets in Nigeria have not exactly taken over the food market. Supermarkets has been relegated to the 'food market' of the elite, they are patronised by other classes of citizens, but the level of patronage is significantly different to the well-to-do members of society (Grain Report, 2018). Even though these supermarket stores are well equipped with the best facilities, they have not been able to compete with other markets for consumer patronage, as consumers tend to patronise the ever-dynamic people's market (i.e., wet market/or open market) which is also termed as an "informal market" for various reasons such as: cheaper price, availability of variety, price negotiation, proximity of the market etc. (Grain Report, 2018). As a result, many Nigerians still buy their food items from traditional open markets as well as street vendors, and these small local vendors account for 80-90% of all food sales in Nigeria (Grain Report, 2018). For instance, in Kenya, which has one of the most sophisticated supermarket sectors in Africa, its supermarket channel only commands 5% of the sales of vegetables and fresh fruits (Grain Report, 2018). In Cote d'Ivoire supermarkets only accounts for 10% of the food sales recorded in the country (Grain Report, 2018). When it comes to prepared foods, interestingly many Nigerians buy food from street food sellers, rather than supermarkets or certified retail food stores (Grain Report, 2018). For many citizens, street food is the cheapest and is also a high source of energy and protein for children and adults in Nigeria (Steyn et al., 2013).

Similarly, in Accra-Ghana, a neighbouring country to Nigeria, where supermarket expansion is on a constant rise, a study by Therien, (2017) found that 73% of its respondents still buy their food from traditional local open markets, as against 8.7% who prefer to buy their food from supermarkets, however 18.3% respondents did not mind visiting either of both shops (Therien, 2017). What this simply implies is that in Nigeria and many other African countries, people shop at supermarkets for bulk staples, processed/semi-processed and packaged food and they do so infrequently maybe once or twice a month. On the other hand, many Nigerians purchase their fresh food for preparation on daily or nearly daily basis, and for this reason they continue to rely on local markets, small shops or street vendors close to them, who also offer to sell food in small quantities (Grain Report, 2018). According to the Grain Report (2018), local-wet market and street vendors offer to sell food to consumers at more affordable prices compared to those found in supermarkets. In South Africa, it was found that the average price of food commodities in supermarkets was 76% higher than the price of similar food commodities sold in local/or wet markets or by street vendors. Obviously, customers have to pay a premium price for well preserved, processed and packaged goods which also commands high quality (Grain Report, 2018).

In summary, the Nigerian supermarket have less patronage compared to the local markets, where food price is highly negotiable, in contrast to the supermarket where the cost of the marketing functions (logistics, middle-men etc) is added to the cost the final consumer would have to pay. Market distance can invariably affect consumers that visit both markets. Food price and food quality together with other factors such as market distance, time, market loyalty etc. (see chapter 4), are examined in this study to understand consumer food purchasing patterns in and around both markets. The next section (2.5) is on food waste, which occurs domestically (cooked and raw food), on the farm as postharvest loss, and in the market as waste which can be 'picked' by the poor as a source of food.

2.5 FOOD WASTE

The Nigerian agricultural sector has the resource capacity to produce a bountiful harvest, but much of this agricultural produce is lost in the field after maturity, during harvest or post-harvest before reaching consumers, processors or aggregators. This may be due to poor harvesting/processing techniques, poor transportation and storage systems and the attack by insects, rodents and/or micro-organisms (Bolarin & Bosa, 2015). Postharvest loss occurs

during physical agricultural or processing activities such as harvesting, sorting, grading, packaging, pressing, storage and transportation of agricultural produce (Bolarin & Bosa, 2015). According to Mijinyawa (2002), studies carried out on agricultural postharvest loss in Nigeria show around 20-30% of grain production, 30-50% of root and tuber, and a high proportion of fruits and vegetables are lost during the aforementioned agricultural processes/activities, with a high percentage of loss recorded during storage.

Figure 2. 3: Post Harvest Loss at Stages in the Supply Chain

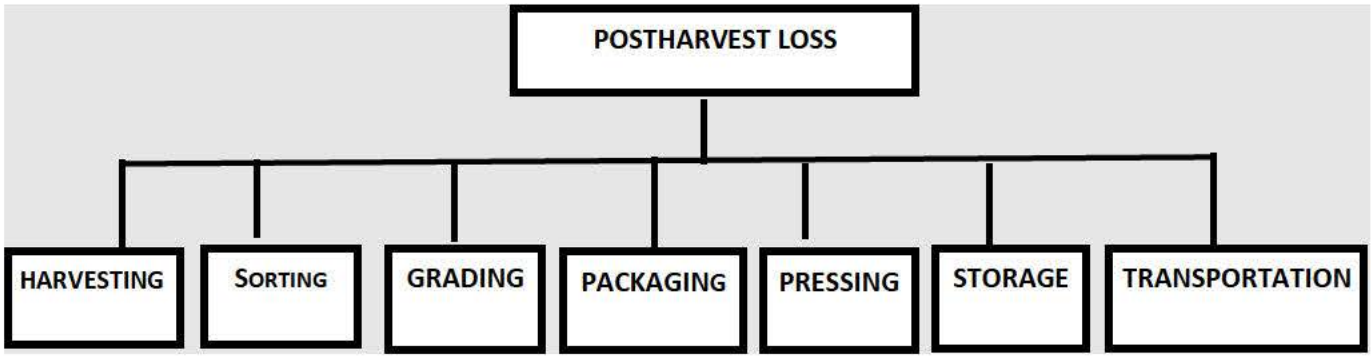


Figure 2:3, illustrates the stages where postharvest loss can occur. Postharvest loss starts on the farm particularly during harvesting, then during sorting, grading and processing with the avoidable levels of produce loss occurring during processing. Also, considerable levels of produce loss are recorded during storage due to the actions of pest and mould infestation leading to toxin formation e.g., aflatoxins (Skribervik, 2020; Kumar et al., 2021). In the transportation of agricultural produce, mechanical and physical damage may further occur, thereby increasing the quantity of food loss realised at every stage of the supply chain.

The four main dimensions/pillars of food security (discussed in section 1.2: see - figure 1.1) include food availability, food access/affordability, food utilisation and sustainability. Postharvest loss affects these four dimensions of food security especially the availability and utilisation of food. In terms of food availability and accessibility, Morris & Kamarulzaman (2014) predict that each year food 'lost' around the world is approximately 1.3 billion tons. In developed countries, these food losses occur because of the food wasted at retail or home level, while in developing countries significant food loss occurs because of activities linked to food supply (De Lucia & Assennato, 2006; Kitinoja et al., 2011). Food waste and food loss are the result of un-sustained, unfair and unsafe production and distribution of food in an inefficient food system (Cloke, 2016).

Food loss during produce harvest, occur when crops, their shells or leaves are left on the ground to decompose, ordinarily these elements of agriculture waste can be recycled or redirected into other forms of productive energy/resources (Kennard, 2020). Nigeria has continued to experience high levels of postharvest loss because of poor and inadequate rural and urban infrastructure. In addition to this, the socio-economic circumstance of Nigerians and an inability to access finance has not supported reducing postharvest loss, limiting the adoption of technologies proven to help reduce such loss (Morris & Kamarulzaman, 2014). Other factors include the lack of uniform information on the level or extent of postharvest loss, and poor capacity to assess postharvest damage further constraining the situation (Morris & Kamarulzaman, 2014). Due to postharvest loss, Nigeria has seen increasing levels of food importation particularly commodities such as rice, cocoa, milk etc., which the country could produce locally or supply, if current levels of food loss were alleviated (Morris & kamarulzaman, 2014). The current situation of food loss has caused a drop in the country's income and increases waste from imported packaged goods, affecting economic activities from rural farmers and local marketers of food-to-food consumers who may be having to pay a higher margin for imported food (Natsa, 2015). Economically, some locally produced commodities produced in SSA and destined for export to the international market get rejected or fail to meet international standards due to factors such as poor infrastructure, lack of adequate storage facility, inadequate or unavailability of processing technologies/facilities, transportation challenges, lack of knowledge on preserving food and overall inadequate power supply, which increases the chances of postharvest loss and reduces national trade income (Natsa, 2015).

In terms of food utilisation and sustainability: although this study does not cover the utilisation of food specifically, the nutritional quality of food especially after harvesting becomes the centre of discussion when considering food loss and food waste. For instance, Afoakwa & Sefa-dedeh (2001) and Adisa et al., (2015) discuss the difficulty in storing fresh yam which is often subject to postharvest loss reducing its quality both for local consumption and exportation in the event of excess production. However, their study notes that ineffective postharvest handling of yam can lead to considerable levels of loss both physically and economically, and the physical deterioration could result in the yam being unfit for edible human consumption. In most cases after harvesting, farm produce is stored before being utilised, but in such storage situations, especially where there is no refrigeration available, such produce becomes subject to postharvest loss. The reduction of postharvest loss is therefore important in order to ensure increased food security and the proper utilisation of food produced

in order to maximise nutrient content of diets for human consumption (Adisa et al., 2015) and consumer acceptance (Bolarin & Bosa, 2015).

Food is necessary for human survival and must be readily available not just in the right proportion (quantity), but also in the right quality (Omonona et al., 2007; Bolarin & Bose, 2015). In Nigeria, about 85% of food consumed by rural households is obtained from their farm as well as surrounding farms (via payment exchange). These foods are assumed to always be available and in wholesome condition so postharvest loss impacts heavily on personal, household, local and regional food insecurity (Bolarin & Bosa, 2015).

In Nigeria, efforts have intensified to increase agricultural food production, some of these efforts by the Federal Government include: the institutionalisation of the river basin authority, agricultural development programmes, establishment of research institutes, bulk purchase systems, and facilitating agricultural input supplies and operations to feed the nation (Bolarin & Bosa, 2015). However, increased agricultural production, while not translate to increased food availability if there is post-harvest loss and so agricultural production alone is not the final solution to the challenge of food insecurity. Production has to be supported by good harvest and postharvest practice to reduce general food loss i.e., a 50% drop in postharvest food loss in Nigeria will strongly induce greater food availability and a reduction in food importation (Bolarin & Bosa, 2015). In essence, in the literature postharvest loss of edible food has been considered under different terms, scopes and definitions some of which include in this section: postharvest loss and postharvest waste, other terms include food loss more generally and food waste (Cloke, 2016; Kennard, 2020). This does not imply that these words are the same, but rather is meant to reflect food 'lost' at the different stages of production and handling (production, harvesting, processing, storage, sale, home etc.).

Food waste management presents an important opportunity for sustained development as well as increased food security (Kennard, 2020). Dropping the amount of food waste at retail and domestic levels i.e., within a typical household setting, will drastically improve food availability and food access both in rural and urban locations without any need to intensify food production, nor to increase the total outlay of land available to agriculture or having to increase the use of agricultural inputs such as pesticides, fertilisers or seeds (Schuster & Torero, 2016). The drive to reduce food waste in an organised urban, rural or commercial setting is within the scope of businesses e.g., for supermarkets and the local markets, who could encourage food access via "waste picking" (Kennard, 2020). By reducing food waste, or rather encouraging waste picking (as a coping strategy), the efficiency of the food supply chain is promoted, in turn reducing food price and/or consumers' food spending (FAO, 2011). One

source suggests that the global population that are undernourished could be fed with only one-fourth of the food that is currently wasted (Kennard, 2020). Although waste picking is salient in many markets, waste picking also occurs where food seekers scout through food dumps (either in the local market, supermarkets or even household waste dumps) for edible food that can still be consumed. Whilst there are food safety issues in using this source of food, for those in abject poverty the practice separates compromised food insecurity from hunger (see section 1.2).

The economic, environmental and social gains from reducing food loss/waste are significant, and food loss/waste reduction can encourage poverty alleviation, advance rural development by making more food available to farmers for their home consumption and sales, reducing the total work hours (time) spent on farm fields, reducing household's food expenditure (i.e. if less is wasted), reduce impact on the natural eco-system because of agricultural expansion to meet rising global populations, reducing the volume of water required for agricultural production by utilising already grown food, and reducing greenhouse gas emission per kg of food consumed that are associated with agriculture and reducing or preventing landfills and the associated methane production (Linpinski et al., 2013). Thus, encouraging a decline in food loss and food waste provides an opportunity to positively contribution to addressing a vast number of the SDG challenges, including food insecurity (Kennard, 2020).

In view of this, infrastructural investment is paramount to achieving a reduction in postharvest loss. It is important to ensure the smooth transportation (good road network infrastructure) of produce from the point of production to consumption as well as ensuring that adequate storage is met with the availability of electricity to extend the shelf life of agricultural produce/products (Lipinski et al., 2013). Other concerns include physical/mechanical damage to produce by pest and diseases which renders it inedible, hence, innovative packaging and storage strategies can be adopted to reduce food loss in this regard. A good example of the importance of infrastructure to the reduction of food waste, comes in the study of Fagbemi et al., (2020). They examine the factors influencing users' perceptions on carrying out environmental sanitation activity in Nigeria. 205 randomly selected respondents (traders) took part in the study. Findings reveal that waste disposal method used by respondents were a nearby gutter/space (1.5%), burning the waste (2.9%), and using designated waste dumpsites (9.0%), while 10.2% pay between ₦50 - ₦100; 8.3% pay ₦101- ₦150; 24.2% of respondents pay between ₦151- ₦200; between ₦201- ₦250 (7.3%); 13.2% remits more than ₦351, and around a third (34.6%) of the rest of the respondents pay between ₦251- ₦300 per person per market

towards the cost of waste collection services; In the same study 8.3% had no water supply at all, 22% had irregular water supplies, 49.8% regular (adequate); and only 7.3% very regular water supply. Within the urban market surveyed, respondents reported the following system of sanitary facilities: water closet (57.1%); pit latrine (24.4%); bucket latrine (9.3%); pour flush (2.9%) and improved ventilated toilet system (6.3%). Environmental facilities available within the market was inadequate, with existing facilities wrongly managed and poorly exploited. The study concludes that environmental sanitation activities in markets should go beyond just sorting out and sweeping up litter scattered in the market environment. This further emphasises the importance of adequate infrastructure within the informal market sector, which will encourage consumers' patronage and strengthen food safety management.

In summary, addressing food loss and food waste is important in ensuring food security. Food waste management focuses on making sure food is available through, proper farming practice, processing, and storage. Waste picking is an important coping strategy adopted by people who may not be able to afford food based on their circumstances, but this assertion does not imply that this study agrees with the need for this strategy. Waste picking however brings into perspective people's (mostly affected by poverty) ability to adopt this unsafe coping strategy, at the market or the municipal waste dump to prevent them from experiencing severe hunger. This aspect is an important consideration in this study and is consider together with all other aspect of food waste (including food loss, and postharvest loss) in both chapter 4 (between section 4.3.11 to 4.3.13) and Chapter 6 (section 6.6) of this thesis.

It is important to note that food waste may be influenced by poor infrastructure, poor levels of processing, inadequate storage facilities or equipment, many of which are covered in the aforementioned chapters. The next section (2.6) discusses the wider coping strategies of the people of Anambra State, the focus of the PhD study, as a means of averting food insecurity.

2.6 AGRICULTURAL PRODUCTION AND RURAL LIVELIHOOD STRATEGY IN ANAMBRA STATE

The rural agricultural food producers' livelihood strategy involves the adaptability of farmers to environmental or economic shocks, which could be seasonal or permanent. Several studies have elaborated on this in the context of this PhD study, and the Nigerian State itself where this study's inquiry was conducted. A study by Ajaero & Madu (2014) reveals that rural-urban migration remains a vital livelihood strategy employed by the rural populace of the

South-eastern region in Nigeria. Their finding showed that majority of rural households (70%) receive remittance from migrant family members, with most migrants sending or remitting more than ten thousand naira (₦ 10,000 or naira) each time they make a remittance (i.e., send money back home). As a result, Ebonyi State had the highest population (98.4%) of migrants that send money home, mostly making remittances, at the time of the study, above 10,000 naira (Ajaero & Madu, 2014). The percentage of migrants sending remittances home from all other eastern States in the study include Enugu State (95.6%), Abia State (88.3%), Imo State (80.3%) and Anambra State (72.9%). According to Ajaero & Madu (2014), these remittances were made for different reasons which include: education of relatives, funerals, cost of food etc. However, these remittances also varied in usage. In most cases the remittances are used for the education of family members, purchase of food items and the purchase of building materials for the maintenance or construction of houses. Ajaero & Madu (2014) conclude that the diversion of remittance for debt repayment, the purchase of food items and the settlement of miscellaneous expenditures are usually uniform across the selected States.

Ajayi & Nwalieji (2010) review the impact of the Anambra State FADAMA project (phase 1) on the socio-economic life of the rural farmers within the State. The study examined vegetable producers within these agricultural zones and their coping strategies as a result of the climatic weather conditions (dry and wet seasons). In the dry season, telferia was mostly (70%) cultivated by vegetable farmers in the State, followed by okra (55.0%), Amaranthus (27.6%), pepper (22.6%), tomatoes (15.0%) and garden egg (10.0%). The study notes that, telferia spp. is prominently cultivated in the South-eastern part of Nigeria and it is gradually picking up national interest. In the wet season, the majority of vegetable farmers in the study (57.6%) prefer cultivating more okra than other types of vegetables, for telferia only 55.0% of farmers cultivated it in the wet season, and others produce grown includes: pepper 50.0%, Amaranthus 22.6%, garden egg 7.6% and tomato 7.6% of farmers. According to Ajayi & Nwalieji (2010), okra production during the wet season performs exceptionally well as farmers record high yields which explains the reason behind its high level of cultivation during that time. Overall, the study concludes that the strategy adopted by vegetable farmers in Anambra State was financially driven with vegetables cultivated in both seasons commanding high market demand (78.8%) and improving farmers' profit margin.

In 2019**,** Obiadi et al., (2019) consider the effect of capacity building through the agricultural development programme (ADP) on cassava farmers' productivity in Anambra State, adopting the Cobb-Douglas production model analysed using descriptive statistics and

an analysis of variance (ANOVA) for 520 respondents. The study shows that there was a clear positive difference in the farming performance of farmers involved with the ADP compared with those who were not. It was recommended that cassava farmers operating in the State who were yet to be involved in the ADP needed to do so, to gain from the various levels of capacity development. Similarly in 2020, Chikwendu & Nwalieji (2020) examine the occupational diversification of small-scale rice farmers in Anambra State. A total of 120 farmers were selected for the study using a multi-stage sampling procedure. The results show that rice farmers mainly diversified their occupation in crop production (i.e., planting different crop types), followed by agricultural enterprises that involve crop processing. Non-agricultural enterprise occupation diversification also occurred, mainly in petty trading. The study reveals the mean annual income per household from rice production, agricultural enterprise and non-agricultural enterprise as: ₦289,683; ₦260,267 and ₦343,500 respectively. Additional income, poverty reduction, food insecurity and reduced risk of crop failure were the main reasons for engaging in diversification. Challenges faced by farmers include poor skill acquisition, market risk, poor credit facilities and poor access to innovation especially access to modern technology. The study recommends the need to increase farmers' access to credit to enable more investment in agriculture and non-agricultural enterprise (Chikwendu & Nwalieji, 2020).

Interestingly, the coping strategies of the rural people in Anambra State was understandably driven by economic reasons (family remittance), diversification of crops to cope within the different cropping seasons in Nigeria and gaining support through extension (ADP) that encourages higher levels of production. In terms of family remittance, a question lies as to the sustainability and frequency of such payments and if it covers food needs, since the money is also spread across other economic needs. It might be important to understand, whether the family member who receives the "support" funds have other source of income other than the remitted amount. Also, such funds may not be sufficient, perhaps being the reason food insecurity persists across the State. On the other hand, crop diversification is done for financial reasons, but it is not clear if farmers rotate and/or adopt different farming systems that would help increase their harvest. Additionally, irrigation of crops during the dry season could help ensure that crops are cultivated all year round. The next section (2.6.1) discusses the main livelihood strategy of the Anambra people (migration).

2.6.1 MIGRATION

Migration is the movement of people, which can either be a permanent or semi-permanent change of residence from one place of settlement to another, i.e., it involves the physical and social change of residence (Chandna, 1998). Migration is also defined as the crossing of a space boundary or region by one or more persons interested in a change of residence (Kok, 1999). These definitions appear to be simple, explaining what migration is without considering or discussing the reasons for migration.

Olajide (2013), whose study was on migration its drivers and implication in South-east Nigeria, uses qualitative methods of data collection and analysis to reveal that over-supply of labour within the rural setting is the major cause of rural-urban migration especially for the young and ablest number within the population, as farm families use less than 50% of their labour requirement of typically 960 man-days per annum. Further findings reveal that the migration rate in the south-eastern region of Nigeria is one of the largest in the country and is influenced by population growth, adverse economic conditions (unemployment) and the political situation (i.e., unfulfilled promises made on infrastructure). In terms of agriculture, this study shows that the combination of poverty, unemployment and environmental degradation has led many families in the South-east to abandon agriculture, resulting in increased food costs and food scarcity i.e., food insecurity.

Further investigations into the reasons why people migrate (rural-urban) in relation to agriculture have been highlighted further in the Northern part of Nigeria, in addition to the case of the South-Eastern part of Nigeria presented above. A study in the North Central part of Nigeria (Kaduna City) assessed the perception of the average Nigerian on climate change, its causes and effects as well as its contribution to the loss of the agricultural workforce within the rural–urban migration context (Abdullahi et al., 2009). Their study employs both quantitative data, namely weather data for Kaduna City over the previous three decades, and qualitative data from randomly selected residents of Kaduna City together with in-depth interviews of government policy makers and other stakeholders. In terms of migration, their study reveals that 32.5% of the people interviewed were born in Kaduna City, 14.5% of immigrants have spent 30 years of their lives in the city and only 10.5% have spent less than five years of their lives in the city. Their study further revealed that migrants are mostly from farming villages and towns who commute in search of opportunities and better life, while others settle in the city based on their administrative postings/jobs. The movement of people from these rural agricultural communities to cities like Kaduna consequently results in the reduction of

agricultural production output. The findings from this study show that many migrants go to the study city (Kaduna) during the off-farming season (at the end of the raining season) some in search of commuter jobs such as drivers (7.5%) or bike drivers (2%). This group of migrants are often temporary (seasonal), and they move back to their farmlands with the onset of rains.

Abdullah et al., (2009) and Olajide (2013) conducted studies on the reasons why Nigerians migrate from rural to urban settings in various parts of Nigeria. Their study found that oversupply of labour in rural areas and the on/off-situation of the farming season were reasons for migration. Kanu and Ukonze (2018) looked at the causes of migration from a broader national perspective and their qualitative study confirms that there are different motives accounting for rural-urban migration amongst rural dwellers that include: (a) socio-cultural issues where people are forced to migrate to avoid numerous social problems at their place of origin, (b) pursuit of better economic opportunity i.e. jobs (c) the low level of rural infrastructural development and a lack of basic amenities, and (d) poor transportation and communication facilities.

In Benue state, Nigeria Mbah, et al., (2016) carried out a study on the effect of youth migration on rural-urban families revealing that the majority of the respondents are male (76.3%), who have a high tendency to migrate to urban centres in search of white-collar jobs, thereby leaving the farming responsibilities to the female members of the family. Their study further concludes that the causes of rural-urban youth migration include inadequate employment opportunities in rural areas, search for better education, inadequate social infrastructure such as schools, and poor medical care services in rural areas, amongst others. As a result of these factors the study also itemises the effects of rural-urban youth migration as being a reduction in the agricultural labour force, low agricultural productivity, high costs associated with rural labour, a drop in annual household income, poor standard of living, concern over the tediousness of farm work, and the continuous involvement of aged people in farming activities.

Interestingly, this section has drawn together a group of literature that has identified some of the key reasons (poverty, unemployment, environmental degradation, seasonality of rainfall, better education, infrastructure, pursuit of better economic opportunities, and poor transportation and communication challenges) why rural-urban migration occur and how it influences food production and then food insecurity, which is why migration is considered as a variable of interest in this PhD. Although, several authors here considered the reasons behind

rural-urban migration in this section and subsection, it is positioned that rural-urban migration serves as a means of livelihood strategy for many Nigerians especially the eastern part of Nigeria, in view of regular remittances (financial support to family members). The next section (2.7) details the theoretical framework of this thesis outlining the variables drawn from the literature that align with or affect the main concepts of this study, household poverty, food security, and rural food systems and urban food systems and the potential linkages between them.

2.7 CONCEPTUAL FRAMEWORK

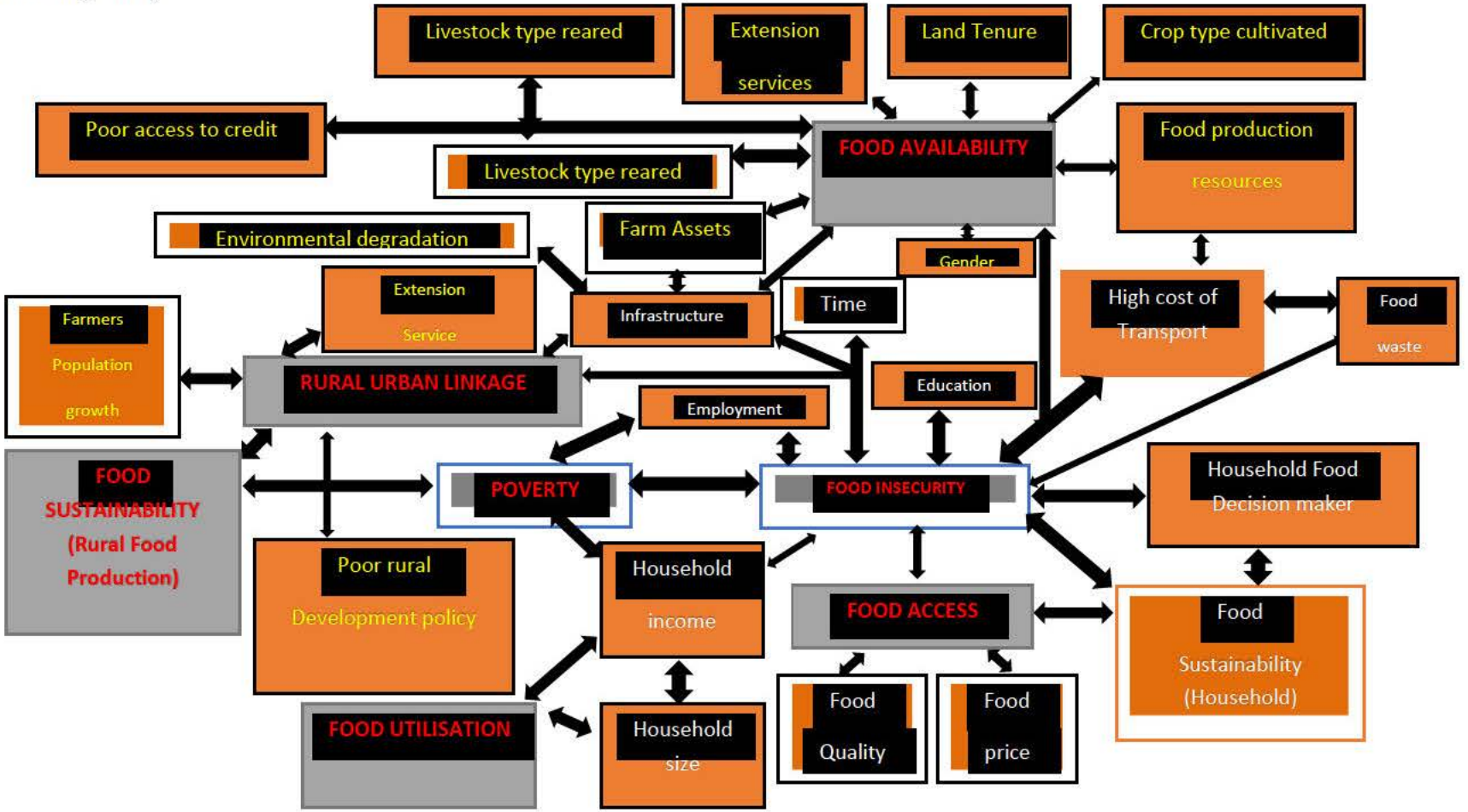
The conceptual framework here is built around the four pillars of food security (food availability, accessibility/affordability, utilisation and sustainability). These pillars formed the foundation for this study. As a result of undertaking the literature review, some key concepts have emerged from the literature, that influence the main inquiry of this research: household poverty, food security/insecurity, rural food systems, urban food systems and the potential linkages between them. Okpala et al., (2021), provides a wider explanation to the interaction between household poverty and food insecurity as well as the rural - urban food systems which are bounded by challenges that hinder better strategies for successful policy interventions and aid provision. This conceptual paper explains that the pillars of food security, especially food availability and affordability (others include food utilisation and sustainability), are influenced by the balance of food production and household income as well as the amount of food that is either imported or exported from the country, in addition to food supply stability and utilisation at the household, community, and national level. Hence, the concern on the impact of food availability of pre- and post-harvest loss in the food supply chain system or food waste within the household. Additionally, other factors such as: infrastructure, financial status, migration and extension services, which frame the financial and physical performance at the farm and household level, influence food security, and the study of these factors has informed the identification of a range of other closely related socio-economic factors (e.g., education, employment status, access to credit, social exclusion, population growth etc.). Indeed, the limitation in the development of personal, household or community livelihood resilience reflects not only on a lack of adaptive capabilities or capacity, but also the limited buffer capacity to be resilient in the face of difficult financial, environmental, political and social shock and squeeze situations that include climate change or environmental degradation (e.g., erosion).

Other concepts emerging from the literature are drawn together in Figure 2.4 including poverty, food poverty, food decision making, migration, infrastructural development, extension services, food systems, gender influences in agriculture, farming systems, marketing systems, food waste and livelihood strategies. These concepts have been considered and inform the theoretical framework of this study (Figure 2.5) which aligns the variables studied with specific concepts. For the sake of clarity, food systems, farming systems and marketing systems were explained in this thesis with different meanings explored based on their context. Hence, food systems explain the generality of food availability and access within a given location; farming systems explains the principle, policies and techniques associated with food production, while marketing systems details the inter-play between the different actors and environments where food is sold.

The literature in this chapter has clearly given rise to several key factors that are cited as influencing household poverty, food security, rural food systems, urban food systems and the linkage between them or not in Nigeria. These factors are examined in this study and are drawn together in tables 2.1 in this chapter, and table 2.2 (appendix 1).

Figure 2. 4: Conceptual Map of the literature examined.

Source: *(Okpala et al., 2021)*



-*Factors Influencing Urban Food Systems (food access)*

- *Factors Influencing Rural Food Systems (food availability i.e., Production).*

Figure 2. 5: Theoretical Framework for PhD study

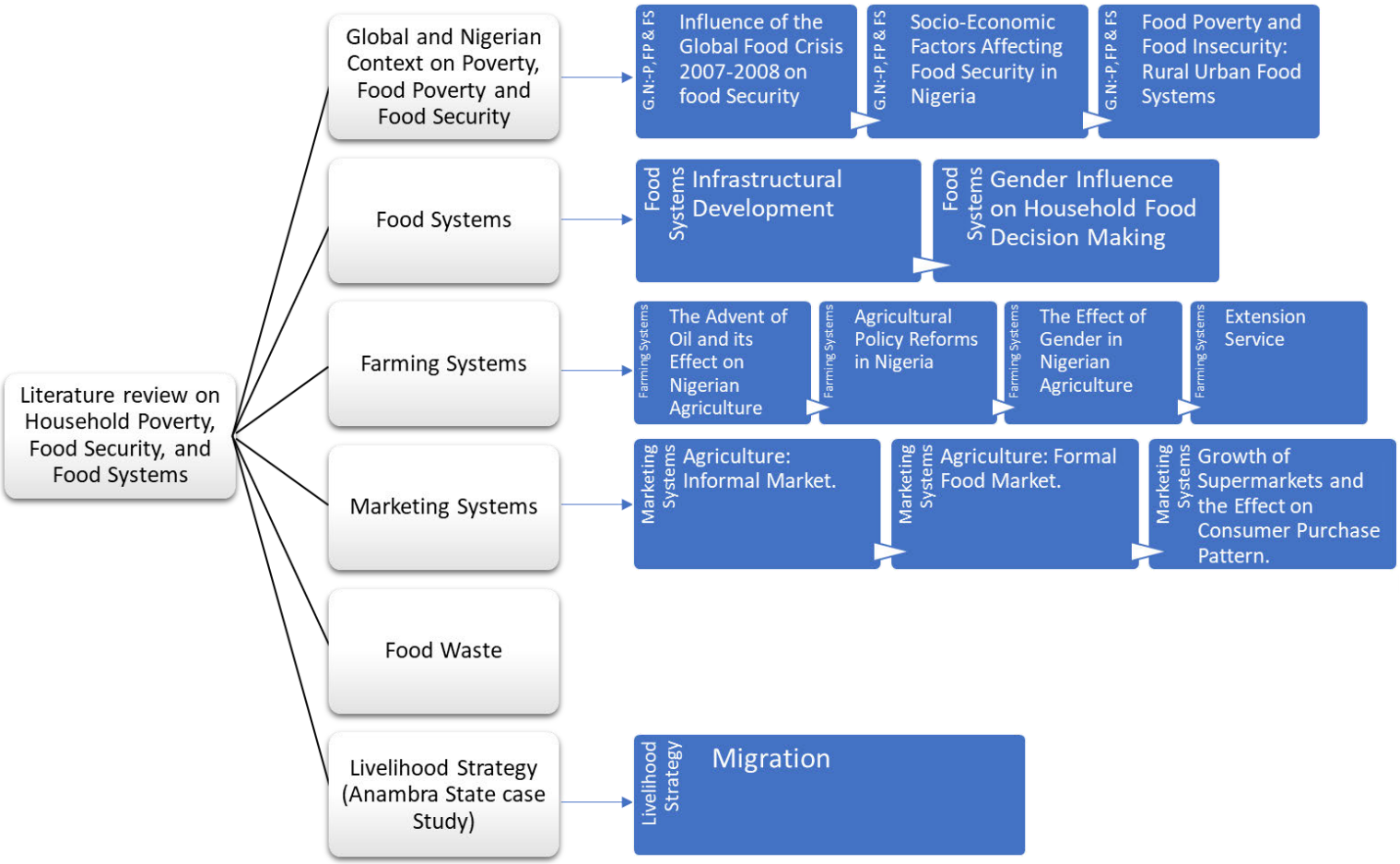


Table 2. 1: ***Factors Identified from The Literature that Influence Household Poverty, Food Insecurity and Rural-Urban Nexus***

S/N	Author	Factors Identified from the Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus	Category	Objective
1	Mwatsama & Stewart (2005)	Financial poverty	Poverty	OBJ 1 & 2
2	David (2017)	Income (financial losses)	Poverty	OBJ 1 & 2
3	Goulden & D' Archy, (2014)	Household income, food price & social norm or societal expectations	Poverty & Food Insecurity	OBJ 1 & 2
4	Smith (2018)	Income (in shock & squeeze situations), Lack of budgeting & food preparation skill	Poverty & Food Insecurity	OBJ 1 & 2
5	Connor et al., (2016)	Low income, education, cooking skill, convenience, personality, choices, lifestyle & cultural acceptability	Poverty & Food Insecurity	OBJ 1 & 2
6	Okolo & Obidigbo (2015)	Food Price, Income level, & growth in population	Poverty & Food Insecurity	OBJ 1 & 2
7	Sanusi et al., (2006)	Low household income, household budgeting skill by household head & education	Poverty & Food Insecurity	OBJ 1, 2, & 3
8	Abu & Soom (2016)	Age, household size, & household income	Poverty & Food Insecurity	OBJ 1, & 2
9	Abiodun et al., (2019)	Poor industrial capacity utilisation & inflation, uneven income distribution, civil & ethnic clash, illiteracy (education), political instability, infrastructure, population growth, bad governance & corruption.	Poverty, Food Insecurity & Infrastructure	OBJ 1, 2, & 3
10	Eme et al., (2014)	Unemployment, income, rural-urban migration.	Poverty & Rural-Urban Nexus	OBJ 1, 2, & 3
11	Abdullahi et al., (2009); Olajide (2013); Kanu & Ukonze (2018)	Poor policy formulation, agricultural policy implementation, poor input distribution, poor infrastructure, food pricing system, increased focus on oil, high dependence on rain-fed agriculture, poor capacity utilization, poor socio-economic status of the Nigeria farmer, environmental degradation, poor credit scheme, poor technology transfer system, & corruption.	Poverty, Food insecurity & Rural Urban Nexus	OBJ 1, 2, & 3

***Table 2.1: Factors Identified from The Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus* (*Continuation*)**

S/N	Author	Factors Identified from the Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus	Category	Objective
12	Demeke et al., (2009); Beraznera & Lee (2013)	Food Price	Food Insecurity	OBJ 1 & 2
13	London Assembly Health & Environment Committee, (2013)	Cost of food, access to transportation & potential disability	Food Insecurity	OBJ 1 & 2
14	Adebayo et al., (2016)	Education & Income (personal or household)	Food Insecurity	OBJ 1 & 2
15	Marcus (2019)	Gender influence on household decision making (Food choice, & purchase decision on products & services)	Household Food Decision Maker	OBJ 1 & 2
16	Su et al., (2003)	Employment, household size, income, & health of household members	Household Food Decision Maker	OBJ 1 & 2
17	Chikweche et al., (2012)	Consumption pattern & type of market visited	Household Food Decision Maker	OBJ 1 & 2
18	Olajide (2013)	Over supply of labour, unemployment & environmental degradation	Migration	OBJ 1 & 3
19	Abdullahi et al., (2009)	Unemployment & seasonality of rainfall	Migration	OBJ 1 & 3
20	Kanu & Ukonze (2018)	Over supply of labour, infrastructure, poor transportation & communication facilities	Migration	OBJ 3
21	Mbah et al., (2016)	Gender related issues, unemployment, education & infrastructure	Migration	OBJ 3

***Table 2.1: Factors Identified from The Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus* (*Continuation*)**

S/N	Author	Factors Identified from the Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus	Category	Objective
22	Olagunju et al., (2017)	Low-income farming household, lack of farming experience, poor road network, poor education & agro-processing facilities and lack of steady electricity	Infrastructure	OBJ 1, 2 & 3
23	Ogunleye et al., (2018)	Poor road & transportation network	Infrastructure	OBJ 1, 2 & 3
24	Leeuwis & Van Den Ban (2004)	Poor infrastructure, primary health care, education & availability of local processing facilities	Extension services	OBJ 3
25	Agoda et al., (2017)	Farmers education & training gaps	Extension services	OBJ 3
26	Maoba (2016)	Education, communication & information sharing & skill transfer	Extension services	OBJ 3
27	Imoloame & Olanrewaju (2014)	Poor funding & policy instability, poor training for extension staff, poor infrastructure (roads, technological advancement e.g., communication), poor staff numbers, poor communication, irregular evaluation of extension staff(s)	Extension services	OBJ 3
28	Warren (2016)	Infrastructure, regulations on trade, government transfer programmes, inadequate food/produce storage provision	Rural-Urban Nexus	OBJ 3
29	Posthumus et al., (2019)	Poverty, rise in population or growth rate, poor agricultural production rate & rapid urbanization	Rural-Urban Nexus	OBJ 3
30	Akkoyunlu (2015)	Migration, food mobility, distant family remittance, income diversification & employment (micro-level); asset ownership, cooperative formation, produce aggregation & storage (meso-level); Market interaction with local, regional, & global demand (macro-level).	Rural-Urban Nexus: (livelihood strategy)	OBJ 3

***Table 2.1: Factors Identified from The Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus* (*Continuation*)**

S/N	Author	Factors Identified from the Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus	Category	Objective
31	Posthumus et al., (2019)	Weak rural-urban nexus, poor education system, & poor market transparency (leading to high cost & increased risk)	Food systems	OBJ 3
32	Tiri et al., (2017)	Mismanagement, inconsistent government policy & regulations, poor infrastructural development	Nigeria agricultural sector	OBJ 2 & 3
33	Olowa & Olowa (2014)	Regulatory standards, international trade & market driven reforms	Nigerian agricultural policy	OBJ 3
34	FAO-News-Room (2008)	Resource discrimination, poverty & hunger	Gender in Agriculture	OBJ 3
35	Abali et al., (2014)	Equality in rights, opportunity & access to productivity resources	Gender in Agriculture	OBJ 3
36	Osemi et al., (2015)	Poor access by women to productive resources	Gender in Agriculture	OBJ 3
37	Ogunnaike et al., (2019)	Gender empowerment	Gender in Agriculture	OBJ 3
38	Ifeanyi-obi & Ugorji (2020)	Formal education, skill acquisition, women empowerment programs; & woman enlightenment & advisory services by extension officers	Gender in Agriculture	OBJ 3
39	Olanrewaju et al., (2018)	Years of experience, lack informal field experiments & environmental understanding	Farming Systems	OBJ 3
40	Kehinde et al., (2018)	Household size, farming experience, farm size, gender, number of extension visits & access to credit	Farming System (Adoption rate)	OBJ 3
41	Asante et al., (2016)	Input availability, road network, family labour, gender & age	Farming system	OBJ 3

***Table 2.1: Factors Identified from The Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus* (*Continuation*)**

S/N	Author	Factors Identified from the Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus	Category	Objective
42	Onyebueke & Geyer (2014)	Education & unemployment	Informal Market	OBJ 1, 2, & 3
43	Ezirigwe (2018)	Education, knowledge of food safety, poor marketing of produce/product, poor market hygiene or environment	Informal Market	OBJ 2 & 3
44	Grain Report (2018)	Cheaper price, availability of variety, price negotiation & distance of the market	Informal Market	OBJ 2 & 3
45	Anbarci et al., (2012)	Quality assurance on product, compliance with regulations, zero bargaining, good maintenance of market environment	Formal market	OBJ 2 & 3
46	Gain report (2011)	Consumer choice for food safety, infrastructure (stable electricity), & compliance with government regulations or policy	Formal market	OBJ 2 & 3
47	Onoha & Nnenabya (2017)	Product price, customer loyalty	Formal market	OBJ 2 & 3
48	Asogwa & Okwoche (2012)	Product price, long customer wait time, poor storage & personal security risk (especially to health)	Formal market	OBJ 2 & 3
49	Morris & Kamamlzaman 2014	Poor infrastructure	Food waste	OBJ 2 & 3
50	Natsa (2015)	Poor infrastructure, lack of adequate storage facilities, poor processing technology, transportation challenges, & lack of knowledge on food preservation	Food waste	OBJ 2 & 3
51	Fagbemi et al., (2020)	Inadequate environmental facilities & infrastructure	Food waste	OBJ 2 & 3

***Table 2.1: Factors Identified from The Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus* (*Continuation*)**

S/N	Author	Factors Identified from the Literature that Influence Poverty, Food Insecurity and Rural-Urban Nexus	Category	Objective
52	Ajaero & Madu (2014)	Rural-urban migration, & family remittance.	Agricultural production & livelihood strategy-Anambra State	OBJ 3
53	Ajayi & Nwalieji (2010)	Planting of a variety of crops (vegetables in this case) to cope with the seasonality of rainfall based on income of farmers or to improve the income of farmers	Agricultural production & livelihood strategy-Anambra State	OBJ 3
54	Chikwendu & Nwalieji (2020)	Crop diversification, trade diversification for non-agricultural endeavour (planting different types of crops) & crop processing. These are influenced by: income, poverty reduction, food insecurity & reduce risk of crop failure.	Agricultural production & livelihood strategy-Anambra State	OBJ 3

Having considered the several different literatures that have identified the key factors that influence household poverty, and food security in the context of the rural food systems and urban food systems it is important to note that in this study the unit of analysis is the "rural and urban food systems and the potential linkage between them," in Anambra State, Nigeria while the unit of observation is the "rural and the urban household." The research objectives of this study which have been informed by the conceptual framework have now been identified and are listed below (section 2.8).

2.8 RESEARCH OBJECTIVE

The research aim for this thesis is already discussed in section 1.7 i.e., to examine how food security can be improved in the study location and the mediating influence of household poverty and gender inequality in the study location, Anambra State, Nigeria.

However, the following specific research objectives have also been developed in support of this study:

1. To examine the socio-economic status of urban households and rural farmers within Anambra State, Nigeria.
2. To identify and analyse factors that influence urban food insecurity and rural food production in Anambra State, Nigeria.
3. To assess the existing rural food systems and urban food systems and the linkage (or not) between them, and how this linkage influences rural and urban households, their livelihoods, and the wider food system that exists between and within both locations (rural-urban) in Anambra State, Nigeria.
4. To discuss how household poverty, food insecurity, rural food system and urban food system linkage can be addressed within Anambra State, Nigeria, through the development of a holistic programme of interventions.

.

2.9 SUMMARY

This chapter positions that Nigeria amidst its natural and economic wealth, its people still live in poverty. When considering the shock and squeeze situations in food supply, which may/or may-not influence poverty, or the degree of food insecurity in both short- and long-term periods. Amongst the reviewed socio-economic factors identified that influence poverty

and food insecurity in view of the literature in this chapter; household income was one of the major factors of interest. Others included: employment/unemployment status, rural-urban migration, poor government policy, education of household head, household food decision maker, influence of gender on agricultural food production, poor infrastructural development, poor extension service delivery, and food waste management etc., With respect to food systems, factors such as: transportation availability, regulations on trade, availability of food storage provision, urban governance, the disparity in consumer's choice of market (formal [supermarkets]; informal [wet markets and street vendors]) and the activities of middlemen, all influence the different levels of food insecurity both at the urban and/or rural household level.

This chapter have adequately considered food production in relation to the distribution of productive resources (land, labour, credits etc) based on farmers' gender as an important aspect of food availability, that has bedevilled Nigeria's capacity to produce based on its continuous dependence on the oil sector, promoting food importation rather than food production. Postharvest loss has a major influence on food availability, accessibility and sustainability. The food supply sector faces serious challenges with a strong need for government's investment. Two major areas have been explored in this regard: firstly, the informal food market characterised by roadside sales, hawking, avoidance of tax, the existence or increased levels of bargaining between marketers and consumers in such market, which often reflected in the quality of food sold to consumers; and secondly, the formal food market which is the complete opposite of this situation, where food safety and hygiene are of utmost importance. Unfortunately, due to the income levels of many Nigerians, the informal market is perceived to be more accessible, raising its patronage level; while the number of supermarkets in Nigeria that assure food-safety and quality is on the rise. However, in the more formal market, the cost of food becomes the key barrier to certain groups of consumers. Additionally, food loss, food waste and waste management (which includes waste picking) are considered here for both markets (formal and informal). These themes are expanded later in this study in chapters 4, and 6.

The next chapter (3) presents the research methodology that introduces the case study area - Anambra State and the capital city - Awka, as well as the rural communities included in this study. The narrative in that chapter (3) outlines the research plan of this PhD study that specifically includes the research paradigm, the type of data and method(s) of collection, the sample size, and the analytical methods used.

CHAPTER 3

3 RESEARCH METHODOLOGY

This section gives an overview of the study location introducing Anambra State and its capital city, Awka, as well as the rural community investigated in this study. This section also outlines the research strategy for this study that specifically includes the type of data and method(s) of data collection, the sample sizes, sampling technique and the analytical methods (descriptive and inferential quantitative statistics, multiple regression and qualitative thematic analysis) used. This section builds on the narrative in the introduction and captures the research paradigm, the reason for its selection and how it would be employed to provide answers to the research objectives. The study limitations, and the positionality of the researcher are also considered in this chapter.

3.1 STUDY LOCATION

3.1.1 ANAMBRA STATE

Anambra State is situated in the Southeast geographical zone in Nigeria. Anambra State originated in 1976. At that time, the then Central Eastern State was divided into Anambra and Imo States respectively (Anambra State Government, 2017; Ejikeme et al., 2017). In August 1991, new States were created from both Anambra and Imo state which gave rise to two new States (Enugu and Ebonyi) (Anambra State Government, 2017). The capital of Anambra is Awka. The State shares boundaries with Kogi State to the North, to the East Enugu State and Abia, Imo and River States to the South, with Edo and Delta States to the West (Ejikeme et al., 2017). Anambra State's population belong to the Igbo tribe. The State has land area totalling 4,416 sq.km which cuts across 21 Local Government Areas (LGA) with about 177 communities. In 2006, the State had a population of approximately 4.18 million people (4,177,828) comprised of 2.12 million males and 2.06 million females (Anambra State Government, 2017). These are the last official figures for the population in the State. Considering the rate of rise in population in Nigeria, the figure is now estimated to be around 5.5 - 6 million (Brinkhoff, 2020).

*Figure 3. 1**: Map of Nigeria***



The State has three important cities namely: Awka the capital city of the State, Onitsha the commercial hub of the State, and Nnewi the industrial zone of the State (Anambra State Government, 2017). Anambra State is urbanised with over 62% of its population residing in urban areas, and the State is rapidly experiencing urbanisation (Igbokwe et al., 2019). The State is seriously burdened by the impact of rural-urban migration that greatly affects its human capital resource when it comes to agricultural production (UN-HABITAT, 2009). The study by Igbokwe et al., (2019) considers the economic implications of rural-urban migration, which persists in Anambra State and suggests that rural-urban migration is unhealthy for development causing a rise in crime rates in urban areas, impacting the economy negatively, and also causing rural neglect. The government of Anambra State could empower rural areas by making better infrastructure and services available: good roads, potable water, schools and recreational

centres, health care facilities and also creating an enabling environment that would encourage the youths of the State to engage in agriculture (farming).

Awka the capital city of Anambra State, occupies the middle of the Anambra State eastern border. It lies due west of the Mamu-river forming part of the Eastern boundary, the land area of Awka covers 10km radius and is heavily populated (UN-HABITAT, 2009). Awka also exist in the centre of the junction of the old Enugu-Ontisha Road as well as the Amawbia-Orlu road and based on this geography the capital (Awka) is encircled by fast growing small and medium towns that include: Amobia, Nibo, Mbaukwu, Umuawulu, Ezinato, Isu-Aniocha and parts of Amansea, Isu, Agulu and Awgbu (UN-HABITAT, 2009). Ajayi & Nwalieji (2010) explains that Anambra State is composed of 21 local government areas which have four agricultural zones (a) Aguata (b) Anambra (c) Awka and (d) Onitsha. The climatic condition of the State is typically equatorial with two main seasons (a) dry and (b) wet, the dry season lasts from October to early May (in most cases) (Igbokwe et al 2019). Awka enjoys high atmospheric temperatures within the range of (27-28°C) which rises up to 35°C between the months of February and April (Ofomata, 1975; UN-HABITAT, 2009) with the coolest period in July through to December and some part of January (early). The weather conditions responsible for this coolness are (a) the raining season, and (b) the Hamathan period (UN-HABITAT, 2009). In terms of vegetation, Awka exists within the rainforest zone in Nigeria, but due to pressure on land as a result of agricultural activities and commerce, the vegetation has largely been reduced to mixed savanna (UN-HABITAT, 2009). Anambra (Awka & Omor farming Community) state is selected as the location for the enquiry of this thesis (focused on household poverty, food security, rural food systems, urban food systems and the potential for rural-urban linkage). There have been rising cases of food insecurity in the State with many different factors captured in the literature (e.g., income, household size, extension support, food production, migration, waste management, household food decision maker etc.). Anambra State was selected for the focus of this study to mirror the event in other parts of Nigeria. Awka (urban) and Omor farming community (rural) were selected to give a representation of urban and rural food systems and any linkage or not existing between both communities. Factors emerging from the literature such as: “urban” - income, education, household size etc; and “rural” - food production: gender disparity, farmers assets, farming systems, land availability etc., are considered in this study. In terms of language barriers as a limitation to data collection, the study location happens to be the home state of the author, so this limited potential language barriers to a reasonable extent. In addition to this, the author speaks English language and the

Yoruba languages together with his native tongue: the Igbo language. It is for these reasons the study location was selected.

3.2 POSITIONALITY OF THE RESEARCHER

In order for researchers to make any claim at all their positionality needs to be clearly stated (Bourke, 2014). Positionality ultimately expresses the vacuum where objectivism and subjectivism meet (Bourke, 2014). The positionality of researchers refers to their stance in relation to the context of the study in question, in this case the community, organisation and the participant group is key (Bourke, 2014). The researcher's positionality greatly affects all the different aspects or phase of the research process, from the way the research problems are outlined, to the design and construction of the research objectives and finally the gathering of the study data according to the sampling plan. It also considers, all the processes that invite people to participate in the study (Bourke, 2014) and any potential bias that could occur. For instance, in administering the set of structured surveys the researcher might decide to use closed questions so there is less bias influencing how the survey(s) are answered. Conversely, the researcher could give opportunity in the survey design for new ideas to be captured even when they were never anticipated.

Positionality can have an effect on the totality of a research process (Holmes, 2020). The positionality of researchers enables them to bring personal experience into the study to shape the research process and the manner in which the research outcome is interpreted (Foote & Bartell, 2011). Positionality also emphasis the research values and beliefs that reflects in the researcher's work through religion/faith, history and geographical background, gender, sexuality, ethnicity, language, social class, race and political allegiance, among others (Sikes, 2004).

My experience as an agricultural officer working at the Federal Ministry of Agriculture and Rural Development, in the Department of Agriculture (nutrition and food safety division) encouraged my zeal to carry out this study. With the experience (5years) I gathered within the service, I noticed that Nigeria has an abundance of food, good soil composition, and good agro-climatic conditions that favours the production of crops and the rearing of animals, but many of the country's residents are still unable to access food. This was the main reason I decided to take on this study in order to better understand the concept of food security. My position as the researcher in this study is subjective and gives room for new ideas which can transform the research and give rise to new findings or studies. My positionality as the researcher is

interpretivist. This study takes on a mixed method approach, which involves gathering and analysing data as well as drawing inference from the analysed data. The interpretivist positionality allows the study data to tell the story and the researcher (myself) provides a narrative that explains the context of the analysed data.

Importantly, language proficiency played a big role in the gathering of the data I used in this study, especially while collecting the survey data with farmers and food consumer. Consequently, the Igbo language which is my native language was mostly used in carrying out this exercise. While in my interacting with food marketers I spoke both Igbo and Yoruba languages. At the Ministry level where I carried out the interview with the FMARD extension and ADP officers, English language was used to communicate with the officers.

My personality as a government official (with the Federal Ministry of Agriculture and Rural Development, Nigeria), afforded me the opportunity to relate with the head or the spokesperson of the ADP and Ministry's Extension department. Because of my position I was able to break through bureaucratic barriers to obtain the data and information needed to complete my research. However, my position as a government personnel (officer) was not disclosed when I interacted with food marketers, farmers and food consumers, because it might have caused these groups of respondents to either not respond at all, or they may not have responded honestly. Hence, I identified myself as a student, which was true.

Research often affords researchers the opportunity within their work to self-reflect on personal bias, preferences and predispositions that can influence the study in view of the study location/place, context and other social phenomenon (gender inclusive) (Kleinsasser, 2000). The gender of a researcher can influence the kind of response he or she receive in relation to the inquiry or data needed to complete their study (Jackson & Kelly, 2019). In view of this, I do not feel my gender (male), had any "significant" effect on how the field recruitment of respondents was carried out or how I interpreted the findings of this study or research outcome. Although, an online article by the WHO-Africa-Nigeria (2019) states that gender bias in data collection is more pronounced in the Northern part of Nigeria. According to the article on the challenges of gender inequality in health surveillance in Nigeria, the gender of a researcher is important and can hinder a research study from taking place or may yield a bias result. I do consider with the approach I used, that gender bias in research investigations (recruitment of respondents and result writings) is an important factor to add to the number of limitations that could affect research outcomes.

I must admit that it was difficult on several occasions to recruit respondents to be part of the study during the field data gathering process. This happened mostly with the food marketers

and farmers group interview. These groups of respondents were scared of giving their response because they thought I was conducting the study for the government (Anambra State or Nigeria). It took lots of convincing to get them to be part of the study (especially with the help of gatekeepers) and on other occasions they completely declined to take part (this is the case of farmers during the group case interview session and the personnel at the first supermarket I visited). This serves as one of the limitations experienced in the field in addition to other limitations listed in section 3.7. I further wish to add that, it was beneficial to have collected my data before the Covid-19 lockdowns and restrictions throughout 2020.

3.3 THE RESEARCH METHOD

This study considers household poverty and food security as well as rural food systems and urban food systems within the framework of the four food security dimensions proposed by FAO (2009) to include: food availability, food access, food utilisation and sustainability with a view to understanding the factors that influence household poverty and food insecurity in the study area. This study covers the economic (food availability & accessibility), social (people related factors), and environmental (effective resource use and waste minimisation, which also involves domestic food waste, and waste picking) aspects of household poverty and food security, but excludes the nutritional aspect (food utilisation i.e., human nutrition) from the scope of the study. This research used a mixed method approach under the pragmatic research paradigm that involves both deductive and inductive forms of research (Ugwumba & Uchehara, 2015; Nduka et al., 2019).

3.3.1 JUSTIFICATION FOR THE USE OF THE PRAGMATIC RESEARCH PARADIGM

Paradigms are established via a set of inter-connected philosophical assumptions that relates to reality, values, knowledge and methodology (Schoonenboom, 2019). Paradigmatic assumptions significantly direct and guide workable inquiry for better decision making, together with the context and theory (Schoonenboom, 2019). A paradigm is a belief system that affects the type of knowledge researchers aim to gain /gather/or obtain with focus on how research evidence collected were interpreted (Brierley, 2017; Morgan, 2007). Morgan (2007) detailed four primary versions of the paradigm concept, they include paradigms based on; world views; an epistemological stance; belief among members of a speciality group/area; and

model examples of research, noting that the difference among these four groups or versions of paradigm is the ability to generalise the system(s) of belief that is captured in the research.

Pragmatism can be found in the works of Pierce (1878, 1905), James (1907) and Dewey (1938) in the early days of research. Pragmatism involves a healthy measure of pluralism which implies that it is not logically contradictory to maintain that quantitative and qualitative research are useful, even though in certain instance they might appear contradictory; perhaps the notion of what is seen as complementary enables a person or a researcher to fully understand the context and robustness of the research or study (Onwuegbuzie & Johnson, 2006). The pragmatic research paradigm, abandons and replace various ontologies and epistemologies with inquiries into the nature and consequences of human actions in a social context (Morgan, 2014; Schoonenboom, 2019). The aim of conducting a research based on the use of the pragmatic research paradigm is not to acquire timeless knowledge, rather it is designed to solve problems, understand research from a viewpoint of succession in experience, especially where previous beliefs are reconsidered/or revised by distinct research actions (Schoonenboom, 2019).

By conducting research pragmatically, the research would normally have to switch from the research end-result/outcome to the current belief of the researcher, with considerations that the belief matches the researcher's study outcome, if not, the researcher's belief must then be updated. Additionally, this updated belief then becomes the current belief forming the basis for a new form of data analysis (Schoonenboom, 2019). This process is repeated continuously until the main objectives or research questions of the study is/or are addressed (Schoonenboom, 2019). Thus, the pragmatic research paradigm, methodologies are not viewed as distinct entities that should be separated based on their individual research stance. Rather, the pragmatic research approach is perceived as been a relatively flexible configuration, where the research approach may combine elements of one methodology with elements of another methodology (Schoonenboom, 2019).

3.3.2 PRAGMATISM WITHIN THE MIXED METHODS RESEARCH

Pragmatism in mixed methods research is seen as a philosophical position (Hathcoat & Meixner, 2017) and a bearing on the effectiveness of mixing different philosophical positions/perspectives (Greene & Caracelli, 1997). According to Creswell (2003), pragmatism positions research as one of four school of thought, that includes constructivist, positivist, as well as participatory, and advocacy claims. Mixed method research conducted under or by

using the pragmatic research approach is viewed as giving key importance to the question(s) asked, this allows researcher to use a plurality of methods to resolve or address the key aims of an inquiry (Hathcoat & Meixner, 2017). This therefore enables researchers to draw from a variety of epistemological and methodological assumptions to arrive at a "functional knowledge" (Maxcy, 2003). The Pragmatic research approach generally resolves to choosing the combination or mixture of procedures or methods that is better suited to or works best in answering the research objectives (Johnson & Onwuegbuzie, 2004: p.17).

Although, pragmatism provides the philosophical base for the mixed methods research approach, its use has caused researchers to justify the integration of qualitative and quantitative data sets within a single study (Howe, 1988; Hathcoat & Meixner, 2017). On the other hand, the underlying dilemma of using the pragmatic research approach is not that it is lacks substance as a guide to the research position, rather it is misunderstood (Hathcoat & Meixner, 2017). Cherryholmes (1999) opines that pragmatism appears simple at first glance, but it is actually very complex. Even though the pragmatic research paradigm better suited the inquiry of this thesis based on the selection of the mixed method research approach, other research paradigms also exist, and could have been used in this research. Some of these paradigms are briefly captured in the next sub-headings.

Positivism

The positivist paradigm imply that real events can be viewed empirically, explored and explained via a logical analysis (Kaboub, 2008). This philosophical paradigm (positivism) became well known in the early 19th century based on the works of Auguste Comte – A French philosopher (Richards, 2003, P.37). Positivism presents that reality exist separately or independently of human interference (Rehman & Alharthi, 2016). The ontological view of the positivist paradigm is that of realism, implying that positivists try to understand or view the social world as the natural world (Rehman & Alharthi, 2016). This gives the view that in nature, the cause – effect relationship exists between trends or phenomena, and once known or established, the certainty of predicting the future becomes highly possible. Hence, for the positivist, the same logic applies (Rehman & Alharthi, 2016).

Interpretivism

Interpretivism reflects the high-dominance of positivism (Grix, 2004. P.82). Interpretivism dismisses the notion that an isolated verifiable reality independent of our reality exists (Rehman & Alharthi, 2016). Interpretivist believes in multiple constructed social

realities (Guba & Lincoln, 2005. P. 204). This implies that truth and reality are not discovered, they are rather created. Rehman & Alharthi, (2016) state that in interpretivism, it is not possible to know reality for reasons generally arbitrated by our senses. I.e., Interpretivist epistemology is viewed as being subjective. Grix (2004) notes that researchers are often part of the social reality they research, i.e., they are not separated from the subject of study. The goal of an interpretive study is not to uncover general values, context free knowledge and truth, but rather try to understand the interpretations of researchers or individuals on a particular social phenomenon that they interact with (Rehman & Alharthi, 2016). The interpretivist research approach requires that social phenomena can be determined or understood through the eyes of the participants/respondents rather than those of the researcher (Cohen et al., 2007). In terms of data collection or that synonymous with the paradigm, Interpretivism is closely linked to the qualitative form of data collection from participants over a period of time. These types of data could either be "case study" or "ethnography" in nature (Rehman & Alharthi, 2016), hence, its approach to data analysis is inductive. In essence, interpretivism is more of the inductive approach than the deductive because it notes that theories are derived from data collection rather than as a driving force of the research (Grix, 2004, P.108).

Post-Positivism

The post-positivist paradigm describes a research approach of knowledge that is implicitly an assessment of the nature of reality (Fox, 2008). Post-positivism may be simplified as the approach that historically would succeed positivist. It is understood as a paradigm that has positivist epistemology and ontology; hence positivist claims regarding the objective nature of reality and the ability of science to recognise that reality by either accepting or rejecting it (Fox, 2008). The post-positivist approach is of the opinion that knowledge remains an important aspect or aim of social scientific enquiry (Fox, 2008). Additionally, understanding rather than explanation is in some cases regarded as the objective of the post-positivist enquiry, which is further constrained by the acknowledgement of contingency and context (Fox, 2008). Under the post-positivist approach the role of the researcher as the interpreter of data is fully accepted or acknowledged, this is in view of the importance of reflexivity in the practice of research (Fox, 2008).

Post-positivism grew as a solution to researcher's experiencing the limitations of positivism as a paradigm (Panhwar et al., 2017). Post-positivism does not aim to disqualify the quantitative elements of a research that is positivist in nature (Panhwar et al., 2017). Post-positivism addresses the limitations of positivism by associating research with empiricism and

rejects the existence of subjective perspectives (Panwar et al., 2017). The post-positivist approach utilises quantitative and qualitative methods that involve the diversity of facts investigated through different kinds of investigating that still respect and value findings that contribute generally to the development of knowledge (Clark, 1998 & Fischer, 1998). Hence, post-positivism is pluralistic in its function as it blends (i.e., balances) both the interpretivist and positivist approach (Panhwar et al., 2017). Being that the post-positivist approach is flexible in its research perspective, it allows the researcher to use multiple methods in a research enquiry based on the nature of the research questions (Panhwar et al., 2017). Having considered the different paradigms (positivist, interpretivist, post-positivist etc.) side by side the pragmatic research paradigm has been chosen as it aligns with the four objectives of this thesis.

Mixed method research design

The mixed method research design was employed in this PhD study because of the selected research objectives and the type of data that needs to be collected to address them. The advantage of mixed method research design is that it integrates the quantitative and qualitative forms of data analysis/study which promises stronger utility of the research resources (data) and practice (Sandelowski, et al., 2006). The limitation of the mixed methods approach is that it is more time consuming due to the nature of the different types of data to be collected, analysed and interpreted. It may also require extra funding, and time to interview participants (Courtney, 2017).

Quantitative research methods are methods that generally use numerical values (e.g., numbers) or elements that are measurable in a systematic style of inquiring about a phenomenon (Leedy, 1993). It is technically used to find answers to questions on variations or relationships that exists between a measurable variable with the intent of explaining and predicting a particular outcome (Leedy, 1993). For the first two research objectives (OBJ 1 and OBJ 2) data was collected through two (n=2) quantitative **surveys**, and data variables used included education level, household size, income, labour type, land size, farming systems, water availability, extension support etc. To this effect, some sources have been of value in the literature to support this element (selected variables) of the PhD. study, they include: Abubakar et al., (2007); Abdullahi et al., (2009); Mbah et al., (2016); Maoba (2016) etc. Among the two different surveys carried out; the first is the food consumers' survey in the urban area and secondly, the farmers' survey (Livelihood Survey) in the rural area.

Shank (2002) defined qualitative research techniques as that form of systematic empirical findings that provide meaning. The word empirical in this context, means that this form of inquiry is centred on the core values of experience. Denzin & Lincoln, (2011) notes that the qualitative research technique generally involves the interpretive and naturalistic approach: meaning that qualitative researchers engage in studies that are in their natural environment and attempt to draw conclusions/reveal or interpret phenomena based on the way people read meaning to such situations. Data for research question (OBJ3) of this study was collected via the case study approach (C.S); which involved two group case interviews [G.C.I] (between 3-6 person minimum) and three face to face **interviews (semi-structured interviews).** The procedure of undertaking the C.S approach involved; the facilitator (self) guiding group-based discussion through a set of predetermined topics while creating an environment that encourages participants to share their experience and viewpoints (Dilshad & Latif, 2013; Evaluation Brief, 2018) Some of the advantages of this method include:

1. The method is relatively easy and quick to arrange.
2. The dynamic nature of the group can provide useful information that structured surveys otherwise will not give.
3. It is useful in breaking down difficult topics via robust insights into such topics.

But there are also disadvantages associated with the use of this method, and they include:

1. The method could be susceptible to bias by the facilitator.
2. Valid information is not provided at the individual level.
3. In many cases the information provided is not representative of other groups.
4. Discussions can be dominated by a few members of the group.
5. Data emanating from such methods is time consuming to analyse and might need to be properly planned in advance.

The C.S element in this thesis was conducted with four groups of individuals; (a) farmers (rural) and (b) food marketers (urban), and then (c) the supermarket head, and (d) extension service providers (n=2) (i.e., Government and ADP officers), for which the semi-structured interview was conducted. This was undertaken to gain richer data to further explore urban food systems, rural food systems and the potential linkage between them. Hence the data collection process was undertaken in multiple phases, that include:

1. Urban food consumers' surveys in two market locations
2. Rural farmers' survey in a rural location
3. Urban food marketers' – Group case interview (GCI)
4. Rural farmers' – Group case interview (GCI), and

5. Interviews with stakeholders – individual interviews

In designing the data collection tools, sets of structured survey questionnaires were developed, targeting the different groups of respondents in rural and urban locations. While further key questions were also drafted to guide discussion during the C.S (interview meetings) with farmers, food marketers, Federal Ministry of Agriculture and Rural Development, the ADP office, and the head of the supermarket). For both the quantitative and qualitative methods, primary data was collected by the researcher in-situ. Oral interviews and structured survey checklist(s) were used to collect data from smallholder farmers, food consumers, supermarket head and government extension departments or agencies. Secondary data was then solicited from pre-existing data sources i.e., online data, policy documents, journals and publications etc. to support many of the findings in this thesis. Table 3.1 outlines the research methods adopted for the different research objectives this study has addressed.

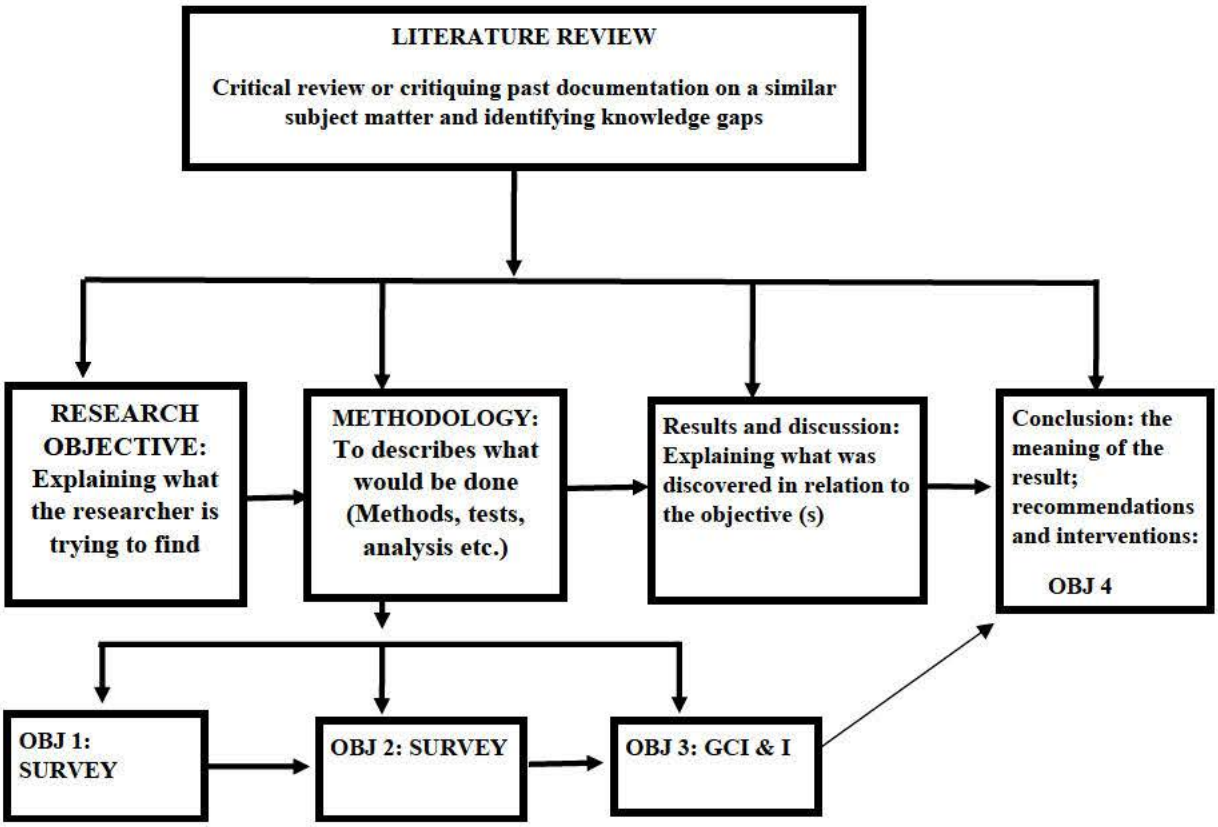
*Table 3. 1**: Research Methods***

Research methods	**OBJ-1**	**OBJ-2**	**OBJ-3**	**OBJ-4**
Surveys	√	√		
Group case and individual interviews			√	
Recommendation/ Intervention				√

Source: Okpala E.F

Figure 3.2 outlines the research structure of this study which explains the strategy that addresses how the research is started via the introduction and literature review which sets the scene for the study inquiry, then the objectives that guides the study, also outlined. The method of data gathering was also identified, all of which links to the discussions on the findings, conclusion and recommendations of the study.

Figure 3. 2: ***Thesis Structure (Research Strategy)***



GCI = Group Case Interview; & **I** = Interview

Having considered the research structure outlined in figure 3.2, which details the study strategy. The next section discusses the different sampling methods employed in this study that supports the gathering of data which supports the analysis and findings in the research section of this study.

3.4 SAMPLING SIZE AND TECHNIQUES

3.4.1 QUANTITATIVE (SURVEY) AND QUALITATIVE (CASE STUDY)

Data for the purpose of this study was collected between the periods of December, 2019 to February, 2020, from adult individuals (n=240) (the inclusion criteria allowed for respondents who had to be 18 years of age or older; these respondents voluntarily consented to being part of the study): 120 respondents being small-holder farmers from rural farming communities (Omor) in Anambra State and 120 respondents being food consumers from Eke Awka market (local market) and Supermarket – A (for the sake of anonymity the supermarket's original name was changed to supermarket-A to avoid any conflict of interest) within the capital city (Awka) of Anambra State. Sixty (n=60) respondents from each retail marketing

channel were represented in the total sample size (n=120) of food consumers. A total sample size of 240 (i.e., 240 respondents) was realised (Table 3.2) from both the food consumers and the farmers survey.

Table 3. 2: ***Planned Survey Population Size***

S/N	SAMPLES	SAMPLE LOCATION	POPULATION SIZE
1	Small holder Farmers	Selected Rural Community	120
2	Food Consumers	Selected Markets in Awka	120
Total =			**240**
95% CONFIDENCE LEVEL			
5% ERROR MARGIN			
SAMPLE SIZE= 240			

Source: OKPALA, Emeka F.

The **convenience sampling** technique was employed for the purpose of this study to recruit 120 farmers (rural) from the Omor farming community and 120 food consumers (urban) within the local market and supermarket store in the study State. The **convenience** sampling technique involves the non-probability selecting of members of a given population to be part of the study based on the researcher's own personal judgement, time, geographical proximity and participants willingness to partake in the study. More so, this sampling technique give members of the population, an equal chance of being represented (selected) to take part in the survey/sample (Farrokhi & Mahmoudi-Hamidabad, 2012). This sampling technique suggests that the inclusion of one population subset does not preclude any other population from being selected to take part in the survey. This technique is selected to give respondents within the sample population (Anambra State) of the study an equal chance of being included in the survey.

This sampling technique (**convenience sampling)** was used in both the survey and the case study (GCI & interview). Data collection: involved the convenience selection of respondents to be part of the study, only that the population of respondents in this case were typically smaller than those of the survey in this study. In conducting the C.S research n=5 sets of interviews were carried out, they include group case interviews with - food marketers (n=5) and farmers (n=5). While individual interviews were carried out with supermarket head, and extension officers (FMARD officer and the ADP officer).

*Figure 3. 3**: Sampling Plan***

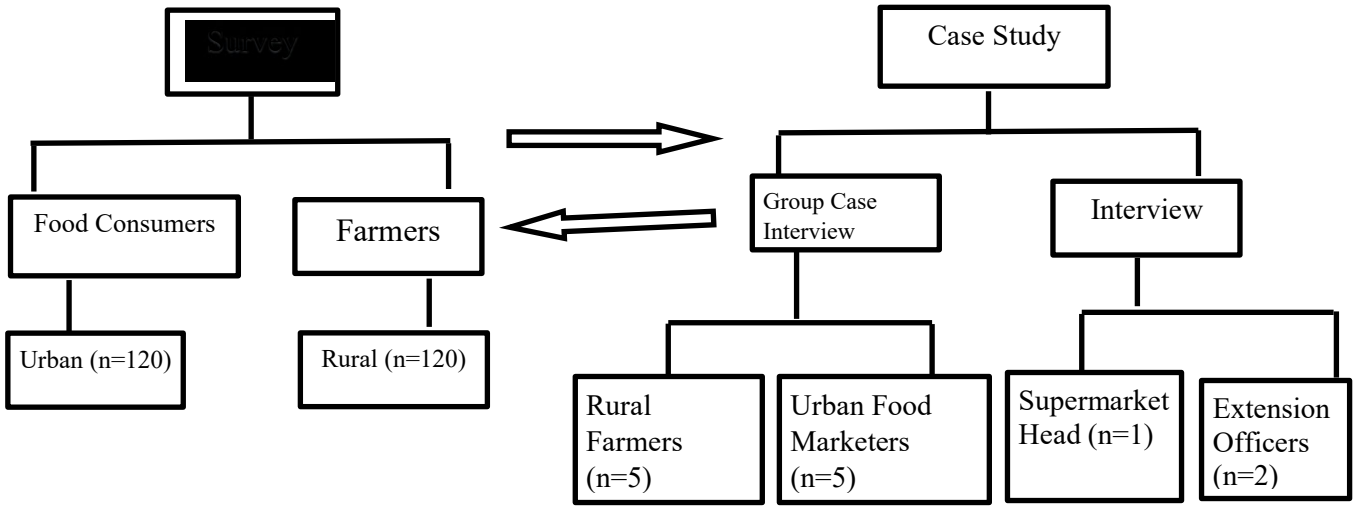


Figure 3.3 depicts the field data collection strategy (sampling plan) and how individual datasets complement each other. On the left, is the survey (quantitative) component of this self-explanatory diagram and on the right is the Case study (qualitative).

3.5 ANALYTICAL TECHNIQUE

3.5.1 QUANTITATIVE (SURVEY)

Quantitative Case Study Approach

A case study (C.S) is defined as an empirical investigation or inquiry into a current phenomenon within its real-life context; especially when the boundaries between such phenomenon and context are not clearly evident (Yin, 2003). A C.S research approach includes a series of data collection techniques over a given period of time, for several or one organisation, or a group of individuals with a view to provide an analysis of the context and processes involved in the case study (Hartley, 2004), in line with the aims and objectives of the research. According to Hartley (1994) & Shareia (2016) it can be argued that the term "case study" is used interchangeably between describing the research method and the research strategy. Stake (1995) & Shareia (2016) distinguished the use of C.S into three categories of purpose. First, is the "intrinsic case study" which is employed to understand and gain more depth of learning about a particular case. Secondly, is the "instrumental case study", which can aid the understanding of a phenomenon through the studying of something else, and lastly, "the collective case study", which involves the conducting of detailed inquiry or research where one or more cases can be chosen or studied at a time. The three categories of cases are represented

as follows: descriptive, exploratory and explanatory (Yin, 2003). When undertaking case study research, different methodological approach can be used in data collection and analysis (Shareia, 2016). The selected methodological approach can either be qualitative, quantitative or a combination of both (Hartley, 1994). This PhD. Study has adopted the combination of both.

The C.S under the quantitative methodological approach employs or relies on theoretical mapping from the literature which will then identify factors that can and will be tested, in order to draw a scientific conclusion (Shareia, 2016). C.S research under the quantitative methodological approach usually involves the systematic and empirical inquiry of a phenomenon through mathematical and statistical processing of numerical data (Basia & Pollalis, 2018). The process of estimating numerical figures (numbers/data) in quantitative research gives room for the fundamental link between empirical observation and mathematical or statistical expression of quantitative relations (Basias & Pollalis, 2018).

3.5.2 DESCRIPTIVE AND INFERENTIAL ANALYSIS

The survey data was collected using set of structured questionnaires for both food consumers in urban areas and farmers in the rural area in Anambra State. Descriptive and inferential statistical analysis was used to seek explanation on variables of interest in this study. The descriptive statistical methods described and summarised the survey data which involved the construction of frequency tables, means/standard deviation (for: continuous variables) and percentages (for: categorical variables). Chi-squared analysis was chosen for this study in order to find any degree of association between one or more variable (that are categorical in nature). Some publications have utilised this method to address some of the factors that affect food security in Nigeria, for instance the study by Agoda et al., (2017) on the assessment of the constraints to effective agricultural extension services delivery in Lagos, Nigeria. The study adopted the use of structured questionnaires/scheduled interview method of data collection, while for analysis of the data; descriptive analysis using frequency counts, mean scores of Likert scale response and percentages were used.

The survey approach in this study was to address objective 1 and 2 of this thesis. In addition to this, the data from the urban food consumers - and rural farmers- surveys was used for the following hypothesis testing (section 4.4 & 5.4).

Urban Food Consumers:

H_1: There is an association between age of respondent and the type of market in which they were interviewed.

H_2: There is an association between respondent's marital status and the type of market the respondent was interviewed in.

H_3: There is an association between respondent's household size and the type of market the respondents were interviewed in.

H_4: There is an association between educational status and the type of market the respondent were interviewed in.

H_5: There is an association between employment status of respondents and the type of market the respondent was interviewed in.

H_6: There is an association between household income after tax and the type of market respondents were interviewed in.

H_7: There is an association between challenges faced in acquiring food and the type of market the respondents use.

H_8: There is an association between who the household food purchase decision-maker is and family size (household size).

H_9: There is an association between respondent's household income and who is the household food purchase decision maker.

H_{10}: There is an association between household size and the household income of respondents.

Rural Farmers Survey:

H_1: There is an association between gender and age of farmers.

H_2: There is an association between gender and the education of farmers.

H_3: There is an association between gender and marital status of farmers.

H_4: There is an association between gender and household size of farmers.

H_5: There is an association between gender and crops grown by farmers (cassava; maize; rice; yam; cocoyam; okra; and leafy vegetables).

H_6: There is an association between gender and livestock reared by farmers (cattle; sheep; goat; pig; and chicken).

H_7: There is an association between gender and assets owned by farmers (vehicle; cart; bike/bicycle; plough; irrigation; radio; mobile phone; television; and solar panel).

H_8: There is an association between gender and farm labour.

H_9: There is an association between gender and farm size.

H_{10}: There is an association between gender and farm inputs (fertiliser; seed; and pesticide).

H_{11}: There is an association between gender and farming systems adopted by farmers (mono-cropping; mixed cropping; mixed farming).

H_{12}: There is an association between gender and water available to farmers for farming.

3.5.3 REGRESSION ANALYSIS

The regression analysis is a statistical technique used to determine the relationship, association or variation between variables, usually the dependent and independent variables (Dan & Sherlock, 2008). According to Dan & Sherlock (2008) regression is generally used in determining prediction and causal inference. The simplest form is bivariate regression; however, regression often shows the variation between one or more independent variable (X) and a dependent variable (Y), as a common formula is indicated below:

$Y = a+b_1xX_1+ b_2xX_2+ b_3xX_3+ b_4xX_4+b_5xX_5+b_6xX_6+b_7xX_7\ldots\ldots\ldots X_0$

Y = Household Food Decision Maker /and Gender of Farmers (both were used as proxy to measure food security in terms of food access and food availability)

X = X_1-X_0 (see section 4.6 & 5.6 for the list of independent variables)

Where, $\mathbf{X_0}$ = Residual

Probit (Binary) Regression

The binary linear regression deals with the linear relationship of both the dependent variable (Y*) usually having two categories of dependent variables and a series of independent variable (X) (Schneider et al., 2010). In many instances the expression of a single independent variable does not on its own describe or explain the dependent variable, hence performing a linear regression with several independent variables to explain the corresponding effect of the variables on the dependent variable (Y*) (Schneider et al., 2010).

See equation:

$Y^* = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + e_i$

Y= Gender of Individual Farmers (A proxy for "food availability": based on farmers capability to access productive resources in view of their gender)

Y* (Y_1 & Y_2) = Y_1 (Male farmers) and Y_2 (Female farmers)

X_1= Labour; X_2= Land Space; X_3= Farming Systems: Mono cropping; X_4= Farming Systems: Mixed cropping; X_5=Cultivated crop: Rice; X_6= Reared livestock: Sheep; X_7= Reared livestock: Goat; X_8= Reared livestock: Chicken

Table 3.3: Shows the descriptive statistics of the variables used in computing the probit (binary) regression result of this study in section 5.6.

Table 3. 3: Descriptive statistics of the variables regressed (Gender of Farmers)

	N	Minimum	Maximum	Mean	Std. Deviation
Sex of Respondent	120	1	2	1.19	0.395
Labour Required for Production	120	0	1	0.04	0.201
Land Space 1	120	0	1	0.44	0.499
Land Space 2	120	0	1	0.36	0.482
Land Space 3	120	0	1	0.20	0.402
Farming System- Mono Cropping	120	0	1	0.64	0.482
Farming System- Mixed Cropping	120	0	1	0.85	0.359
Crop Cultivated - Rice 1	120	0	1	0.19	0.395
Crop Cultivated - Rice 2	120	0	1	0.26	0.440
Crop Cultivated - Rice 3	120	0	1	0.55	0.500
Reared Livestock - Sheep 1	120	0	1	0.76	0.430
Reared Livestock - Sheep 2	120	0	1	0.22	0.414
Reared Livestock - Sheep 3	120	0	1	0.03	0.157
Reared Livestock - Goat 1	120	0	1	0.46	0.500
Reared Livestock -Goat 2	120	0	1	0.35	0.479
Reared Livestock - Goat 3	120	0	1	0.19	0.395
Reared Livestock - Chicken 1	120	0	1	0.64	0.482
Reared Livestock - Chicken 2	120	0	1	0.27	0.444
Reared Livestock - Chicken 3	120	0	1	0.09	0.290
Valid N (listwise)	120				

The descriptive statistics computed in table 3.3 was done to show the minimum and maximum units (elements of variables exists in unit between 0 & 1) of the variables used in computing the regression analysis. All variables have a total sample size of n=120 respondents.

The probit (binary) regression model used in this study is captured in chapter 5 (section 5.6). The model considers the gender of farmers and their access to productive resources and/or their ability to cultivate and/or rear certain crops or livestock among the study group involved in this study.

Multinomial Logistic Regression (MLR)

The multinomial logistic regression (MLR) is used when data set consists of a dependent variable that is categorical in nature with two or more un-sequenced or unordered levels (Omane-Adjepong, 2012). In practical sense, MLR appears to be identical to the logistic regression, only that the MLR gives multiple possible outcomes as opposed to just one outcome (Omane-Adjepong, 2012). MLR is one among the generalised models that are linear, which depicts an extension of the binary logistic regression model. In using the MLR the independent variables can either be continuous, categorical or both (Hosmer & Lemeshow, 2000). Hosmer & Lemeshow (2000) noted that MLR can have its dependent variable to be one with two or more categories, but the model will be better interpreted if the variables are restricted to only 3 categories (Agresti, 2007).

Justification For Using The MLR

When analysing data using MLR, it is important as part of the process to check that such data set can actually be analysed using the MLR. To ensure that the data set conforms, it is important to ensure that the analytical procedure involving the use of the MLR aligns with the following assumptions (for which the data set must agree with at-least all or 2 of these assumptions in practical sense (Omane-Adjepong, 2012):

- Assumption 1: the dependent variable must be measured at the nominal level.
- Assumption 2: the data set has one or more independent variable that are either ordinal, continuous or nominal.
- Assumption 3: observations should be independent, and the dependent variable must have mutually exclusive and exhaustive categories.
- Assumption 4: multicollinearity must not exist amongst variables i.e.; this occurs when two or more independent variables have high correlation within the data set.
- Assumption 5: a linear relationship must exist between the continuous independent variables and the logistic transformation of the dependent variable involved in the data set.
- Assumption 6: no outliers.

Practically, the data set of this PhD. study as illustrated in chapter 4 (4.6), conforms to all of the above assumptions.

See equation:

$$y = Log\left(\frac{p}{1-p}\right) = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e_i$$

Where, Y= Household Food Purchase Decision Maker (a proxy for food access [one of the pillars of food security]), X_1= Market choice (food price), X_2= Market choice (quality of food), X_3= Age of respondent, X_4= marital status, X_5= Challenges faced with acquiring food, X_6= occupation, $X_{7=}$ Household size, $X_{8=}$ education status, $X_{9=}$ household income, $X_{10=}$ frequency of market visit.

Table 3. 4: Descriptive Statistics for variables regressed (Food Consumers)

	N	Minimum	Maximum	Mean	Std. Deviation
Household Food Purchase Decision	120	1	3	1.66	0.815
Influence of Market Choice (Food Price)	120	0	1	0.49	0.502
Influence of Market Choice (Quality of Food)	120	0	1	0.53	0.501
Age of Respondent	120	1	3	1.98	0.526
Marital Status: Married	120	0	1	0.67	0.473
Marital Status: Single	120	0	1	0.33	0.473
Challenges: Traffic	120	0	1	0.41	0.494
Challenges: Time	120	0	1	0.35	0.479
Challenges: Bad Road Network	120	0	1	0.24	0.430
Self/Unemployed	120	0	1	0.54	0.500
Fully Employed	120	0	1	0.46	0.500
Household Size 1	120	0	1	0.33	0.470
Household Size 2	120	0	1	0.68	0.470
ED- Sec. School Certificate	120	0	1	0.46	0.500
ED- Bachelor Degree	120	0	1	0.37	0.484
ED- Master's Degree	120	0	1	0.18	0.382
Household Income PMAT 1	120	0	1	0.46	0.500
Household Income PMAT 3	120	0	1	0.23	0.419
Household Income PMAT 2	120	0	1	0.32	0.467
Frequency of Market Visit	120	1	3	1.87	0.607
Valid N (listwise)	120				

PMAT= Per Month After Tax

The descriptive statistics here on table 3.4 was done to show the unit of each variable regressed (between 0 & 1). This is well indicated in the column (minimum and maximum) and was used in computing the MLR analysis of this study. All variables had a total sample size of n=120 respondents.

With respect to food security, Ali et al., (2016) carried out a study on the determinants of food security in Rangpur city, Bangladesh using the logistic regression model. The result of the regression analysis indicates that several variables were found to be important in explaining

the food security status of households in Bangladesh. Accordingly, the **number of dependants** or household size indicated a negative impact on food security owing to the fact that the income of the household head is usually fixed with dependants wanting more food to consume within such income. **Income** of the household head had a positive effect on food security, suggesting that the greater the chance that the household head is gainfully employed the better the chances of such household being food secure. **Age** also had a positive effect on food security suggesting that older household members have the possibility of having higher incomes as a result of their long stay in jobs and other income activities. Also, **Education** had a positive effect on food security, as a result higher levels of education provides a chance for better jobs which would/could directly promote the level of household income available for food. It is important to note that all the factors analysed above forms part of the enquiry of this thesis with respect to food insecurity in the study location (Anambra state, Nigeria).

The findings by Ali et al., (2016) portrays a strong link between the topic in question in this research (food insecurity) and the variables tested (age, income, education and number of households). This PhD study have used similar variables to test their relevance, or not in Anambra State Nigeria with respect to the household food decision maker (see Chapter 4). This method fitted well for analysing the current context of urban food insecurity, and the testing of food production capacity (including the role of gender in agriculture) in the rural setting of Anambra State, Nigeria. This research method (regression) identified key factors or elements that contributes to the who and how the household food decision is made within a given household in the study area (see Chapter 4), and those factors that contributes to the reasons why the different genders influence food production (see Chapter 5). The regression analysis conducted in this study was developed using data from the field survey.

3.5.4 QUALITATIVE

3.5.5 CASE STUDY RESEARCH

Qualitative Case Study Approach

C.S is a research method typically used in social and life sciences (Heale, 2018). C.S research can be defined as an in-depth study about persons, a group of individuals or people or unit, with the aim of then generalising over several other units (Gustafsson, 2017). *Although this study's qualitative inquiry initially intended using the ethnographic research technique, due to time constraint and security issues, the case study research lent itself to the time*

available, and the sample size realised from the field data collection exercise. This is a potential to the limitation of this study.

CS research examines complex events in their natural setting to improve the understanding of such entities (Hamel, 1993; Yin, 20003). It can be adopted as a research method in various fields e.g., medicine, education, psychology, anthropology, social work and political sciences. However, unfortunately, C.S is highly subjective and sometimes it becomes difficult to generalise outcomes/or results in respect of a larger population (Cherry, 2022). The steps involved in the use of the case study approach, allows researchers to take a broad and complex topic and then narrow it down to a manageable research enquiry, question or objective(s) (Heale, 2018). The C.S research method is widely adopted in academia especially for research that is qualitatively driven (Baskarada, 2014). C.S uses certain key/fundamental steps that are important to its functionality, these steps include the process of data collection, analysis and interpretation based on qualitative means (Quintao et al., 2020).

C.S offers various levels of advantage. According to Yin (2017) the main advantage of C.S is that it is highly applicable to human situation and the context of real-life experiences. Yin further noted that C.S is deep, time broad and has an integrated view of a complex/contemporary social unit often composed of multiple results/outcomes. According to Cherry (2022) C.S pose the following advantages and disadvantage:

Advantages:

1. Affords researchers the chance to collect information with great depth.
2. Allows researchers to gather information on rare or unusual cases.
3. Enables researchers to come up with hypothesis that can be explored in experimental studies.

Disadvantages:

1. With a larger population size C.S may not be generalisable.
2. Cause and effect cannot be demonstrated by C.S.
3. Scientifically, C.S may not be rigorous and can lead to some level of bias.

Additionally, Cherry (2022) identified the different types of C.S and the methods of data collection as follows:

- Collect case studies: this involves the study of a group of individuals within a certain setting or the entire community may be considered.
- Descriptive case study: it generally involves beginning with a descriptive theory, then the observation of subjects, the information collected is then compared and contrasted with pre-existing theories.

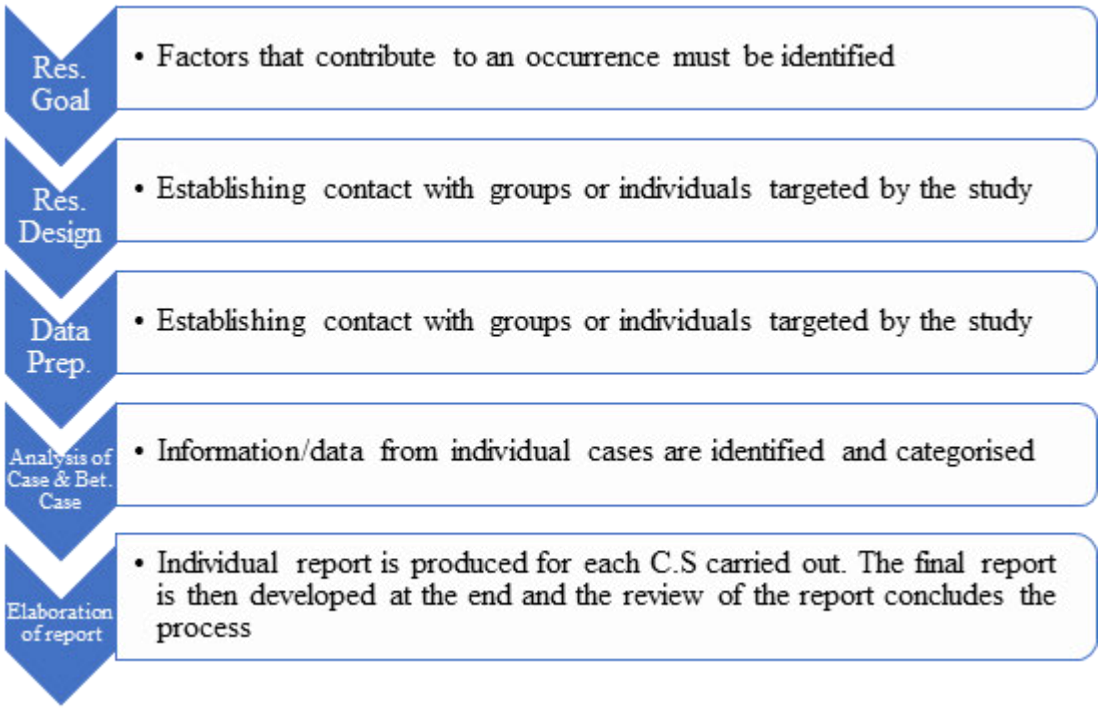
- Explanatory case study: this is used to carry out a causal investigation into a topic of interest especially when researchers consider factors that may cause certain events.
- Exploratory case study: researcher use this type of C.S to gather more in-depth knowledge on an event or phenomenon.
- Instrumental case study: here researchers are allowed by the group or individual subjects to understand more than what was originally obvious to observe.
- Intrinsic case study: this happens when the researcher has vested (personal) interest in the case. e.g., a researcher observes his/her own child, with the goal of developing a psychological theory.

Data Collection with a range of records including:

- Archival records (e.g.: survey records, census record etc.)
- Documents (e.g.: newspaper articles, letters, admin. records)
- Direct observation: This involves observing the subject(s) over time in its or their natural setting.
- Interviews: it can involve the use of an open-ended or semi-structured questions to gather information.
- Participant observation: this occurs when a researcher participates in an event as a participant and records the observations of actions and outcome of such events.
- Physical artifacts: this occurs when objects, tools, instruments and artifacts are directly observed as subjects in the study.

This thesis used interviews as its unit of data collection within the qualitative phase; both in the group phase and that of the individual phase. Stages of a Case Study research, according to Yin (2017), include: Research Goal; Research Design; Data Preparation and Collection; Analysis of Cases and Between Cases; and Elaboration of Reports. Figure 3.4 discusses the different steps that are involved in a typical case study research.

Figure 3. 4: ***Phase of Case Study Research***



Res = Research

3.5.6 DATA COLLECTION (Case Study Interview)

In this study, the C.S interviews were purposive sampled. As a result, individuals (respondents) who were not interested in taking part in the study (for instance) were excluded. Five (5) interview sessions I.e., (n=2 GCI; n=3 Individual interviews) were conducted to present the views of food marketers (urban) and farmers (rural) with a sense of understanding of the interaction between rural food systems and urban food systems in the study area. Other interviews conducted, were with a supermarket head and extension officers (government and its agencies one each) to gather information that enabled the understanding of the farmers support scheme, as well as the movement of food and services between rural and urban areas. Gender distribution among the interviewees was not even, in the case of the food marketers (n=5) no male marketer was available for selection to be part of the group. Whereas, amongst farmers (n=5) it was mostly male farmers. The supermarket manager (n=1), ADP offer (n=1) and the FMARD officer (n=1) were all female respondents.

3.5.7 QUALITATIVE CONTENT ANALYSIS

Content analysis (C.A) is an analytical method designed to identify and give meaning in a recorded form of communication, by separating small key pieces of data that reflects or represents salient concepts, which are then applied to create a framework that organises the pieces in a way that it can be used to give meaning to or describe a phenomenon (Kolbe & Burnett, 1991). C.A is generally useful in situations where there exists a large volume of unanalysed textural data (Kleinheksel et al., 2020). Because of its ease of use and accessibility, C.A was chosen for use in this thesis (see chapter 6) to analyse useful qualitative textual data from the field conducted via GCI or individual interview (s).

C.A was initially introduced as a firm /strict quantitative method, that records count through the observed frequency of pre-identified textual content in consumer research (Kolbe & Burnett, 1991). However, as a naturalistic qualitative paradigm became prevalent in the social science field of research, researchers have become more interested in people's way of behaving in a natural situation or setting, so the process C.A offers becomes more interesting and meaningful as a research approach in science (Kleinheksel et al., 2020). C.A is based on the assumption that text is a rich source of data with strong potential of expressing or revealing information about a phenomenon that is valuable (Kondracki et al., 2002). Its process involves considering both the participants and the context of the given information when grouping text into categories that enable the identification of difference/and/or similarities, patterns and associations either implied within the text or on the surface (Julien, 2008; Graneheim et al., 2017). The method can be applied for both qualitative and quantitative studies based on its versatility, given its potential to yield high educational research (Krippendorff, 2012).

The difference between the quantitative and qualitative methods of C.A is that; the quantitative methods seek to create/generate a numeric value for use either in statistical analysis or citing prevalence within text, while the qualitative method relates to the identification of a concept or concepts using key words or phrase to substantiate or provide meaning to the text being described (Kleinheksel et al., 2020). Table 3.5 details some of the key terminologies used in content analysis.

Table 3. 5: ***Definition of Terminologies Used in Qualitative Content Analysis***

Terms	Definition
Condensation	The process of shorten text into a unit, while still retaining its original meaning
Code	A short label (usually 1-3 words) used to describe a unit of meaning
Category	The organisation of several codes that relates in context or content
Theme	This involves the organisation of two or more categories that relates or represents a particular phenomenon or meaning. It describes experiences, emotions & behaviour that happens within several categories

Source: (Kleinheksel et al., 2020)

The process of content analysis for this study that relates to the outcomes in chapter 6 is displayed in figure 3.5.

*Figure 3. 5****: The Process of Content Analysis for this Study***

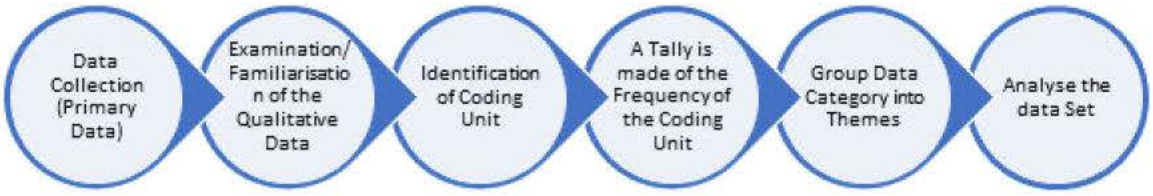


Figure 3.5 outlines the different steps undertaken in this study to process and analyse the qualitative data from the case study component of this thesis. For better understanding of the application of this analytical tool, several studies in the field of social sciences have put this analytical tool to use. Danjibo et al., (2019) used content analysis to arrive at the findings of their study "Adoption of Cause-and-Effect Theory in the Fight Against Food Security" a case of Kogi state, Nigeria. Similarly, in Anambra state Nigeria, Ezeama et al., (2015) collected data via focus group discussions and in-depth interviews of mothers from communities in Anambra, to understand the coping strategies of mothers within food insecure households. The data was analysed using thematic content analysis to identify several coping strategies that

mothers adopted. In summary, thematic content analysis have been applied to social science studies, especially in cases that apply to the inquiry of this study (see section 6.6). Although it was mostly used for in-depth interviews and focus group discussion in the reviewed studies, CA is well suited for this thesis inquiry on household poverty, food insecurity, rural food systems and urban food systems and the potential for connections between them.

3.6 PRE-TESTING FIELD DATA COLLECTION TOOL

The data collection tools (questionnaire and predetermined interview questions) for both the quantitative and qualitative component of the thesis were pre-tested to assess the strength and weakness of the data tools identified or mapped out and any improvements that could be made. The pre-field test study was done with 10 Nigerian students that resided in Cirencester, many of whom also attended the Royal Agricultural University on other study programmes (e.g.: masters, PhD. Students). This presented me with ample knowledge on areas of weakness that needed to be strengthened to capture what the objectives of the study were set to achieve. As a result, several key questions were either reframed or changed to suit the study objectives.

3.7 LIMITATIONS OF STUDY RESEARCH METHOD

There are different factors that affected the individual phases of data collection, analysis and interpretation. These factors may bring about some level of bias in the presentation of the study findings. Some of the factors are expressed below:

- **Organisational limitation:** this happens with both the qualitative and quantitative methods of data collection. Hindrance to the disclosure of vital information to researchers by most organisations might limit the strength of the research investigation. This situation could affect research outcome(s), creating a significant level of bias through underreporting.
- **Physical limitation:** In the study area (Anambra State), access to the rural areas may be constrained by poor infrastructural facilities (poor road network). This factor may limit the reach of the researchers in investigating the core factors contributing to poverty, food insecurity, as well as rural-urban linkage *(if any)*, owing to the fact that the population of interest in the research (food consumers, smallholder farmers, extension officers etc) may reside in hard-to-reach places (cities, communities, villages or settlements of the state).

- **Choice of study area:** The study area may represent a micro agro-climatic location in Nigeria. The majority of Nigeria's agriculture or farming activity takes place in the Northern part of the Country. Due to security reasons this project's inquiry cannot be conducted in the disturbed (conflict) regions of the Country (Nigeria). However, the results from this study may reflect (or could be generalised to) the food insecurity situation in Nigeria as a whole.
- **Time:** ultimately the date and time for project completion must be met. It is important to bear in mind that time is an important factor of every study, including its methodological delivery, because time lapsing in one process or study phase could grossly affect the progress of the research in general. Hence the research methodology was adhered to and delivered in a timely and accurate manner by the researcher.
- **Lack of prior research studies:** Citing previous research studies forms an essential part of the literature review or the thesis in general. This is crucial because it also lays the foundation for understanding the research challenges which may further inform the type of data to be collected. It is important to note that the lack of prior studies on a particular subject matter could affect the selection of variables for inclusion in a study.
- **Language fluency:** even though data is expected to be collected from the native state (Anambra State) of the researcher, language fluency may be an issue that gives room for some level of bias in field reporting and interpretation (transcribing).
- **Self-reporting:** whether data is pre-existing, or self-collection i.e., gathered using sets of structured survey data. Self-reported data is usually limited and characterised by the fact that it rarely can be independently verified. This means that the researcher will have to rely on what other people have said or say either during interviews, or in administering the structured survey. This means that the researcher will greatly depend on the respondent's response being truthful at it has to be taken at face value.
- **Research Generalisability:** Since the research is conducted in one State in Nigeria, the ability to generalise the outcome of the research findings remains uncertain. However, it may be possible to relate some of the research outcomes to other States in Nigeria where certain similarities persist, but where there are

differences such as the geographical location (soil condition), weather condition, human behaviour/culture etc, means more/or further studies may then be required.

3.8 SUMMARY

This chapter (Chapter 3) has presented the overview of the study area, with emphasis on the overall mapping of the context of the State (Anambra) and its capital (Awka). This chapter also builds on the strategy and methodology for developing the research objectives and hypotheses in this study. As a result, the rationale for the study; mixed method analysis within a pragmatic research approach is explained. The research objectives were planned for, using primary field data in both the quantitative (survey) and qualitative (group case and individual interview sessions) form. The questions used were field tested in the UK (by some Nigerian students) before its actual implementation on the field. Several limitations of the study include insecurity, difficulty in some instance to recruit participants, organisational limitations, physical limitations, time, lack of prior research studies, lack of generalisability, language fluency, self-reporting and choice of study area. The positionality of the researcher is positioned to be **interpretivist**, which allows the data tell the story, while giving room for new ideas to emerge from the data and subsequently interpreting the outcome of the field research.

The methodology in this thesis was structured to ensure that the major factors affecting poverty, food security, rural food system and urban food system are identified and analysed in order to arrive at strong conclusions with the possibility of providing feedback (policy/interventions/ or actionable programmes) to the Anambra State Government. Each of the next three (4, 5, & 6) chapters includes a short review of literature that set the scene for the presentation of the study findings. The next chapter (4) discusses household poverty and food insecurity within the urban context (in Awka), Anambra State, Nigeria.

CHAPTER 4

4 URBAN FOOD SYSTEMS AND FOOD CONSUMER'S BUYING PATTERNS IN AWKA, ANAMBRA STATE, NIGERIA

This chapter explores the current context of food security in the study area (Awka, Anambra State) as well as the socio-economic characteristics of food consumers by investigating the factors that contextualise poverty and food security with a view to isolating and analyse the key factor(s) that influence household poverty and food insecurity in the city of Awka, Anambra State, Nigeria.

4.1 BACKGROUND INFORMATION

The concept of poverty points to the lack of access to services, empowerment, income, and assets (Sabates, 2008). It depicts a situation where an individual lacks money or assets which can be political, social, and/or economic in nature (Etim et al., 2017). Poverty has two forms (a) absolute and (b) relative, where absolute poverty regardless of location suggests a person's inability to meet basic needs that include food, clothing and shelter. While the term relative poverty portrays a situation where certain individuals within a given society cannot enjoy the minimum standard of living when compared to others, especially when in this case, norms in a given location are taken into account (Sabates, 2008). Poverty is well evidenced in situations where there is an inadequate improvement in human development, agriculture, infrastructural development, and capacity building, and poverty is more pronounced in people that live below $2 per day (Etim et al., 2017). Poverty is also characterised by ill health, which connotes a state of powerlessness, insecurity, bad social relationships, physical weakness, and material lack e.g., clothes, shoes etc. (Etim et al., 2017). Poverty further implies the inability by affected people to meet the expected level of education, health, and life expectancy (Worldbank, 1996). Additionally, in such situations, the poor do not get involved in making critical decisions regarding the running of the society they live in (Anyawu, 1997). Some factors contribute to people being poor within a society, and they include: inadequate micro-economic policies, education, poor economic growth, low productivity, low levels of employment and low wage renumeration (Ajakaiye &Adeyeye, 1999; Awogbenle & Iwuamadi, 2010; Etim et al., 2017).

In today's society, poverty is also perceived as a product of laziness, low intelligence and poor individual inaction (Duze et al., 2008; Etim et al., 2017). Hence, poverty is framed as the inability to afford the basic necessities of life that include food, and the lack of financial

access, to resources, opportunities etc (Etim et al., 2017). This inability to afford/access basic life necessities indicate the social divide between the poor in a society and those who have the necessities to function fully within the same society. As a result, poverty is strongly linked to food insecurity, since it reduces the chances of individuals or households to be food secure in the context of other livelihood costs that are often outside their control.

One of the World's most challenging problems today is the rising human population, represented in more than seven billion people scattered all over the planet [earth] (Idris et al., 2020). In considering the number of people around the world that are in food crisis situation and poverty, the Global Report on Food Crisis (GRFC, 2020) claimed that over 135 million people in 55 countries are suffering from severe food insecurity, with 73 million people of the affected global population coming from 36 countries in Africa (Otekunrin et al., 2020) Over the years, various perceptions of the factors behind food insecurity have arisen including: inadequate supply of food due to the fall in agricultural production and the weakness of its distribution channels, poverty and hunger, and all are found occurring in many African countries including Nigeria (Etim et al., 2017).

The concept of food security is wide and multifaceted and is determined by geographical and socio-economic factors (Etim et al., 2017). Under the FAO (2009) framework that captures the four dimensions of food security (food availability, food access, food utilisation and stability) which also gives a clear understanding of the factors that influence poverty and food security. Similarly, the first and the most significant of the millennium development goals (MDGs) was to eliminate extreme poverty and hunger (Etim et al., 2017). Although, through the MDGs programme many positive impacts on the lives of people have been recorded, one in every five people in developing countries (including: Nigeria) still live on less than $2 a day. With the concern that millions of people might fall into poverty and become food insecure if adequate measures are not put in place (Etim et al., 2017). The Sustainable Development Goals (SDGs) were crafted to specifically address food insecurity, with goal one: addressing poverty and goal two: dealing with ending hunger, both taking on a dual approach in tackling food security challenges, improving nutrition and promoting sustainable agriculture.

Moving on, the factors that influence household poverty and food insecurity are considered in this chapter with regards to the urban study location, Awka, Anambra State, Nigeria. Having stated this, factors such as: education, employment status, household size,

household income, household food decision maker and the influence of market choice offer an insight and greater understanding of the contextual situation associated with poverty and food security in Awka, Anambra State. At the same time the data from this section of the PhD study provides answers to the following two research sub-objectives:

- To determine common and differentiated socio-economic drivers affecting urban food insecurity in Awka, Anambra State, Nigeria.
- To analyse factors responsible for urban food insecurity in Awka, Anambra State, Nigeria.

4.2 METHODOLOGY

The quantitative element is described in this chapter and the qualitative research undertaken in Awka is explored in Chapter 6. The methodology is explained in Chapter 3, but in summary primary data was collected using a semi-structured face to face survey administered by the researcher (see Section: 3.4 & 3.4.1) with 120 food consumers realised from Supermarket-A (n=60) and the local market, Eke-Awka (n=60). Descriptive statistics were used to analyse the data to present frequencies and percentages, while inferential (chi-squared) statistics was also carried out to consider the degree of association between two or more variables. Regression analysis was conducted using correlation analysis and regression coefficients to indicate the potential significance of the association of key factors assessed in the study.

4.3 SOCIO-ECONOMIC CHARACTERISTICS: RESULTS AND ANALYSIS

Across the dataset, respondents between the age range of 26-45yrs were the highest percentage in the [local market, supermarket and combined data set (where, the combined data set includes merged figures from both markets)] (75%, 70% & 72.5% respectively). This is followed by respondents within the age range of 18-25 (13.3%, 16.7% & 15%) and 46-65 (11.7%, 13.3% & 12.5%) see Table 4.1. This age range compares with the age level between 31-40 of (49%) reported by Mbah et al., (2016) in their study. In other comparisons, the Anambra State-Erosion and Water Shed Management Project (ANS-NEWMAP), (2014) showed the age distribution of respondents were between 18-35years (30%) and respondents between the age of 46 to 65 years to have the highest percentage of the dataset which is similar to the sample population in this survey. In addition to this, according to UN-Habitat, (2009)

based on the 2006 national population census, the total population of the people living in Awka made-up for all the six local government area totalled 1,003,911, with an annual average growth rate of 3.17% (per annum). Again, the population of female and male (the study by UN-Habitat did not specify on whether the population recorded is just adults or including children) within the capital city of Awka grew from male (322,647); female (343,249) in 1991 to male (521,389); female (482,522) in 2006. UN-Habitat further noted that the average household size per planning area (based on the data set of 1991) was 5 persons per household.

Female respondents in the local, supermarket and the combined data of the study population represents a high percentage in the population surveyed (68.3%, 76.7%, 72.5%), with male respondents across the two markets and the combined dataset (31.7%, 23.3%, and 27.5%) lower. Hence, female respondents were thus more represented among the study population than men (Table 4.2).

Based on the general dataset, n=80 (66.7%) of respondents are married, while n=29 (24.2%) are single, n=9 (7.5%) were widowed while only n=1 (0.8%) of the respondents surveyed was divorced and another, a widower (Table 4.3). No divorced respondent in the local market, nor widowers in the supermarket was surveyed. This implies that two thirds (66.7%) of the sample population are within married households and may access multiple income sources that may or may not enable households to afford food. Those who are single (24.2%), depending on whether they are living on their own or within a family unit and/or if such respondents are working, will influence their own ability to afford food or if they contribute to the family's ability to afford food. Across the dataset, males (including fathers) n=67 (55.8%) are stated to be in the position to take decisions on household food purchase (Table 4.4), followed by females n=27 (22.5%) and then individuals who are not residing in a family n=26 (21.7%).

4.3.1 AGE OF RESPONDENTS

Table 4. 1: Age of Respondent

	Local Market		Supermarket		Combined Data	
Age Range	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
18-25	8	13.3	10	16.7	18	15
26-45	45	75	42	70	87	72.5
46-65	7	11.7	8	13.3	15	12.5
Total	60	100	60	100	120	100

FIELD SURVEY, 2020. N=120

4.3.2 GENDER OF RESPONDENTS

Table 4. 2: Gender of Respondent

	Local Market		Supermarket		Combined Data	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Male	19	31.7	14	23.3	33	27.5
Female	41	68.3	46	76.7	87	72.5
Total	60	100	60	100	120	100

FIELD SURVEY, 2020. N=120

4.3.3 MARITAL STATUS

Table 4. 3: Marital Status

	Local Market		Supermarket		Combined Data	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Single	15	25	14	23.3	29	24.2
Married	38	63.3	42	70	80	66.7
Widowed	6	10	3	5	9	7.5
Divorced	0	0	1	1.7	1	0.8
Widower	1	1.7	0	0	1	0.8
Total	60	100	60	100	120	100

FIELD SURVEY, 2020. N=120

4.3.4 HOUSEHOLD FOOD PURCHASE DECISION MAKER

Table 4. 4: Household Food Purchase Decision Maker

	Local Market		Supermarket		Combined Data	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Father	33	55.0	34	56.7	67	55.8
Mother	12	20.0	15	25.0	27	22.5
Not residing in a family	15	25.0	11	18.3	26	21.7
Total	60	100.0	60	100.0	120	100.0

FIELD SURVEY, 2020. N=120

In the local market (Eke Awka), respondents with household size 3-6 had the highest percentage (45%) within the sample population, then individuals who live on their own (n=14; 23.3%), followed by respondents with household size of 7-10 (n=13) being 21.7% of the dataset (Table 4.5). Respondents in the supermarket setting displayed a different demographic, as family size within the range of 3-6 had the highest percentage (n=32; 53.3%), followed by single individuals (n=11; 18.3%), Families with household size of 7-10 (n=9) were 15% of the population, while those who with only two people in a household (n=8) were 13.3% of the dataset. The combined data set showed that amongst respondents in the surveyed population, the household size of 3-6 was mostly represented (n=59; 49.2%) this was followed by 20.8% of single individuals (n=25) and then 18.3% for households with a size between 7-10 (n=22).

4.3.5 HOUSEHOLD SIZE

Table 4. 5: Household Size

	Local Market		Supermarket		Combined Data Set	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Household Size of - 1	14	23.3	11	18.3	25	20.8
Household Size of - 2	6	10	8	13.3	14	11.7
Household Size of 3-6 (Median 4.5)	27	45	32	53.3	59	49.2
Household Size of 7-10 (Median 8.5)	13	21.7	9	15	22	18.3
Total	60	100	60	100	120	100

FIELD SURVEY, 2020. N=120

This implies that the majority of households are within the household size of three to ten people (67.5%). More so, single individuals and persons living on their own are represented as the second highest population when the three sets of data are compared. This compares with a household mix of 2-4 people (17.88%) and 5-9 people (40.90%) reported in NBS (2019). The question that arises is: are these families and single individual's food secure? This ultimately makes more sense when the average family size is correlated with the income statistics provided by the respondents (section 4.4.2 [table: 4.18]: see Chi-square tabulation of household size and household income per month after tax). This analysis will provide opportunity to estimate the food security index at individual and household level for the individuals in the sample population.

4.3.6 EDUCATION

Table 4. 6: Education

	Local Market		Supermarket		Combined Data Set	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
No formal education	6	10	0	0	6	5
Secondary school leaving Certificate	27	45	22	36.7	49	40.8
Bachelor's Degree	18	30	26	43.3	44	36.7
Master's Degree	3	5	5	8.3	8	6.7
Tertiary Institution-(Polytech)	6	10	7	11.7	13	10.8
Total	60	100	60	100	120	100

FIELD SURVEY, 2020. N=120

Here, the local market respondents with the largest group in terms of educational status hold a secondary school leaving certificate (n=27: 45%), this is followed by those with a bachelor's degree certificate (n=18: 30%). Whereas, in the supermarket setting respondents with the highest educational level were observed to be those with a bachelor's degree (n=26: 43.3%), then those with secondary school leaving certificate (n=22:36.7%). Similarly, in the combined data set respondents with a secondary school leaving certificate had the highest percentage (n=49: 40.8%), closely followed by those with bachelor's degree certificate (n=44: 36.7%). Interestingly, no respondents in the supermarket setting stated they had "no formal education" (Table 4.6). This agrees with the findings of Mbah et al., (2016) whose study was on "urban poverty incidence in Nigeria: a case study of Awka metropolis, Anambra State" and

showed that 47% of the sampled population in their study had secondary school education and 25% had tertiary education. This PhD study's sample population had a higher frequency of degree holders, while Mbah et al.'s study concludes that the sample population consist of people who are fairly literate. These results show that respondents that use both markets and supermarkets are moderately educated with a good number of them falling in the category of those having secondary school leaving and bachelor's degree certificates. This further implies that the majority of the respondents (40.8% and 36.7%) who took part in the survey (study) are educated with useful skills that increase their chance of employment, this could earn them sufficient salary that would in return boost their ability to cater for themselves and their families' food needs in addition to all other social and societal needs which include infrastructural bills (housing, transport etc.). In addition to this, these educational statistics of respondents also shows that the majority of the respondents would have some sort of basic knowledge regarding - food - dietary intake, based on their level of education.

4.3.7 EMPLOYMENT STATUS

Table 4. 7: Employment Status

	Local Market		Supermarket		Combined Data Set	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Unemployed	1	1.7	2	3.3	3	2.5
Partially Employed	6	10	2	3.3	8	6.7
Partly Employed & Student	9	15	8	13.3	17	14.2
Student	2	3.3	6	10	8	6.7
Self Employed	32	53.3	22	36.7	54	45
Fully Employed	10	16.7	20	33.3	30	25
Total	60	100	60	100	120	100

FIELD SURVEY, 2020. N=120

In the local market, self-employed respondents had the highest percentage (n=32; 53.3%) within the sample population. This is followed by those who are fully employed (n=10; 16.7%), respondents who are partly employed as well as studying at the same time were n=9 (15%), and those who are partly employed (i.e., individuals who operate on zero - hour contract or have occasional employment) only represented n=6 (10%) of the population (Table 4.7). While in the supermarket, respondents who are self-employed had the highest percentage of n=22 (36.7%) followed by fully employed respondents n=20 (33.3%) which is double that of

the respondents from the local market. This is followed by students who are also partly employed (n=8; 13.3%), then students that survive on the allowance/stipend received from their parents and /or sponsors were one tenth of the sample (n=6; 10%) population.

In the combined dataset, respondents who are self-employed had the highest percentage (n=54; 45%), followed by respondents who were employed full time (n=30: 25%), students who are partly employed (n=17; 14.2%), while students n=8 (6.7%) who are not employed but also receive some sort of stipend from parents or sponsors followed. Interestingly, only three respondents stated they were unemployed in this survey n=3 (2.5%). This compares with an unemployment rate of 34.24% for male and 24.13% for female reported in national data NBS (2019). This means that the sample population in this study had a higher employment rate than captured with the NBS figure, which summarised the unemployment rate in Nigeria as a whole. Similarly, the NBS (Q2), 2020 report for unemployment/and underemployment, showed that the current unemployment rate in Anambra state is 27.1%, while those who are under employed was 28.6%. The unemployment rate indicates that more people within Anambra State are either unemployed or underemployed than the proportion shown amongst respondents in this PhD study. The fewer respondents captured could have just been as a result of their presence at that study location, at the time of data collection, or respondents may have been too embarrassed to reveal or indicate that they were unemployed (i.e., there was a reporting bias), or it could simply just be the case of a skewed sample population, compared to the general city population or even both. This is an important consideration when reflecting on the findings of this study.

The dataset also suggests that the majority (53.3%, 36.7% & 45%) of the respondents in the study area are self-employed, which implies that they own their business which ordinarily exist on a small scale. Examples include: the hairdressers, tailor; barber shop, mechanic, electrician, printing press, book shop etc. While those respondents who are fully employed are likely to work for established entities (such as banks, manufacturing and transport companies etc.), it is important to note that from the combined dataset only 2.5% of the sampled population was observed to be unemployed.

The statistics show that majority of the survey population is occupationally engaged which means their ability to afford food is dependent on the salary they are paid or earn. The quantity and quality of food consumed by these respondents becomes significant in determining the food security level of the population surveyed owing to the respondent's household size and household income per month after tax (see section: 4.4.2).

4.3.8 HOUSEHOLD INCOME PER MONTH AFTER TAX

Table 4. 8: Household Income Per Month After Tax

	Local Market		Supermarket		Combined Data Set	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
<N18,000	7	11.7	10	16.7	17	14.2
N18,000-N40,000	23	38.3	15	25	38	31.7
N41,000-N80,000	20	33.3	18	30	38	31.7
N81,000-N100,000	6	10	14	23.3	20	16.7
N100,000>	4	6.7	3	5	7	5.8
Total	60	100	60	100	120	100

FIELD SURVEY, 2020. N=120

Respondents in the survey from the local market (Eke Awka) (Table 4.8) reported household income margins of N18,000-N40,000 (n=23; 38.3%) and N41,000- N80,000 (n=20; 33.3%) with these two groups having the highest frequency within the sample population. Similarly, in the supermarket setting, respondents with household income of N41,000-N80,000 (n=18; 30%), and household income of N18,000-N40,000 (n=15; 25%) were reported, while households within the income range N81,000-N100,000 represented nearly a quarter of the respondent's population (n=14; 23.3%). In the supermarket subset of the study data, n=10 (16.7%) households had income levels of and below N18,0000; and n=3 (5%) households are observed to have income of and above N100,000. While for the combined data set, respondents with income ranging between N18,000 to N40,000 and N41,000 to N80,000 was the highest proportion of respondents (n=38; 31.7%), while only n=20 (16.7%) of the sampled population had an income after tax between N81,000 and N100,000 per month, with n=17(14.2%) of the sample population living on less than N18,000 per month, and n=7(5.8%) had income of and above N100,000 per month after tax.

The NBS in a report about poverty from September 2018 to October 2019, state that 40% of the population (82.9 million people) lived below the poverty line of 137,430 naira ($381.75) a year or 11,450 naira per month NBS (2019). This figure represents urban and rural populations with the proportion being 18% in urban areas. This latter figure is similar to the sample population in this study. This means that majority of the households in the study population can be said to be **food insecure**. According to the World Bank Group, a person can be said to be living below the poverty line, if food expenditure and consumption is below $1.90

per person per day (Cruz et al., 2015). With regards to the data collected, this study's "household size" averaged 4.5people (obtained from the household data of this study/survey see Table 4.5). If household size is compared with household income, with the current exchange rate $1=N367 (as of 30th March 2020). N80,000 equates to an average household income per month of $218 or $7.79 per day. With an average household size of 4.5, this means that an average income of less than $1.73 per day is available for all expenditure for 77.6% of the sampled population respondents. This assumes that the household income is spent equally across all members of the household. This depth of analysis was not a key determinant of this study, but this overview finding is worthy of further analysis in future studies of this nature. However, food insecurity is influenced by access, acquirability and affordability more generally and potentially in this sample population. The aim of the research has not been to determine who is in poverty, or relative poverty according to a baseline figure, but positioning the sample population against such data is of value when interpreting the findings of the study. The results on the factors that influence food market choice (local market or supermarket) is presented next.

The data shows that food price appeared to be the main driver of consumers' market choice for 91.7% of the respondents in the local market (Table 4.9). In the supermarket, food quality is much more influential as 96.7% of the surveyed population stated this factor influenced choice. Other factors (location, food variety, loyalty, and distance to market) were of less influence but they still had some effect on consumer's choice of food market.

4.3.9 INFLUENCE OF FOOD MARKET CHOICE

Table 4. 9: Influence of Food Market Choice

	Local Market				**Supermarket**			
	Yes		**No**		**Yes**		**No**	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (n)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Food price	55	91.7	5	8.3	4	6.7	56	93.3
Distance to market	26	43.3	34	56.7	17	28.3	43	71.7
Food Variety	21	35	39	65	7	11.7	53	88.3
Loyalty	10	16.7	50	83.3	10	16.7	50	83.3
Food Quality	5	8.3	55	91.7	58	96.7	2	3.3

FIELD SURVEY, 2020. N=120

The distinguishing feature in the responses between the local market and the supermarket (food: price and quality), show the different behaviour of food consumers and their interaction with the two market types. This behaviour of food consumers depending on the type of market they visit, which could be as a result of; ***opportunity*** or wishing to have ***convenience***. Opportunity could be a factor in the sense that food consumers (especially in the local market) try to take advantage of the low food price of food commodities. While convenience attributes are associated with the supermarket food consumers, for whom price is not the primary concern, but quality is. This may be because they do not want to make lengthy travels to purchase low priced food commodities that are available in the local market, or they do not perceive the quality of the food in the market (local) as appropriate to their needs; hence they do their shopping in the supermarket or with street vendors closer to them, or simply a case where cost is not important to them. However, convenience comes at a price. This relates to the findings of Giroux et al., (2020), whose study was on informal food vendors and food system planning in an emerging African city. Their study concluded that despite the continuous rise in the number of supermarkets in South Africa, informal food vendors remain an important source of food for households in South Africa. This explains food consumer behaviour in patronising informal food vendors which reflects food consumers' approach to convenience. It could be said that food consumers rely on these three factors for their choice of market (a) physical factors (b) economic factors and (c) social factors. With regards to physical factors, food consumers consider factors as associated with infrastructure including: the type of building, road network that leads to the market, traffic, electricity within the market for food preservation, etc. The economic factors of influence include food price, quantity of food, food availability, quality for the price they pay (value) etc. While the social factors relate to the general environment (i.e.: market infrastructure and market hygiene) of any such market, and the level of interaction between the seller and the buyer that includes the: positioning of marketers within the market and the level of bargaining that takes place between both groups Giroux et al., (2020). Next is on the challenges food consumers face in acquiring food.

Road traffic was stated by 44 respondents (36.7%) in the combined data set, as the main challenge they face in acquiring food, this was followed by time constraints (n=40 (33.3%). A bad road network was also a factor to consider (Table 4.10). Interestingly, time was not an important factor for those respondents at the local market as only eight (n=8) people reported this as a major challenge (13.3%), however, this was the most important factor for respondents at the supermarket (n=32; 53.3%). In the combined data set, that includes data from both markets, high transportation cost (n=5; 4.2%) and distance to market (n=3; 2.5%) were both

identified but had a low response rate. Only two respondents (1.7%) noted that they faced no challenge what-so-ever in acquiring food. This implies that road traffic in this urban area (the study location: Awka), is a major challenge faced by respondents in acquiring food and can be attributed to poor infrastructural development within the city. Food insecurity in this regard is influenced by market access and consumers ability to acquire foods.

4.3.10 CHALLENGES FACED ACQUIRING FOOD

Table 4. 10: Challenges Faced Acquiring Food

	Local Market (Eke Awka)		Supermarket		Combined Data Set	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Road Traffic	30	50	14	23.3	44	36.7
Bad road network	19	31.7	7	11.7	26	21.7
Time	8	13.3	32	53.3	40	33.3
Distance to Market	2	3.3	1	1.7	3	2.5
High transportation cost	1	1.7	4	6.7	5	4.2
No Challenge Faced	0	0	2	3.3	2	1.7
Total	60	100	60	100	120	100.0

FIELD SURVEY, 2020. N=120

Respondents who noted that "time" was of major concern, could attribute this to their heavy/busy schedules, although this factor (time) was more challenging to food consumers in the supermarket than in the local market. As established previously the majority of the respondents who visit the supermarket (Table 4.9) state that they do so for the quality of the food, which on many occasions can attract high prices. Hence food consumers may be offsetting a lack of time with being prepared to pay higher prices. Similarly, this may reflect the busy lifestyle of the Awka working-class and business owners confirmed by the study of Bentina & Miriam (2015), who noted that fast food entrepreneurs grew quickly in numbers in the State to provide fast, on-the-go meals for the majority of business owners and working-class people of Awka metropolis. This trend was driven by individuals whose lives are hectic, busy and fast-paced. As a result of the busy schedules of food purchasers some people have no time to get food from the market. Hence, consumers may make a trade-off between working and earning income; and going to the market for food that may be more affordable. However, it is understood that food insecurity may continue even though consumers have the financial

ability to buy food. In other words, one third of food consumers (33.3%) amongst the study group in the Awka metropolis could be described as believing 'that they are time poor'.

4.3.11 DOMESTIC FOOD WASTE (RAW FOOD)

Table 4. 11: Food Waste-Domestic (Raw Food)

	Frequency (n)	Percent (%)
0-1%	69	57.5
2%-5%	51	42.5
Total	120	100

FIELD SURVEY, 2020. N=120

Sixty-nine (57.5%) respondents noted that at least 1% of waste is generated from the raw food that they purchased and processed (prepared, cooked) for their consumption (Table 4.11). While the remainder, fifty-one (42.5%) respondents stated that at least 2-5% of waste is generated from the raw food they purchase. This suggests that respondents are very meticulous with raw food purchased from the market and food waste at this stage is reasonably minimised. Invariably, the waste in this case may refer to non-edible food waste e.g., eggshells, bones from meat etc. Elsewhere in South Africa, the study by Ramukhwatho et al., (2017) found that household food waste emerged mostly from excess food buying, excess food preparation, poor food storage, poor purchase planning and falling for special offers and over purchasing. While this is the case in the South African study, respondents in this study were observed to be judicious with the raw food they purchase, this may be attributed to the proportion of low-income earners among the study group (see table 4.8). This was the opposite of the findings by Ramukhwatho et al., (2017) who noted that respondents in the Tshwane metropolitan municipal city in South Africa, whose household income is high tend to waste food the most, as it was observed that this group of respondents prepare too much porridge and rice that goes into waste. In this study only 2.5% of respondents stated they wasted more than 5% of the food they cooked (Table 4.12). Poor food storage is one factor that is similar to food consumers in both study locations especially in the case of Nigeria (Awka, market and supermarket respondents) (see table 4.14) where poor access to electricity is seen by respondents (79.2%) in this PhD study as one of the main factors that affects their ability to store food.

4.3.12 DOMESTIC FOOD WATES (COOKED FOOD)

Table 4. 12: Food Waste-Domestic (Cooked Food)

	Frequency (n)	Percent (%)
0-1%	31	25.8
2%-5%	86	71.7
6%-15%	3	2.5
Total	120	100

FIELD SURVEY, 2020. N=120

Eighty-six (71.7%) respondents noted that 2-5% of food waste is generated domestically from cooked food (Table 4.12). This was followed by 25.8% of respondents stating they lost 0-1% of cooked food as waste, while only three (2.5%) of respondents generated 6-15% of waste from their utilisation of food (cooking food). This implies that food waste (as a result of cooking) in the sample population is not reported as high. This may be because respondents cook food carefully for the numbers who will eat it in the household thus preventing food waste, or they find a means to properly store excess cooked or unconsumed food to prevent or minimise domestic food waste. Significantly, it is important to highlight that the storing of food in refrigerators would require constant electricity (infrastructure) [see table 4.14 on: challenges faced in preparing and storing food]. Poor infrastructure such as living where there is no access to electricity, or the electricity supply is intermittent, might limit the respondent's desire to purchase food in a large quantity or cook in a large quantity. Again, this also goes against the findings of Ranukluwatho et al., (2017). As respondents in this PhD study are observed to have low income, food purchase planning may be done meticulously to minimise waste and as suggested, in the absence of a consistent, steady electrical power supply (see table 4.14), these respondents could invest in generator sets that power their storage equipment (refrigerator), but generator sets are expensive to sustain, and unfriendly to the environment causing air pollution.

4.3.13 WASTE HANDLING

Table 4. 13: Dealing with Domestic Waste

	Frequency (n)	Percent (%)
Bin	96	80
Compost	24	20
Total	120	100

FIELD SURVEY, 2020. N=120

Ninety-six (80%) respondents stated they throw away their domestic waste, while only 20 percent stated that they compost their domestic waste either for plant production or animal feed production (Table 4.13) i.e., a high number of respondent's throw away their waste, albeit that they have little waste. It is however important to find out what happens to the food waste that was 'municipal waste'; for example, is it someone else's food source (food picking)? Is the food waste recycled or used for another activity? Does it go to landfill (dumped on empty land area), and then become a source of food, or lead to pollution as it degrades? This study, under the case study section (qualitative data analysis section) will try to answer these questions further (see chapter 6).

4.3.14 INFRASTRUCTURAL CHALLENGES FACED IN PREPARING AND STORING FOOD

Table 4. 14: Infrastructural Challenge faced in Preparing and Storing Food

CHALLENGES FACED IN PREPARING AND STORING FOOD	**Yes**		**No**		**Total (n)**
	Frequency (n)	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**	
Poor access to electricity	95	79.2	25	20.8	120
Water availability	67	55.8	53	44.2	120
High cost of cooking facilities	48	40	72	60	120

FIELD SURVEY, 2020. N=120

Infrastructurally, 79.2% of respondents noted that poor access to electricity is their main challenge in preparing and storing food (Table 4.14). Water availability had no clear distinction over whether it is an issue to respondents as 55.8% of respondents accepted that water availability affects their effort in preparing and storing food. Six out of ten of the sample population, disagreed that the "high cost of cooking facilities" is an important challenge in preparing and storing food. This implies that poor access to electricity is the major factor of concern from the three proffered in the interview to respondents.

4.3.15 MARKET CHALLENGE

Table 4. 15: Market Challenge

	Local Market (n=60)		Supermarket (n=60)		Combined Data Set (n=120)	
Variables	Yes	No	Yes	No	Yes	No
Over crowding	55 (91.7%)	5 (8.3%)	9 (15%)	51 (85%)	64 (53.3%)	56 (46.7%)
Delay in time of response by Seller	7 (11.7%)	53 (88.3%)	54 (90%)	6 (10%)	61 (50.8%)	59 (49.2%)
Challenges encountered in using this market (Poor Market Facility)	27 (45%)	33 (55%)	23 (38.3%)	37 (61.7%)	50 (41.7%)	70 (58.3%)
Poor mobility network - Footpath access	39 (65%)	21 (35%)	2 (3.3%)	58 (96.7%)	41 (34.2%)	79 (65.8%)
High market charges/taxes	3 (5%)	57 (95%)	34 (56.7%)	26 (43.3%)	37 (30.8%)	83 (69.2%)
Poor communication	3 (5%)	57 (95%)	7 (11.7%)	53 (88.3%)	10 (8.3%)	110 (91.7%)
Poor preservation	2 (3.3%)	58 (96.7%)	1 (1.7%)	59 (98.3%)	3 (2.5%)	117 (97.5%)

Source: Field Survey, 2020. N=120

As result of poor electricity supply, food preparation and storage depict vulnerability, and this could discourage food consumers from purchasing food in large quantities as they may try to prevent waste, which may indirectly induce hunger. This agrees with the findings of Warren (2016), who identified a host of issues that affect food safety, food retail, food governance, urban and peri-urban agriculture in Africa and urban food systems in Africa. Peculiar to Nigeria, Warren Smith noted that the unavailability of portable water and the lack of adequate infrastructure (including electricity) affects the safety of food at all levels (household, street vendors, supermarket etc.), with practical examples in this thesis chapter 6.

Some market challenges are peculiar to either the local market or the supermarket, others are common to both. In the local market "over-crowding" (n=55; 91.7%) is significantly more important while "poor mobility network-footpath access" is slightly more of a concern for those accessing the local market (Table 4.15). In the local market, it is clear that infrastructural challenge exists for those seeking to access the market. In the supermarket, among the sample group, "delay in time of response by the seller" was stated by 90% of respondents as being a challenge encountered by food consumers. In the combined data set, "high market charges" (n=61; 50.8%) appeared to be a concern for half of the respondents among the study group who were then asked about options to improve the market channel they use in the next section.

4.3.16 MARKET IMPROVEMENT OPPORTUNITIES

Table 4. 16: Market Improvement Opportunities

	Local Market (n=60)		Supermarket (n=60)		Combined Data Set (n=120)	
Variables	Yes	No	Yes	No	Yes	No
Employment of more staff	1 (1.7%)	59 (98.3%)	54 (90%)	6 (10%)	55 (45.8%)	65 (54.2%)
Government intervention	52 (86.7%)	8 (13.3%)	1 (1.7%)	59 (98.3)	53 (44.2%)	67 (55.8%)
Provision of improved market facilities	28 (46.7%)	32 (53.3%)	24 (40%)	36 (60%)	52 (43.3%)	68 (56.7%)

Source: Field Survey, 2020. N=120

In the local market, respondent's clamour for government intervention (n=52; 86.7%) in improving food market infrastructure for the convenience of both the food sellers and food consumers who visits the market (see table 4.16). On the other hand, in the supermarket, the employment of more staff (n=54; 90%) was found to be more important to respondents as an improvement within its setting. Finally in the combined data set of both the local and supermarkets, no variable was found to be significantly more important than others across both locations mainly because of the skewed response in each group for these two factors and similar results for improvement of facilities.

In summary, having considered the univariate results by each market response group and as a combined dataset. The bivariate analysis is now undertaken to determine inference and equivalence in response from both sub-populations, and alternatively highlight any significantly different responses between the local market and the supermarket respondents.

4.4 INFERENTIAL ANALYSIS OF THE DATA

The first set of analysis considers the demographics of the respondents and whether this is a factor of influence in the different types of market they patronise.

4.4.1 ASSOCIATION BETWEEN MARKET TYPE AND RESPONDENT'S DEMOGRAPHICS

Type of Market and Age of Respondent (H_1)

The age of respondents and the type of market they were interviewed in was analysed (table 4.21 [Appendix 2]). A total of eighty-seven respondents (n=45 and n=42) in both the local market and the supermarket were between the age of 26-45. Respondents between the age of 18-25 had a total number of respondents across the two market settings as n=18 (n=8 and n=10). And only, n=15 respondents were between the age of 46-65. Using the Chi-square test of independence ($X^2(5) = 0.392$, $p > .05$), the null hypothesis is accepted and there is no statistically significant association between age of respondent and the type of market they were interviewed in.

Type of Market and Marital Status (H_2)

The marital status of respondents and the type of market they were interviewed in was analysed (table 4.21 [Appendix 2]). In both the local market and supermarket, the margins of disparity are low. Respondents who were married where slightly higher (n=42) in the supermarket setting than the local market setting (n=38). Those who are single (local market n=15; supermarket n=14) were similar. Widowed respondents were slightly higher in the sample from the local market (n=6), than the supermarket (n=3). Using the Chi-square test of independence ($X^2(4) = 3.234$, $p > .05$), there appeared to be no statistically significant association between the marital status of respondents and the type of market they use.

Type of Market and Household Size (H_3)

In both the local and super-market(s), household size between 3-6 were observed to be the highest in terms of respondents (table 4.21 [Appendix 2]). Fifty-six respondents were from this household in this category (household size between 3-6), single households had a total number in both markets of twenty-five respondents and respondents with larger household size (between 7-10) were slightly more likely to be in the local market group of respondents than the supermarket respondents. Using the Chi-square test of independence ($X^2(3) = 1.797$, $p > .05$), it is determined that, there is no statistically significant difference between the household size of respondents in the sample population and the types of market these respondents were interviewed in.

Type of Market and Educational Status (H_4)

Of the 120 respondents sampled in both the local and supermarket(s), respondents with secondary school leaving certificate were found to have a higher occurrence (**n=55:** local market n=33 and supermarket n=22) among the study group see table 4.21 [Appendix 2]. Respondents with bachelor's degree in both markets represents (**n=44:** n=18 and n=26), whereas respondents with Master's degree certificate and above had (**n=21:** n=9 and n=12). Using the Chi-square test of independence ($X^2(2) = 4.083$, $p > .05$), there appear to be no statistically significant difference between the education of respondents and the types of market the respondents were interviewed in.

Type of Market and Employment Status (H_5)

In considering respondents' occupation, a total of n=55 respondents had full time employment (or are fully employed) in both the local market and supermarket population (n=25 and n=30). While fifty-four respondents are self-employed in both markets (n=32 and n=22) see table 4.21 [Appendix 2]. Other case reported was the unemployed category (n=11; n=3 and n=8). Using the Chi-square test of independence ($X^2(2) = 4.579$, $p > .05$), it was determined that there is no statistically significant difference between the occupation status of respondents and the types of market these respondents were interviewed in.

Type of Market and Household Income After Tax per Month (H_6)

Respondents in both local and supermarkets had a total of thirty-eight respondents with a household income of either (₦18,000-N40,000) or (₦ 41,000-N80,000). Twenty respondents stated they had households (n=6 and n=14) with an income between ₦81,000 - ₦100,000. Seventeen respondents had an income <₦ 18,000 and seven respondents had monthly income after tax ₦ 100,000 and above. Using the Chi-square test of independence ($X^2(4) = 5.662$, $p > .05$), it is clear that there is no statistically significant association between the respondent's household income per month after tax and the different markets the respondents were interviewed in.

In summary, there was no significant difference determined for these demographic criteria of the respondents and the markets in which they were interviewed.

Type of Market and Challenges Faced with Acquiring Food (H_7)

The factors faced when acquiring food were cross tabulated against the market where the respondents were interviewed (see table 4.17). Using the Chi-square test of independence ($X^2(5) = 29.890$, $p < .001$), the null hypothesis is rejected and due to the violation of one of Chi-square's assumptions (i.e., six cells (50%) having expected count less than 5), the likelihood ratio 32.167 was then reported with p= 0.000 which is (<) less than .001.

Table 4. 17: Chi-square Between Challenges Faced Acquiring Food and Type of Market Consumers Visit

	TYPE OF MARKET		**Total**	**X^2**	**P-Value**
	Local market	Supermarket			
CHALLENGES FACED WITH ACQUIRNG FOOD					
High transportation cost	1	4	5	29.89	<.001
Bad road network	19	7	26		
Traffic	30	14	44		
Time	8	32	40		
No Challenge Faced	0	2	2		
Distance to Market	2	1	3		
Total	60	60	120		

Source: Field Survey, 2020

This means that there is a statistically significant association between the challenges faced by respondents in acquiring food and the different types of markets respondents patronise. This indicates that the challenges faced by respondents in acquiring food varies by their market choice. In the local market, respondents reported they were more likely to face the challenge of 'traffic' and 'bad road network' in acquiring food, whilst in the supermarket setting respondents stated they were more likely to face the challenge of 'traffic', but also 'time.' These results concur with earlier findings from the descriptive statistics (see: table 4.10) but show that there is a statistically significant difference between the responses of the two sub-groups in the study population.

4.4.2 ASSOCIATION BETWEEN GENDER AND THE CHARACTRISTICS OF THE HOUSEHOLD (FOOD DECISION MAKER)

Gender of the Household Food Purchase Decision-Maker and Household Size (H_8)

Respondents in both locations were asked to identify who the household food purchase decision maker was in the family context, and they were further asked to respond in terms of father, mother or not that they were not residing in a family (see table 4.19). Where the household size was over three people, between 3-6 household members, the father (n=39) made the household food purchase decision followed by mothers n=19. For household size between 7-10, the fathers (n=20) still made the food purchase decision, then mothers who were only two people in this category. Indeed, in the sample population, the family size that depicted that of an average (real) household (n=94), 71.3% identified the food decision-maker as being the father.

The chi-square test of independence ($X^2(6) = 111.254$, $p < .001$) shows that the null hypothesis is rejected. However, due to the violation of one of Chi-square's assumptions (four cells (33.3%) having expected count less than 5), the likelihood ratio 107.719 was reported with p= 0.000 which is (<) less than .001 the null hypothesis was also rejected. This implies that there is a statistically significant association between who is the household food purchase decision-maker and the household size of respondents. The Phi Value is 0.963, $p < .001$ and is significant. This implies that there is a large/strong association between household food purchase decision-maker and the household size of respondents. A rise in the household size where fathers are the breadwinners of the home, fathers are more likely to be the food purchase decision maker, followed by mothers and then individuals who live on their own.

Household Food Purchase Decision Maker and Household Income (H_9)

In this study, a relative poverty baseline of a household income per month after tax, as being greater than N80,000 (understood from previous narrative, see section 4.8). Respondents who are fathers (n=19 and n=6) are above this relative poverty line, similarly only (n=2) mothers are in this range. Hence, the data also shows that those who are single and staying on their own (n=15) are living below this household income "line", but they tend to be in smaller households (see: table 4.18). The chi-square test of independence ($X^2(8) = 71.717$, $p < .001$), implies that the null hypothesis is rejected. However, due to the violation of one of the Chi-square's assumptions (seven cells (46.7%) having expected count less than 5), the likelihood

ratio 75.850 was reported with p= 0.000 which is (<) less than .001 the null hypothesis was also rejected. This implies that there is a statistically significant association between who the household food purchase decision-maker is and their household income per month after tax. The Phi Value is 0.773, p< .001 and is significant. This implies that there is a large/strong level of association between household food purchase decision maker being the father as household income per month after tax of respondents increases.

Table 4. 18: Chi-Square: Association between Gender and the Characteristics of the Household (Food Decision Maker)

HOUSEHOLD FOOD PURCHASE DECISION MAKER AND HOUSEHOLD SIZE							
	Household Size of Respondent				Total	X^2	P-Value
Household Food Purchase Decision Maker	1	2	3-6	7-10			
Father	1	7	39	20	67	111.254	<.001
Mother	0	6	19	2	27		
Not residing in a family	24	1	1	0	26		
Total	25	14	59	22	120		
HOUSEHOLD FOOD PURCHASE DECISION MAKER AND HOUSEHOLD INCOME							
	Household Income Per Month After Tax					Total	X^2	P-Value
Household Food Purchase Decision Maker	<N18,000	N18,000-N40,000	N41,000-N80,000	N81,000-N100,000	N100,000>			
Father	0	16	26	19	6	67	71.717	<.001
Mother	2	12	11	1	1	27		
Self	15	10	1	0	0	26		
Total	17	38	38	20	7	120		
HOUSEHOLD SIZE OF RESPONDENT AND HOUSEHOLD INCOME								
	Household Income Per Month After Tax					Total	X^2	P-Value
Household Size	<N18,000	N18,000-N40,000	N41,000-N80,000	N81,000-N100,000	N100,000>			
1	15	9	1	0	0	25	73.127	<.05
2	0	6	6	1	1	14		
3-6	2	20	22	13	2	59		
7-10	0	3	9	6	4	22		
Total	17	38	38	20	7	120		

Source: Field Survey, 2020

Household income and household size (H_{10})

Across the dataset tabulated (see table 4.18), the family size between 3-6 had the highest total number of respondents n=59 (n=20 [N18,000-N40,000] and n=22 [N41,000-N80,000]).

Using the chi-square test of independence ($X^2(12) = 73.127$, $p < .001$), the null hypothesis is rejected. However, due to the violation of one of Chi-square's assumptions (twelve cells (60%) having expected count less than 5), the likelihood ratio 71.287 was reported with p= 0.000. This implies that there is a statistically significant association between respondent's household size and their household income per month after tax. The Phi Value is 0.781, $p < .001$ and is significant. i.e., a rise in household income was associated with a rise in the number of household members that would be catered for. This may be the case of having more children as income allows, or once an individual's income increases, the likelihood of marrying more wives or feeding other extended family members other than their own direct family becomes more viable and occurs. This is worthy of further study.

The inferential statistics in this section between household food purchase decision maker and household size and household income indicates that there is a statistically significantly association between the variables, indicating that within the households of the study groups, larger households are more likely to have fathers as the decision maker regarding food purchase, where fathers are present households are more likely to have higher incomes. This study highlights the role of fathers within the household in consideration of aspects of poverty and food insecurity. Following on from this section, the next section focuses on the reported influence of the household food purchase decision maker on key variables, using correlation, regression coefficient, regression distribution chat, probability plot, and scattered plot analysis in explaining the findings.

4.5 REGRESSION ANALYSIS

The regression analysis (correlation and regression coefficient) is summarised in Table 4.19 and 4.20. The aim of the analysis is to test further associations in the dataset. The findings are then discussed. Thus, this section reflects on any association identified. The relationship between respondent's variables was computed here using the Pearson Product Moment Correlation Coefficient.

Table 4. 19: Correlation Results-Analysis

Association	Result	Comments
Educational status of respondent and marital status	There was a weak, positive correlation between the two variables, r=-0.180, n=120. p<.05.	This implies that there is a statistically significant association between respondent's educational status and marital status. This implies for the sample population that the more educated an individual is the less likely their marital status would change.
Educational status of respondent and employment status	There was a weak, negative correlation between the two variables, r=0.014, n=120, p>.05.	This further indicates that respondents would be occupationally engaged even if they are not educated, for instance respondents with menial jobs that do not require certificates to hold a job or work, respondents with such jobs have sort of earnings and can afford food. 45% of respondent are self-employed in this study.
Educational status of respondent and challenges faced with acquiring food	There was a weak, positive correlation between the two variables, r=0.132, n=120, p>.05.	The result reveals that the educational status of respondents has no effect on the challenges they face in acquiring food by respondents in the study area, because even if respondents are educated; they all still face the same challenge in acquiring food.
Educational status of respondents and household size of respondent	There was a weak, positive correlation between the two variables, r=0.168, n=120, p<.05.	There is a statistically significant association between household size and educational status of respondents. The result shows that the more educated an individual respondent is, the more likely his/her household size is to be larger.
Educational status of respondent and household income per month after tax	There was a moderate/ medium weak, negative correlation between the two variables, r= -0.373, n=120, p<.001.	There is an inverse statistically significant association between educational status of respondents and household income per month after tax. This implies a rise in the educational status of the respondent leads to a decrease in the household income per month after tax of respondents. This may be a factor of the high level of self-employed respondents in the study.
Employment status and marital status	There was a moderate/ medium, positive correlation between the two variables r=0.426, n=120, p<.001.	This implies that there is a statistically significant association between respondent's employment status and their marital status. This may show that the employment status of respondents has a significant influence on their decision to settle down (marriage).
Employment status and household size of respondents	There was moderate/ medium, positive correlation between the two variables. r=0.542, n=120, p<.001,	There is a statistically significant association between the employment status and household size of respondents. This association has already been identified (H_{11})
Employment status and challenges faced with acquiring food	There was a weak, negative correlation between the two variables, r= -0.181, n=120. P<.05	This implies that there is a statistical association between employment status and challenges faced with acquiring food. See section 4.5.2 being employed may limit opportunities to acquire food.

Table 4.19: Correlation Results – Analysis-Continuation

Association	Result	Comments
Employment status and household income per month after tax	There was a moderate/medium, positive correlation between the two variables, r=0.377, n=120. P<.001.	This implies that there is a statistically significant association between respondents' employment status and household income per month after tax. Implying that respondents who are occupationally engaged stands a better chance of boosting their household income simply because of their exposure to a steady source of income.
Household size of respondent and marital status	There was a moderate/medium, positive correlation between the two variables. r=0.446, n=120, p<.001	This implies that there is a statistically significant association between respondent's household size and their marital status. This implies that household sizes are different based on their marital status. Hence, respondents who are either married/or engaged, have an increased household size (increasing either by one or more persons) again having some level of influence on their household food security.
Household size of respondent and household income per month after tax	There was a strong, positive correlation between the two variables, r=0.600, n=120. p<.001.	This implies that there is a statistically significant association between respondent's household size and household income per month after tax. The result shows that household income has an effect on household size.
Household income per month after tax and marital status	There was a moderate/medium, positive correlation between the two variables. r=0.308, n=120, p<.001	This implies that there is a statistically significant association between respondent's household income per month after tax and their marital status. Similar to employment status, the more comfortable respondents are (with regards to income), the more likely they are to settle down (get married). This also changes their food purchase planning and decision-making processes.
Challenges faced with acquiring food and household income per month after tax	There was no correlation between the two variables. r=-0.042, n=120, p>.05	This implies that there is no statistically significant association between the challenges faced by respondents in acquiring food and their household income per month after tax. This may be the case as majority of the challenges respondents face in acquiring food are physical challenges (bad road network, traffic, and time), affect all of the respondents equally irrespective of income.
Challenges faced with acquiring food and marital status	There was no correlation between the two variables, r=-0.116, n=120. P>.05.	The data shows that there is no statistically significant association between challenges faced by respondent in acquiring food and marital status. The data shows that marital status have no effect on the challenge faced with acquiring food.

Table 4.19: Correlation Results – Analysis-Continuation

Association	Result	Comments
Household food purchase decision-maker and marital status	There was a moderate/medium, positive correlation between the two variables, r=-0.450, n=120. p<.001.	This implies that there is a statistically significant association between respondent's household food purchase decision-maker and marital status. This shows there is an association with marital status and who is the decision-maker (see previous narrative).
Household purchase decision-maker and employment status	There was a moderate/medium, negative correlation between the two variables. r= -0.465, n=120, p<.001.	This implies that a statistically significant association exists between household purchase decision maker and their employment status. The result here does not conform to expectation (or is unrealistic). Hence, not all respondents were the household food decision maker. i.e., a woman stating her employment status whereas the husband is the household food decision maker.
Household food purchase decision-maker and household size of respondent	There was a strong, negative correlation between the two variables, r=-0.798, n=120, p<.001.	This implies that a statistically significant association exists between household purchase decision maker and house size of respondent. The result implies that the household size of respondent is negatively associated with who is the purchase decision-maker
Household food purchase decision-maker and household income per month after tax	There was a strong, negative correlation between the two variables. r=-0.644, n=120, p<.001.	This implies that there is a statistically significant association between household food purchase decision-maker and household income per month after tax. The result shows that household income has an inverse effect on who is the food purchase decision maker.
Household food purchase decision-maker and educational status of respondent	There was a weak, negative correlation between the two variables. r=-0.286, n=120, p<.001.	This implies that there is a statistically significant but inverse association between household food purchase decision maker and respondent's educational status. This implied that a rise in the education level of respondents is negatively associated with who is the purchase decision-maker.
Household food purchase decision-maker and challenges faced with acquiring food	There was a positive, weak correlation between the two variables, r=-0.060, n=120, p>.05.	This implies there is a weak statistically significant association between who is household food purchase decision maker and the challenges faced by respondents in acquiring food.

4.5.2 EMPLOYMENT STATUS AND CHALLENGES FACED WITH ACQUIRING FOOD

The relationship between respondent's employment status and challenges faced in acquiring food shows a statistically significant association ($p<0.05$) i.e., an increase in employment status of respondents would likely result in a decrease in the challenge faced by respondents in acquiring food which most importantly includes time and access (financial access or physical access with regards to transportation). This further indicates the trade-off for respondents between earning income and having time to acquire food, and as respondents in the study area rise in their employment status. This agrees with the findings of Kalenkoski & Hamrick (2013) who studied the daily activities of Americans. Using a survey as well as the associated eating and health analysis they assessed the relationship between time poverty and behaviour with respect to specific food energy balance. The study found that "time poor" individuals had different food consumption (eating) and physical activity patterns than those who are not-time-poor. Notably, those who were time-poor were less likely to purchase fast food (due to distance to travel) and they are also less likely to partake in active travel. This shows that there is an interaction between physical infrastructure, time available and food access. In Canada, Coltruglio & Slater (2016) used qualitative analysis in a "grounded theory study" to explore the concept of food literacy of young adult Canadians and found that young adult Canadians faced challenges with healthy eating as well as acquiring and using food (literacy or skill in cooking). The study identified three main reasons for this: (1) the lack of food and nutrition education before individual adults live independently via home and/or school environments, (2) time limitations and (3) complicated food relationships. This further shows that food consumers in this PhD study may face other forms of challenge (lack of knowledge and complicated food relationships) in acquiring and utilising food. This was not considered in this study but is worthy of further analysis.

4.6 REGRESSION COEFFICIENT

In a typical regression output, the regression coefficients and p-values combine to reveal which relationship in the model is statistically significant as well as the nature of such relationships. The regression coefficients explain the mathematical relationship between each of the independent variables and the dependent variables, where the p-values of the coefficients indicates if such relationships are statistically significant or not. The results here outline the relationship between the independent variables and the dependent variables displaying the regression coefficients and their p-values (table 4.21). The equation is:

$$y = Log\left(\frac{p}{1-p}\right) = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + e_i$$

Where, Y= Household Food Purchase Decision Maker [father, mother, and self] - (a proxy for food access [one of the pillars of food security]), X_1= Market choice (food price), X_2= Market choice (quality of food), X_3= Age of respondent, X_4= marital status, X_5= Challenges faced with acquiring food, X_6= occupation, X_7= Household size, X_8= education status, X_9= household income, X_{10}= frequency of market visit.

Table 4. 20: Regression Coefficient: Household Food Decision Maker-Marital Status (Married)

Household Food Purchase Decision		B	Wald	Sig.	Exp(B)
Mother	Intercept	10.481	5.622	0.018	
	Influence of Market Choice (Food Price)	-0.927	0.537	0.464	0.396
	Influence of Market Choice (Quality of Food)	0.745	0.272	0.602	2.106
	Age of Respondent	-2.661	3.413	0.065	0.070
	Marital Status: Married	-3.363	7.975	0.005**	0.035
	Challenges in acquiring Food: Traffic	0.135	0.028	0.866	1.144
	Challenges in Acquiring Food: Time	-1.083	1.360	0.244	0.338
	Fully Employed	-0.333	0.211	0.646	0.717
	Household Size 1	-0.541	0.312	0.576	0.582
	ED- Sec. School Certificate	-0.781	0.731	0.393	0.458
	ED- Bachelor Degree	-1.111	1.537	0.215	0.329
	Household Income PMAT 1	0.180	0.062	0.804	1.197
	Household Income PMAT 1	-1.302	1.807	0.179	0.272
	Frequency of Market Visit	-0.874	1.306	0.253	0.417
Self	Intercept	14.061	0.000	1.000	
	Influence of Market Choice (Food Price)	33.193	0.000	0.998	2603.000
	Influence of Market Choice (Quality of Food)	17.494	0.000	0.997	3958.216
	Age of Respondent	-39.011	0.000	0.997	1.142
	Marital Status: Married	-52.209	0.000	0.995	2.118
	Challenges in acquiring Food: Traffic	-36.053	0.000	0.996	2.198
	Challenges in Acquiring Food: Time	-4.168			0.015
	Fully Employed	-50.160	0.000	0.994	1.644
	Household Size 1	66.841	0.000	0.994	1.068
	ED- Sec. School Certificate	51.020	0.000	0.995	1.437
	ED- Bachelor Degree	36.413			6514.000
	Household Income PMAT 1	33.185	0.000	0.995	2583.000
	Household Income PMAT 1	30.977			2839.400
	Frequency of Market Visit	-17.582	0.000	0.997	2.312
a. The reference category is: Father.					

Source: Field Survey, 2020. N=120

* Significant at p<0.05, ** Significant at p<0.01%, *** Significant at p<0.001%

Adjusted R^2= 0.695 F-value= 42.836

The estimated parameters and the relevant statistical results obtained from the analysis as presented in Table 4.20 is detailed below, additionally, only significant variables, based on the set (significance) parameters listed above have been reported in this section.

Model Fitting Information

This was assessed using the chi-squared statistics. The result showed that the chi-square value is 156.054 and the p-value was less than 0.001 (156.054, p<.001), i.e., the p-value is significant at 1% level of confidence. This implies that there is a significant association between the independent variable and the dependent variable in the model that was tested.

Pseudo R-square

The pseudo-R-square measure include the Cox and Snell (0.728), Nagelkerke (0.843) & McFadden (0.655). The model accounts for 65.5% to 84.3% of the variance and relatively reflects an acceptable-sized effect.

Likelihood Ratio Test

The likelihood ratio test shows that the following independent variables (Age of respondents [8.330; p=.016*]; Marital status - Married [26.418; p<.001***]; Household size 1 [24.617; p<.001***]; were significant at different levels. This implies that these independent variables contribute significantly to the overall model.

Regressed Parameters

Mothers:

With respect to the household food purchase decision making (dependent variable), and fathers as the reference variables. Marital status - Married (for women or mothers) had a significant (b= -3.363, Wald= 7.975, p=.005**) association with the household food purchase decision making (with a negative coefficient). This shows that women who are married among the study group were less likely to be the household food purchase decision maker. The odds ratio also indicated that women (mothers) were .035 times less likely to be the decision maker. Implying that amongst married couples within a household, women (mothers) are less likely to be the household food purchase decision maker. The result here practically implies that amongst married members of a family unit (among the study group), the household food decision-maker is more likely be the male (father) in this case (see table 4.4).

All other variables: influence of market choice (food price and food quality); age of respondent, challenges faced with acquiring food (traffic, time); occupation (fully employed);

household size; educational status (Sec. school certificate & Bachelor degree) and household income per month after tax (1 & 3), had no significant effect on household food purchase decision making (with fathers as the reference variable) in the case of the mothers.

Self (those who reside on their own):

The variables regressed (see table 4.20), had no significant effect on household food purchase decision with fathers as the reference variable. This confirms to expectation, since these group of individual leave independently on their own and make their own food purchase decision outside the influence of their parents (father or mother) or even the household in general terms.

Bourlakis & Weightman (2004) explored the role(s) of household food decision maker and other family members who support or influence the food decision making process within the household in six (6) roles:

(a) Initiators: this is the individual that recommends the idea of buying the food product or services.
(b) Influencers: the person whose notion, view or suggestion influences the food purchase decision making process.
(c) Decider: the person who makes the decision on any aspect of a buying decision, if to buy, what food to buy, where to buy from and how to buy such food component.
(d) Buyer: the person who actualise the food purchase plan i.e., the person that does the leg work.
(e) Users: the person(s) or individual(s) that consumer or make use of the food products and services purchase or paid for.
(f) Gatekeepers: the person that tracks food information and products intended for the household/family.

Whilst all householder members are users and could be initiators or influencers at a given time, the findings (regression) in this chapter are centred on the "food decider." It is worth of noting that the household 'gatekeepers' regulate what food products and services the household actually pay for (Bourlakis & Weightman, 2004), also see subsection [2.2.2]. Supporting this finding is a study conducted in Kenya by Langat (2016), who used multi-stage sampling method, in surveying 150 smallholder farmers; and found that majority (52.7%) of households were food insecure and households with male household heads more likely to be food insecure than ones headed by their female counterparts. Langat's study revealed that age,

gender, and educational status (years of education) of the household head, land size, household size, and income significantly influenced household food insecurity. The results further indicate that the likelihood of household food insecurity is related to who makes the household food consumption decision. In the Langat study this was better when such decisions are made by women. However, this is not the case in many African Countries (including Kenya), where household food decision making is actioned by men, then women are often the subordinates in this decision-making process. Langat's study concludes that intra-household decision-making has a vital role in influencing household food security, therefore gender-based resource allocation and women empowerment policies needs to be encouraged for better household food security (Langat, 2016). The study by Langat suggests that women were better at household resource allocation than men. This theme is taken forward in more detail later in the PhD study – see chapter 7.

Elsewhere in the USA, Blisard & Stewart (2006) considered how low-income families plan their food budget relative to the cost of the thrift food plan. The study compared how households allocate their food budget based on the USDA's thrifty food plan (TFP) which signifies the national standard for a low-cost nutritious diet. The study sought to examine whether selected household types with low incomes allocate their food budget in accordance with the TFP. The study considered four food categories: cereal and bakery goods, meats, fruits and vegetables and dairy products and revealed that low-income households spend over 86 percent of TFP costs on food at home. Slightly over the TFP amount (102 percent) was spent by households on cereal and bakery goods, with only 53 percent spent on fruits and vegetables. The US study concludes that for specific types of low-income households, the spending (or expenditure) made by female headed households with children and those married couples with children were less likely to meet the TFP expenditure. This shows a challenge with meeting nutritional guidelines for households headed by women or those who are married with children. This creates a mixed picture in the literature of the influence of the gender of the household food decision-maker.

In relation to this research, the majority of the household food purchase decision-makers for the sample population were shown to be men where they headed households (see table:4.4) and the households tended to be low income (see table: 4.8). It would be interesting to see in the context of Nigeria how household food decision making by male and/or female household heads affects food insecurity as a measure of the nutritional intake of such households which is not an objective of this study but gives room for future research.

4.7 DISCUSSION

This element of the PhD study considered consumer aspects of an urban food system in Awka, Nigeria. The socio-economic characteristics of respondents in this element of the study has been analysed with nearly three quarters of the sample being female and of working age, between the age of 26-45yrs. In family units, fathers were the predominant food decision-maker. The data set highlights that family size in the study group appeared to be comparable to the national Nigerian average of 4.6 person per household (NBS, 2007) and 5 person per household for the population people living in the capital city of Awka (UN-HABITAT, 2009). In term of education, the majority of the sample population (40.8%) appeared to be basically educated with secondary school leaving certificate, 36.7% had bachelor's degree, implying that a good number of respondents in the study area are educated with basic and useful skill that can earn them a living, creating for them the possibility to cater for the food needs of their household. Inferential analysis showed that household size, and household income had a statistically significant association with who was the household food purchase decision maker. This implies that a rise in household size and income would result in fathers, followed by mothers being likely to make household food purchase decisions (planning and budgeting) to accommodate the food need of the household and that of the extended family members (*if need be*). While the regressed data of this study showed that amongst married couples (with the study group) male (fathers) were more likely to be the household food purchase decision maker than mothers (women). Although, Langat (2016) found that households were women make the household food purchase decision were more likely to be food secure than those households where male (fathers) are the food purchase decision maker.

Occupationally, many of the respondents among the study group are self-employed (45%), with only 25% fully employed. In terms of household income, 77.6% of respondents earn below the poverty income margin designated by the World Bank (Cruz et al., 2015). Table 4.10 (section 4.3.10) opens another narrative on food insecurity, acquirability and accessibility. Many individuals in the sample population were business owners and/or the group of working-class people in the Akwa metropolis, and a clear narrative was being "time poor" affecting the time available to purchase food, despite having the money to do so. The challenges faced by the food consumer in Awka in acquiring food were infrastructure related and with road traffic being the most common challenge, followed by time, bad road network, high transportation costs and distance to market. Improving the road network to reduce traffic is critical to national and community development and the creation of new markets close to where food consumers

live, and work could have enabled them cut down on travel time and stress. Age, marital status, household size, education status, employment status, household income after tax of the sample population had no influence on the type of market they visit. However, an association was found between the challenges faced with acquiring food and the type of market accessed by food consumers ($p<0.01$) with choice of food market depending on the various levels of challenge faced in acquiring food. When it comes to consumers' choice of market channel, the focus in the local market was the price of food commodities, compared with food quality in the supermarket. Food waste was considered and whilst declared as low, was mainly disposed of in municipal waste indicating a gap in technological (infrastructural) advancement, especially in converting such food into energy or a useful resource.

4.8 CONCLUSION

It is evidenced by this study that food insecurity persists in Awka, Anambra State. Data shows that, respondents earn low incomes and the majority in the sample population are self-employed and trying to grow their business as well as meeting their household needs. Food consumers reported that they distinguished market choice based on price versus food quality and time available has a mediating role over choice of market e.g., some respondents offsetting a lack of time with higher prices in the supermarket. Male heads of households were more likely to make food purchase related decisions for the entire household needs amongst married couples within the study group. In summary, more needs to be done by the government and the organised private sector to create more job opportunities, proper and adequate renumeration (salaries) for workers to enable them to cater for the food needs of their households. Infrastructurally, adequate road networks, un-interrupted electricity, and water availability are similarly important to reduce food insecurity issues linked to acquiring and utilising food. Aspects of the gender roles in households and its influence on food insecurity requires further research.

The next chapter (chapter 5) draws together the results from the survey associated with the rural food system with particular emphasis on agricultural food production, how this is influenced by gender (male and female) of farmer in association with how gender influences the farming resources available or at their disposal.

CHAPTER 5

5 RURAL FOOD SYSTEMS - GENDER INFLUENCE ON AGRICULTURAL FOOD PRODUCTION IN OMOR FARMING COMMUNITY, ANAMBRA STATE, NIGERIA

This chapter discuss the socio-economic characteristics of individual food cultivators (farmers) in the Omor farming community by investigating the factors that contextualise the effect of gender on food production characteristics with a view to understanding the key elements of food production and food crops that are synonymous with farmers in the community more generally and specifically according to gender attributes (male and female). The findings can provide some insight into rural food systems and how they drive food availability in Anambra State, Nigeria.

5.1 BACKGROUND INFORMATION

In Nigeria, agriculture is dominated by small scale farmers engaged in the production of the bulk of the food requirement of the Country (Girei et al., 2018). Smallholder farmers typically operate on a small land size which is sometimes less than ten hectares (Girei et al., 2018). These farmers make up about 80 percent of the Nigerian farming population and contribute 80-90 percent of the Nigerian food basket, but they are amongst the poorest socio-economic groups in the country (Mgbenka & Mba, 2018). Low level of food production is a major issue in Africa that needs urgent attention. Around 50% of the African population depends on subsistence farming as their only means of livelihood, which when compared to other types of farming systems is characterised by low production capacity (Bachewe et al., 2018; Osabohien et al., 2020). Farmers' food production capacity is important, because a fall in the production capacity of food (yield, quality) could lead to a deterioration in household livelihoods, their food security (Omardi, 2019) and wider national food security. However, food production in Africa has declined in real terms, resulting in an increase in importation expenditure which as of 2017 was 35 billion USD per annum, and was estimated to increase further to about 110 billion USD annually by 2020 (Nevin et al., 2019).

In a bid to control reliance on food importation for urban communities, local food production needs to increase, and this could be done by addressing most or all of the factors that affects farmers' capability or capacity to produce food. By addressing these factor(s),

farmers could be afforded the chance to improve livelihoods for themselves from their food production effort (Nevin et al., 2019). However, there are various barriers that prevent the Nigerian agricultural sector from attaining its full capacity. Some of these include under investment, corruption, lack of farm machinery, weak policy implementation strategies, poor market access, factors associated with gender in agriculture and poor agricultural extension schemes (Downie, 2017).

Food insecurity is still prevalent in Nigeria even though Nigeria is endowed with a favourable agro-ecology for food production (Nwozor et al., 2019). Nigeria has a total land mass of 92.4 million hectares, out of which about 32million hectares or 34.63% are being utilised both for community development and agricultural food production (Nwozor et al., 2019). Therefore, Fadare et al., (2019) notes that Nigeria lacks both the capacity and capability to provide the food and nutritional requirements of its ever-growing population. Undoubtedly, there is immense potential in the Nigerian agricultural sector, and if properly harnessed, this would unleash a huge change to the livelihoods of farmers, increase food security and create employment in the many industries associated with agriculture (Nwozor et al., 2019). Having provided this background, this chapter considers the factors that contribute to food availability with regard to the study location Omor, the farming community, in Anambra State, Nigeria with specific emphasis on the effect of gender in the community in terms of agricultural food production. Hence, the narrative and data presented here seek to address the research sub-objectives, which form an element of the overall study research objectives 1 & 2 of this Thesis:

- To determine common and differentiated socio-economic drivers affecting rural food production within Anambra State, Nigeria.
- To analyse factors responsible for gender related rural food production gap in Anambra State, Nigeria.

5.2 METHODOLOGY

This element of the PhD research adopts the use of a quantitative method of analysis. Primary data for the purpose of this part of the study was collected from 120 farmers in the Omor farming community. Descriptive statistics were used to analyse the data, and this is presented in the forms of frequencies and percentages, while inferential (chi-squared) statistics was also carried out for bivariate analysis. Regression analysis was conducted using correlation

analysis and regression coefficients to isolate key factors of influence within the study and to compare different sub-groups within the dataset.

CHI-SQUARE AND REGRESSION MODEL

Primary data for the purpose of this study was analysed using frequencies and percentages; inferential statistic (chi-square) and probit (binomial) regression (see equation for regression analysis is on section 5.6 and subsection 3.5.3).

5.3 RESULTS AND ANALYSIS

This section presents the results of the analysis of this study, it elaborates on the outcome of the socio-economic analysis, chi-squared analysis, and the regression analysis.

5.3.1 SOCIO-ECONOMIC STATISTICS

The data in table 5.1 shows that the survey population had more male (n=97; 80.8%) respondents who are farmers than their female counterpart (n=23;19.2%). 83.3% of respondents (n=100) were within the age group of 20-40 years while only 16.7% (n=20) of respondents are between the age of 41-60 years. On the other hand, respondents in the age group 41-60 year (n=100) could be assumed to have more experience in agricultural production, this might not always be the case for those respondents within this age group who may have recently changed business or found agriculture to be more profitable based on the environment they find themselves.

Table 5. 1: Socio-Economic Characteristics

	Frequency (n)	Percent (%)
GENDER		
Male	97	80.8
Female	23	19.2
Total	120	100.0
Respondents' Age		
20-40 years	100	83.3
41-60 years	20	16.7
Total	120	100
RESPONDENTS' EDUCATION LEVEL		
Primary	22	18.3
Secondary	49	40.8
Tertiary (Polytechnics)	26	21.7
No Education	23	19.2
Total	120	100
MARITAL STATUS		
Single	37	30.8
Married	78	65
Widow	3	2.5
Widower	2	1.7
Total	120	100
RESPONDENTS HOUSEHOLD SIZE		
1	30	25
02-05	67	55.8
06-09	23	19.2
Total	120	100

Source: Field Survey, 2020

Respondents with secondary school education had the highest percentage in the sample group (n=49; 40.8%), respondents with some sort of tertiary education were 21.7% (n=26), individuals with no formal education were 19.2% (n=23) of the sample population and individuals who had only primary school education represented 18.3% (n=22) of the group interviewed. Interestingly, the result shows that a good number of the sample population is educated with at-least primary school education. This may have some effect on the respondent's performance in agricultural food production activities. The data shows that (n= 78; 65%) of respondents are married, (n=37; 30.8%) of respondents are single, (n=3; 2.5%) are widows and (n=2; 1.7) are widowers (see table 5.1). The majority of the respondents n=67 (55.8%) had a household size between 2 and 5 in number. Thirty respondents (25%) account for families with only a single/individual person household. Another twenty-three respondents

(19.2%) had a family size between 6-9 in number. In comparison to the national population, Ibukun & Adebayo (2021) estimated that the average household size in Northern Nigeria is 7.57, while in the South 4.66 (where this PhD Study was carried out) and the combined data set represented 6.10 as the average household size. The data was adapted from the Nigerian COVID-19 national longitudinal phone survey (NLPS).

5.3.2 CROPS GROWN BY FARMERS

Farmers in the Omor farming community cultivated the following crops: cassava, cocoyam, leafy vegetables, maize, okra, rice and yam and noted various levels of outputs (see table: 5.2).

Table 5. 2: Crops Grown by Farmers

	PERCENTAGE OF FARMING OUT-PUT (QUANTITY)	FREQUENCY (n)	PERCENT OF RESPONDENTS (%)
Cassava	0%	17	14.2
	10%-20%	93	77.5
	21%-30%	9	7.5
	31%-40%	1	0.8
Cocoyam	0%	69	57.5
	10%-20%	49	40.8
	21%-30%	2	1.7
Leafy Vegetables	0%	99	82.5
	10%-20%	21	17.5
Maize	0%	23	19.2
	10%-20%	92	76.6
	21%-30%	5	4.2
Okra	0%	91	75.8
	10%-20%	28	23.3
	21%-30%	1	0.8
Rice	0%	23	19.2
	10%-20%	31	25.8
	21%-30%	59	49.2
	31%-40%	7	5.8
Yam	0%	84	70
	10%-20%	35	29.2
	41%-50%	1	0.8

Source: Field Survey**,** 2020. N=120

The data in table 5.2 showed that farmers cultivated more rice, maize, cassava and cocoyam (n=97; n=97; n=103; n=51) in the study location as against other crops (yam and leafy vegetable), which keeps with other studies such as that of Verter & Becvarova (2014) who agreed that farmers in Nigeria cultivated the majority of the crops listed here. Typically, yam is cultivated in the northern part of Nigeria and transported to other parts of the country. Leafy

vegetables appeared to be cultivated only by a by small groups of farmers (n=21) in the study location.

5.3.3 LIVESTOCK REARED BY FARMERS

Data shows that farmers within the sample population were more likely to rear goats (54.2%), followed by poultry birds (chicken) 35.8%, then sheep (24.2%) and pigs (10.8%). None of the farmers reared cattle. This reflects the Nigerian agro-ecological zones, where the study community was located, which see cattle rearing occurring in the northern part of Nigeria, with meat/and or dairy products sold and distributed around the country (Kubkomawa, 2017).

Table 5. 3: Livestock Reared by Farmers

	NO. OF LIFESTOCK REARED	FREQUENCY (n)	PERCENTAGE (%)
Cattle	0	120	100
Chicken	0	77	64.2
	1-4	4	3.3
	5-10	28	23.3
	11-15	5	4.2
	16-20	5	4.2
	20+	1	0.8
Goat	0	55	45.8
	1-4	42	35
	5-10	23	19.2
Pig	0	107	89.2
	1-4	7	5.8
	5-10	5	4.2
	11-15	1	0.8
Sheep	0	91	75.8
	1-4	26	21.7
	5-10	3	2.5

Source: Field Survey, 2020. N=120

In the sample population, less farmers are involved in the rearing of livestock than the cultivation of crops (comparing tables 5.2 and 5.3), implying they are small producers rather than rearing animals on a large-scale. Thus, from a livestock rearing perspective, farmers may be involved in this activity as a side business or a backyard hobby that makes an occasional contribution to their household income as compared to the crops they cultivate and sell for cash.

5.3.4 ASSETS OWNED BY FARMERS

The assets owned by farmers can make a significant contribution to the success of their farming enterprise and the degree of automation that they can adopt.

Table 5. 4: Assets Owned by Farmers

	CONFIRMATION	FREQUENCY (n)	PERCENTAGE (%)
Radio	Yes	120	100
Mobile Phone	Yes	118	98.3
Television	Yes	111	92.5
Irrigation Equipment	Yes	109	90.8
Bike/Bicycle	Yes	104	86.7
Cart	Yes	58	48.3
Vehicle	Yes	26	21.7
Plough	Yes	19	15.8
Solar Panel	Yes	15	12.5

Source: Field Survey**,** 2020. N=120

Here, the study data (on table 5.4) showed that all farmers among the study group owned a radio set (n=120;100%), then mobile phones; television sets, irrigation equipment; bikes/bicycle; and carts. Assets such as vehicles, ploughs or solar panels were not owned by large proportion of farmers in the community. This could be as a result of the cost of acquiring such equipment, which may not be affordable for all farmers. The respondents in the sample group do have assets which can support improving their farming operation or keeping them informed.

5.3.5 LABOUR AVAILABILITY AND ACCESS TO WORKERS

A large number (n=104, 86.7%) of farmers among the study group solely carry out their agricultural activity full-time, eight farmers (6.7%) have at-least 2 household members working on their farm full-time, and one farmer (0.8%) has at-least 3 family members working on their farm full-time. Farmers and other members of their household may also have secondary jobs, and their children may fall within the age group who are currently in school. Depending on the farmers' level of agricultural activity, he/she may resort to hiring external farm support which may cost him/her money.

Table 5. 5: Labour-Full Time Workers

Number of Household Members that Work on the Farm Full-Time	Frequency (n)	Percent (%)
0	7	5.8
1	104	86.7
2	8	6.7
3	1	0.8
Total	120	100
Number of Household Members that Work Part-time on the Farm	Frequency (n)	Percent (%)
0	59	49.2
1	24	20
2	8	6.7
3	11	9.2
4	11	9.2
5	7	5.8
Total	120	100
Bought in Labour Cost per Day	Frequency (n)	Percent (%)
0	1	0.8
N1000-N1500	10	8.3
N1600-N2000	109	90.8
Total	120	100
Labour Rented Out per Day	Frequency (n)	Percent (%)
0	45	37.5
N1000-N1500	2	1.7
N1600-N2000	43	35.8
N2000-N2500	30	25.0
Total	120	100

Source: Field Survey, 2020. N=120

Almost half of the population of farmers amongst the study group had their ward support them (labour) in the cultivation of their farmland, this support varies from one individual farm to the other (see table 5.5). Farmers within this category noted between 1 and 5 household members worked on the farm on a part-time basis. This means that farmers amongst the study group have some level of support from family members. The data further showed the cost of labour to individual farming households per day and on days when such labour is required. 90.8% of farming households surveyed pay between ₦1,600 to ₦2,000 (Naira) for labour sourced for their farmland. Another ten farming households (8.3%) pay between ₦1,000 to ₦1,500 (Naira) for labour per day. Only one farmer (0.8%) appeared to be independent of the requirement of the need for external labour. This implies that labour is an important aspect of agricultural food production, and that farmers in the sample population of the "Omor" farming community are not self-sufficient in labour needs within their own

household, which prompts them to source additional work force from within and/or outside their immediate community when it is needed.

Further observation from the data showed that farming households in the sample population rent-out or receive between ₦2,000 to ₦2,500 (Naira) (25%); N1,600 to N2,000 (Naira) (35.8%); ₦1,000 to ₦1,500 per person/per day (Naira) (1.7%) when any household member is out-sourced for labour services for income. This shows that farmers and their ward rent out their services as a way of making additional household income. More so, the data also shows that farming households tend to charge more for labour when and if they are being rented out than what they tend to pay for labour themselves (i.e., pay the people that work for them), as a result it is possible that they see renting out of labour as a business enterprise.

5.3.6 LAND AVAILABILITY AND LAND TENURE

Respondents (n=31; 25.8%) in the study area appear to have some ownership over the land they use for their agricultural activities. These lands can be owned outright by farmers with possession of title deeds, or other forms of ownership, which could be ancestral as a result of inheritance. Only n=27 (22.5%) had no title deed for the land they operate on, this might signify that these farmers rent their land from others for agricultural purposes.

Table 5. 6: Farmers Land Ownership and Land Size

		Frequency (n)	Percent (%)
Land Ownership	No	27	22.5
	Yes	31	25.8
	Some with title deeds	31	25.8
	Inherited Land (Ancestral)	31	25.8
Total		120	100
Land Size	>1HA	2	1.7
	1 Plot	51	42.5
	2 Plot	43	35.8
	3 Plot	24	20
Total		120	100

Source: Field Survey, 2020. N=120

Data on land size (Table 5.6) shows farmers in the sample population who farm just 1plot of land was 42.5%, those who farm 2 plots of land (35.8%), and those with 3plots of land

(20%). Only two farmers claim to farm less than a hectare of land for their farming activities. Regardless of potential gender inequality, female farmers in the sample population still found a way to acquired land for their agricultural activities, either via renting or buying lands through their husbands/brother, or even through ancestral ownership (land owned by the family).

5.3.7 FARM INPUTS, RESOURCES AND ACQUIRABILITY ISSUES

Access to seeds, fertilisers and pesticides is difficult for the respondents among the study group (Table 5.7) with only 23- farmers stating they could access seed, 5- fertilisers, and only 1- could acquire pesticides conveniently. This challenge will have a serious effect on agricultural productivity and yield. The ability or inability to source seeds, fertilisers and pesticides within respondent's local community may be because of several factors (finance, absence of retail shops within the locality, transportation etc). Section 5.4.7 and table 5.15 elaborates on this and shows the crosstabulation between gender and input availability (seeds, fertiliser, and pesticides) in order to determine how input availability affects the farming activities of both male and female farmers.

Table 5. 7: Challenge Faced in Acquiring Farm Input (s)

		Response of Farmers	Frequency (n)	Percentage (%)
Farm Input in The Farming Community	Seed	Yes	23	19
		No	97	80.8
	Fertilisers	Yes	5	4.2
		No	115	95.8
	Pesticides	Yes	1	8
		No	119	99.2
Challenges Faced with Acquiring Farming Inputs	Finance	Yes	117	97.5
		No	3	2.5
	Input Availability	Yes	92	76.7
		No	28	23.3
	Market Distance	Yes	47	39.2
		No	73	60.8
	Input Quality	Yes	2	1.7
		No	118	98.3

Source: Field Survey, 2020. N=120

Almost all farmers amongst the study group n=117 (97.5%) agreed that finance for the purchase of agricultural production inputs is a major challenge to their farming activity. Some

of these farmers n=47 (39%) also noted that the distance they had to travel in acquiring farming inputs was also challenging to their crop cultivation activities. Three quarters of farmers (76.7%) claimed that input acquirability in the Omor farming community is a challenge facing them in carrying out their agricultural activity. All but two farmers stated that the quality of inputs was not an issue, rather its acquirability within their locality was more of a concern to them.

5.3.8 FARMING SYSTEMS

A high number of farmers n= 102 (85%) within the study group practiced mixed cropping. Slightly more farmers n=77 (64.2%) noted that they also engage in the practice of mono-cropping. This is a complex response because some farmers have stated they practiced mixed cropping and mono-cropping together or jointly. Hence, the data on table 5.8 shows that at-least 64.2% of the farmers that state they practice mono-cropping also carry out mixed cropping so this response could be based on particular seasons or for different crops grown i.e., in some parts of the year they are mono-cropping and in others they are mixed cropping or whilst some crops are grown as a monocrop, others are grown as mixed crops.

Table 5. 8: Farming Systems Implemented

		Frequency (n)	Percentage (%)
Mixed Cropping	Yes practiced	102	85
	Not practiced	18	15
Mono-Cropping	Yes practiced	77	64.2
	Not practiced	43	35.8
Mixed Farming	Yes practiced	6	5
	Not practiced	114	95
Organic Principle	Not practiced	120	100
Conservation Agriculture	Not practiced	120	100

Source: Field Survey, 2020. N=120

While only six (5%) farmers stated they practice mixed farming involving livestock and crops, none of the respondents practiced either “organic principles” or “conservation agriculture”. This may imply that farmers use common, old or traditional systems of farming, that are generally applied in the region especially with their limited acquirability of inputs.

5.3.9 WATER AVAILABILITY FOR AGRICULTURAL ACTIVITIES

In order for agricultural crop and livestock production to flourish the importance of water availability and sufficiency cannot be over-emphasised.

Table 5. 9: Farm Water Availability and Sufficiency

	Response of Farmers	Frequency (n)	Percentage (%)
Availability of Water Source	Yes	101	84.2
	No	19	15.8
Sufficiency of Water Source	Yes	100	83.3
	No	20	16.7

Source: Field Survey, 2020. N=120

The majority of respondents maintained that water is available (84.2%) and sufficient (83.3%) for their agricultural activities (Table 5.9). This implies that majority of the farmers among the study group do not perceive access to water as a major factor that limits their agricultural activity.

5.3.10 SOURCES OF IRRIGATION WATER FOR AGRICULTURAL ACTIVITIES

Water sources (for irrigation) for agricultural activities are very important, as farmers were using rainfall and ground water (well or borehole) for irrigation (Table 5.10). Only 15.8% were using rainfall without any other source of water.

Table 5. 10: Source of Water for Irrigation

	Frequency (n)	Percent (%)
Well + Rain Fall	71	59.2
Rainfall	19	15.8
Well	15	12.5
Borehole	11	9.2
Borehole + Rain Fall	4	3.3
Total	120	100.0

Source: Field Survey, 2020. N=120

This implies that respondents in the farming community of "Omor" operate their farms within the level of availability of water for their farming activities which could either be from rainfall, well or borehole or a combination of one or two of the water sources. This finding disagrees (based on geographic difference) with the findings of Abdullahi et al., (2009) who noted that farmers in the Northern part of Nigeria are "economic migrants", they move to urban centres in search of 'greener pastures 'during the off season and move back to their farming communities upon the onset of rain (see subsection 2.6.1) i.e., they only practice rain-fed agriculture.

5.3.11 EXTENSION SERVICE PROVISION

All farmers interviewed in the study location stated they had had no visit from extension service officers in any capacity (training, input support or market linkage). The reasons for this gap could be the lack of extension staff numbers, lack of teaching resources, communication and lack of funds for resource mobilisation. These factors will be considered in depth in the qualitative analysis of this study (see chapter 6).

In conclusion, having considered the univariate results of farmers socio-economic status, the bivariate analysis is now undertaken (next section 5.4) to determine potential differences based on gender in the responses from the sample population.

5.4 INFERENTIAL RESULTS AND ANALYSIS

Here, the inferential analysis evaluates the association between two or more variables using the chi-squared analysis in testing the hypothesis identified in the methodology section of this thesis. Table 5.11 to 5.16 (within text) and then 5.19 to 5.21 (Appendix 2) contains the crosstabulations for this section.

5.4.1 GENDER AND SOCIO-ECONOMIC CHARACTERISTICS (H1,2,3,4)

Gender and Age (H_1)

The study data showed that n=81 (male) and n=19 (female) were between the age of 20-40 years of age. While n=16 (male) and n=4 (female) were between the age of 41-60 years of age. Using the Chi-square test of independence ($X^2(1) = 0.011$, $p>.05$), the alternate hypothesis was rejected. However, due to the violation of one of Chi-square's assumptions (one cells (25%) having expected count less than 5), the likelihood ratio 0.011 was then reported with p= .918 which is > .05, also the alternate hypothesis is also rejected. This implies that there is no statistically significant association between respondent's gender and their age.

This means that in the study group there is no difference in the age profile of male and female farmers.

Gender And Education (H_2)

In comparing education levels between male and female respondents the Chi-square test of independence ($X^2(3) = 4.661$, $p>.05$), and the likelihood ratio (5.079; $p= .166$) meaning that the alternate hypothesis is rejected and male and female farmers in the study population had fairly equal levels of education.

Gender And Marital Status (H_3)

In comparing marital status by gender, the alternative hypothesis is accepted (Chi-square test of independence ($X^2(3) = 20.957$, $p<.001$; likelihood ratio 21.468, $p < .001$). This means that the marital status of farmers in the study group varied by gender. Indeed, female farmers were more likely to be married, or widowed than their male counterparts. The Phi value is 0.418, $p< .001$ shows that there is a medium or moderate relationship between gender and respondent's marital status.

Gender and Household Size (H_4)

When considering household size for a gender influence (see section 5.3.1; table 5.1). The Chi-square test of independence ($X^2(2) = 9.775$, $p<.01$; likelihood ratio 15.209, $p < .001$), so the alternate hypothesis was accepted. Female respondents were more likely to be in multiple occupancy households. No female in the study group resided in single occupancy housing. The Phi Value is 0.285, $p< .01$ implies that there is a small level of relationship between gender and respondent's household size, again the alternate hypothesis was accepted.

The next section discusses farmers' gender and the type of crops they cultivate. This could be influenced, for example, by the physicality of cultivation for a particular crop and/or the varying level of resources at the farmers disposal to engage with particular farming enterprises.

5.4.2: GENDER AND CROPS GROWN BY FARMERS (H5)

A total of (n=120 respondents) were sampled and evaluated on the statistical relationship between the "gender of respondents and the crops grown by farmers."

Table 5. 11: Gender and Crops Grown by Farmers

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
IMPORTANT CROP GROWN									
Cassava	0	5	12	34.71	<.001	28.003	< .001	0.538	<.001
	10% - 20%	84	9						
	21% - 30%	7	2						
	31% - 40%	1	0						
Maize	0	14	9	7.425	< .05	6.531	< .05	0.249	<.05
	10% - 20%	79	13						
	21% - 30%	4	1						
Rice	0%	5	18	64.429	< .001	55.099	< .001	0.733	<.001
	10% - 20%	30	1						
	21% -30%	55	4						
	31% - 40%	7	0						
Yam	0%	61	23	12.194	< . 01	18.653	< .001	0.319	<.01
	10% - 20%	35	0						
	41% - 50%	1	0						
Cocoyam	0%	55	14	0.551	> .05	0.927	> .05	0.068	<.05
	10% - 20%	40	9						
	21% - 30%	2	0						
Okra	0%	84	7	34.035	< .001	29.672	< .001	0.533	<.001
	10% - 20%	12	16						
	21% - 30%	1	0						
leafy vegetable	0%	94	5	72.76	< .001	60.447	< .001	0.779	<.001

Source: Field Survey, 2020. N=120

The findings were as follows:

Cassava: Using the Chi-square test of independence ($X^2(3) = 34.710$, $p< .001$; likelihood ratio 28.003, $p< .001$), the alternate hypothesis was accepted. The Phi value is 0.538. This implies that there is a strong/large relationship strength between respondent's gender (sex), and crops grown by farmers (cassava). As a result, the data indicates that more male are involved in the cultivation of cassava than women and this may be due to the physical nature of growing cassava in the absence of any mechanisation.

Maize: Using the Chi-square test of independence ($X^2(2) = 7.425$, $p< .05$, likelihood ratio 6.531, $p<.05$, the alternate hypothesis is accepted. The Phi value is 0.249, $p< .05$ implies that there is a small-moderate relationship strength between respondent's gender (sex), and

growing maize. Whilst males may be more likely to grow maize, the growing of maize for home use and for sale off farm is not differentiated here.

Rice: Using the Chi-square test of independence ($X^2(3) = 64.429$, $p < .01$, the likelihood ratio 55.099, $p < .01$), the alternate hypothesis is accepted. The Phi value is 0.733, $p < .01$. This implies that there is a large/strong relationship strength between respondent's gender (sex), and growing rice. Males are more likely to cultivate rice than females in the study group, this could be as a result of women's (female farmers) access to land (Iruonagbe, 2010), or the primary objectives of growing food on the land (home consumption or being sold off farm). Women are generally more involved in the processing and marketing of rice (NFRA & JICA, 2009) than their male counterparts. In Southwestern Nigeria, Ojo et al., (2020) used the Oaxaca-Blinder (OB) gender decomposition model in their study "gender differentials on productivity of rice farmers", which showed that an unequal farming situation exist among male and female farmers, leading to a gender productive gap of about 29% in favour of men. The decomposition model further showed that education, marital status, farm size and access to market information are significant determinant factors that contributes to over 15% of the production gap. In Osun State Nigeria, Ayanwale & Amusan (2014) used primary data from 100 rice farmers and concluded that male farmers had higher rice production efficiency than female farmers via the use of mechanisation and the supply or availability of fertiliser input. More so, greater availability or supply of postharvest equipment would enable women to diversify more into value addition along the rice value chain.

Yam: The Chi-square test of independence ($X^2(2) = 12.194$, $p < .05$, likelihood ratio 18.653, $p < .001$), revealed that the alternate hypothesis is accepted. The Phi value is 0.319, $p < .05$. This implies there is a moderate relationship strength between respondent's gender (sex), and crops grown by farmers (yam). The analysis here concludes that men are likely to be involved in yam production than women. In Northern Nigeria where yam is produced on a commercial scale, the study by Ojo et al., (2013) on gender analysis of labour input among yam farmers revealed that labour input was statistically more significant for men than women, i.e., in terms of labour contribution to yam farming, male farmers were more labour efficient compared to female farmers. The study also identified major constraints for yam farming so for male farmers, lack of mechanisation, transportation and plant disease were important. For female farmers, the lack of mechanisation, time spent on off-farm activities and transportation were the constraints identified in the cultivation of yam within the study location. Some of these factors are of influence in this PhD study too.

Cocoyam: Using the Chi-square test of independence ($X^2(2) = 0.551$, $p > .05$; the likelihood ratio 0.927, $p = 0.629$) so the alternate hypothesis is also rejected. This implies that there is no gender difference on likelihood to grow cocoyam.

Okra: The Chi-square test of independence ($X^2(2) = 34.035$, $p \leq .001$, likelihood ratio 29.672, $p \leq .001$), revealed that the alternate hypothesis is accepted. This means that there is a statistically significant association between respondent's gender (sex), and likelihood to grow okra, as more women in the study group were likely to be involved in the production of okra than men. The Phi value is 0.533, $p \leq .001$ this implies that there is a strong/large relationship strength between both variables (I.e., gender of farmers and okra production).

Leafy vegetables: Using the Chi-square test of independence ($X^2(2) = 72.760$, $p \leq .001$, the likelihood ratio 60.447, $p \leq .001$), so the alternative hypothesis is accepted. The Phi Value is 0.779, $p \leq .001$ implies that there is a strong/large relationship strength between respondent's gender, and crops grown by farmers (leafy vegetables). Female farmers were mainly found to be involved in the production of leafy vegetables much more so than male farmers.

5.4.3 GENDER AND LIFESTOCK REARED BY FARMERS (H6)

A total of (n=120) were sampled and evaluated on the statistical relationship between the "gender of respondents and the main livestock assets" farmers reared. Interestingly, all respondents noted that they do not own or reared any cattle. The results were as follows:

Sheep: Using the Chi-square test of independence ($X^2(2) = 1.821$, $p > .05$), the alternate hypothesis was rejected, so there was no gender association with farmers who reared/owned sheep.

Goats: The Chi-square test of independence ($X^2(2) = 6.996$, $p < .05$, indicates that the alternate hypothesis is accepted. The Phi value is 0.241, $p < .05$ implying that there is a medium or moderate relationship between gender and rearing/owning goats. The data indicates that male respondents are more likely to rear/own more goat(s) than female respondents.

Pigs: Only a fraction of the study population reared/owned pigs. Using the Chi-square test of independence ($X^2(3) = 1.665$, $p > .05$, likelihood ratio 2.801 $p = 0.423$) which implied that there is no association between respondent's gender and whether they reared/own pigs. The data shows that male respondents were more likely to rear/own pig(s) than female farmers, although the number of people who rear pig (s) in the study area are observed to be small. This

could be attributed to the poor demand for pork product in food market, which could be as a result of cheap alternatives or religion.

Table 5. 12: Gender and Livestock Reared by Farmers

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
LIVESTOCK ASSET OWNED BY FARMING HOUSEHOLD									
Cattle	0	97	23	-	-	-	-	-	-
Sheep	0	76	15	1.821	> .05	1.699	> .05	0.123	>.05
	1-4	19	7						
	5 – 10	2	1						
Goat	0	41	14	6.996	< .05	11.227	<.05	0.241	<.05
	1 – 4	33	9						
	5 – 10	23	0						
Pig	0	85	22	1.665	> .05	2.801	> .05	0.118	>.05
	1 – 4	6	1						
	5 – 10	5	0						
	11 – 15	1	0						
Chicken	0	71	6	22.466	< .001	20.67	< .01	0.433	<.001
	1 – 4	3	1						
	5 – 10	18	10						
	11 – 15	3	2						
	16 – 20	2	3						
	20+	0	1						

Source: Field Survey, 2020. N=120

Chickens: Using the Chi-square test of independence ($X^2(5) = 22.466$, $p<.05$, likelihood ratio 20.670, $p= 0.001$) so the alternate hypothesis is also accepted. This implies that there is a statistically significant association between respondent's gender and whether they rear/own chickens, and women (female farmers) were more likely to own and rear chickens than men (male farmers).

5.4.4 GENDER AND ASSET OWNED BY FARMERS (H7)

This subsection discusses the assets owned farmers among the study group. These assets are known to support their farming activities are distributed among farmers in view of their gender and the level of farming activities they are involved with.

Vehicles: Only 23 males and 3 female farmers who took part in the study had a vehicle. Using the chi-square test of independence, ($X^2(1) = 1.247$, $p> .05$, likelihood ratio 1.366, $p=2.42$), shows both male and female (farmers) respondents are equally likely not to own a vehicle.

Table 5. 13: Gender and Assets Owned by Farmers

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
ASSET OWNED BY FARMERS									
Vehicle	Yes	23	3	1.247	> .05	1.366	>.05	-0.102	>.05
	No	74	20						
Cart	Yes	38	20	16.997	< .001	15.138	<.001	0.376	<.001
	No	59	3						
Bike/Bicycle	Yes	86	18	1.74	> .05	1.564	> .05	0.376	>.05
	No	11	5						
Plough	Yes	18	1	2.817	>.05	3.56	>.05	-0.153	>.05
	No	79	22						
Irrigation	Yes	87	22	0.794	>.05	0.929	>.05	0.81	>.05
	No	10	1						
Radio	yes	97	23	0	-	-	-	-	-
Mobile Phone	Yes	95	23	0.482	>.05	0.859	>.05	0.063	>.05
	No	2	0						
Television	Yes	89	22	0.408	>.05	0.46	>.05	0.058	>.05
	No	8	1						
Solar Panel	Yes	14	1	1.729	>.05	2.125	>.05	-0.12	>.05
	No	83	22						

Source: Field Survey, 2020. N=120

Cart: more respondents owned a cart than a vehicle. The Chi-square test of independence ($X^2(1) = 16.997$, $p< .01$) indicates that the alternate hypothesis is accepted, implying that there is a statistically significant association between gender of farmers and access to household assets such as a cart. The Phi Value is 0.376, $p< .01$ this implies that there is a moderate relationship between gender of farmers and access to carts. Female farmers were statistically more likely to have a cart than male farmers at the $p< .01$ level. As a result, female farmers are generally involved in the sale of agricultural produce, so the cart serves as a good means of mobility for the sale of their agricultural commodity at the market or on the roadside.

Bike/Bicycle: A good number of the sample population owned either a bike or bicycle. Using the chi-square test of independence ($X^2(1) = 1.740$, $p> .05$, the likelihood ratio 1.564, $p= 0.211$) which means that among the study group i.e., female and male farmers are equally likely to have a bicycle.

Plough: Only nineteen respondents (male n= 18; female n= 1) stated they have a plough. Using the chi-square test of independence ($X^2(1) = 2.817$, $p > .05$, likelihood ratio 3.560, $p = 0.059$). The result implies that there is no difference by respondent's gender, however more male farmers had ploughs than female farmers.

Irrigation equipment: Using the chi-square test of independence ($X^2(1) = 0.794$, $p > .05$, likelihood ratio 0.929 $p = 0.335$), data here shows that there is no statistically significant difference by respondent's gender, and both male and female farmers were equally likely to have irrigation equipment, or not.

Radio: All respondents reported they owned a radio.

Only two respondents stated they did not own a **mobile phone**. Using the chi-square test of independence ($X^2(1) = 0.482$, $p > .05$, likelihood ratio 0.859, $p = 0.354$) this demonstrates no gender difference in the sample population.

Television: Only nine respondents did not own a television. Using the chi-square test of independence ($X^2(1) = 0.408$, $p > .05$, likelihood ratio 0.460, $p = 0.498$) shows men (male farmers) and women (female farmers) in the sample population were equally likely to have a television set.

Solar Panels: Only 15 respondents (male farmers n= 14; female farmers n= 1) stated that they own a solar panel. Using the chi-square test of independence ($X^2(1) = 1.729$, $p > .05$, likelihood ratio 2.125, $p = 0.145$) shows that whilst more male farmers had solar panels than female farmers, there was no significant association between the two groups.

5.4.5: GENDER AND FARM LABOUR (H8)

This subsection considers farm labour in relation to the different gender of farmers, and how available farm labour is to both or either gender groups involved in this study.

Gender And Labour Rented-In: Many respondent's (farmers) n=109 (male n=91; female n=18) rent-in labour to support their farming activities at a cost of ₦1,600 to ₦2,000 per day. Ten farming households state they rent in labour at a cost between ₦1,000 to ₦1,500 (Naira per day) See table 5.21 (appendix 2). Using the chi-square test of independence ($X^2(2) = 7.514$, $p < .05$, likelihood ratio 6.127, $p = 0.047$), the alternate hypothesis is accepted. This means that there is a statistically significant association between respondent's gender, and household labour rented-in for agricultural activities. The data indicates that male farmers are

more likely to rent in farm labour to support their agricultural activities, than female farmers. The Phi Value is 0.250, p< .01 this implies that there is a small relationship strength between gender and labour rented-in by farmers based on the crop cultivated.

Gender and Labour Rented Out: See table 5.21 (appendix 2). Using the chi-square test of independence ($X^2(3) = 47.423$, p< .001, likelihood ratio 54.910, p= 0.000), here the alternate hypothesis is accepted. This means that there is a statistically significant association between respondent's gender, and their household labour rented out for farm activities, suggesting that men are more likely to be involved in the labour marketing by renting out theirs and/or other household members labour, than women. The Phi value is 0.629, p< .001 this implies that there is a large relationship strength between gender and labour rented out by farming household per day.

5.4.6 GENDER AND LAND SIZE OF FARM (H9)

Gender and Farmland Size: Using the chi-square test of independence ($X^2(3) = 14.838$, p< .01, likelihood ratio 17.500, p= 0.001) the alternate hypothesis is also accepted.

Table 5. 14: Gender and Land Size Available for Farming

		GENDER							
		MALE	FEMALE	X2	P-Value	LR	P-Value	Phi/or Cramer's V	p-value
FARMLAND AVAIABLITY									
Size of Farmer's Total land Production Plot	> 1 HA	0	2	14.838	<.010	17,500	<.010	0.352	<.010
	1 Plot	39	12						
	2 Plot	34	9						
	3 Plot	24	0						

Source: Field Survey, 2020. N=120

This means that there is a statistically significant association between respondent's gender, and the size of land they cultivate with male farmers respondents more likely to own farmland(s) larger in size for their agricultural activities than female farmers. The Phi Value is 0.352, p< .01 this implies that there is a moderate association strength between gender of farmers and their corresponding farmland size.

5.4.7 GENDER AND FARM INPUTS (H10)

Gender and Input Availability (Fertiliser): Using the chi-square test of independence, the following result was realised: ($X^2(1) = 1.237$, p> .05, likelihood ratio 2.179,

p=0.140). This shows that there is no statistically significant association between respondent's (farmers) gender, and their acquirability of fertiliser so both genders found it difficult to access this input. See table 5.15 below.

Table 5. 15: Gender and Farm Inputs

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
INPUT AVAILABILITY									
Fertiliser	Yes	5	0	1.237	>.05	2.179	>.05	-0.102	>.05
	No	92	23						
Seed	Yes	20	3	0.689	>.05	0.741	>.05	-0.076	>.05
	No	77	20						
Pesticide	Yes	1	0	0.239	>.05	0.428	>.05	-0.045	>.05
	No	96	23						

Source: Field Survey, 2020. N=120

Gender and Input Availability (Seeds): Only 23 respondents (male n=20; female n=3) stated they could source seeds for crop production activities from their local community (see table 5.15). Using the chi-square test of independence ($X^2(1) = 0.689$, $p > .05$, likelihood ratio 0.389, p=0.389) shows there is no difference between genders. More male farmers were able to access seeds for crop production locally than female farmers in the study location, but poor access affected most respondents.

Gender and Input Availability (Pesticides): All but one respondent stated that they cannot source pesticides for agricultural production activities from their local community (see table 5.15). Using the chi-square test of independence ($X^2(1) = 0.239$, $p > .05$, likelihood ratio 0.428, p=0.513) implies that there is no difference by gender in terms of their ability to access pesticides locally, hence all farmers found this difficult.

5.4.8 GENDER AND FARMING SYSTEMS (H11)

Gender and Farming Systems (Mono-Cropping): The Chi-square test of independence ($X^2(4) = 1.176$, $p > .05$) implies that there is no difference by gender (see table 5.16).

Gender and Farming Systems (Mixed-Cropping): The Chi-square test of independence ($X^2(1) = 12.994$, $p < .001$, likelihood ratio 10.728, p= 0.001) means the alternate hypothesis is accepted (see table 5.16). The Phi Value is -0.329, $p < .001$ this implies that there is a medium or moderate relationship between the gender of farmers and their use of the mixed-cropping

system of farming. The data suggests that male farmers are more likely to adopt and use mixed cropping farming system than female farmers.

Table 5. 16: Gender and Farming Systems Practiced by Farmers

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
FARMING SYSTEMS									
Mono-cropping	Yes	60	17	1.176	>.05	1.222	>.05	0.099	>.05
	No	37	6						
Mixed Cropping	Yes	88	14	12.994	<.001	10.728	<.01	-0.329	<.001
	No	9	9						
Mixed Farming	Yes	6	0	1.498	>.05	2.627	>.05	-0.112	>.05
	No	91	23						
Organic Principle	-	97	23	-	-	-	-	-	-
Conservation Agriculture	-	97	23	-	-	-	-	-	-

Source: Field Survey, 2020. N=120

Gender and Farming Systems (Mixed Farming): The Chi-square test of independence ($X^2(1) = 1.498$, $p > .05$, likelihood ratio 2.627, $p = 0.105$). This implies that there is no statistically significant association between the gender of farmers and their use of the mixed-farming systems (see table 5.16).

5.4.9 GENDER AND FARM WATER AVAILABILITY (12)

Water availability to farmers of different gender (male and female) is considered here as an important aspect of food production.

Gender and Water Availability: Using the Chi-square test of independence, the following result was realised: ($X^2(4) = 12.407$, $p < .05$, likelihood ratio 15.860, $p = 0.003$). The result implies that there is a statistically significant association between respondent's gender, and the water source for farming activities. The Phi Value is 0.322, $p < .05$ this implies that there is a medium or moderate relationship between gender of farmers and their access to water source for their farming activities. Here the data further indicates that male farmers among the study group are more likely to have access to water source/supply than female farmers. See table 5.22 (appendix 2).

5.5 CORRELATION AND REGRESSION ANALYSIS - RESULT

Correlation implies statistically the association between two quantitative variables within a model (chi-squared in this case). The regression coefficients explain the mathematical relationship between the independent and the dependent variables - as shown below, where the p-values of the coefficients indicates if such relationships are statistically significant or not. Table 5.17 is the correlation results which shows the cross characterisation of the different variables that is part of this study, while table 5.18 is the regression coefficient of this study that shows which variable significantly influences the dependent variable.

Table 5. 17: Correlation Results-Analysis

Association	Result	Comments
Gender of respondents and labour required for crop and live-stock production.	There was a weak, positive correlation between the two variables, r= 0.110, n=120, p>.05.	There appeared to be no association between the gender of respondent and the labour required for crop and life-stock production. This implies that labour required for food production is not gender biased i.e., both male and female can make equal contribution to food production in terms of labour.
Gender of respondent and total size of production land	There was a moderate, negative correlation between the two variables. r = - 0.313, n=120, p<.001.	This implies that there is a statistical association between gender of respondent and total size of production land. Hence, Men are more likely to farm more land
Gender of respondent and water availability for crop and livestock production activities	There was a weak, positive correlation between the two variables. r = - 0.153, n=120, p<.05.	This implies that there is a statistical association between the gender of respondent and water availability for crop and livestock production activities. Which implies that men are more likely to access water for their agricultural activities.
Gender of respondent and major crops grown by farmers (cassava)	There was a moderate/medium, negative correlation between the two variables, r = - .377, n=120, p<.001.	There appeared to be a significant association between the gender of respondent and major crops grown by farmers (cassava). Which implies that an increased involvement by both gender of farmers would imply an increase in the production of cassava.
Gender of respondent and major crops grown by farmers (maize)	There was a weak, negative correlation between the two variables, r = -0.210, n=120, p<.05.	There appeared to be a significant association between the gender of respondents and the major crops grown by farmers (maize). This implies that gender disparity will have an inverse effect on maize production. i.e., if one gender group is more involved in maize production, its (maize) production will be affected and possibly drop among the study group.
Gender of respondent and major crops grown by farmers (rice)	There was a strong, negative correlation between the two variables. r = - 0.579, n=120, p<.001.	This implies that there is a statistical association between gender of respondent - and - major crops grown by farmers (rice).
Gender of respondent and crops grown by farmers (yam)	There was a weak, negative correlation between the two variables. r = - 0.280, n=120, p<.01.	This implies that there is a statistical association between sex of respondent - and -the crops grown by farmers (yam). The result shows that gender disparity have some effect on yam production, i.e., an increase in the number of farmers involved based on gender, will result in an increased yam production within the study location.

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Gender of respondent and crops grown by farmers (okra)	There was a moderate/medium, positive correlation between the two variables. r = 0.480, n=120, p<.001.	This implies that there is a statistical association between sex of respondent - and - crops grown by farmers (okra). The result shows that gender disparity have a considerable level of effect on the production of okra, i.e., an increase in gender disparity of farmers involved in okra production will result in an increase in its yield.
Gender of respondent and crops grown by farmers (leafy vegetable)	There was a strong, positive correlation between the two variables, r = 0.779, n=120, p<.001.	This implies that there is a statistical association between sex of respondent - and -crops grown by farmers (leafy). The result shows that gender disparity amongst farmers in the study area had an effect on the production of leafy vegetables. Indicating that an increase in gender disparity amongst farmers will result in an increased production of leafy vegetables. which means that the more both male and female farmers are involved in the cultivation of leafy vegetables, the greater the yield of leafy vegetables.
Gender of respondent and livestock reared by farmers (sheep)	there was a weak, positive correlation between the two variables, r = 0.122, n=120, p>.05.	this implies that there is no statistical association between gender of respondent - and - livestock reared by farmers (sheep). the result indicates that the rearing of sheep is not gender sensitive.
Gender of respondent and livestock by rear farmers(chicken)	there was a moderate/medium, positive correlation between the two variables, r = 0.426, n=120, p<.001.	this implies that there is no statistical association between gender of respondent - and -livestock reared by farmers (chicken). the result reveals that gender disparity had an effect on the rearing of poultry birds (chicken) by farmers in the study area (Omor).
Gender of respondent and livestock reared by farmers (goat)	There was a weak, negative correlation between the two variables, r = -.219, n=120, p<.01.	this implies that there is a statistical association between gender of respondent - and -livestock reared by farmers (goat). the result shows that gender disparity have an effect amongst farmers that rear goats in the study area
Total size of production land and labour required for crop and life-stock production.	There was a moderate/medium, negative correlation between the two variables, r = - 0.350, n=120, p>.001.	There appeared to be no association between the total size of production and the labour required for crop and life-stock production. This means that an increase in the total land available of food production would result in reduced levels of labour required for food production depending on type of farming system operated within the study area, i.e., farmers may be operating a mechanised or semi-mechanised system of farming.
Total size of production land and water availability for crop and livestock production activities	There was a moderate/medium, negative correlation between the two variables. r = - 0.344, n=120, p<.001.	This implies that there is a statistical association between total size of production land and water availability for crop and livestock production activities.

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Total size of production land and major crops grown and consumed (cassava)	There was a weak, positive correlation between the two variables, r = 0.210, n=120, p<.05.	There appeared to be a significant association between the total size of production land and the major crops grown and consumed (cassava). The result shows that total land size/space had some level effect on the production of cassava by farmers in the study area. Hence, the larger the farm, the more likely the growth of cassava will be possible.
Total size of production land - and- major crops grown and consumed (maize)	There was a moderate/medium, positive correlation between the two variables, r = 0.338, n=120, p<.001.	There appeared to be a significant association between the total size of production and the major crops grown and consumed (maize). The result shows that total land size/space have moderate effect on the production of maize. More so, an increase in the availability of land space on one hand will imply an increase in maize production in the study area.
Total size of production land - and- major crops grown and consumed (rice)	There was a weak, positive correlation between the two variables. r = 0.168, n=120, p<.05.	This implies that there is a statistical association between total size of production land - and -major crops grown and consumed (rice). the result shows that total land size have an effect on the production of rice in the study area. Hence, an increase in the availability of land space, will in turn result in an increase in the production of rice.
Total size of production land - and- crops grown by farmers (yam)	There was a strong, positive correlation between the two variables. r = 0.515, n=120, p<.001.	This implies that there is a statistical association between total size of production land - and -major crops grown by farmers (yam). The result indicates that the higher the total land space available for yam production, the higher the yield.
Total size of production land - and- crops grown by farmers (okra)	There was a weak, positive correlation between the two variables. r = 0.159, n=120, p>.05.	This implies that there is no statistical association between total size of production land - and -crops grown by farmers (okra).
Total size of production land - and- crops grown by farmers (leafy vegetable)	There was a weak, negative correlation between the two variables. r = -0.266, n=120, p<.01.	This implies that a statistical association exists between total size of production land - and -crops grown by farmers (leafy vegetable). Total land space had an inverse effect on the production of leafy vegetables, i.e., an increase in the total land space available for food production will result in a decrease in the production of leafy vegetables. this could depend on the scale of production, if farmers in the study area are growing leafy vegetables on a small scale or just as a backyard cultivation for household use and selling the surplus to the market for extra family income.

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Total size of production land - and- livestock reared by farmers (sheep)	There was a weak, positive correlation between the two variables. r =0.156, n=120, p<.05.	This implies that there is a statistical association between total size of production land - and - livestock reared by farmers (sheep)". This implies that the total land space has a significant effect on choice to rear sheep in the study area.
Total size of production land - and- livestock reared by farmers (chicken)	There was no correlation between the two variables. r =0.052, n=120, p>.05.	This implies that there is no statistical association between total size of production land - and - livestock reared by farmers (chicken)".
Total size of production land - and- livestock reared by farmers (goat)	There was a moderate, positive correlation between the two variables. r =0.240, n=120, p>.01.	This implies that there is a statistical association between total size of production land - and - livestock reared by farmers (goat)". The result indicates that total space had no effect on goat rearing. In Africa especially Nigeria, because of the common system used in the rearing of ruminants (in this case: goats) the "free roaming system" implies that goat rearing by farmers in the study area is not limited by land space as goats can roam freely within the locality for forage.
Labour required for crop and life-stock production -and- water availability for crop and livestock production activities.	There was a weak, negative correlation between the two variables, r = - 0.138, n=120, p>.05.	There appeared to be no association between the labour required for crop and life-stock production -and- water availability for crop and livestock production activities.
Labour required for crop and life-stock production and major crops grown and consumed (cassava)	There was a weak, negative correlation between the two variables. r = - 0.147, n=120, p>.05.	There appeared to be no statistical association between total the labour required for crop and life-stock production and major crops grown and consumed (cassava). Note: labour discussed here is the family labour.
Labour required for crop and life-stock production-and-major crops grown and consumed (maize)	There was a weak, negative correlation between the two variables. r = - 0.114, n=120, p>.05.	This implies that there is no statistical association between total the labour (family labour) required for crop and life-stock production and major crops grown and consumed (maize).
Labour required for crop and life-stock production-and-major crops grown and consumed (rice)	There was a weak, negative correlation between the two variables, r = -0.246, n=120, p<.01.	There appeared to be a significant association between labour (family labour) required for crop and life-stock production and the major crops grown and consumed (rice). Hence an increase in the availability of family labour may have an inverse effect on rice production. This does not conform with reality.

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Labour required for crop and life-stock production-and- crops grown by farmers (yam)	There was a weak, positive correlation between the two variables, r = 0.101, n=120, p>.05.	There appeared to be no significant association between labour (family labour) required for crop and life-stock production and the crops grown by farmers (yam).
Labour required for crop and life-stock production-and-major crops grown and consumed (okra)	There was no correlation between the two variables, r = -0.023, n=120, p>.05.	There appeared to be no significant association between labour (family labour) required for crop and life-stock production and the crops grown by farmers (okra).
Labour required for crop and life-stock production-and- crops grown by farmers (leafy vegetable)	There was a weak, positive correlation between the two variables, r = 0.233, n=120, p<.01.	There appeared to be a statistically significant association between labour (family labour) required for crop and life-stock production and the crops grown by farmers (leafy vegetable). This implies that labour had an effect on the production of leafy vegetables, i.e., a rise in the levels of labour employed in production, will result in a rise in the production of leafy vegetables, or the growth of leafy vegetables by farmers would imply a high need for labour for its production.
Labour required for crop and life-stock production-and-livestock reared by farmer (sheep)	There was a weak, negative correlation between the two variables, r = -0.112, n=120, p>.05.	There appeared to be no statistically significant association between labour (family labour) and rearing sheep). ***Same reason as goats, as minimal labour is required for their production (as they may roam freely).***
Labour required for crop and life-stock production-and-livestock reared by farmers (chicken)	There was no correlation between the two variables, r= -0.062, n=120, p>.05.	The result showed that there is no statistically significant association between the labour (family labour) required for the rearing of chicken. This may imply that the rearing of chicken in relation to labour do not require high levels of labour for its production.
Labour required for crop and life-stock production-and-livestock reared by farmers (goat).	There was no correlation between the two variables, r= -0.018, n=120, p>.05.	There appeared to be no statistically significant association between labour required for crop and life-stock production and the livestock reared by farmers (goat).
Water availability and-major crops grown (cassava)	There was no correlation between the two variables. r = 0.002, n=120, p>.05.	No statistical association existed between two variables. This implies that cassava is rather a rain fed crop in Nigeria rather than it been irrigated.
Water availability and major crops grown (maize)	There was no correlation between the two variables. r = - 0.092, n=120, p>.05.	This implies that there is no statistical association between water availability for crop and livestock production activities -and- major crops grown (maize).

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Water availability for crop and crops grown by farmers (rice)	There was a weak, positive correlation between the two variables, r = 0.263, n=120, p<.01.	There appeared to be a significant association between water availability for crop and livestock production activities and the major crops grown by farmers (rice). This means that water availability is important for rice cultivation.
Water availability and crops grown by farmers (yam)	There was a moderate/medium, negative correlation between the two variables, r = -0.478, n=120, p<.001.	There appeared to be a statistically inverse significant association between water availability for crop and livestock production activities and the crops grown by farmers (yam). ***i.e., the availability of more water will not support the cultivation of yam as yam requires less water for production than rice that would ordinarily perform well on a swampy land.***
Water availability and crops grown by farmers (okra)	There was a moderate/medium, negative correlation between the two variables, r = -0.316, n=120, p<.001.	There appeared to be an inverse but statistically significant association between water availability for crop and livestock production activities and the crops grown by farmers (okra). ***Hence the availability of Moderate levels of water supports the production of okra than rice which requires more water.***
Water availability and (leafy vegetable)	There was no correlation between the two variables, r = 0.080, n=120, p>.05.	There also appeared to be no statistically significant association between water availability growing leafy vegetables.
Water availability and livestock (sheep)	There was weak, positive correlation between the two variables, r = 0.141, n=120, p>.05.	There also appeared to be no statistically significant association between water availability (irrigation) for livestock reared by farmers (sheep)". Hence, irrigation is not required for foraging.
Water availability and livestock (chicken)	There was weak, positive correlation between the two variables, r = 0.126, n=120, p>.05.	There also appeared to be no statistically significant association between water availability (irrigation) the livestock reared by farmers (chicken).
Water availability and livestock (goats)	There was no correlation between the two variables, r = -0.092, n=120, p>.05.	There also appeared to be no statistically significant association between water availability (irrigation) and livestock (goat) rearing**.** Irrigation is also not required for foraging.
Crops grown (cassava) and (maize)	There was a weak, positive correlation between the two variables, r = 0.186, n=120, p<.05.	There appeared to be a significant association between the major crops grown by farmers (cassava) and crops grown by farmers (maize). The result shows that an increase in the production of cassava will result in an increase in the production of maize. This result is absolutely true, because in a Nigeria many farmers grow cassava side by side maize as they are known to be compatible and not compete vigorously for soil nutrient.

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Crops grown (cassava) and (rice)	There was a moderate, positive correlation between the two variables. r = 0.321, n=120, p<.001.	This implies that there is a statistical association between crops (cassava) and (rice). The result implies that an increase in the production of cassava will in turn result in an increase in rice production output.
Crops grown (cassava) and (yam)	There was no correlation between the two variables. r = 0.087, n=120, p>.05	This implies that there is no statistical association between crops grown (cassava)- and (yam).
Crops grown (cassava) and (okra)	There was a weak, negative correlation between the two variables. r = -0.167, n=120, p<.05	This implies that there is a statistical association between crops grown (cassava) and (okra). This implies that cassava production has an inverse effect on the production of okra, i.e., this indicates that a rise in the production of cassava will result the fall of okra production amongst farmers within the study location.
Crops grown (cassava) and (leafy vegetable)	There was a moderate/medium, negative correlation between the two variables. r = -0.439, n=120, p<.001.	This implies that there is a statistical association between crops grown (cassava) and (leafy vegetable). The result implies that cassava production has an inverse effect on the production of leafy vegetables, that is an increase in cassava production will result in a reduction of leafy vegetables by farmers in the study location.
Crops grown (cassava) and livestock (sheep)	There was no correlation between the two variables. r = -0.054, n=120, p>.05	This implies that there is no statistical association between crops grown (cassava) and livestock (sheep). The result shows that cassava production had no effect on the rearing of sheep by farmers.
Crops grown (cassava) and livestock (chicken)	There was a moderate/medium correlation between the two variables. r = -0.312, n=120, p<.001	This implies that there is a statistical association between crops grown (cassava) and - livestock (chicken)". The result shows that the production of cassava had an inverse effect on the rearing of poultry bird (chicken). i.e., a rise in the cultivation of cassava by farmers in the study area would result in a drop in the production (rearing) of poultry birds, this may be attributed to the spread of labour or the agricultural system farmers are interested in.
Crops grown (cassava) and livestock (goat)	There was no correlation between the two variables. r = -0.009, n=120, p>.05	This implies that there is no statistical association between crops grown (cassava) and livestock reared (goat). The result showed that cassava production had no effect on the rearing of goats.
Crops grown (maize) and (rice)	There was a no correlation between the two variables, r = 0.053, n=120, p>.05.	There appeared to be no significant association between the crops grown by farmers (maize) and crops grown (rice).
Crops grown (maize) and (yam)	There was a week, positive correlation between the two variables, r = 0.124, n=120, p>.05.	There appeared to be no significant association between the crops grown (maize) and crops grown (yam).

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Crops grown (maize) and (okra)	There was no correlation between the two variables, r = 0.060, n=120, p>.05.	There appeared to be no significant association between the crops grown (maize) and (okra).
Crops grown (maize) and (leafy vegetable)	There was weak, negative correlation between the two variables, r = -0.232, n=120, p<.01.	There appeared to be a statistically significant association between the crops grown (maize) and (leafy vegetable). This implies that maize production has an inverse relationship with production of leafy vegetables. i.e., An increase in the production of maize will in turn result in a drop in the production of leafy vegetables by farmers in the study area (Omor).
Crops grown (maize) and livestock (sheep)	There was no correlation between the two variables, r = 0.066, n=120, p>.05.	There appeared to be no statistically significant association between the crops grown (maize) and livestock (sheep).
Crops grown (maize) and livestock (chicken)	There was a weak, positive correlation between the two variables, r = 0.103, n=120, p>.05.	There appeared to be no statistically significant association between the crops grown (maize) and livestock (chicken). Whilst maize is one of the primary components of poultry feed, there is only a weak association in terms of maize cultivation and rearing of chickens on the same farm.
Crops grown (maize) and livestock (goat)	There was no correlation between the two variables, r = 0.076, n=120, p>.05.	There appeared to be no statistically significant association between the crops grown (maize) and livestock (goat). The result shows that the cultivation of maize had no association with the rearing of goats. maize is unlikely to be a forage for goats.
Crops grown (rice) and (yam)	There was a weak, negative correlation between the two variables. r = -.107, n=120, p>.05.	This implies that there is no statistical association the between crops grown (rice) and (yam).
Crops grown (rice) and (okra)	There was a moderate/medium, negative correlation between the two variables. r = -0.460, n=120, p<.001.	This implies that there is a statistically significant association the between crops grown (rice) and (okra). This implies that a rise in the production of rise will result in a fall in okra production amongst farmers within the study location.
Crops grown by farmers (rice) and (leafy vegetable)	There was a moderate/medium, negative correlation between the two variables. r = -0.579, n=120, p<.001.	This implies that there is a statistically significant association the between crops grown (rice) and (leafy vegetable). This implies that an increase in the production of rice will in turn result in a drop in the production of leafy vegetables by farmers in the study area (Omor).

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Crops grown (rice) and livestock (sheep)	There was a weak, positive correlation between the two variables. r = 0.130, n=120, p>.05.	There is no statistically significant association the between crops (rice) and livestock (sheep).
Crops grown (rice) and livestock (chicken)	There was a moderate/medium, positive correlation between the two variables. r = 0.342, n=120, p<.001.	This indicates that there is a statistically significant association between crops grown (rice) and livestock (chicken). The result shows that an increase in the cultivation of rice will result in a rise in the rearing of poultry birds (chicken). Again, this could be attributed to labour, and how it supports the cultivation of rice and the rearing of livestock or that this is an example of a different farming model.
Crops grown (rice) and livestock (goat)	There was a weak, positive correlation between the two variables. r = 0.157, n=120, p<.05.	This indicates that there is a statistically significant association between crops grown (rice) and livestock(goat). The result shows that the rearing of goats is related to rice cultivation. This could be attributed to labour. i.e., farmers may rear goats and sell them at will in order to finance the labour required for rice production.
Crops grown (yam) and (okra)	There was a weak, positive correlation between the two variables, r = 0.171, n=120, p<.05.	There appeared to be a significant association between the crops grown by farmers (yam) and major crops grown by farmers (okra). This implies that a rise in the production of yam will result in an increase in okra production amongst farmers. Data here suggests that both yam and okra could thrive in the same farming season within the study location.
Crops grown (yam) and (leafy vegetable)	There was a weak, negative correlation between the two variables, r = -0.187, n=120, p<.05.	There was a significant association between the crops grown (yam) and (leafy vegetable). The result shows that yam production had an inverse relationship on the production of leafy vegetables. i.e., An increase in the production of yam will result in a drop in the production of leafy vegetables by farmers. This may be caused by the prevailing farming season (dry or raining season) at the time or weather the farmer has sufficient labour to accommodate the production of both crops.
Crops grown (yam) and livestock (sheep)	There was no correlation between the two variables, r = -0.012, n=120, p>.05.	There was no significant association between the crops grown (yam) and the livestock reared (sheep.
Crops grown (yam) and livestock (chicken)	There was no correlation between the two variables, r = -0.018, n=120, p>.05.	There was no significant association between the crops grown (yam) and the livestock (chicken).
Crops grown (yam) and livestock (goat)	There was weak, positive correlation between the two variables, r = 0.221, n=120, p<.01.	There was a significant association between the crops grown by farmers (yam) and the livestock reared by farmers (goat)".

Table 5.17: Correlation Results – Analysis-Continuation

Association	Result	Comments
Crops grown (okra) and (leafy vegetable)	There was a moderate/medium, negative correlation between the two variables. r = -0.376, n=120, p<.001.	The result shows that okra production also had an inverse association with the production of leafy vegetables. Since both crops are vegetables, they may compete within the cultivated plot (ridge) i.e., if one is growing the other will/may not.
Crops grown (okra) and livestock (sheep)	There was no correlation between the two variables. r = 0.074, n=120, p>.05.	There is no statistically significant association the between crops grown (okra) and (sheep).
Crops grown (okra) and livestock (chicken)	There was a moderate/medium, positive correlation between the two variables. r = 0.314, n=120, p<.001.	This shows there is a statistically significant association between the crops grown (okra) and - livestock (chicken). This might be the case especially if the majority of okra farmers who are female and are likely to devote time to the domestication of poultry birds (chicken).
Crops grown (okra) and livestock (goat)	There was no correlation between the two variables. r = -0.024, n=120, p>.05.	This implies that there is no statistically significant association between crops grown (okra) and livestock (goat)".
Crops grown (leafy vegetable) and livestock (sheep)	There was no correlation between the two variables, r = -0.027, n=120, p>.05.	There appeared to be no association between the crops grown (leafy vegetable) and the livestock (sheep)."
Crops grown (leafy vegetable) and livestock (chicken)	There was moderate/medium, positive correlation between the two variables, r = 0.436, n=120, p<.001.	There appeared to be a significant association between the crops grown (leafy vegetable) and livestock (chicken). The result shows a rise in the cultivation of leafy vegetables is associated with rearing of poultry birds (chicken). Again, this might be the case if the majority of the farmers of leafy vegetable are female and more likely to rear poultry birds (chicken).
Crops grown (leafy vegetable) and livestock (goat)	There was weak, negative correlation between the two variables, r = -0.184, n=120, p<.05.	There appeared to be a significant association between crops grown (leafy vegetable) and livestock (goat). The data show that farmers who cultivate leafy vegetables are less likely to rear goats. This might be due to gender effects, spread of labour, or competition for resources (i.e., water, land space etc.)
Livestock (sheep) and livestock (chicken)	There was a weak, positive correlation between the two variables, r = 0.114, n=120, p>.05.	There appeared to be no association between livestock rearing (sheep) and (chicken)".
Livestock (sheep) and livestock (goat)	There was a weak, positive correlation between the two variables, r = 0.255, n=120, p<.01.	There appeared to be a significant association between livestock reared by farmers (sheep) and the livestock reared by farmers (goat)". This imply that farmers that rear sheep are like to rear goat at the same time.
Livestock (chicken) and livestock (goat)	There was no correlation between the two variables, r = 0.059, n=120, p>.05.	There is no association between livestock reared (chicken) and (goat).

5.6 REGRESSION COEFFICIENT

The regression coefficients and p-values highlight which relationships in the model are statistically significant as well as the nature of the relationship(s).

Probit (Binomial) Regression Equation:

$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + e_i$

Y= Gender of Individual Farmers (A proxy for "food availability": based on farmers capability to access productive resources in view of their gender)

Y* (Y_1 & Y_2) = Y_1 (Male farmers) and Y_2 (Female farmers)

X_1= Labour; X_2= Land Space; X_3= Farming Systems: Mono cropping X_4= Farming Systems: Mixed cropping; X_5=Cultivated crop: Rice; X_6= Reared livestock: Sheep; X_7= Reared livestock: Goat; X_8= Reared livestock: Chicken

Above is the regression equation that guides the regression analysis of this section as shown in table 5.18 which are the coefficients resulting from this regression equation analysed.

Table 5. 18: Regression Coefficient: - Gender of Farmers and Crop Grown/ Livestock Reared/ and Farming Input

	B	Wald Chi-Square	Sig.	Exp(B)
(Intercept)	2.147	2.196	0.138	8.556
Labour Required for Production	5.691	0.000	0.999	296.050
Land Size 1	-0.583	0.883	0.347	0.558
Land Size 3	-10.022	0.000	0.999	0.000
Farming System- Mono Cropping	-1.164	2.928	0.087	0.312
Farming System- Mixed Cropping	-0.593	0.418	0.518	0.553
Crop Cultivated - Rice 2	-3.290	11.661	0.001***	0.037
Crop Cultivated - Rice 3	-2.585	15.298	0.000***	0.075
Reared Livestock - Sheep 2	1.204	3.565	0.059	3.333
Reared Livestock - Sheep 3	7.695	0.000	0.999	2197.720
Reared Livestock -Goat 2	-0.365	0.365	0.546	0.694
Reared Livestock - Goat 3	-14.307	0.000	0.999	6.115
Reared Livestock - Chicken 2	0.783	1.721	0.190	2.187
Reared Livestock - Chicken 3	1.565	2.202	0.138	4.784
(Scale)	1[b]			
Dependent Variable: Gender of Respondent				

Source: Field Survey, 2020

*** Significant at p<0.001, ** Significant at p<0.01 * Significant at p<0.05

Only results that are statistically significant are reported in this section. The estimated parameter and the relevant statistical results obtained from the analysis are presented in the table 5.18 above and explained as follows:

Model Information

A binomial probit regression output is computed here with dependent variables being the "Gender of Respondent (of individual farmers)", with male farmers being the reference dependent variable in a total of n=120 respondents.

Categorical Variable Information

The information showed that male farmers n=97 (80.8%) was more than female farmers n=23 (19.2%) among the study group. Because this population size is not evenly distributed, the regressed output may be skewed.

Omnibus Test

The likelihood ratio – chi-squared test (85.756, p<.001***) shows that the model containing the set of predictor variables represents a significant improvement in fit over the conditional model.

Regression Parameters

The regressed parameters showed that female farmer's cultivation of rice depending on the quantity (crops cultivated rice 2 [between: 10% - 20%] and rice 3 [between: 21% - 40%]); with parameters for cultivated rice 2 (b= -3.290, Wald= 11.661, p<.001***); cultivated rice 3 (b= -2.585, Wald= 15.298, p<.001***) are both significant [with negative coefficient]. This shows that women (female farmers) among the study group were less likely to cultivate rice especially in the quantities specified above. The odds ratio shows that female farmers are 0.037 times and 0.075 times (which is low) less likely to cultivate rice in quantities between 10% to 20% and 21% to 40% among the study population. All other variables: labour, land size, and farming system (mono-cropping, and mixed cropping), reared livestock (sheep; goat and chicken) were insignificant.

In practical terms, the results imply that in the face of limited or scarce resources available to farmers in Omor-farming community to cultivate the main staple (rice) commonly cultivated by majority of farmers among the study group (see section: 6.2). Male farmers among the study group were more likely to cultivate rice than their female counterparts.

This complies with expectations, as rice cultivation clearly demand more physical effort (land preparation, planting, harvesting, processing, storage etc) which makes it a crop cultivated by farmers (in this case majorly male farmers) with either/or both the physical inputs or financial strength to ensure productivity. In a way this affects food availability as gender plays its role in farming. For instance, in Sub-Saharan Africa, women have less access to land and mechanical inputs required for food production compared to men (Kilic et al., 2015). This phenomenon affects food production owing to the disparity in the strength and resources available to individual farmers, preventing female farmers from accessing agricultural production inputs which could have resulted in additional production of the crops (rice), that would have further ensured food availability (a pillar of food security).

5.7 DISCUSSION

The socio-economic statistics of this study showed that more male 80.8% were in the study group than female farmers (19.2%). When compared to the national data, Anderson et al., (2017) noted that smallholder farming population in Nigeria includes a good number of older individuals with at-least half of the population (55%) aged between 30 to 49 years of age; 33% aged between 50 and above, while one-tenth were under the age of 30. As a result, the regional zoning figure for smallholder farmers across Nigeria showed that 12% represented the population of the Southeast, South-south 12%, South-West 9%, North-central 25%, North-east 20% and North-west 22%. This is evidence that the greater concentration of Nigerian farmers is in the Northern part of Nigeria. In addition to this, Anderson et al., (2017) further demonstrate that male farmers represented 88% of the population while female farmers were only 12%. The majority of the farmers group captured in this PhD study (83.3%) were within the age bracket of 20-40years, while 16.7% were between the ages of 41-60years. Most respondents had secondary school education (40.8%), tertiary education (21.7%) and primary school education (18.3%) showing that a good number of farmers amongst the study group were educated.

The majority of farmers (86.7%) worked on their farm single handed on full time basis, some household members worked on the farm on part-time basis, 20% of respondents claimed to have one other household member support them on their farm, and one third had a higher number of household members work on the farm on part-time basis. The majority of farmers 77.4% noted that they own the land that they cultivated, farmers with no ownership on the land they operate, indicated that they farmed on the land either based on renting for a short period of time or by an agreed term of occupancy (usually longer).

Acquirability of farm inputs was a challenge for virtually all farmers due to a range of factors, finance (97.5% stated this) and/or distance to market/absence of retail shops within the farming community, and high cost of transportation. With regards to farming systems, farmers practiced mixed cropping (85%) and mono-cropping (64.2%) more than mixed farming (5%) (*the figures do not add-up to 100% because each question was dealt with individually using the yes or no answer)*. This showed some confusion between farmers as to the terms or for some crops they undertook mono-cropping e.g., rice, for others they practiced mixed cropping on the same farm. Farmers amongst the study group were not conversant with organic principles (farming) or conservation agriculture. This suggested that farmers amongst the study group are either not open to using organic farming and conservation agricultural methods because they don't know about it, or it does not suit the type of crop (s) they cultivated and the livestock they rear. This phenomenon also reflects the lack of extension services within the community.

Farmers (84.2%) noted that they have access to irrigation, 83.3% stated that the available water is sufficient for their agricultural activities, while 84.2% further noted that they owned irrigation equipment. The majority of farmers (59.2%) depended on well and rainfall water, 15% of farmers depend on just rainwater (rainfall), 12.5% depend on the use of well-water only, while 9.2% of farmers operated their farms with borehole water system showing the different irrigation methods farmers in this study employ for their farming activities. This implies that farmers in the Omor farming community appeared to operate their farms with a range of farming models including the water systems they use.

Extension services was faulted by all farmers amongst the study group, these farmers insisted that they do not receive visits from extension service providers, which could have been due to several reasons: lack of extension staff numbers, lack of teaching resources, communication and lack of funds for resource mobilisation. This aspect is covered in-depth in the qualitative section of this study (next Chapter 6) but also give way to a wider requirement for further research.

To address research objective 2 the influence of gender was assessed. In terms of crops grown the data shows an association between the gender of farmers and their cultivation/production of cassava, maize, rice, yam, okra and leafy vegetable. The majority of the crops (cassava, rice, yam, and cocoyam) were more likely to be cultivated by male farmers than female farmers. Other crops such as (okra and leafy vegetables) were more likely to be cultivated by female farmers than male. Only maize production did not show a gender bias. The study shows that male farmers were more likely to rear goat and pigs than female farmers.

On the other hand, female farmers were more likely to rear chicken than male farmers, while both male and female farmers equally shared the likelihood of rearing sheep.

Farmers (owned) assets that contribute to their performance in terms of agricultural food production. It was observed that gender had no significant association with farmers' ownership of vehicles, bike/bicycles, plough, irrigation equipment, mobile phone, television and solar panel. As a result, both male and female farmers were equally likely or equally unlikely to own a particular asset. The gender of farmers only had a significant association with owning a cart, where female farmers were more likely to own a cart. Male farmers were more likely to rent-in farm labour to support their agricultural activities than female farmers and they were more likely to rent out their labour too. Gender also influenced size of farm where male farmers were more likely to own/rent larger farms. Males and females were equally disadvantaged with acquiring inputs or accessing extension services. Male farmers in the study group were more likely to adopt and use mixed cropping and mixed farming systems compared to female farmers, and females more likely to adopt and/or cultivate crops using the mono-cropping farming system.

Male farmers were observed to be more likely to have access to water source/supply for their farming activities than their female counterparts.

The probit (binomial) regression of this study revealed that amongst the variables regressed, data show that rice cultivation is carried out mainly by male farmers amongst the study group. This is so because male farmers are thought to have more assess to productive resource than female farmers women, this is in addition to the physical strength that enable male farms engage more with the crop (rice) compared to their female counterpart.

5.8 CONCLUSION

The results from the analysed data of this study showed how gender disparity plays its part in the agricultural sector and influence food availability (one of the pillars of food security). This study further showed that certain agricultural activities based on their resource needs are more cultivated/reared by one gender group (male or female) than the other. It is essential to address current levels of food insecurity in Nigeria that will ensure farmers regardless of their gender are exposed to equal opportunities and access to resources such as extension services and inputs (e.g., land, seedling etc) that would improve their agricultural output. The support of extension service providers to reduce gender disparity in agriculture within the study location is very important. However, it is paramount to note that government at all levels need

to consider and/or ensure resources and inputs are equally distributed amongst farmers in order to ensure or guarantee an increased food basket for the nation (Nigeria).

The next chapter (6) touches on the qualitative aspect of the study that supports the findings in both chapters 4 and 5 of this study. Individual interviews and group case interviews were carried-out for information that supports the aforementioned two chapters. Data on farmers food production, market operation, and consumers use of the local market as well as the supermarket was captured.

CHAPTER 6

6 FOOD PRODUCTION, MARKETING, RURAL FOOD SYSTEMS AND URBAN FOOD SYSTEMS AND THEIR CONNECTIONS IN ANAMBRA STATE, NIGERIA

This chapter considers rural food systems, urban food systems and their degree of connectedness from the point of production to consumption. With emphasis on food production, food marketing, and rural-urban linkage, the chapter considers the challenges encountered in getting food from rural areas to urban consumers as well the possible steps that could be taken to limit such challenges in the Nigerian context with particular focus on Anambra State. In this PhD study, individual and group case interviews (under the case study approach) were used to examine the existing or non-existing linkages between rural and urban communities, their influence on food security and more so, identified ways of improving the linkage between both communities (rural-urban) within the study area (OBJ 3).

6.1 BACKGROUND AND CONTEXT

In 2014, the Nigerian economy catered for a population said to be over 150 million people (Uma et al., 2014), representing over 20 percent of the population of the sub-Saharan region in Africa (Uma et al., 2014). At the time of this PhD study, the Nigerian population is estimated by the CIA Factbook (2021) to be 219.5 million people (by July 2021). Nigeria's rate of growth in its human population, as previously explained in this thesis could be viewed to be out of step with its internal food production i.e., the country's food production is not rising to meet the demands of the growing population (Uma et al., 2014). The food insecurity situation in Nigeria has also not been given the attention required, despite the country's endowment with fertile land, quality labour, weather conditions etc. (Uma et al., 2014). There are many factors that may have contributed to this, although agriculture is the highest employer of labour, and a means of connecting with rural communities, the Nigerian Government have over time focused its effort on the oil sector for economic growth, productivity and to driving its GDP as previously outlined in this thesis (see subsection 2.3.1). The Nigerian agricultural sector is characterised by subsistence farming, low farmer income, farm input scarcity (seedlings, fertilisers, labour), poor food marketing channels, infrastructure, insufficient post-harvest loss facilities, and poor extension services (Ibeawuchi et al., 2015). This has been highlighted in the previous chapter and there is an urgent need to bring change to the sector to underpin rural livelihoods (Bachewe et al., 2018). Food production and marketing is important

as its absence can cause household livelihoods to fall and food security strength/capacity to deteriorate (Omardi, 2019). Food chain actors (farmers, food processors, food marketers etc.) face challenges that affect their productivity and performance. Some of these challenges include the poor state of infrastructure, communication, commodity pricing etc., it is however important to note that these challenges vary from one food chain actor to another based on demography, resource endowment and government support (Omardi, 2019).

In order to attain a sustainable agricultural system in Nigeria, there is the urgent need to rapidly transform the agricultural sector. This could be achieved by encouraging farmers and other food chain actors via the mapping of new and existing schemes or policies that support their effort, making it cheaper and safer to use available farm inputs, access modern farming technology, marketing support, training and advice provided to farmers to improve their knowledge on food production and distribution through a food system that works (Adekunle et al., 2009). The impact of failing to address these challenges is that Nigerian citizens could go hungry, food prices will rise, farmers' livelihoods will drop leading to a rise in food scarcity, and an increase in crime-rate occurring as citizens strive to sustain themselves. However, it is thought that existing resources could be used to address such challenges, but they are often spent not only on the oil sector, but also on food importation into the country, thereby crippling home-grown food production and foreign exchange through export (Adekunle et al., 2009). Hence, this section of the thesis hopes to address the component of this study that is concerned with food availability, food access and linkage between the rural and urban food systems in Anambra State, Nigeria in view of the markets/communities that were evaluated in the course of this study. This chapter addresses the following research question:

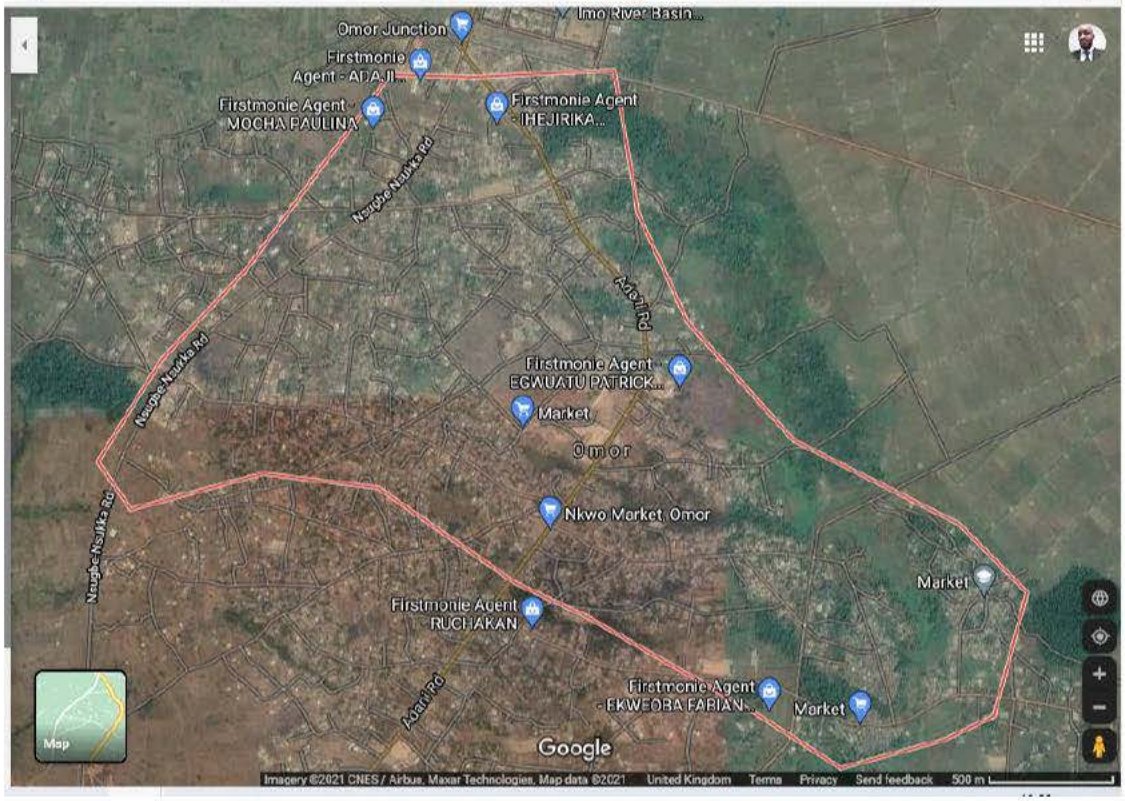
- What are the existing linkages between rural and urban communities in relation to food supply and demand in the study area and how they influence food security?

This chapter is framed by the findings from the two group case interviews and three individual interviews that were undertaken with farmers, food marketers, and a supermarket representative and wider stakeholder interviews (extension service providers), outlined in section 3.4 of this study (methodology section).

6.2 FARMERS GROUP CASE INTERVIEW (OMOR FARMING COMMUNITY, OMOR, ANAMBRA STATE)

The group case interview presented here was conducted with farmers (n=5) who cultivated different agricultural commodities (e.g., rice, okra, maize, cassava, cocoyam, plantain, oil palm etc.). Additionally, it was found that these farmers commonly cultivate rice, and as-such the group case interview was centred on farmers who primarily cultivated rice, in order to limit the broadness and risk of overgeneralisation from the inclusion of other crops. Other types of farmers and the information they provided are captured in the quantitative analysis of the farmer interviews (survey) in chapter 5 of this thesis. Almost all members of the community (Omor) appeared to be farmers cultivating one or more types of crops, and even though female (women) farmers were part of the sampled population, they were in a minority. (***See-*** *chapter 5*). New farmers continue to start farming businesses yearly, causing the population of farmers to increase in the study location. This indicates that people from other sectors/trades are increasingly getting interested and joining in the cultivation of food in Omor community because of the economic gains that can be made compared to other occupations. Figure 6.1 show an area snapshot of the Omor farming community, with large green area to be farmlands, also showing on the map is one of the community's major market - the Nkwo market.

Figure 6. 1: Google Map Showing a Satellite Snapshot of Omor Farming Community



The next subsection (6.2.1) is on the activities of farmers in the Omor community with emphasis on their ability to cultivate rice as a result of the support (input availability, market, extension services etc) at their disposal.

6.2.1 AGRICULTURAL ACTIVITIES OF FARMERS IN OMOR COMMUNITY WITH PARTICULAR FOCUS ON RICE PRODUCTION

Farmers who participated in the group case interviews noted that no single variety of rice is constantly cultivated i.e., rice farmers within the Omor community cultivate different variety of rice, for reasons such as low risk of pest infestation, taste, early maturing, ease of harvesting and processing etc. Further changes to the variety of rice these farmers cultivate could also be due to the high market demand for one particular variety of rice from customers. Aside from the cultivation of rice, which is the major crop cultivated in Omor community, rice is grown alongside other seasonal crops (such as: maize, cassava etc.). Most farmers within the community also reared livestock (goats, poultry birds, pigs [not all farmers], and sheep) usually within their household or farming environment. On a general note, farmers across the community operate their farms, on small-scale level and while others do so on a semi-

commercial and commercial level (few), which further indicates that farming is the main economic driver of the Omor community.

Figure 6. 2: Farmers Group Case Interview, Female Farmers Selling Their Produce and a Local Rice Mill Plant



Source: Field Survey 2020

More so, these farmers cultivate farmlands which could have been bought, inherited or rented. Interestingly, farmers also cultivate the land of persons/people who are non-farmers, and mostly living/reside in cities and whose lands lay fallow within the community. These individuals provide farmers with resources (financial, equipment's, machinery, seedlings, seeds, fertilisers etc.) to cultivate on such lands on their behalf (see Chapter 5 for wider descriptive analysis).

6.2.2 FARM INPUT

According to the farmers who took part in the group case interview, agricultural inputs for food production are sourced by them (farmers) from the open market, in addition to the 1/10 of farm inputs (fertilisers, seedlings, seeds etc.) supplied by the Nigerian government based on individual cooperative associations, but this does not occur on a regular basis (i.e., the supply of inputs by government is not constant). In the open market, the price of agricultural inputs such as fertilisers and seedlings (from the sellers' point of view) are subject to change due to several reasons such as scarcity, travel cost, and service cost.

In terms of the labour required for agricultural food production, the Omor farming community operates two major systems: (1) Family labour, and (2) Hired labour. Farmers cultivate their farms themselves with support from family members and in the event that labour support from family members is not sufficient, they then hire the efforts of paid labour. As a result, farmers insisted that only a few families lose members of their household in migration to cities and white-collar jobs, who ordinarily would support them in their farming activities with other family members staying back to help improve the farm. This implies that migration had no effect on the supply of labour for agricultural food production for the group interviewed supporting the survey findings. This disagrees with the findings of (Abdullahi et al., 2009; Olajide, 2013; and Amaka et al., 2016) who noted that food production capacity reduces as a result of the migration of people from rural farming communities to urban areas (see chapter 2: subsection 2.6.1).

6.2.3 FOOD LOSS

On the farm, food loss could occur during the growth of the plant (actions of pest, weather), harvesting (mechanical damage to produce), transportation, processing, packaging etc. Since rice is the common agricultural commodity grown by farmers in the study area (Omor), farmers in the discussions confirmed that waste in rice production mostly occurs during transportation and processing (drying) of rice. In the case of pest infestation during rice processing and storage, a clear example is the study by Krijger et al., (2020) which focuses on the efficacy of management and monitoring methods in preventing post-harvest losses resulting from the action of rodents in Bangladesh. The study considered an approach for reducing the quantity of rice consumed by rodents in household granaries. This post-harvest monitoring method used trapping and better hygiene within and around granaries to reduce the rodent population. The estimated percentage of household food losses in the absence of rodent control measures were estimated at 2.5% in Bangladesh and 17% in Myanmar. Upon the implementation of rodent control measures, these losses were reduced down to 0.5% in Bangladesh and 5% in Myanmar. The study concludes that the impact of rodents on smallholder storage can be assessed accurately or near accurately in the field under real-life conditions. Hence, trapping and environmental management are suggested as effective and affordable tools that can reduce the impacts of rodent action on stored grains within communities and can alternatively be the viable substitute to rodenticides. This is not currently implemented in the Omor community but would be of value as reducing post-harvest losses caused rodents would make a strong contribution to food security. Elsewhere in SSA, Fahad et

al., (2021) considered bio-based integrated pest management in rice. The study considered the use of bio-based integrated pest management systems in the control of insect pests and weeds in rice production, processing and storage. The study noted that this system is environmentally friendly, effective and economically viable as compared with the use of chemical pesticides. In most cases, up to 20% of the produce is lost during transportation and the occurrence of natural events such as rainfall (causing deterioration).

In the course of processing however, the farmers among the study group (in this Thesis) insist that no loss occurs during rice processing, except during the milling stage and the rice husks and other by-products are sold at a reduced rate for animal feed processing. Thus, producing a circular system for managing waste and utilising it as an input in an alternative agricultural enterprise.

"We do not lose much of our rice produce to pests. However, the main form of rice loss is during the transportation and milling of rice. During the milling process the excess wastes (husks and broken grains) are sold off for animal feed processing" – (Farmer: 1)

The farmers explained in the discussions that rice once harvested and processed is stored in different mills located in different parts of the community at no cost to farmers, and these storage sites enable farmers mill their rice for free. However, if such farmers decide to move their stored rice to another mill, such action by farmers would attract some administrative charges (fee). Hence, there is a reduced level of loss associated with the processing of rice, except for the husks and other secondary by-products which are sold for animal feed production. This is similar to the findings of Fahad et al., (2021).

6.2.4 MARKETING ACTIVITIES

The farmers were asked some questions about their marketing activities. They explained that Omor rice farmers process their rice in the mill of their choice. The rice mill was identified by these farmers as the marketplace for the sale of their rice, purely because of its close proximity to them (farmers). Farmers who market rice to cities such as Onitsha as well as supplying to middlemen who wait and negotiation on roadsides, in most cases, use a hired car or bus for the movement of rice from the point of production to the point of sale. This demonstrates that farmers in the Omor community engage the services of middlemen who may make profits from the produce of farmers especially if the farmers lack market intelligence (information) and the infrastructure to sell directly to consumers. This occurs as farmers

expressed their discomfort in the services of middlemen who buy agricultural commodities from them at reduced prices and sell to other chain actors or city markets at a higher rate.

"The rice mill is usually the marketing spot for our rice produce because it is within our community. Other times we either market our rice produce on the roadside to commuters and middlemen. Additionally, we may decide to bag the rice depending on the quantity and transport it ourselves to big cities for sales depending on the difference between the timing for harvest and the new planting season" – (Farmer: 5)

This challenge has been discussed extensively in this thesis in section 2.4 as well as in the study of Ogbu & Usman (2018). On a general note, middlemen can assist in rural-urban linkage by providing farmers with key information or feedback on (1) the quality of produce for farm level improvement; (2) the quality of produce for processing improvement (3) and the quantity of such produce/product. However, farmers in the Omor community stressed that the information provided by middlemen is not always credible nor reliable. This creates a vulnerability for them as a community, as they are physically and informationally disassociated from the main market.

6.2.5 INFRASTRUCTURE

In the production of agricultural commodities, the farmers when speaking identified one of the bottle necks they encounter, as the lack of agricultural machinery e.g., tractors, harvesters, driers etc. which limits their potential to drive food productivity. In terms of produce transportation, farmers are challenged by the lack of good road network and high transportation cost for food produce. These factors are similarly faced in the distribution of farm produce. Subsection (2.2.1) in the literature review emphasised the role of infrastructure and its impact on agriculture and national development.

"We [farmers] are affected by the poor state of infrastructure in Nigeria particularly bad road-pot holes etc., this causes us to lose some of our produce during transportation and marketing especially while commuting to other communities" – (Farmer: 2).

6.2.6 EXTENSION SERVICE

Rice farmers in the Omor community insisted that extension service agents do not visit them and there is no transfer of knowledge or ideas to them either by those who come from the government offices or the private sector. Further to this, the farmers in the Omor community also noted that they have derived no benefit from extension service providers. As a result, these farmers recommended, during the group case interview session that constant visits by extension agents for knowledge transfer on agricultural production would highly improve their farming practice, lifestyle and livelihoods.

"We [farmers] do not see extension officers come around to support us" – (Farmer 1) See more quotes on this in section 6.6 (extension services)

Table (6.1) shows the factors farmers among the study group reported would influence farmers' ability to cultivate crops (particularly the subject crop "rice") in the Omor farming community. The response and the frequency of response on each factor mentioned by farmers during the group case interview session is included. The frequency order represented by the self-reported factors are outlined as follows, infrastructural challenges, challenges with input acquirability (availability and affordability), activities of middlemen, and poor extension service. These factors were mostly seen as having a negative influence on farmers' food production activities.

Table 6. 1: Factors Affecting Farmers Food Production Activities

S/N	Factors of influence	Frequency
1	Infrastructural challenges	5
2	Input acquirability challenges (availability and affordability)	4
3	Activities of middlemen	3
4	Poor extension service	3

Source: Field Survey, 2020

Table 6.1 shows the key factors affecting farmers ability to produce agricultural commodities. One of the most reported infrastructural challenges they face is the bad road network leading to and out of the Omor community to other parts of Anambra State. This has a profound influence on farmers (amongst the study group) in terms of access to other essential elements of food production and market support including those listed in table 6.1 above.

6.2.7 FARMING BARRIERS EXPERIENCED AND POSSIBLE SOLUTIONS

Farmers in the discussions identified some of the barriers they experienced during food production to include poor availability of farm inputs (fertilisers, seeds, seedlings etc); poor availability of farm machinery (tractor, dryers); and lack of support by government etc. To this effect, rice farmers suggested that more should be done by government in terms of improving infrastructure, extension service delivery, provision of machinery, and driving an increase in the supply and distribution of farm inputs.

"When it comes to farming inputs, we rarely get support from the government. The distance to the places where we buy farming input is considered to be far from us, this is in addition to the bad road network that doubles our journey as we rarely get farm inputs such as fertiliser, seedlings, seed, pesticides etc., within the Omor farming community or most of its neighbouring towns". - (Farmer: 5)

In terms of the farmers' feedback mechanism on the quality of produce or products from marketers to farmers, farmers stated that they receive feedback information on the quality and quantity of their produce directly from urban marketers, insisting that they consider information/feedback from middlemen as unreliable. However, the functioning of the feedback system between farmers and marketers as well as middlemen operates as follows: information goes directly from marketers to farmers. On other occasions, feedback information is passed through middlemen. See section 2.2 (Food Systems) for a wider explanation of the linkages involved.

6.3 EXTENSION SERVICES (FEDERAL AND STATE – ADP ACTORS)

6.3.1 CHARACTERISATION OF EXTENSION SERVICES

Extension services as previously explained, encompass the training/education that farmers and rural dwellers receive in order to improve their farming practices, livelihoods and community. Data for the purpose of this section was gathered through a face-to-face interview with a Government extension officer and a telephone interview with an Agricultural Development Programme officer (ADP). The Nigerian extension system operates various forms of extension service delivery:

(1) training and visit, (2) farm to farm, and (3) adopted village programme (mostly for technology transfer). More so, the type of extension services offered to individual farmers under the various forms of extension system include farmers' field school; farmers business school approach; smallholder horticulture empowerment promotion (SHEP-for horticulture crop); and community-based adoption (CBA). Literature on the Nigerian extension service system was reviewed in subsection (2.3.5) of this study. However, other studies have tried to explain extension service in the Nigerian context. Adegboye (2016) examined the effect of participation in community-based agriculture and rural development project (CBA-RDP) on the socio-economic status of rural community dwellers in northern Nigeria. The study concluded that CBA-RDP impacted participants socio-economic status positively, but implementation delay was perceived by participants as the main challenge to their engagement. In Kwara State Nigeria, Adesoji et al., (2020) study focused on the adoption of community based agricultural development project technologies among smallholder farmers. Using multistage sampling techniques, chi-square and correlation analysis, data was collected and analysed from 270 respondents. The study findings showed a moderate adoption level of the CBA-RDP technology with higher adoption rates occurring in orchard, poultry, fishery, and cattle packaging, while adoption rate was low in livestock, crop production, processing, and agro-packaging. More so, CBA-RDP was significantly associated with respondent's gender, marital status, social organisational membership, compatibility and relative advantage. The study suggested that more publicity (awareness) needs to be created by participating stakeholders to encourage more women to actively participate in such projects. These studies have made findings that can directly be linked to the contribution of this thesis for better understanding of the Nigerian extension service system.

The interview with the federal government office covered discussions on the selection process for involvement in extension programmes for communities and farmers. This process includes: the national allocation and visit by extension officers, and farmers selection based on agro-commodities/ crops of interest. Hence, this selection process is of interest when reflecting on this PhD study. Within the Federal Ministry of Agriculture and Rural Development (FMARD), the hierarchy of extension service office in Nigeria takes the following steps: the **FMARD departments** communicates new skills and innovation to the **agricultural development programme (ADP)** which acts on the information and trains **block extension agents (at the zonal level)** who then recruit and train /transfer skill and knowledge to **village extension agents (community level).** They interact and ensure that farmers get the necessary support they need to deliver on the teaching module dispatched to them as well as in the

promotion of their household's livelihood. This exemplifies the "top-down" approach of extension. In terms of farmers' livelihood and rural community development, the extension office (at the Federal level) stated that it delivers support in the following capacity (a) the livelihood enterprise programme: where women and cooperatives are supported with enterprise starter packs, and (b) the youth and women investment programme: where youth farmers and women are also supported with training and starter packs.

In the eastern part of Nigeria, extension services function with the support of the ADP officers within the State. This is so state ADP actors anchor several one-stop agricultural extension service delivery centres (with demo plots, equipment and machinery) across the state. In view of this, it is rather unfortunate that farmers surveyed in this thesis (see, chapter 5; section 5.3.11), explained the non-interaction they had with State extension officers. This was explained by the interviewees (extension and ADP officers) to have been caused by several factors that include: the lack of funding, and the poor mobilisation of extension officers and resources. Personal security or physical safety of extension officers was a reason for concern (expressed by the interviewee), especially where extension services are field-active. Perhaps this may have also contributed to the factors that limit extension officers' ability to extend services to the Omor farming community. *See quotes on section 6.6 for more depth.*

6.3.2 SUPPORT FOR FOOD PRODUCTION

The Nigerian extension system claims that it supports farmers with input supply (fertilisers, agro-chemical, seeds, equipment, and agro-mechanised utility) (Camillone et al., 2020). This was a notion denied by farmers in the Omor farming community during the group case interview of this study. In terms of post-harvest loss, the government extension service providers of Nigeria (FMARD), reiterated that they supply farmers with silos for the storage of their produce especially grains (See previous points [section: 6.2.3] raised about post-harvest loss especially as a result of pests). In addition to this there were claims of the provision of logistical support in conveying farm produce from the farm to processing sites/ or storage units, as well as the market linkage they provide to farmers to reduce post-harvest loss. These tasks may be very clear, easy and explicit on paper but hard to execute because of some of the challenges these extension personnel's face (funding and mobilisation to the field) in delivering extension services to farmers. This shows that farmers within the Omor farming community are not the beneficiaries of these policies and strategies drafted by the Government of Nigeria.

More needs to be done to determine the barriers that have prevented adoption and to enable processes that develop wider access to these benefits.

6.3.3 MARKET SUPPORT SERVICES

The success of marketing depends significantly on market information, especially with regards to the sourcing of product or produce on the marketer's side, and price of the commodity on the side of the consumer. The power of market information to drive farm-level innovation cannot be underestimated. The Federal Ministry of Agriculture and Rural Development (FMARD) provides market information to farmers through "enumerators." These enumerators work within the planning, monitoring and evaluation unit of the extension office at FMARD. Some of the information disseminated includes information on farm produce location, information on the location of agro-commodities sold by farmers and information on possible markets where similar produce is sold.

In terms of the logistical support available to farmers in getting their produce from the point of production to sale, the FMARD-extension service department's interviewee stated that, in the past supported farmers with the logistics and movement of produce from the production areas to markets. This support has presently ceased leaving farmers in the case study to find their markets and make sales on their own, because extension officers are under-funded and were poorly mobilised in their field support to these farmers, this was according to the Interviewee (FMARD-Extension services). This however implies that there could be a rise in post-harvest loss, and an increase in farm level waste resulting from poor market linkage and/or support. Table 6.2 show the factors and frequency as reported by the rice farmers during the group case interview session, on what influences extension service delivery to farmers in the Omor farming community. The frequency is reported purely to show the degree of emphasis in the qualitative data.

Table 6. 2: Factors Affecting Extension Service Delivery Amongst Farmers in Omor Farming Community

S/N	Factor of influence	Frequency of use of the term
1	Poor funding and mobilisation of resources	7
2	Poor numbers of extension staff	3
3	Lack of support to farmers (inputs, information and logistic support)	2
4	Farmers' literacy	2

Source: Field Survey, 2020

6.3.4 BARRIERS TO EXTENSION SERVICE DELIVERY AND POSSIBLE SOLUTIONS

This section of the chapter considers some of the bottlenecks (funding, number of extension staff and the literacy level of farmers) that affects the provision of extension services to farmers and discusses possible solutions to them. According to the Federal Ministry of Agriculture and Rural Development (FMARD)- extension unit (the interviewee), in the past farmers were not involved in the development of training plans or training decisions, whereas today the reverse is the case (as farmers are now highly involved). More so, the interviewee stressed that, in the past extension services were carried out using the top-down approach which was not participatory (by farmers), instead it took the form where knowledge, innovation and skills are developed and transmitted to farmers without their involvement or consultation. More recently, the bottom-up approach, which involves farmers more effectively and completely has been adopted, enabling them to decide what works best for them. This has greater potential as an approach to guarantee the adoption of innovation, and skills or that knowledge is transmitted effectively. In order to cite an example of the use of this approach (bottom-up) and its benefits to farmers, the study by Ajani and Onwubuya (2010) considered two key methods of the bottom-up approach: farmers field school (FFS) and junior farmer field and life school (JFFLS). The two approaches were participatory for local communities, enabling people who work in groups to build on traditional or indigenous knowledge that they are using, and in doing this participating communities were found to develop or discover new ideas by themselves. The study recommends the need to promote these methods in the national extension policy to ensure production sustainability.

In order to improve on the services provided to farmers in Nigeria (Southeast- Omor farming community), the **FMARD extension office** and the **ADP officer proposed suggestions as follows**: the provision of funding by government and private sector as the first and most important support required; second was the employment and training of more extension officers and thirdly, enhancing farmers' literacy level through adult education, which could be done via the training of village/farmers/community champions, farmers' heads of community, or local leaders who would in turn train farmers and community members in their local languages. These champions could also be engaged in the development of training materials which clearly emphasis the bottom-up approaches currently adopted by the government of Nigeria (FMARD) in interacting with farmers. To further enhance the uptake of extension services by the FMARD-extension staff and the ADP offices, continuous training

and re-training of such extension officers will be essential. It will be especially important to equip extension officers with the appropriate resources and equipment necessary for the delivery of their duty/task on/off the field to farmers. The next section will now focus on the market group case interview.

6.4 MARKET GROUP CASE INTERVIEW (EKE-AWKA MARKET, AWKA, ANAMBRA STATE)

The market group case interview was conducted at the Eke Awka market, five food marketers (fish, tomato, yam and onion) took part in the meeting, with two of these marketers selling fish. The Eke Awka market is categorised as a local market for reasons such as market facilities, environment, its general infrastructure. The market was characterised by over-crowding, narrow access road (within the market) and poor market hygiene. Other poor features of the market were that marketers were observed making sales in small shops and on the roadside. More so, most agricultural commodities sold in this market were not packaged, nor labelled. Commodity purchase by consumers was often down to bargaining for price.

6.4.1 FOOD PURCHASE/FOOD SOURCING

Food (agro-commodities) sourcing by marketers, may have a degree of impact on the price of food commodities sold. Marketers explained the source of their agricultural commodities for sale through the following means: cold room dealers (in the case of fish marketers) and wholesalers (in the case of tomato, yam and onion). Two out of the five marketers (tomato and yam) claimed to grow part of the produce they sell, as marketers note that about 70-80% of the tomato, yam and onion sold within the market comes from other parts of Nigeria (i.e., other States). As a result, marketers jointly stated that almost all the tomato, yam and onion sold within the market (Eke Awka) is sourced from the Northern part of Nigeria, while fish is sourced from cold room dealers. These dealers buy from distributors in the Western part of Nigeria (Lagos State, Nigeria), giving a clear indication of inter-state food trade (food linkage) between Anambra State and other states in Nigeria.

"We source [the] majority of the tomato, yam and onion we sell from the Northern part of Nigeria. We also grow some of the produce we sell ourselves in our back yard garden". (Marketer 2)

"The fish we sell is sourced and stored very close to the market, it is very convenient, once out of stock we can easily repurchase and carry-on selling. While we do take unsold fish back to the cold room for storage"- (Fish marketers 5)

The formalisation of the food supply chain at the Eke Awka Market was one described as being either formal or informal. The fish purchasing process operated by fish marketers and their suppliers was argued to be a formal supply system (see subsection 2.4.1 and 2.4.2), while the supply chain system for crop produce (tomato, yam, and onion) operates an informal system. This supports the finding in this study (in section 4.3.9: factors influencing consumers' food market choice), showing the dynamics that exist in the local market where food price was found to be the major reason for food consumers' choice of market. In other words, how local food marketers source their agricultural commodities, will be a direct influence on affordability and the retail price of such commodities (tomato, yam and onion). A study by Egwuma et al., (2017) on the topic "what determines food price inflation", considered the relationship between food price inflation and important supply and demand variables that includes: food import, real gross domestic production and crude oil price with regards to Nigeria. Using an annual time series data from 1988 to 2017, the study showed that real GDP, food importation and the price of crude oil related positively to inflation of food prices in the long run. The study further concluded that real GDP and food imports were important determinants of food price inflation. The price food consumers are willing to pay for food varies according to seasonality, scarcity, distance to source, high cost of transportation, value addition, and the action and activities of middle-men, all of which influence the price food consumers pay for agricultural food commodities.

6.4.2 MARKET SUPPORT AND MARKETING ACTIVITIES

Within a given market, marketers constantly need to promote the sales of the commodities they sell, some of the actions they often take may include the decision on price, sales location as well as the method of sale (Omardi, 2019). Marketing support is considered here to be the totality of support marketers receive with regards to their access to information, market, and customers/consumers preferences. These marketers in the discussions noted that the agricultural commodities they purchase locally are sourced from local farmers (with the exception of the supplies from other States). These marketers also insist that they do not engage the efforts of middle-men in their procurement activities, emphasising that they source their agricultural produce /supplies themselves from farmers and wholesalers alike.

"We do not engage with middlemen, because they make a business out of our little business for themselves, they are not honest. By engaging with them we lose time, money and customers."- (Marketer 1).

This marketing approach is different to that cited in the literature (Okpala Don, 2003; Abebe et al., 2016) (see section 2.2- Food systems) where these sources state that middlemen play a key role in the agricultural produce market, linking urban and rural cities through food marketing. The difference here could be as a result of the location of study and/ or the prevailing marketing circumstance at the time of the study. Additionally, marketers within the case study market noted that there was no direct market information provided to farmers with regards to commodity specifications and requirements due to the informal and hasty process of transaction that transpires between the farmers (sellers in this instance) and commodity marketers. This may limit farmers' ability to improve and deliver on markets' (produce/product) requirements.

Logistically, marketers in the discussion stated that they hire cars, trucks or wheelbarrow in conveying produce from the point of purchase to the point of sale (Eke Awka Market). This in some cases increases the cost of the agricultural commodity sold by marketers to consumers and in other cases, may contribute physical damage to produce which might cause marketers to sell such agricultural commodities at low prices affecting their income and/or profit.

Detailing some of the challenges faced in the marketing of agricultural produce, marketers at Eke Awka market highlighted the high cost of transportation, which suggests poor infrastructural development (also captured in the survey section of this study: see chapter 4; table 4.10 (section 4.3.10)):

"We marketers pay high amount of money to convey our produce/products to the point of sale. In most cases, we have to store unsold commodities in our wheelbarrows, these commodities may deteriorate making us sell them at a lower price if not throwing them away". – (Marketer 1)

Challenges were faced with acquiring food. Similar factors such as road traffic, and a bad road network play a key role in increasing the transportation cost incurred by marketers. On the other hand, poor preservation opportunities within the market have led food marketers to store unsold agricultural commodities in wheelbarrows, raising serious concerns for food

safety and food waste. Again, infrastructural challenges feature, with emphasis on the access to and/or continued supply of electricity, which could afford marketers the opportunity to adequately store perishables like tomato in cool conditions. Finally, due to the local nature of the market, information on agricultural commodities, are not made available to consumers (e.g., labelling) this depicts the characteristics of an informal market (local market), supporting similar situations described in the literature (Scull & Fuller, 1967; FAO, 2003; Anbarci et al., 2012; Asogwa & Okwoche, 2012; Ezirigwe, 2018). Moving on from marketing as a theme, infrastructure is now considered in more detail in the next section.

6.4.3 MARKET INFRASTRUCTURE (EKE AWKA)

Infrastructure is the combination of basic facilities, structure, and systems serving a particular location, which could be a community, village, town, cities, state or country, that are necessary for it to economically and socially function (Ayogu, 2018). The subset of infrastructure includes roads, bridges, processing and storage facilities etc. The various impacts of infrastructure on aspects of food security have been discussed in previous chapters (2 & 4). The cost of infrastructure on food production, transportation, processing and storage was discussed here by food marketers in the Eke Awka market.

Owing to the timing of food supplies to marketers, marketers in Eke Awka noted in the discussions that they seek supplies of agricultural commodities on a daily basis (fish marketers), weekly (tomato marketers) and every fourth night (yam and onion marketers). The systematic delivery in supply could be as a result of the perishability of these commodities and the absence of preservation mechanisms, such as refrigeration. The timing of deliveries adopted by marketers is important in order not to lose money, because of poor infrastructure or the resultant food loss for product that cannot be sold.

"Because we do not sell our commodities [tomato, yam, onion and fish] in shops that operate with electricity, we have to restock for sales every two weeks [yam and onion marketer], weekly [tomato marketer] and on daily basis [fish marketer]. Even if we sold our commodities in shops there is no electricity to power refrigerator sets that would be used to preserve our commodities". - (Marketer 1)

The cost of transportation, distance to market and bad road network were some of the logistical challenges expressed by food marketers. These factors have a significant effect on price (for consumers), profitability (for marketers) and the shelf life of the commodity

marketers sell. Studies by United Nations (2011); Nwose (2013); Olagunju et al., (2017); & Ogunleye et al., (2018) considered in chapter 1 (section 1.1) and chapter 2 (subsection 2.2.1) of this study, concur that national infrastructural challenge (bad road network, electricity etc.) affects food transportation, preservation and storage. Market environmental hygiene was also highlighted by marketers to be poor, with poor market facilities, which are marked by overcrowding, constant power outage (especially for small shop owners), and absence of water supply within the market. Most of these were also discussed in chapter 2 (subsection:2.4.1) and in the study of Ezirigwe (2018) who reflected on the informal food market system in Nigeria, identifying factors that contributes to poor food hygiene and food safety, which also included poor food preservation, transportation and the knowledge of food marketers on food safety, all of which highlight the poor state of infrastructure in Nigeria.

Marketers in the group case interview, suggested several steps that could be taken to ensuring that the market system works better. Some of these steps include stopping or reducing market tax/charges as well as the proper organisation of the market.

Still on market infrastructure, marketers sell along the roadside at Eke Awka market and continuously have to move out of the way for delivery vehicles, yet these marketers pay market charges for the space they occupy. Despite this, the members of the group case interview felt that the market management do nothing to improve the conditions of the market. In similar proceeding, Asogwa & Okwoche (2012) noted that the informal market for agricultural produce, is one characterised by the display of commodities in an unauthorised or unapproved location. In view of this, marketers in Eke Awka market suggested that walk-way space be improved to reduce overcrowding, they further suggested the construction of better market shades; and the relocation of car park space to prevent marketers from moving their merchandise each time delivery vehicles arrive their location to off-load goods. The next session focuses on the waste evolving from the local market.

6.4.4 MARKET WASTE (EKE AWKA MARKET)

Agricultural food waste management at the Eke Akwa market like every other market has its specific mode of operation. Marketers reiterated that local labour is recruited and paid by marketers to pick, pack and dispose-off waste generated within the market. Although the waste from Eke Awka market could not be quantified by the marketers, food waste realised

from the market section of the marketer (fish, tomato, yam and onion) amounted to around 20% of produce from their standpoint.

While waste management and recycling are an important aspect of energy generation in many developed countries, Marketers stated in the discussions that they had no knowledge of food waste management and energy generation, rather waste from items such as cartons, and raffia baskets are recycled by people involved in craft making - into bags, caps, shoe fillings etc., These items may then be sold for income. Hence, the Eke Awka market is categorised as a local market, and understandably the technologies that will aid the conversion of food waste into energy is absent along with other important infrastructure.

Interestingly, the food marketers claim that waste picking by those that seek food appears not to occur (not observed). This may or may not be the case, as marketers insisted that they had not seen this happen. In most instance, waste picking occurs after the close of market sale hours. As a result, during the busy hours of the day food marketers may not see the activities of food waste pickers. More so, since food waste within/or around the market is cleared by local persons (labour) who are paid to dispose-off these wastes, the secondary location where waste is later disposed at could be the point where actual waste picking by food seekers occurs rather than within the market premises. In terms of waste utilisation/conversion, food marketers suggested that food waste should be composted and used for farming purposes whether in household gardens or outdoor fields.

6.4.5 MARKET BARRIERS AND POSSIBLE SOLUTIONS (EKE AWKA)

Agricultural commodity marketers at the Eke Awka market categorised the biggest barriers to agro-food marketing as follows: market infrastructural barriers (market facilities, and market space); national infrastructural barriers (road network); and logistical barriers (high cost of transportation).

Figure 6. 3: Eke Awka-Local Market in the Urban City of Awka Showing: Over Crowding, Infrastructural Challenges and Food Safety Concerns



Source: Field Survey, 2020

Market infrastructural barriers (market facilities, market space): worldwide the success of any market depends on its organisation, that ensure marketers operate under marketing facilities that are conducive to encouraging business transactions; environmentally free from over-crowding; and ensure the free flow of goods and services coming through or leaving the market (United Nations, 2011; and NBS, 2013). The case is the reverse in Eke Awka market where agricultural commodity marketing is bedevilled by poor market infrastructure, overcrowding, space deprivation etc. (see Figure 6.3). It is important for the organisers of the market to properly map/and/organise the market with its standards for its improvement (see section 4.3.15; table 4.15).

National Infrastructural barriers (road network): Government has a key role to play in this regard. Bad road networks have led to the loss of agricultural produce during the course of transportation, causing food waste to rise. This phenomenon may lead to a drop in profit for food marketers and may further increase the level of hardship confronting marketers in their sales of agricultural commodities (see chapter 2, subsection 2.2.1). Interestingly, data from the CIA World Fact-book (2021), summarised the Nigerian roadways for transportation (infrastructure) includes a total road network of 195,000km (in 2017) of which only 60,000km were paved, while 135,000km are unpaved. This explains the difficulty faced by farmers and

food marketers in conveying their commodity and produce from the farm gate to the final consumer.

Logistical barriers (high cost of transportation): Market overcrowding during delivery, bad road networks and the quantity of agricultural product/produce to be transported, could increase the premium paid by marketers for the transportation of produce from the point of purchase to the point of sale which then affects the price consumers pay for the food items they purchase. Again Government (through the Ministry of Transport) could regulate the price charged for conveying agricultural produce from one point to another so as to alleviate the financial stress food marketers go through in convening their merchandise from one place to another.

In conclusion, the feedback mechanism between agro-marketers and their supplier (farmers, wholesalers, etc.,), bears the following chain starting from the consumers. Consumers -to- Retailers –to- Wholesalers -to- Distribution -to-Manufacturers/Producers. The next section considers the supermarket views on agricultural commodity marketing in Awka, Anambra State, Nigeria.

6.5 SUPERMARKET-A INTERVIEW

6.5.1 PURCHASING ACTIVITIES

The manager of the Supermarket-A in Awka, Anambra State, Nigeria was interviewed about the supermarket's food purchase protocols; market support and marketing activities; infrastructural challenge and mitigation efforts or suggestions that could bring about change within the sector. This interview was to provide context and is intended to be illustrative rather than as a representative interview of all supermarkets in Awka.

"In this supermarket we source food commodities from within Anambra State and from other states across Nigeria, we even go as far as ordering food commodities from a neighbouring country. The orders for the purchase of the commodities are done by myself and the owner of the business" - (Supermarket manager).

Food purchased by this supermarket was reviewed to establish product origin either within the State, inter-State or across different countries. Agricultural commodities purchased by the supermarket include groundnut, cashew nut, egg, bread, plantain chips, rice, dry meat, kilishi, palm oil, green peas, honey, yogurt, and coconut chips. The interviewee (supermarket manager) established that most of the agricultural commodities sold in the supermarket were

sourced locally from a partnering farm known as Red-Rock Farms located in Isu, Awka North, Anambra State, Nigeria. Other commodities were sourced elsewhere, the full details of commodities and their source of origin are as follows: (1) Plantain chips and Palm oil (Nibo, Awka South, Anambra state); (2) Rice (Oba town, Anambra State); (3) Dry meat (Enugu State); (4) Kilishi (Abuja, FCT); (5) Honey (Katsina State); and (6) Yogurt (Kaduna State) and (7) Coconut Chips (Benin Republic).

Food is purchased for sale within the Supermarket-A setting via the placement of order(s) by either the owner of the business or the manager, and these order(s) are fulfilled and then delivered to the business. More so, other sales items are sourced and bought by one of the staff members who is delegated by the business management to do so. It was further explained that 50-60% of the marketable produce comes from Anambra State. The agricultural commodities and the quantity purchased by Supermarket-A are detailed as follows: rice=15bags, palm oil=3gallons, plantain chips= 8 cartoons, green peas= 10kilo and cashew nut= 5 cartoons per periods when the supermarket is out of stock, which could be per week or per month depending on the demand/and/or purchases by consumers.

This clearly shows the occurrence of food linkage between local communities in Awka (Red Rock Farm- Isu Awka North and Nibo- Awka South), also Oba town, within Anambra State and the urban food retailer. Inter-state food linkage is also occurring between Anambra State and Enugu, Abuja (FCT), Katsina and Kaduna States respectively. Food linkage was also observed to occur between Anambra-Nigeria and the Republic of Benin (between two countries).

This is a different sourcing pattern compared to the food marketers in the local market (Eke Awka). Understandably, the system within the supermarket is more sophisticated as orders can be placed for a food commodity or a member of staff sent out to carry out bulk shopping that aids the restocking of the supermarket, compared to the local market where food sourcing is bedevilled by poor organisation, high risk of profit loss due to food waste or loss in transit (infrastructural issues), cost of time in acquiring food commodities on the part of the food seller etc.

6.5.2 MARKET SUPPORT

The market activities of Supermarket-A are described in this section. It was established that food supplies were obtained directly from local farmers in most cases. In addition to this, the supermarket manager stated they engaged the services of middlemen in sourcing and

delivering agricultural commodities especially from States other than Anambra State. Interestingly, the operation of the middlemen linked to the supermarket appeared to be very organised, as the supermarket was comfortable with the use of middlemen to restock their shelves. In view of the food purchased for the supermarket from other States, it was explained by the supermarket manager that the business usually incurred high logistical cost as a result of the use of middlemen. Apparently, such costs were transferred to food consumers who paid twice the original cost for agricultural commodities sold to them. Interestingly, chapter 4 (section 4.3.9) of this study considers the factors that influences consumers choice of market. The action of middlemen and other infrastructural challenges (road, electricity etc) all contribute to the high premium food consumers pay for food commodities in this marketing channel. Food consumers in this marketing channel showed that they are ready to pay a higher price for the higher quality of agricultural commodities they purchase. Perhaps, if middlemen (who also communicate to farmers the quality specification of the markets they supply as well as food consumers) were to be eliminated from the chain, other factors such as infrastructure may still impact on and increase the price food consumers pay for the agricultural food commodities they purchase.

With regards to market information, the supermarket is an organised business where information on the quality or quantity of agricultural commodities is made available to farmers to drive compliance with requirements and improvement. More so, product market information is made available to food consumers as well for their consideration in terms of food safety, nutrition, and price. Supermarket-A had 98% of its displayed products adequately labelled (with the price of the commodity, calories, ingredients, expiry date, weight etc), while only 2% of such product had no labels at all e.g., eggs (see Figure 6.4).

This indicates that food consumers who patronise such supermarkets welcome having first-hand information on the agricultural commodities purchased or that they intend to purchase. This further explains the findings in the quantitative analysis of this study (Influence of consumers market choice see Chapter 4: section 4.3.9), that the consumers interviewed would shop in the supermarket for the quality of food they expect to purchase. Information about the product available at the point of purchase may be part of the perceived quality offering from the supermarket.

Figure 6. 4: Agricultural/food Products Displayed at Supermarket-A



Source: Field Survey, 2020

Every organisation faces challenges in getting produce/products to their consumers. The interview suggested that Supermarket-A's challenges include, supply gap for agricultural commodities; delay in delivery after payment; damage to goods on route; internal accidents on products (e.g., water spilling on sales items); lack of funds to restock shelves in most cases and staff shortage.

6.5.3 INFRASTRUCTURE

Infrastructure within the supermarket (Supermarket-A) seemed well organised but had its limitations. Although, food commodities get delivered to the supermarket on daily basis including Saturdays and Sundays, the supermarket experienced logistical challenges such as: high cost of transportation, time, bad road network and traffic. Other non-logistical infrastructural challenges include power outage. The demerits of power outage are significant especially in the supermarket setting where cold food preservation/refrigeration operates. This can cause serious cost implications for such organisations that rely on electricity. Constant electrical power outage means that the occurrence of food waste could rise, resulting in a drop in the price consumers are willing to pay for damaged commodities, and if not sold such commodities make their way to the waste bin with the associated loss. As a result, storage

challenges were also experienced by Supermarket-A, some of which included: late delivery of stocks, time (expiration of products), and water spillage on food commodities within the shop.

In the interview it was described that food waste generated from the supermarket is generally thrown into waste bins. Interesting, the prevalence of waste pickers did occur in the supermarket compared to the local market (Eke Awka) where food picking was claimed not to exist (see section: 6.4.4). In the supermarket, it was said that food waste (mostly expired) is binned, but waste pickers browse through the bin and gather food items for their use/consumption. Examples of such items may include sardines, bread, milk etc. The actions of these groups of waste pickers tends to reduce the overall food waste (organic waste) that comes out of the supermarket. However, the interviewee suggested that given the chance it is important that waste should be recycled/ or reused in any other way (e.g., energy or compost).

6.5.4 MARKET BARRIERS AND POSSIBLE SOLUTION

Within the setting of the supermarket (Supermarket-A), some of the biggest barriers in the marketing of agricultural commodities were itemised as follows by the interviewee: communication gap, transportation cost, regulations, produce/product cost, electricity outage, water supply, and manpower shortage. These are now considered individually.

***Communication gap*:** This could take various forms in a business such as the supermarket. A communication gap which involves the exchange of information about a commodity or the service sold by the supermarket could exist between floor staff and the management staff of the supermarket. It could also exist between the floor staff themselves or between the floor staff and customers resulting in a shortfall of the service provided or rendered to food consumers. This could be addressed by effective training and refresher training.

***Transportation cost*:** This affects the eventual cost of food within such supermarkets. As the cost of transportation for agricultural food commodities rises, so would the price/cost of food.

***Regulations*:** Supermarket-A was found to be juggling with different regulations (a company certificate to operate in Nigeria (i.e., certificate of incorporation), complying with the requirements of the environmental taskforce, the standard organisation of Nigeria [SON] etc.) and meeting such regulations takes time and effort and it can be cost intensive in ensuring compliance. These regulations are important to be fulfilled for the registration of the organisation; the organisation's right to do business; food safety and traceability etc.

***Electrical Outage*:** Typically, Nigeria is known to experience power outages very often, so organisations affected (including Supermarket-A) would spend lots of funds on power

generating equipment in order to keep the store running. The cost of fuelling generator sets in such retail outlets is often placed on the cost of food items displayed on the shelves of supermarkets, making consumers pay higher premiums for food commodities they purchase. A good example of a very synonymous situation is that of the Nigerian Water Board supplying water to many homes in Nigeria but is grossly inefficient. As the Government's water distribution scheme continues to be less efficient in its delivery, many private households, shops, and other establishments source their own water supply system by digging boreholes for water (Balogun & Redina, 2019).

***Man-Power Shortage*:** Staffing of supermarkets can be difficult especially in cases where staff members are resigning and/ or sourcing jobs elsewhere, calling off sick and taking time off work. Staff shortages could have some level of effect on the enterprise and could lead to increased customer waiting time, stress on the few staff members available, poor response time for tasks and mistakes in stock-taking reflecting on the food available in the supermarket.

Further, government intervention, private sector enablement, interventions of the market regulatory board and the promotion of agricultural product transportation were all suggestions made by the manager of Supermarket-A to help make the supermarket sales of agricultural commodities conducive in this sector. In terms of feedback between the market, farmers, suppliers, and food consumers. It was stated that that feedback communication flow happens in this way: consumers == to the Supermarket == Wholesaler == Distributor == and Manufacturer. This communication process could either happen on a face-to-face basis or over the telephone. Between the marketer group case interview and the supermarket interview the following factors were identified and their frequency (of occurrence in the field manuscript) tabulated to show hierarchy of importance of the key factors affects the marketing of agricultural commodities in Anambra State, Nigeria (Table 6.3).

Table 6. 3: Factors Affecting Local and Super-Market

S/N	Identified market factor	Frequency
1	Infrastructural Challenges	7
2	Purchase Challenges	4
3	Logistic Challenges	3
4	Market Hygiene	2
5	Market Intelligence	2
6	Time	1

Source: Field Survey, 2020

Infrastructural challenges are the primary problem faced by all marketers.

6.6 DISCUSSION

Several issues were raised during the group case interviews and the individual interviews captured in this section of the PhD thesis. These issues are considered in this discussion section under the following themes: Infrastructure; input availability and affordability; actions of middle-men in agriculture; food source, market intelligence and agri-logistics; market infrastructure and hygiene (local markets and supermarkets); and extension service.

- ***Infrastructure***

The outcome of the farmers; marketers and supermarket personnel interviews (group case and individual), highlighted that poor infrastructure was experienced across the three areas of business (both in rural and urban areas).

"***Traveling to acquire farm inputs (e.g., seedlings, fertilisers etc) is not very convenient for us farmers because of the state of the roads, it takes us time to reach our destination and back. This also affects our supply of produce to cities and markets around us here in Omor community" (Farmer 2)***

"Here in the local market, we sell on the roadside and each time big delivery vehicles make their way, we have to move our merchandise from the way of these heavy vehicles, this happens as we still pay for the small space, we occupy that is not even a shop" (Food Marketer 1)"

This was identified as one of the main factors influencing food productivity, distribution and food access in Anambra, State. It is interesting to understand how this factor "infrastructure" affects the food production (farmers-rural) and food marketing (food marketers-urban) and food purchasing (urban-consumer), this is with emphasis on rural-urban linkage through the supply chain. Food (agricultural commodity) logistics faces infrastructural difficulties that include the challenge of bad road networks, no alternative transportation systems, high transportation cost etc. In addition to this, the actions of middle-men who are employed for their marketing services because of the lack of information and market connection available to farmers and food marketers, represents a different type of challenge. Here, physical infrastructural challenges include road access and transportation mechanisms (car, truck etc.), while informational infrastructure includes all channel of communication between the buyers and the seller. This often involves the availability of information to buyers by farmers on the readiness to sell their harvested produce. This communication method could be through the modern means of telephone communication.

On a general note, Adepoju & Salman, (2018) explained that infrastructural challenge in Nigeria has continued to be a matter of concern given its importance to the wellbeing of the populace as well as aiding the growth and development of the economy. Adepoju & Salman (2018) also note that the Nigerian infrastructural facilities (road network, buildings, electricity, electrical grids, bridges, dams, pipelines, ports, railway, water supply, telecommunication (including internet) etc) are grossly inadequate to meet the needs of the Nigerian people, industries and business of which the agricultural sector is one element. The efficiency in the provision of infrastructure is now highly recognised as essential to the agricultural sector (Fakayode et al., 2009). However, infrastructure can contribute to economic growth through agriculture, poverty reduction and the drive for environmental sustainability. In modern cities such as Awka where the supermarket within the study is located, infrastructure plays a key role in determining food access and availability which supports the better quality of life of the country's citizens (Adepoju & Salman, 2018). Infrastructure such as electricity, transportation networks, potable water, and quality health care facilities are important in the development of communities/societies/or cities whether rural or urban with respect to food, human capital movement and development (Adepoju & Salman, 2018).

Efforts by farmers in any given society to escape malnutrition and in most cases poverty by lifting themselves above subsistence levels depends on whether their access to infrastructure and markets are poor, adequate or good (Adepoju & Salman, 2018). The FAO (2005) note that investing in rural and urban infrastructure, particularly road networks, electricity, processing and marketing facilities would enhance the growth of the agricultural sector's food production and distribution activities. This will have a positive effect on food security. Hence, Adetola (2001) concludes that people are poor because their access to infrastructure is at an unnecessary low-quality level. This includes farmers and food marketers in both of this study's locations (Awka and Omor farming community).

- ***Input Availability and Affordability***

Inputs for agricultural productivity within this study refers to land, fertilisers, seedlings, pesticides, herbicides, water and labour. It however worthy to note that in Nigeria, the abundance of these inputs varies from one farm/farmer to another depending on their production capacity, as explored in the quantitative data of this study (see chapter 5: section 5.4.7) suggesting that the majority of the farmers in the Omor farming community operate their farms in the scale between small to medium size. Input availability is critical to the food producing effort of farmers, and inputs are essential to the growth and development of the sector.

"We rarely get farming inputs within our locality, so we have to travel as far as other communities to acquire input[s], with the poor state of the road and the cost of input[s], the process is very difficult for us farmers" (Farmer 3)

A lack in the availability of the farm inputs required for agricultural activities could result in a drop in food production. According to Osuji et al., (2014), agricultural production performance increased in developed countries as against developing countries due to the high level of investment in research and development especially in many areas such as land, labour, capital (financing), the use of fertilisers, machinery, seedlings etc. Bockel (2002) states that farmers in Madagascar (East Africa) grew productivity by 3.98% between 1990 to 2001 because of the increased use of mechanisation and the use of farm inputs such as pesticides, fertilisers, herbicides, seedlings etc. Improved farm inputs such as labour, land and capital contribute largely to the productivity of farmers as a result of the efficient use of such resources which contributes to farmers' productivity outputs (Barrette et al., 2004). Lamb (2003) explains that farmers' productivity fluctuates because of poor access to, and the high cost of, inputs. Osuji et al., (2014) conclude that poor investments in farm inputs have an impeding effect on agricultural productivity, farmers' livelihood and food sustainability.

Past Nigerian agricultural input subsidy policy (i.e., the market stabilisation scheme) was widely perceived to be ineffective due to issues such as the direction of input supply to the greater benefit of middlemen, late delivery of inputs, the cumbersome acquisition process and the low quality of some inputs (Micheal et al., 2018). Shortly after this policy, the Nigerian Government under the Agricultural Transformation Agenda (ATA), established the Growth Enhancement Support Scheme (GESS) in July 2012 (Ejiogu, 2017) with the primary aim of depoliticising the input scheme and ensuring that farmers are properly catered for by removing State procurement power of inputs, while developing a private sector channel of input distribution (Grow Africa (2016); Micheal et al., 2018). Under this scheme, GES, farm inputs such as fertilisers, herbicides, pesticides and seedlings are distributed to only registered smallholder farmers through the electronic information portal (system) (Tiri et al., 2015).

However, a slight improvement to the GES scheme is the "Agricultural Promotion Policy" [the Green Alternative] from 2016 - 2020, which covers high-yielding crop varieties (HYVs), irrigation and agro-chemicals which is purely perceived as technological intervention and improvement to boost food production (Oladele et al., 2011). Perhaps, Nigerian farmers could further benefit from other programmes that can transform their productivity. Some of

these programmes include: the National Accelerated Food Production Programme (NAFPP), River Basin Development Authorities (RBDA), Agricultural Credit Scheme (ACGS), Agricultural Development Programme (ADP), the National Land Development Authority (NLDA) and the Directorate of Food, Road and Rural Infrastructure (DFRRI) amongst others (Micheal et al., 2018).

- ***Actions of Middle-Men in Agricultural Commodity Marketing Channels***

Boone & Jurtz (2004) define marketing channels of distribution as the organised structure of marketing institutions and their inter-play to promote the physical distribution and ownership of services and goods from the producer to the end users. The use of marketing channels in food distribution can be a cumbersome process, especially with farmers trying to find the right market for their produce in order to enable them to maximise profit from the transactions of their primary enterprise. Farmers in this study claim that they do not trust middlemen, even though the farmers in the Omor farming community have to transact business with them for the sale of their produce.

"We [farmers] don't like using middle-men, but in some cases, we have to use them to prevent our produce from being wasted, or in cases where we do not have market contacts or connections that are in big cities, then we have to work with them" (Farmer 1)

However, Imam et al., (2014) state that there are direct and indirect channels of marketing. The direct marketing-channel involves the direct sales between the producer and the end users, while the indirect marketing channel involves other actors or participants within the supply chain between the producer and consumers. In this study, farmers work with middle-men in marketing their produce which is often seasonal, while the middle-men serve as the formalised supply chain to urban centres and communities. Male farmers were however more likely to deal with these middlemen than female farmers who mostly cultivated vegetables (leafy vegetables and Okra), as indicated in Figure 6.2, which showed women selling their produce in bulk locally, or from one nearby community to another.

The choice of distribution channel depends on the farmers and the middlemen they work with, each distribution channel has its own limitations which could be a result of the interaction between three functions within the distribution channels:

a) Spatial Functions - the transportation and assembly of products;
b) Commercial Functions - detailing product assessment, communication and customer service; and
c) Time Functions - this relates to financing of transactions and stocks – (see Folorunsho & Wazi, 2005; Iman et al., 2014).

Within the scope of the group case interview interactions with food marketers, the relationship between these three functions varies for the different product/produce they sell. As a result, some agricultural commodities (e.g., fish) are more perishable than others, hence the time function becomes important while for non-perishable commodities (e.g., rice) both spatial and commercial function come into play as being more important. In view of this, the characteristics of supply in a given situation are important to consider. Sometimes agricultural produce is assembled for collection by middlemen in produce markets. Other times middlemen move around to gather and buy produce from individuals or groups of farmers (e.g., farmers' cooperatives) either directly from their fields or at their household. In such situations the distribution channel becomes longer, or more complex, because more actors may be employed to gather the quantity desired for purchase and this could further increase cost to the middlemen and lower farmers' benefits or returns (Iman et al., 2014).

The poor financial situation of farmers (lack of capital individually or as a community) limits their ability to develop and use a direct market channel, thereby pressuring them to rely on middlemen who instead come to them to buy their produce at a lesser financial margin than they would have received if they had sold the produce themselves. Hence, farmers could be helped through a number of ways (as detailed below) to retain more of the value of their agro-commodities.

(1) farmers can come together to form commodity clusters, cooperatives or associations, then within such groups create a logistics team whose job would be to collect, and market produce directly to markets. The proceeds could then be shared amongst participating farmers.
(2) Farmers could also reach out either through groups or on an individual basis to markets where their produce is of demand, allowing marketers to bear the cost of logistics while farmers still make profit (note: mobile cell phones could be beneficial in this regard), and

(3) Farmers could leverage on the effort of an extension service provider for market intelligence and to link these farmers up with local, regional and international buyers of their produce. Again, mobile phones could play a key role here in enhancing communication between farmers and extension officers. Farmers would be able to receive up to date advice from extension officers in their local language. After the first visit by the extension officer(s), where it is envisaged that mobile phone contact would have been established with the farmer(s), the mobile phone could further be used by extension officers to advise farmers on planting seasons, crops of value, weather etc encouraging farmers to produce as well as help them market their produce by linking them to prospective buyers.

Market intelligence and agri-logistics as key elements of the rural-urban nexus are now considered.

- ***Food Source, Market Intelligence and Agri-Logistics***

Information from this study shows that agricultural commodities/produce/products are sourced both in the local and supermarkets from different parts of Nigeria and beyond (internationally). Sourcing/procurement entails a detailed logistical effort which in many cases is quite tedious and expensive. However, in most cases the availability of such commodities/products or produce is a challenge as marketers continue to seek ways of linking up with producers and processors via cost effective means. On the other hand, farmers and processors also try to reach out to the best customers in marketing their goods in order to enable them to maximise profit. This process entails rural-urban linkage around market intelligence and agri-logistics.

"Because of how and where we source the food items from, and the difficulty we sellers go through, the customers will have to pay more to cover this cost difference" (Food Marketer: 4- yam)

An agricultural value chain involves the totality of actions that happen to farm produce from the farm gate to the final consumers (Trienekens, 2011). Some of these actions include processing, repackaging, storage, transportation etc. In Nigeria, value chain development has been largely affected by the lack of investment in the agricultural sector in the past, which resulted in low levels of agricultural food production (Posthums et al., 2019). With higher demand in markets located in growing metropolitan centres, consumers still seek cheap

produce/products from local markets (see chapter 4 [section 4.3.9]: table 4.9) (Posthumus et al., 2019). According to Posthumus et al., (2019), agribusiness investments in the processing of produce should be accompanied by investments in agricultural productivity (through the combination of extension service and quality input supply) that would increase production output and creating sufficient supplies for processing industries. The lack of market information and the problems of corruption (within the market, especially by the market governing body) makes it difficult to bridge the gap between farmers and targeted producer markets and to sell produce at a price that should reflect their economic needs. The findings of this PhD study clearly align with these points especially the outcome of the group case interviews with farmers and marketers.

Market intelligence enables farmers and food marketers to share information on prevailing prices of commodities and comparative market prices in other markets (nearby) and provides the necessary market signals that encourage the production of commodities with clear market specifications on type, time and quality required by consumers (Ibrahim et al., 2013). Agricultural market information in Nigeria, is provided to farmers by the Ministry of Agriculture through its field extension service officers and broadcast media (Ibrahim et al., 2013), where this is available to farmer communities, as it was stated as lacking in the Omor community when they were interviewed. The findings from this study shows that farmers among the case study group are not linked to extension officers from FMARD for logistical and financial reasons at all levels (both federal, state or the local (ADP) officers). However, there is more to be done in this sector, especially with skill transfer (to farmers), market information and developing mechanisms to address the current weak logistical arrangements in food supply (bedevilled by poor infrastructure). More so, the use of mass media in exchanging market intelligence, Ibrahim et al., (2013) asserts that poor reception quality and area coverage are a barrier to the widespread use of mobile phone and radio programmes for extension services/duties. Perhaps, with respect to sourcing, marketing and logistics of agricultural commodities, farmers and food marketers can benefit from the FMARD Agricultural Promotion Policy (APP) (FMARD, 2016) which focuses on strengthening value chains and supporting enterprise development of agricultural commodities.

- ***Market Infrastructure and Hygiene (Local Markets and Supermarkets)***

Market environments in this study gave two distinct pictures. In the local market, the marketing situation is characterised by over-crowding, poor infrastructure, space deprivation, obstruction, litter of rubbish etc. and in the supermarket the environment is clearly different,

with a better form of infrastructure, orderly movement of people in and out of the supermarket, and litter and waste dealt with appropriately.

"This market [the Eke Awka local market] is always filled up with people moving around and making their transaction, there is no drinking water, we the marketers have to buy drinking water on many occasions, we sell by the road side because shop spaces are small and expensive to afford, we also have no access to electricity, and the general marketing condition/facility is very poor" (Food Marketer 3)

The market plays an important role in food purchase processes (Abejegah et al., 2013). The distinction in both markets mentioned above can further be reflected in the price and quality of commodities sold within both markets (see chapter 4 [section 4.3.9] of this study). A consumer focus on price of commodities relates most strongly to the local market "Eke Awka Market," while consumers' focus on the quality of food commodities and convenience relates most strongly to the supermarket (Supermarket-A). The markets attract large numbers of buyers and sellers, and as a result, with little operational coordination in place, their coming together in large numbers leads to over-crowding, considered to be of risk in the spread of communicable diseases (Abejegah et al., 2013) as is the case with the current World pandemic (COVID-19). In the local market it is very common to find/observe mountain of refuse, the heaps of waste/ refuse provide an excellent breeding environment for vectors of communicable diseases. Such vectors include rodents, polluted air, insects etc, increasing the spread of infectious diseases (Nigerian Observer, 2012). It also important to highlight that some of the diseases that affect Nigerians (tuberculosis, typhoid, malaria, diarrhoea) are from unhealthy environmental conditions (Nigeria National Planning Commission, 2004) such as the one explained in this section. Further, heaped refuse could also pose fire hazard and is a source of unpleasant odour (Abejegah et al., 2013). An article by The Guardian (2020) newspaper on the "disturbing spate of market fires", noted that different markets in Nigeria have experienced incidents of fire at various intervals and locations, from Lagos to Maiduguri, Onitsha and Sokoto the story remains the same. Fire incidents continues to ravage markets in Nigeria causing the loss of lives and goods/properties worth millions of naira, all blamed on poor market structure and infrastructural discord that exist in many Nigerian markets today. Effiong (2019) hints at possible solutions for the Federal Government of Nigeria to adopt in preventing future outbreaks of fire and they include: (a) organising the Nigerian markets, (b) investing in infrastructure, (c) equipping the market with fire extinguishers, (d) acquiring group fire

insurance for market groups, (e) encouraging a central power generation unit, and banning the utilisation of individual generator sets.

More so, poorly constructed Nigerian markets are characterised by the inadequacy of sanitary facilities such as water, toilets, refuse disposal bays etc. which results in open urination and defecation (in most cases) being common features of the local market where food and environmental contamination can lead to severe health problems and environmental destruction (Abejegah et al., 2013). Additionally, poor supervision of markets by poorly trained, unequipped and corrupt market officials has resulted in over-crowding, and marketers trading on market access roads (Avanenge, 2015). Also, for expired goods (post duration date), marketers in Nigeria still sell them in most cases to make gains from their stock and minimise losses. However, a report by (Olokor, 2021) on expired products reveals that the National Agency for Food and Drug Administration (NAFDAC) shut down a food manufacturing company (Every Rose limited: Manufacturers of SomGeo brand spice) for adulterating and revalidating expired curry and thyme spice which begs serious food safety questions as at the sealed warehouse of the company packaging materials, labels, and stamps were found which were being used to illegally revalidate the expired good (spices). The situations found in both the local market and supermarket during this study require better management in ensuring that food contamination as a result of negligence, poor market facilities, national infrastructure (electricity for food storage) is reduced to the barest minimum.

Food picking is suggested to occur in the two markets (more in the supermarket, than observed in the local market), Perhaps the reason behind this might be because of the level of infrastructure and hygiene displayed in both markets. Additionally, the study by Nzeadibe et al., (2012) waste picking suggests that despite the social and health problems that results from waste picking, scavenging and recycling, the activity continuous to provide important economic and environmental benefits to certain segments of an urban population. Consequently, the study recommended that waste management in urban policy development would help provide the quality of life (QoL) for specific groups of individuals living in urban areas. The market governing body need to ensure that market structuring and spacing are properly provided, marketers pay the cost of waste removal (this was observed to already occur); and they need to introduce sanitary facilities to enable marketers and food consumers have a clean environment, free from contamination, polluted air, and fire hazards. The local town planning authority with the local government office in Awka, Anambra State, Nigeria,

needs to properly plan the market and development of the city of Awka, while ensuring the market locations are given enough space for access roads to reduce traffic.

- ***Extension Service***

In Nigeria, extension service delivery operates in the three tiers of government; federal, state, and local government and they all play different roles in ensuring that farmers in Nigeria are reached, as such the federal government of Nigeria is the primary and major provider (financially) for the Nigerian extension service system (Hamisu et al., 2017). The findings concerning extension in this study shows that farmers amongst the study group report they have no access to extension services.

"We do not see extension officers come around to help us at all, we have stopped expecting them"- (Farmer 1).

"We make budgetary and training provisions for farmers in Anambra state, through the Federal Ministry of Agriculture and Rural Development office at the State level. Hence it is expected that farmers in that State are well taken care of. Additionally, we do carry out training in Awka, Anambra State"- (FMARD Officer).

"It is difficult for us the extension officers in the State to reach some farming communities in Anambra state because of the lack of funds and staff manpower"- (ADP Officer).

These quotes may imply that these farmers are not being supported on the technicalities of agricultural production, livelihood support and development, market intelligence and urban food linkage etc. However, it is important to understand why farmers in the study location "Omor farming community" have stated they have no support linkage to urban markets, resources, information etc. through extension officers. Hamisu et al., (2017) explain that the current (some already identified in the analysis section of this chapter) extension approach used in Nigeria includes: training and visit (T&V) extension, Ministry of Agriculture operated extension, university operated extension, commodity/sectoral agency extension, sasakawa global 2000 (SG 2000), special programme for food security (SPFS), community based agricultural and rural development approach (CBARDA) and the latest addition to this group is: the farmers field school, all of which takes on the bottom-up approach in the delivery of extension services to farmers and rural community dwellers. Some of the findings of this thesis are captured in the Agamu (2005) and Koyenikan (2008) studies. The Nigerian extension

service programme have been bedevilled by several problems including poor funding (i.e., funding inadequacy and funding instability), poor logistics support for extension field workers, poorly trained personnel at local levels, poor effectiveness of the agricultural extension research linkage, poor technological advancement and lack of farmers participation in programmes (training material) development (Agamu, 2005; Koyenikan, 2008; Sahel et al., 2018). Other problems include irregular evaluation of policies and extension programmes, poor resource supply, programme and institutional instability (Koyenikan, 2008). Some suggestions that could improve the extension service delivered to farmers include:

(1) the appropriation or mapping out of more funds to developing the extension service system. The funding mechanism for extension officers need to be properly arranged by Governments at all levels, to ensure that extension officers are adequately funded to enable them reach-out to farmers and rural community dwellers. The government of Nigeria may also source sustainable financing options by working with commercial banks in assuring transparency, traceability of funds and accountability.
(2) Adequate training and staffing of officers as well as the provision of infrastructure would enable extension officers deliver the best service to farmers.
(3) Developing training material (bottom-up approach) with content relevant to farmers and their current situation e.g., production activities and market linkage etc.
(4) Encouraging private sector investment in the Nigerian extension system, that would create competition and a fast system of extension delivery to farmers.
(5) The use of modern telecommunication means e.g., television sets, phones, radio set to communicate innovation to farmers without extension personnel having to make lengthy trips to farms or farming communities to support the acquiring of knowledge.

This study further agrees with Koyenikan (2017) who suggested that a National Agricultural Extension Policy (NAEP) be considered to enable the formulation and implementation extension services in Nigeria, aiding extension officers perform their role on a better scale.

6.7 CONCLUSION

This section of the study focused on exploring objectives 3 of this thesis, which address rural-urban linkage and its influence on food systems. Linkage was found to exist between the

rural food systems and urban food systems in this study through various process and activities that include food physically moving from the rural to the urban area. Other services and processing of foods (extension service, infrastructure etc) was not tailored and linked back to the rural community. The challenges faced by farmers and food marketers where summarised and explained in depth in this chapter. Some of these issues include infrastructure, input availability, activities of middlemen, food purchase, market intelligence, market hygiene, extension services system with suggestive ways of addressing these challenges. It is important to bridge the gap between rural and urban food systems through the flow of agricultural commodities and services, while this is so, farmers could benefit from existing government programmes that aid their productivity, as such extension service delivery need to be improved to enable the communication of such government programmes and more to farmers. The next chapter (7) is the conclusion section of this thesis. This chapter encompasses discussions on the key findings of this study, the liking of the key findings to the SDG programme, a framework for intervention, and some recommendations on possible ways of resolving the challenges highlighted in this study.

CHAPTER 7

7.0 CONCLUSION

This concluding chapter considers the key findings and implications of the study. This section holistically explores the study outcome (findings) from chapter 4, 5, and 6 as well as discussing how the findings address the study objectives. The chapter ends by drawing key recommendations from the PhD study and explores their implications for policy and future research. This section addresses the question:

- *How can food security be improved in both rural and urban communities within Anambra State through specific programmes of intervention?*

7.1 BACKGROUND AND CONTEXT

This chapter summaries the findings of the field enquiry set out in the methodology (chapter 3) of this study. The results explain, in the context of this PhD study, household poverty, food security as well as the rural food system and the urban food system and the linkages that exist between both communities, using evidence from the field research. Four principal research objectives (also captured in chapter 2 [section 2.8]) were addressed during the course of this study and they are reintroduced here for clarity.

Research Objectives (RO):

1. To examine the socio-economic status of urban households and rural farmers within Anambra State, Nigeria.
2. To identify and analyse factors that influence urban food insecurity and rural food production in Anambra State, Nigeria.
3. To assess the existing rural food systems and urban food systems and the linkage (or not) between them, and how this linkage influences rural and urban households, their livelihoods, and the wider food system that exists between and within both locations (rural-urban) in Anambra State, Nigeria.
4. To discuss how household poverty, food insecurity, rural food system and urban food system linkage can be addressed within Anambra State, Nigeria, through the development of a holistic programme of interventions.

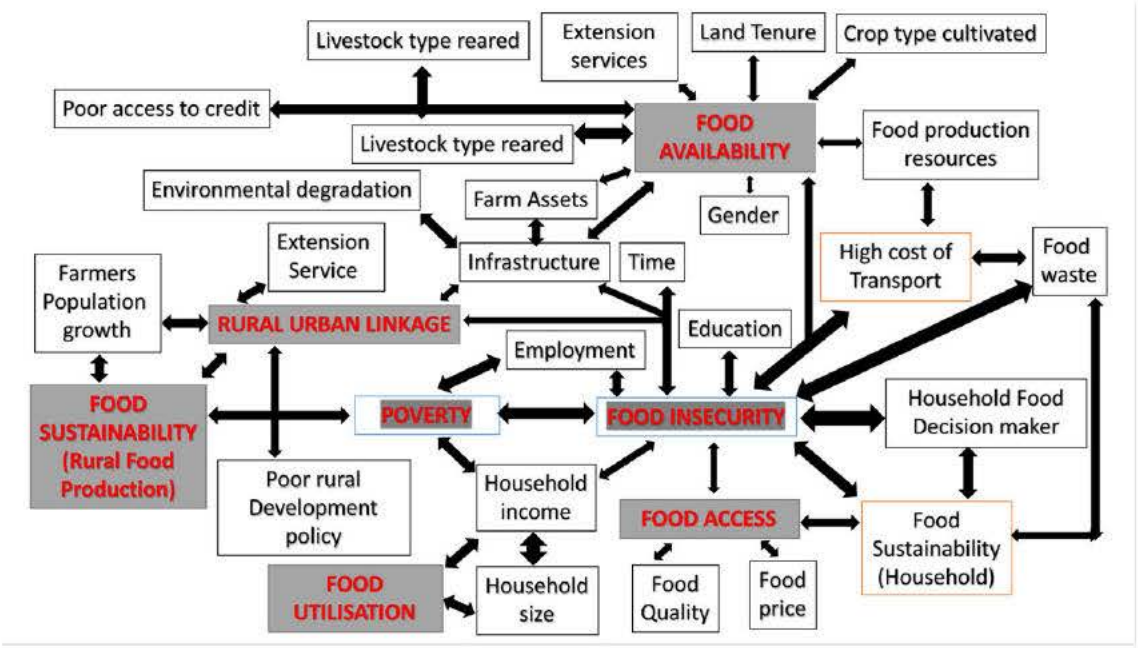
Household poverty was explored mostly in the urban context and to an extent in the rural setting, where the underlining factor limiting food consumers' access to food and other livelihood resources was attributed to the level of consumer income, which affected their food security situation. Household poverty in this thesis was measured via the correlation of the income level of households after tax with their household size. The result showed that, based on the benchmark proffered by the World Bank (Cruz et al., 2015), 77.6% of households in the sample population were living below the poverty level, which had implications for their ability to access, afford or acquire food. Acquirability as an emergent term is considered more fully in this chapter.

Food security was critiqued in this study in both the rural (food production) and urban setting (food consumption and marketing), based on the FAO (2009) food security dimensions/or pillars, that include: food availability and stability (production); access (income and infrastructure) and utilisation (quality and quantity). **Food availability** (food production) was addressed in this study (see chapter 5; and chapter 6 for more depth) in the rural context by exploring the resources/opportunities available to the different genders (male and female) of farmers in the production, processing and storing of food. While in the urban setting, **food access** was investigated in terms of respondent's household income after tax, household size, and the influence of the household food decision-maker. Additionally, urban **food access** (see chapter 4) was also considered based on the factors that influence food consumers' choice of food market in terms of price versus quality, this is in addition to consumers income that supports their access to food (see table 4.8). Then **food utilisation** was considered in the urban context including the factors affecting food consumers' ability to prepare food within the household as well as the potential for household food waste. Infrastructural challenges affected both the **availability** (food production and community linkage), **accessibility** (transportation, bad road network etc), **utilisation** (availability of electricity and water supply) and **sustainability** (food storage) of food. It is important to note that households can be said to be experiencing some level of shock or squeeze situation, which may directly or indirectly lead to economic poverty (inability to afford food), which can ultimately lead to varying degrees of food insecurity.

Food systems were explored in both the rural and urban context separately and then together in terms of "food" links to both communities. The study established that the food systems in both communities (rural and urban) had inadequacies in terms of product and information flow, as food physically moves from rural areas to urban areas; extension service

provision and associated information and knowledge from the urban areas did not transfer in the reverse direction to the rural areas, excepting information farmers get either directly or indirectly through middlemen and from food marketers. This has been observed in this study to limit rural-urban linkage development which is vital to the growth of the study state (Anambra State). Figure 7.1 shows the different factors collated from the literature review through to the findings that can influence household poverty, food security and food systems in Anambra State, Nigeria.

Figure 7. 1: Poverty, Food Insecurity and Food Systems Factor Mapping



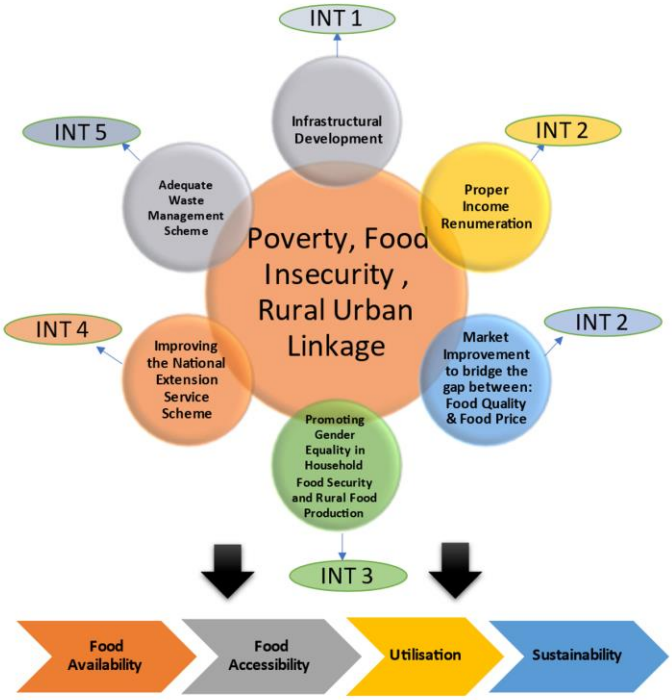
Source: *(Okpala et al., 2021)*

The key findings are embedded in the individual discussion sections across the chapters (4, 5 & 6). They are also captured in Figure 7.1 showing the linkages amongst factors. This study, through RO4, also addressed the socioeconomic drivers that influence food insecurity as well as the effect of gender inequality (primary access, or ability to acquire resources) on food production among farmers in the State. Furthermore, the factors that contributes to urban food insecurity and the influence that gender inequality has on rural food production systems in Anambra State, were also considered. Rural-urban linkage was further explored with regards to the existing food systems (rural and urban) in the study state (Anambra State) and how this factor influenced food security. The final objective (RO4) focused on systems improvement through a holistic programme of intervention(s) based on the current situation (in terms of household poverty, food security and food systems) in Anambra State, Nigeria. It is important

to note here that food security and food insecurity are positioned in this PhD thesis based on the findings and are captured as not being the opposite of each other, but rather being two different constructs i.e., the difference between the definitions of food security (four pillars) and food insecurity (FIES levels) are more nuanced than simply being the mirror opposites (see section 1.2 for both definitions). Thus, food security relates to the "**status**" of being food secure in terms of the pillars, while food insecurity expresses the "**condition**" of being food insecure i.e., mild to severe conditions of being food insecure.

The proposed sustainable rural-urban framework developed in the context of this PhD study (Figure 7.2) highlights key policy recommendations and other actionable programmes and activities that promote resilience and equity that would help resolve the main enquiry (household poverty, food security and rural-urban system linkage, or not) of this study.

Figure 7. 2: Elements of a Sustainable Rural-Urban Development Framework Programme



A programme of interventions that arise from the findings of this study have been developed considering Awka (Urban), and the Omor farming community (Rural), in Anambra State, Nigeria (Figure 7.2). The five interventions cut across infrastructural issues; proper income/remuneration; market improvement; promoting gender equality and its role on household food decision making and on agricultural production; improving the Nigerian extension service scheme; and adequate waste management (to include the operationalisation

of food banks). In other words, by addressing the identified key findings of this thesis through the recognised "five" interventions, the four pillars (food availability, accessibility, utilisation and sustainability) of food security can be better met.

The term acquirability, as a fifth pillar of food security, is not defined specifically in the existing literature. In the context of this study, acquirability in terms of food consumers relates to those socio-economic behaviours or perceptions (household food decision making, time availability etc.,) that influence consumers ability to access and utilise the food available within their location. Hence, acquirability provides additionality to the four (4) pillars of food security (availability, accessibility/affordability, utilisation) and a link to the SDGs (sustainability) considered earlier captured in the literature. Whilst the four pillars of food security are discrete concepts, acquirability as a concept is much more holistic. Indeed, the reason food security is not achieved in many parts of the world today is that the elements that form the concept of food acquirability have not been suitably addressed. In other words, considering acquirability creates an opportunity for future research into consumer-focused food related studies.

Thus, a new definition of food security in the Nigerian context that captures food acquirability, is proposed here based on the findings emanated from this thesis:

Food security is said to occur when safe and nutritious food is acquirable by all people at the right proportion, at all times. Acquirability of food is driven by uninterrupted physical, social and financial access to food, while encouraging the reduction of food loss and food waste to ensure that enough safe and nutritious food is available and affordable for human consumption.

In revisiting the literature and findings from this study, the proposed aspects/or elements of acquirability, that are of interest for future studies, are considered below:

Taste: this factor considers the desire to consume a given type of food commodity. Household tastes or preferences will affect the household's ability to acquire food. Tastes include meal choice, and food preferences.

Culture and change of diet: culture is the way of life of a given society, which is associated with the roles, positions and symbols of that society. It includes societal believes, values, institutions, language, taboos, dress style, food and feeding habits, arts, language, and institutions (Agada & Igbokwe, 2016). Changes in diet based on cultural or health reasons such

as diabetes, cancer or heart diseases (Arisukwu et al., 2019), can affect household food budgeting (making special purchases), and affect their ability to acquire food.

Cooking skills and cooking resources available: the difference in one's ability to cook, or possess cooking skills and cooking resources (energy, equipment etc.) links to food choice and the household's ability to acquire food.

These three elements are in addition to that earlier mentioned i.e., household food decision maker and time that influence food acquirability at the urban household level. In the case of rural farmers, acquirability (as explained in subsection: 7.1.1) relates to elements such as: decision making, time, influence of gender on access to resources and the type of farming systems have been captured in the body of this Thesis. In food production, this study shows that the food security pillars access, affordability, utilisation and sustainability are all important considerations for small scale farmers in Omor Community. Acquirability considers the socially framed ability or inability of certain farmers to acquire productive resources i.e., land, inputs (seeds, fertilisers etc.), credit/loans, farm equipment, labour and extension services etc. to produce food. Farmers in this study that were challenged with acquirability of productive resources tended to be female. Thus, the status of being female is important framing the unequal socio-economic conditions in which females produce food. In summary, food acquirability explains those social elements or factors that influence the purchase of food or the ability to gain or use productive resources in food production.

7.2 The Contribution of this Study to Existing Knowledge

The contribution of this study to existing knowledge when compared to existing literature, in the country (in this case Nigeria) or continent (Africa) focuses on acquirability in rural and urban contexts: particularly: product related factors that influence marketing channel selection in urban food systems (price versus quality), and socially related factors including gender dominance in household food decision making and in access to resources in rural food production. In view of the literature considered earlier in this thesis, there appears to be limited studies that reflect food consumers' market selection based on the attributes of price and food quality in the Nigerian context as well as socio-cultural factors (e.g., taste, culture and change in diet, time poverty and cooking skills) and how these factors influence household food decision making. Additionally, acquirability also relates to those social behaviours (gender dominance) that are associated with the household food decision making process. Additionally, the finding of this study linking price, quality as well as sociocultural factors that influence

household food acquirability, may relate to the strategy of the Alexandra Rose charity[1], which could be adopted in the study location in Nigeria. In 2014, in London UK, the charity provided vouchers (or purchase waivers) to low-income households that enabled them acquire fruits and vegetables for free. This approach addresses the SDGs encouraging the reduction of hunger and promoting food security generally.

Several interventions based on the findings of this study have been proposed below and strongly relate to two components of consumer behaviour; (a) their ability to sustainably acquire food (urban food systems); and (b) their ability to sustainably gain access to productive resources that encourage the production of food (rural food systems). These interventions include (see section 7.4): intervention 1 (infrastructure); intervention 2 (household income); intervention 3 (promoting gender equality); intervention 4 (national extension service) and intervention 5 (the management of waste), which are directly linked to social behaviour emanating from the findings of this study. These elements of interventions are associated with the rural-urban development framework of this study, which would together, and individually, address the key points of this study (Household poverty, food insecurity and food systems).

7.3 KEY FINDINGS OF THE PHD STUDY

This section discusses the key findings of this study. The major factors that contribute to household poverty, food security and rural food systems and urban food systems in view of the linkage that exists or not between the two communities are critiqued in the context of the study. Key components of this research are considered novel and are identified to show the contribution of this study to existing literature.

7.3.1 HOUSEHOLD POVERTY: FOOD SECURITY INFLUENCED BY LOW INCOME (RO 1&2)

The study considered urban food consumers in Awka, and the rural community of Omor, Anambra State. It was observed that in the urban area, that the non-probability-based sample population had an average household size of 3-6 persons (77.6%) living on an average income of N80,000 or less per month, and were found to be food insecure based on the income margin set by the World Bank group (Cruz et al., 2015) i.e., that a person is said to be living below the poverty line, if expenditure and consumption is below $1.90 a day. Nationally, National Bureau of Statistics (2018) note that 82.9 million people in Nigeria are living below

[1] Alexandra Rose Charity: https://www.alexandrarose.org.uk

this poverty line. Conversely, 22.5% of the sample population are with an average household size (3-6 persons) and an income level of N100,000 or more, this group were found to be living above the poverty level.

Economic status of rural households was observed via the type of asset(s) they owned. Farmers that took part in this study were observed to operate on a small to medium scale, with many of them owning common/or low-cost assets /or farm equipment (radio set [n=120 – all farmers], mobile phones[n=118], television set [n=111], irrigation equipment [n=109], bike/bicycle [n=104] and pushcart [n=58]). While costly and heavy farm assets: vehicles [n=26], plough [n=19] and solar panels [n= 15] were owned by only a few (mostly male) farmers. This group of farmers (few and mostly male) could be said to operate their farms on commercial or semi-commercial basis, hence the requirement for spending on farm asserts that would enable them to meet market demand. The rest of the farmers had invested in minimal equipment. Thus, the farmers in this study, from a household perspective had the ability to economically access certain assets over and above subsistence living.

Of the urban food consumers surveyed in this study 45% were self-employed and were observed to be involved in trades that include hairdressers, tailors, barber's shops, mechanics, electricians, running printing presses, book shops, cloth sales etc. of which a further 25% of them were observed to be full-time workers in establishments such as banks, manufacturing and transport (companies). As a result, students involved in this study who work part-time were only 14.2% of the sample population. Household income in all settings (urban and rural), is one of the main requirements that enables consumers economic access to food. In Awka, Anambra State and in Nigeria as a whole, the government at all levels could consider investing in social protection measures that would increasing the minimum wages of workers in the country and State, so that their income can match their household food needs (in terms of food affordability). Hence, it is suggested that the government of Anambra State explore more income generating opportunities that will encourage job creation with the hope of raising incomes for workers within the State. Never-the-less, data from this study does not show whether: the income of a household is solely dependent on a single individual family member's income or that of all working members of the family. This is a limitation that is worthy of future research.

With regards to farmers in the Omor farming community, these farmers also experience several challenges that limit their productive efforts in gaining access to inputs or selling their

produce, both of which affects their production capacity and income generation effort. Farmers in this study were affected by infrastructural challenge (poor access roads) which limits their access to inputs and the sale of their produce, leaving them at the mercy of middlemen who buy at low prices in rural areas and sell to consumers in urban settlements at a higher margin. Additionally, farmers stated that they have no support from extension service providers, this prevented them from effectively linking/accessing urban markets, leading to food waste and loss of income by farmers and more widely food insecurity. Improving food supply resilience is essential, especially gaining greater opportunity to supply food consumers in urban areas, while farmers in the rural areas can explore the means of generating sufficient income to encourage food security and alleviate extreme poverty.

Reflecting on food security and poverty, a portion of the sampled population 33.3% (n=40) considered "time" as another challenge they face in acquiring food, which highlights them as 'feeling time poor'. More respondents in the supermarket setting observed they were time poor compared to those respondents who used the local market. The reason for this was possibly tied to the busy schedules of food consumers in the study location, some of whom may be engaged in full time roles at work or juggling more than one job or business to make ends-meet. However, this study asserts that, although certain groups of urban food consumers can afford food, time poverty and its influence on acquiring food, especially for those that use supermarkets, becomes the main limitation driving food choice rather than income alone. This assertion is supported by the study of Bardasi & Wodon, (2015). As food consumers find themselves more time pressured, particularly those who shop in the supermarket, they may offset their lack of time for higher priced foods thus making a trade-off between working/income earning, paying higher prices for food in the supermarket, or going to the local market to source food that is less expensive and not necessarily of the same quality.

7.3.2 INFLUENCE OF HOUSEHOLD FOOD DECISION MAKER (RO 1&2)

This aspect of the study was covered in the survey conducted with food consumers in the urban area (Awka, Anambra State). The data shows that more females (n=87; 72.5%) were involved in the study "as respondents" than men (n=33, 27.5%), of which 66.7% were married and 24.2% were living as single individuals. Fathers (55.8%) were identified as the main household food decision maker, mothers (22.5%) were next in this category, then individuals who are not residing in a family but made decisions on their own food purchases followed

(21.7%). Evidence from this study suggests that the role of the fathers as the principal food decision maker within the household could predominantly influence household food decisions in the study location (Awka, Anambra State), i.e., fathers make financial/food decisions for the household probably because they are the higher earners in the household and are culturally seen as the head of the household. The data from this study did not specify, the income of fathers or mothers within a household unit that would clearly highlight fathers as the household food decision makers by virtue of income, however further studies can be carried out to give more context to this finding. A correlation between household size and the household food purchase decision maker was significant at the 1% level ($p<0.01$), implying a significant association between both variables which further indicates that fathers are more likely to be the household food purchase decision marker as the household size rises. The regressed data in this study showed that both "household size" and "household income per month after tax" was associated with the food purchase decision maker (the dependent variable) implying that a rise in household size and income (of the household head) would result in the household food decision-maker being more likely to be the male (father) in this case (see section 4.3.4; table 4.4). This role of decision-maker is considered within the studies of Bourlakis & Weightman (2004); Blisard & Stewart (2006); and Langat (2016). However, future studies may need to be conducted to ascertain in the Nigerian context, how the balance of household food nutrition in the urban area is affected by either males or females being the household food purchase decision maker. This is an important aspect of food insecurity and in particular, nutritional insecurity rather than calorie insecurity.

7.3.3 INFLUENCE OF FOOD MARKET CHOICE (RO1)

The study explored urban food consumers' market behaviour as a socio-economic driver of urban food insecurity in the context of the two major marketing channels in the urban city of Awka, Anambra State. The difference in the behaviour of food consumers and their interaction with the two market types (local & supermarket) was reflected in the response of food consumers that visit any/or both markets. The behaviour of food consumers depending on the type of market they visit. This can be attributed to either (a) opportunity, or (b) convenience. Several factors that influence market choice were identified (food price, distance to market, food variety, market loyalty, and food quality) see section 4.3.9 (table 4.9).

Food "price" was found to be the main factor that determined food consumers choice of using the local market, and in the supermarket, consumers were linked to the market because

of the "quality" of food they could purchase. The **opportunistic** behaviour can be said to be synonymous with consumers that visit the local market who try to take advantage of low price in their purchase for food commodities. Whereas consumers whose behaviour is attributed to **convenience** are linked to those who access the supermarket and are not as concerned, or do not have time (time poor) to be concerned about price and then to make lengthy travels to purchase food from the local market. However, they may further source costly food commodities from street vendors who sell in shops close to their homes. Convenience comes at a cost, in most instance consumers would have to pay more for food from supermarkets and street vendors compared to the price they would ordinarily pay for food items in the local market. Supporting this view was the study by Giroux et al., (2020), whose study found that despite the continuous growth in the number of supermarket outlets in South Africa, informal food vendors remain a key source of food to households, mainly because of its convenience. Again, with regard to time poverty, consumers ability to either visit a local market and/or supermarket may be associated with traffic, bad roads, and over-crowding at the market which may be weighed against the relative cost of food. The purchasing of ready to eat foods from street vendors is also of interest as a food source in urban areas, where the busy lifestyle (time poor individuals) or low-income earners, would domestically imply that cooking food is a challenge. This was earlier highlighted in this thesis (section 4.3.10).

In conclusion, the behaviour of food consumers in Akwa, Anambra State is influenced by physical, economic and social factors. ***Physical factors*** reflect infrastructure e.g., building type, road access, traffic, electricity and the ***economic factors*** of influence include household income after tax, employment status, food quality, food price, marketing channel, the level of interaction between sellers and buyers, and the whole range of information about a market available to food consumers prompting whether food consumers feel they should use the market or not. ***Social factors*** relate to family size and the household food decision maker. These themes of physical, economic, and social factors are expanded on further later in this chapter.

7.3.4 FOOD SECURITY AND WASTE MANAGEMENT (RO 1&2)

Food waste is discussed in this study in the rural and urban context in terms of "household food waste", "market waste" and "produce (rice and other crop) waste". Reported food waste generated within the urban household (cooked food) is low (2-5% and 0-1%), followed by (1% and 2-5%) of raw food by the study population in Awka, Anambra State. This implies that the food waste (cooked - food waste and raw - food waste) reported by urban food

consumers is not at a high rate or level. The findings of this thesis compare with the findings of Oelofse et al., (2018), who calculate that household food waste disposal in two cities in South Africa (Ekurhulemi & Johannesburg), was not at a high level and were elaborated as follows: Ekurhulemi (3% or 0.48 kg/head per week) and Johannesburg (7% or 0.69kg/head per week).

The reason(s) for low food waste in this study could include that respondent found a way to process, or store cooked and raw food in a refrigerator powered by generator sets where access to electricity in the study area was found to be limited (section 4.3.14 [table 4.14]: infrastructural challenges faced in preparing and storing food). In cases where access to electricity is poor without power supported gadgets (such as generator sets, solar system etc.), consumer's desire to purchase or cook/prepare food in large quantities may be limited. This means that consumers may purchase food only for immediate needs, hence prompting them to make frequent trips to the market to purchase food. This assertion is supported by the study of Ramukhwatho et al., (2017) who found that the reason for household food waste in the Tshwane metropolitan municipal city in South Africa were: excess food purchase, excess preparation of food, poor food storage, poor purchase planning and succumbing to special offers. Interestingly, household food waste in Awka, Anambra State and Nigerian may on the one hand decline even further if electricity becomes stable to allow food consumers buy and store the food they need, or alternatively, access to electricity may lead to over-purchase of food and then more food waste.

Market (local and supermarket) waste management systems were also explored in this PhD study. In the local market, local labour was recruited and paid for by marketers to pick and dispose of waste generated from the market. While in the supermarket, food waste (especially expired products) is placed in bins within the premises of the supermarket and later disposed of by the State (Anambra) waste management authority at a secondary location. However, in the local market, because the marketers were not directly involved with the disposal of waste, they could not tell if waste picking occurred in the market. Perhaps, waste picking takes place at the secondary location or at the later end of the busy day when food marketers have left the market premises for their home. Although, food marketers noted that non-food items such as cartons and raffia baskets were picked by certain individuals who recycle these items further to be used in the production of bags, caps, shoe fillings etc. While in the supermarket, it was gathered that food picking occurred particularly for food items such as (bread, sardines etc), which serves as food for some members of the community. Both the

markets (local & supermarkets) concluded that there was no technology within the market or its environment that converts waste into energy, (see *chapter 1; section 1.6)* the studies of (IPCC, 2006; Kosseva, 2009; Lin et al., 2013; Oelofe & Nahman, 2013; and Pham et al., 2014) which would be an opportunity to retain the calorific value inherent in the waste.

In the rural farming community (Omor) where farmers cultivated more of rice than any other crop, they confirmed that food loss along the rice value chain, occurs during transportation and processing (drying). Other forms of food loss occur as a result of pest infestation in rice and other crop produce (e.g.: maize, cassava etc) during processing and storage. In addition to this, in the processing of rice (milling), the rice husks and residues are sold at reduced rates to animal feed processors. Kok & Snel (2019) determine that a total of 35% rice loss was realised from the point of harvest to the point when rice is graded and sorted before it is accepted at Olam's procurement warehouse, with the percentage loss of rice varying from one farm to another of 8% to 55%. Kok & Snel's study concludes that low-cost technologies and creative/innovative strategies to reduce loss are important and engaging systematic monitoring and tracking via collaborative rice loss assessment methodologies are important at various stages of the rice value chain. Ibrahim et al., (2018) recommend that extension services can be adopted to enlighten farmers on adequate measure for handling post-harvest loss in rice production. The study concludes that further adoption of processing and storage facilities e.g., destoning, and innovative storage facilities such as silos offered to farmers by the government and the private sector (NGO) at a reduced rate is recommended to enable the reduction of post-harvest loss in the rice value chain.

In essence, it is likely that food loss/waste contributes to food insecurity, especially that which results from processing, transportation and storage. Hence, if food loss/waste is reduced, food becomes more available and accessible to food consumers. As the quality of the available food increases, the more the likelihood that the incomes of farmers, food processors and marketers would increase. This is worthy of further study.

7.3.5 GENDER AND AGRICULTURAL FOOD PRODUCTION RESOURCES (RO 1&2)

The role of gender in agricultural production was considered in this study in terms of resources and opportunities available to female and male farmers in the study location. More male farmers (n=97,80.8%) were involved in the study than female farmers (n=23;19.2%). The data from this study showed that in terms of education level male and female farmers were fairly equal. However, with regards to crop production, male farmers in the sample group are more likely to cultivate cassava, rice, yam, or cocoyam. Women were more likely to cultivate okra and leafy vegetables that require less resources to cultivate except land (which could be rented, owned by their spouse or ancestral). The crops grown by women command lower market price compared to other crops cultivated more by male farmers and are sold generally in an informal rather than formal market structures. Both male and female farmers were equally likely to cultivate maize. For livestock farming, female farmers were more likely to be involved in the common rearing of poultry birds, but both male and female farmers were equally likely to rear sheep, while goats and pigs which clearly require greater economic investment and some more physical effort (feeding, housing, monitoring etc,.) were likely to be reared more by male farmers than female farmers. None of the farmers in the study owned cattle.

In terms of assets ownership, male farmers were more likely to own heavy or expensive assets (vehicles, plough, and solar panels). Although, the ownership of these assets was limited in the study population. Female farmers on the other hand were likely to own cheaper assets (push-cart) than male farmers. While male and female farmers had equal likelihood of owning bike/bicycles, irrigation equipment, radio sets, mobile phones and television sets. Again, to further elaborate on the inequity of resources controlled by male/female farmers, more male farmers owned farmlands and rented in/out labour than female farmers, indicating the difference in labour demand for the crops grown. With emphasis on farm inputs, male farmers had more access to farm inputs than female farmers and were more likely to source farm inputs such as fertilisers, seeds and pesticides than female farmers. However, access generally to such inputs was limited. The study also shows that male farmers were more likely to practice some farming systems: mixed cropping and mixed farming than female farmers, while the case was the reverse for “mono cropping” with more women practicing this farming method than men. More so, men in this study had greater access to water supply/source for their farming activities than their female counterparts. These findings show the influence of gender on food production in the study location.

The regression analysis undertaken in this study confirmed that gender involvement in the cultivation of rice shows gender disparity. Male farmers were more likely to cultivate the crop rice, that demands increased physical efforts (land preparation, planting, harvesting, processing, storage etc) which may drive or position male farmers to have access to agricultural production inputs (e.g.: land, labour, seed etc) more than female farmers. These findings are supported in multiple studies (Ojo et al., 2013; Ayanwale & Amusan 2014; Kilic et al., 2015; & Oyo et al., 2020) see section 6.6 for more detail. In summary, it is clear that there is gender difference in terms of farming practice among the study group. However, more needs to be done in the agricultural sector to raise the level of opportunity available to women to boost their food production capability, and encourage their active involvement in the agricultural sector, not just in harvesting or storage or processing and marketing of agricultural commodities but to encourage women's ownership of land, resources, credits, facilities, labour support, and infrastructural enablement that would ensure their continuous participation in all aspects of the agricultural value chain. Recommendations for how to address this challenge are in section 7.4 of this thesis.

7.3.6 INFRASTRUCTURE (RO 1, 2 & 3)

Across the spectrum of response in this study, infrastructure was identified at every level of the PhD investigation as the most important factor that affects respondents, be it urban respondents (food consumers and food marketers) or those in the rural areas (farmers and/or extension service officers). Food consumers often face infrastructural challenge (bad road network [21.7%] and traffic [36.7%]) in accessing food, which further implies high transport costs [4.2%] that show the difficulty faced by food consumers and marketers in gaining and maintaining their physical access to food. Further to this, food consumers in Awka (urban area), Anambra State (as earlier explained -see: food security and food waste management [7.3.4] and subsection 4.3.14 [table: 4.14]) go through infrastructural struggles domestically in the processing and storing of food due to the poor state electrical supply, because of this food consumers have to take measures (the powering of refrigerator sets with electricity generator sets) to ensure that household food waste is reasonably reduced especially as many respondents are on low incomes.

Food marketers also face several aspects of infrastructural difficulty in sourcing (bad road network, traffic on the roads etc.) food which may also contribute to food waste as food marketers may tend to lose their produce in transit. Similarly, due to the barriers of

infrastructure in storage and processing of produce/products, food marketers use conventional methods in prolonging the shelf-life of their produce which raises food safety questions. For instance, tomato sellers in Eke Akwa market noted that they leave unsold tomatoes inside the wheelbarrow they use to move the produce from one point of the market to another, and just cover it till the next day when they again try to sell off their stock. Then if the tomatoes have started showing signs of spoiling, they are sold to customers at cheaper rates thereby making such marketers lose the capital (money) in their investment. This challenge is considered by several studies including United Nations (2011); Nwose (2013), Olagunju et al., (2017); & Ogunleye et al., (2018). In the local market, the infrastructural gap is reflected in poor storage, roadside sales, poor or zero packaging of produce/labelling, poor access roads and over-crowding. It is for this simple reason that food consumers barter for the price of food as against the scenario in the supermarket that operates on better infrastructure, better environmental hygiene and market facilities. This is the reason why products are adequately labelled and sold at fixed price in the supermarket. The studies of Scull & Fuller (1967); FAO (2003); Anbarci et al., (2012); Asogwa & Okwoche (2012); & Ezirigwe (2018) explains this in detail. Their research agreed that infrastructure was better organised in the supermarket than in the local market.

Farmers in this study were also faced with infrastructural issues. In the production and cultivation of food, farmers insisted they were affected by the lack of government support in the procurement of farm machinery such as tractors, harvesters, driers etc which may improve their production capacity. After production, farmers lose produce in the transportation of their farm produce particularly rice (which is the key crop produced by the majority of farmers in the Omor community) from the farm to processing sites, mainly caused by the bad road network making farmers lose income. The poor state of the Nigerian roads (CIA World Fact-book, 2021) coupled with pest infestation of stored food crops may cause farmers to outsource the marketing of their produce to middle-men who buy from farmers at a low price and sell in urban cities to marketers and food consumers at a higher price. Gainfully, these middle-men encourage some aspect of rural -urban food linkage and also facilitate the sharing of feedback between food consumers/marketers and farmers (Ogbu & Usman, 2018). More so, improvements in the structure and safety of the Nigerian roads would attracts other forms of development. For instance, farmers amongst the study group stated that they do not encounter extension officers to support their farming practice. Perhaps, the state of the road infrastructure and concerns on personal safety (on the road) leading to Omor farming community, could be a

factor discouraging extension officer(s) from engaging with the communities (Omor). The lack of access to extension officers has been cited severally in this thesis (see chapter section 6.3 [6.3.1] & 6.6; subsection 5.3.1), this is now considered in the next subsection.

7.3.7 EXTENSION SERVICE IN ANAMBRA STATE (OMOR FARMING COMMUNITY) (RO 3 & 4)

The extension system in Nigeria operates under various capacities to include training and visits, farm to farm visits, and adopted village programmes (mostly for technology transfer), with more specific services under different extension systems approaches such as: farmers' field school, farmers business school approach, smallholder horticulture empowerment promotion (SHEP-for horticulture crops) and community-based adoption (CBA) (Adegboye, 2016; Adesoji et al., 2020). Farmers involved in such training are selected based on national allocation, visits by extension officers, and commodity/crop of interest-based selection, all of which were discussed by the extension office at the Federal level (Federal Ministry of Agriculture and Rural Development [FMARD]) and the agricultural development programme officer (ADP) at the State level. With regards to this, training modules were developed at the Federal level mostly in collaboration with farmers (the bottom-up approach) who are identified regionally by selecting the heads of farmers associations and cooperatives to form part of the stakeholder's forum that develops such training modules. These training modules are later transmitted to state actors (state extension offices and ADP officers) who use the module to train state farmers. At the Federal level, the government support farmers in programmes that include: (a) the livelihood enterprise programme where women and cooperatives are supported with enterprise starter packs and (b) youth and women investment programme: where youth, farmers and women are supported with training and starter packs (e.g., farm training on the use and supply of inputs [seedlings, fertiliser etc.]; shad for sale of agro-commodities etc). At the State level, the extension service delivery centre also carries out demonstrations on demo plots, as well as provides equipment, and machinery to farmers within their coverage or reach.

However, farmers in the Omor farming community noted that they do not encounter the services of extension service providers. Explanations by the Federal office and the ADP person attributed several causative factors that hinder farmers' access to extension services in Omor community. These include lack of funding, poor mobilisation of extension officers and resources; and the personal security of extension officers (to an extent). This agrees with the

findings of Abdul (2020) that suggests that agricultural extension in Nigeria is bedevilled by inadequate and/or poor funding stability, poor field staff logistic support, inadequate training and retraining of extension personnel especially at the local level. It is important to note that the extension service in the Omor community, requires some serious intervention and reform. The findings of this study suggest reforms that could improve the level of extension service delivered to farmers in the study location that include the use of mobile phones to reach farmers in remote locations (such as the Omor farming community) in order to share with farmers important skills and innovation in their local language that would/could encourage productivity, reduce the cost of mobility and ensure the safety of extension officers and resources.

7.3.8 RURAL-URBAN LINKAGE (RO 3 & 4)

Although, rural-urban linkage was found to exist between the study location(s) (Omor farming community, Akwa or other cities) in Anambra State, it was not adequate as certain elements (infrastructure, extension services, marketing etc) were found to be lacking and negatively affects the linkage between rural and urban areas. A typical food chain process (food system) in a circular economy (where the recycling of food and other materials matters) is one that starts from production, followed by aggregation and distribution, then processing, marketing, food preparation and finally its disposal and recycling or reuse. This process usually entails rural-urban linkage at one stage or another. If one component of the process is disrupted (by either infrastructure or lack of communication or labour), it can affect consumers' access to food. A resilient food system must be based on both sustainable urbanisation and a sustainable rural community through a more balanced urban-rural development framework using agriculture and food supply as a tool in driving this change (Tacoli & Vorley, 2015). Within the context of this study a balanced sustainable (i.e., ensuring continuity) urban-rural development framework, would ensure the adequate flow of information, essential services, goods, commodities, produce and personnel (labour) between both elements of the geographic association. These groups of activities would ensure steady and stable growth in terms of the rural-urban economy, food linkage, employment and information exchange between both areas.

Infrastructure with regards to rural-urban linkage (especially access roads), was found to have contributed to the poor movement of people as expressed by members of the study community (Omor Community). As farmers among the study group noted, migration is not of

concern to them and that it does not occur regularly, adding that more farmers are joining the population every year. From this finding, one might tend to imagine that farmers perceive better economic and social opportunities living in their rural community compared to a move to urban cities where infrastructural challenges (i.e., bad road, poor electricity etc), poverty, unemployment and over-crowding still persist. The farming community in this study do experience setbacks for reasons such as the poor mobilisation of extension officers due to the lack of funding and to some extent the safety of extension officers which could have its mark on future development. Since the extension system in Omor farming community does not function (reflecting a gap in farmers' technical know-how and overall community development), this may be a limiting trend for the community's future access to opportunities and resources.

Rural-urban linkage was observed in this study in terms of **product** (agricultural commodity) linkage, and **information** and **market linkage** (extension service and middle-men), with several drivers identified, that influence the effectiveness of such interaction (rural-urban). The claim of rural-urban linkage in the study locations (Omor community and Awka) in Anambra State, suggests that food only leaves the farming community for urban areas (Awka, Onitsha and Nnewi); in return farmers in the rural area have no technical support (training, education, access road, machinery, and stable electricity/water supply) from urban areas. This is largely attributed in the study to poor infrastructure, poor government extension service delivery due to funding, and the lack of private sector intervention. This would paint a very negative picture of the situation.

With regards to food marketing, middlemen and food marketers from urban settlements assist rural-urban linkage by providing farmers with marketing services and key information that aids their ability to improve produce in line with market demand. In other words, infrastructure, and extension services (market linkage and extension training) have to be improved in the study location to enable rural-urban benefits via a balanced sustainable urban-rural framework which will attract development and investment into the State. Next is the summary of the study based on three main elements that encapsulate this research and its key findings.

7.3.9 SUMMARY OF ECONOMIC, PHYSICAL AND SOCIAL FACTORS

In view of the research objectives set out in this PhD study (section 2.8 & 7.1), the following findings were identified as providing the significant outcomes of this study and are grouped thematically under the following headings: economic factors, physical factors and social factors that link to the three elements of sustainability and sustainable development. The concept of acquirability emerges strongly here and is explored further.

Economic factors

- Food price was the primary influence for the respondents using the local market while food quality was the primary influence for the respondents using the supermarket.
- Influence of low income on household poverty and food insecurity (food affordability, & access) exists in the urban area among the study group as it was observed that 77.6% of those interviewed had a household income below the poverty line set by the World Bank of $1.90 per person per day. In view of this, food affordability relates to the price of commodities compared with the consumers' income, while food accessibility is influenced primarily by infrastructural factors.
- Low number of farmers owned key farming (especially female farmers) equipment that can change agricultural food productivity.

Physical factors

- Infrastructural challenges had an effect on urban food consumers' food purchasing habits, and this was found to influence their food security status. Examples include poor roads, lack of electricity to store and process food and lack of potable water supply.
- Farmer's access to productive resources and markets were constrained by poor infrastructure (bad road networks etc.).

Social factors

- Urban consumers that used supermarkets reported themselves as being 'time poor' and were willing to go to other markets that were more convenient, even if the price was higher. Hence, acquirability here relates to those socio-cultural factors, other than income - availability or physical-access that influence consumers' food purchasing and utilisation.

- Household size and household food decision maker influenced household level food purchase choice with fathers (men) being more likely to be the decision makers than mothers (women).
- Gender in agriculture (especially with reference to land, labour, farm input resources, farming systems and the production of certain types of crops by the different gender groups), extension service delivery, and market linkage influenced "female farmers" ability to acquire resources, which further affects their food production capability.
- Food waste realised at the household, at processing (rice) and during marketing was not reported as severe. Food picking by individuals was found to occur mainly in the supermarket location than the local market. Waste collection was in place at both types of market. This study did not establish what happens to waste at the secondary location in order to know if it was used as land fill or recycled, hence the need for future studies to be conducted in this area.

This element of the chapter has touched on majority of the key findings of this study. The next section is the recommendations that suggests actionable changes that can help to resolve the main inquiry (household poverty, food insecurity and rural-urban nexus) of this study.

7.4 RECOMMENDATIONS

This section explores actionable activities, programmes and policies that would ensure resilience and equity for the populace in Anambra State. The programme of interventions outlined on table 7.1 is arrived at by virtue of the set objectives of this study. This programme of interventions will require a necessary change to the present situation in Anambra State, Nigeria. And could guide change within the next five to ten (5-10) years especially if the Government of the State intends to meet its commitments regarding poverty alleviation, food security as well as developing a rural-urban linkage system that works in Anambra State and that would also deliver on the sustainable development goals. For this to be realised the State Government will have to:

1. Invest in infrastructural (road, markets, and electricity) development in both rural and urban areas,
2. Negotiate an improved income regime that promotes the food security status of its residents at individual and household level,
3. Promote gender equality in rural and urban areas within the State,

4. Improve on the national extension service scheme, and
5. Then structure a food loss/food waste management scheme that works for the people of Anambra State, which may offer a third marketing channel for food provision in urban areas.

The interventions identified are all achievable by the Government of Anambra State either on its own or in partnership with the private sector and international organisations. However, intervention 1 &2 can be achieved through the private sector partnerships (in terms of infrastructural construction) and State residents' consultative forums and participation/engagement to identify an income scheme that ensure state residents are economically secure to afford food. John (2008) proposes that consultative (forums) dialogue between government and stakeholders is a key part of policy making in the United Kingdom (UK). Such consultative forums/or dialogue strongly relate to the formulation of a new policy or considering a change to a policy already existing in its process or practices. John (2008) further noted that a formal consultative forum has the potential to scrutinise government's preliminary policies or its implication under consideration. Examples of where such consultative forums have been adopted, includes but not limited to: (1) Climate Assembly-UK: a committee (comprised of 100+people from all works of life) set-up to reach by the year 2050—net zero green gas emission, and (2) The Agricultural Sector Food Security and Nutrition Strategy (2016-2025) by FMARD, FAO & GAIN (Global Alliance for Improved Nutrition). Both can be found online [2]. Intervention 3, 4 & 5 can be achieved in full but in a staged process because of the different levels of stakeholders involved. The five interventions are further categorised in Table 7.1 to identify long or short-term duration for the individual achievement of the thesis' recommended interventions.

[2] John Hutton (2008): Layout 1 (publishing.service.gov.uk); & FAO.org :

Table 7. 1: Study Findings: Social and Economic Interventions and Possible Duration for Intervention and level of investment required

INTERVENTIONS	SHORT TERM INTERVENTION (1 to 5 years)	LONG TERM INTERVENTION (5 to 10 years)	Level of investment required (high/medium/low)
INT-1 Infrastructure		X	High
INT-2 Household income	X		Medium -to- High
INT-3 Gender Equality	X		Medium
INT-4 National Extension Service	X		High
INT-5 Food Waste Management		X	Medium

Source: Okpala E.F, 2021

The recommendations here are identified to intervene based on the findings of this thesis and were reached after careful review and assessment of the current situation in the study State. The recommendations that follow are not a 'wish list' of ideas that are hoped might help, rather they are concrete proposals for short-term [between 1 to 5 years] (e.g., improvement on household income) that should be revisited for implementation on an annual basis (i.e., 1 year interval) and long-term interventions (e.g., infrastructural development) that will need to be implemented over a longer timeframe. The interventions align well with several SGDs (Table 7.2) and the duration for implementation can range between 1 to 10 years or more. Some interventions may be seen as long-term intervention and should have a definite time scale, its implementation could rather be continuous i.e., maintenance inclusive for physical infrastructure such as roads, bridges etc. The table is now critiqued below and more dept given.

Table 7. 2: Key Elements of the Thesis - "Based on the Sustainable Rural Urban Development Framework"- Linked to the SDGs

	SUSTAINABLE DEVELOPMENT GOALS (2030)																
Key Thesis Outcome/Findings	SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
Effect of Gender on Agricultural Food Production i.e., Access to Production Resources and Finance (INT-3)		√			√					√							√
Effect of Rural-Urban Linkage on Food Availability (INT-4)									√		√						√
Improved Extension Service Delivery (INT-4)		√									√						√
Infrastructural development (INT-1)							√		√		√						√
Influence of Food Market Choice (INT-2)											√						
Influence of Household Income	√	√						√			√						
Influence of Household Food Decision Maker (INT-3)		√	√		√					√							
Influence on Food Waste & Food Picking to Improve Food Security (INT-5)	√	√				√					√	√					
SDG- CATEGORIES	SDG1: No Poverty	SDG2: Zero Hunger	SDG3: Good Health & Well-Being	SDG4: Quality Education	SDG5: Gender Equality	SDG6: Clean Water & Sanitation	SDG7: Affordable & Clean Energy	SDG8: Decent Work and Economic Growth	SDG17: Partnerships for the Goals								
	SDG9: Industry, Innovation & Infrastructure	SDG10: Reduced Inequalities	SDG11: Sustainable Cities and Communities	SDG12: Responsible Consumption and Production	SDG13: Climate Action	SDG14: Life Below Water	SDG15: Life on Land	SDG16: Peace, Justice and Strong Institution									

Source: Okpala E.F (2021)

Interventions and Recommendation 1: Infrastructural Development

Infrastructurally, evidence from this study showed that the level and quality of urban and rural infrastructure in Nigeria is fairly low and this affects the food security enablement of the State residents (whether they are: food consumers, food marketers or farmers). Most importantly, and as captured by the CIA-World Fact Book (2021), although Nigeria has access roads to many of the country's locations, not all these roads are paved. This disruption in road accessibility can greatly affect the movement of people, goods and services from one part of the country to another and should be addressed by the Government ensuring that over time all Nigerian roads are adequately paved to also reduce the risk of food waste and road accidents. Other infrastructural issues in Nigeria that directly affecting food security include: the availability of electricity and pipe bore water in urban and rural locations. The instability in electrical and water supply in Nigerian can affect the volume of food that households' buy, prepare and store at home, and as a result affected households could be saddled with the stress of frequenting the market. Additionally, households may/or may not possess power generator sets for electricity that allows them store food (raw and cooked). Unfavourably, such power generating equipment can contribute to environmental (air) pollution, which may have health implications for its users and those living around them. The Ministry of Power, Works and Housing need to ensure that infrastructural investment that aids livelihood development (and food security), e.g., transportation network, electricity, potable pipe bore water, are adequate and accessible. The practical implication of this is the construction of (linking) urban and rural roads as well as the construction of bridges; generation of sufficient energy for power supply (hydro (dams)), wind turbines, solar energy etc; development of water storage and/or digging for bore hole water that is channelled to the home of the State residents.

In terms of policy recommendation emanation from the findings of this research, the Government of Anambra State can develop public-private-partnerships with companies that are able to implement infrastructural mapping and development, in order to enable the construction of roads, electricity generation and the channelling of pipe bore water to homes of the State's (Anambra) residents. This policy would spell out the funding mechanism for such projects. It may happen that the Government of Anambra State fund road construction while

the partnering company employs and train its staff from the local community within the State, or the Government of Anambra State provide the land for the construction of food markets while the construction is done by the private company involved who will then continuously benefit by virtue of its partnership from the regular rents paid by occupants of the shops/stalls in the constructed market. Similar, arrangement could be made with respect to the water supply within the State, where the water storage facilities in the State are revitalised (i.e., the construction of reservoirs and the channelling of water to homes) by such public-private-partnership either through its direct payment [funding] by the state [Anambra] Government or through a form of arrangement. It is however important to note, that for projects to be executed, the Government at all levels depends on income generated within its State as well as the National allocation it receives from the Federal Government to fund such projects. Tax in Nigeria need to be collected more effectively and used by the Government more efficiently to drive the level of infrastructure required and the quality of life aspired by residents of the State.

Intervention and Recommendation 2: Household Income

Households in the urban area of this study (Awka) clearly show that income levels amongst the food consumers interviewed did vary. The majority of such households (77.6%) in the study, using the World Bank metric, live below the poverty line of $1.90 per person per day (Cruz et al., 2015). This implies that the income of households may often not match their food demand, and this requires urgent attention. The Government of Anambra State and more widely in Nigeria through consultative forums, together with the organised private sector, need to review the minimum wage for working individuals within the State to ensure that it match their needs (food, social, infrastructural etc). The review and implementation of a better wage (a living wage), for household income earners would translate into better household food decision making process, guaranteeing better nutritional status for the Anambra people. With infrastructure (road traffic, bad road network) and time also playing its part in the balance between work and food shopping, the Anambra State government need to ensure that infrastructural commitments and the proper mapping of the city (Awka) as well as the restructuring of the workplace/schedules to allow ample time off work (holidays, break-times and weekend rest) for the state's residents to ensure that their wellness (food purchase and

preparation; travel etc) is considered. With this in mind, hopefully the nutrition status of the Anambra people would be improved. Further trends could be observed in the types of market food consumers visit. Again, this is linked to household income, as most food consumers may shop for food quality in the supermarket, then food price in the local market. Food is also purchased from street vendors in informal settings. In terms of social protection measures that can be put in place to address this problem of low incomes. The Anambra State Government can set up a department or state ministry of internal affairs. Their duty would be to mobilise and deploy officers into communities in Anambra State (urban and rural). These officers would target or identify vulnerable households within the community, who would be supported with skill acquisition (e.g., apprentice) programmes, after which they could then be handed start-up funds or enterprise equipment (e.g., shade, shops, sowing machines etc). This would be done to improve the income of the lower income households within the State. While the State Government [Anambra] will fund the salaries of the staff of the created Ministry. Although the extension officers seem to already be doing this in some rural areas, as this study identified. Additionally, in a bid to cut cost, households can also be advised to practice home gardening where they possibly can. This has several levels of benefits to humans from its nutritional benefits - to - its environmental contribution. Home gardening would also enable households to gift their excess produce to other family members or friends within their network who may be in need or might be struggling with income for food.

Intervention and Recommendation 3: Promoting Gender Equality within the Household and Farming Enterprise

In terms, of food production, this study emphasised on gender and its effect on food production. National policies such as the Agricultural Transformation Agenda and the Agricultural Promotion Policy consider gender-based reforms by improving on the productivity of women and men participating in the agricultural sector. The Nigerian policy on gender development should consider the mainstreaming of gender issues in agricultural extension programmes, land tenure for women in agriculture ownership, credit schemes that are accessible or not gender specific, and ensuring input availability at subsidised rates to youth and female farmers in order to promote agriculture within the study State (Anambra) and more

widely in Nigeria. These aspects all reflect the inclusive elements that is supported by this PhD. study.

Gender matters are currently being channelled through the programmes and forums of many government agencies in Nigeria, however, there seem to be questions about its effectiveness. One case study for instance highlighting a good policy recommendation is the study of Makhdum & Kousar (2021) whose research in rural Pakistan was on gender in agriculture. The study found that literacy rate, social status, and infrastructure (rural) are key determinants of the rural labour market system. Their study further recommended policies centred on educational opportunities, limiting market entry barriers in labour for women and infrastructural development. With this in mind, this thesis recommends the continuous education for both genders [male and female] both at the household level (in order to foster proper household food decision making) and within the society (occupationally and otherwise), as well as for the young and the elderly using different mediums (face to face household talks by responsible persons of Government, consultative forums, classrooms in schools etc.) to get the message across, as well as ensuring equal opportunities across all sectors for men and women within Anambra State.

And finally, with regards to household's decision making on food. Gender training programmes that empower women with the right skills and tools (education, employment etc.) to make informed and adequate contribution to the household food decision making process should be supported and encouraged by the Government of Anambra State. This study further recommends that proper communication should be advised by extension officers or family planning personnel to ensure that such families have a consensus on what food to buy and prepare within the household, in order to avoid bias.

Intervention and Recommendation 4: Improving the National Agricultural Extension Service Scheme

Recommendations on the improvements of the Nigerian extension service can be seen in Sections 6.6 and subsection 7.3.7 of this study. The agricultural extension service is perceived in this study as the technical back bone of agricultural productivity amongst farmers such as the farmers in the Omor community. The agricultural extension system in Anambra State should ordinarily address food production, market linkage, rural-urban linkage, gender (women) support, food processing etc. but the reverse is the case. Hence, the service needs the support of the government at all levels (whether at State or at community level) to be able to attain its full potential.

Rural-urban linkage in Anambra State is weak and it operates a one-way system, where food leaves the rural farming community for urban cities (Awka, Onitsha & Nnewi), while farmers do not experience the efforts of extension officers. More needs to be done by the Nigerian government especially the Federal Ministry of Agriculture and Rural Development and, other relevant agencies e.g., (ADP and the organised private sectors (to include: the bank of agricultural, the Nigerian agricultural cooperative and rural development banks as well as other commercial banks) that have vested interest in the agricultural sector to support extension service delivery in the study State and the country at large. The support for extension service delivery can be realised through the funding of extension programmes, adequate recruitment and mobilisation of extension officers, as well as ensuring adequate farmers inclusion in the development of training programs, forums or policies (bottom-up approach), and equip extension officers with the resources they need to ensure that the extension service is working adequately in the study State. This will in turn steer rural-urban linkage to function at its optimum level guaranteeing food availability, its access, utilisation and ensuring food supply/demand stability, as well as the movement of services and activities: training, market linkage, and information sharing, that would encourage farmers and rural community development. In the far to reach geographic areas, often difficult to cover by extension service providers, due to infrastructural (roads), and financial reasons (the lack of funds), and by virtue of the findings of this study (i.e., majority of farmers own a radio set). As a result, radio shows

and jingles that convey agricultural and rural development message(s) can be projected in the native language of farmers within the study state. Similarly, since almost all farmers in this study also own telephones, important text messages (e.g., method of land preparation, time to plant, weather forecast etc.) could also be sent to farmers.

Interventions and Recommendation 5: Food Waste Management

Food waste management and redistribution would contribute to the food security of certain groups within the community in the urban city of Awka, Anambra State. Hence, the Government of Anambra State/Nigeria, need to take a leaf out of the book of developed countries (such as the UK) where food banks are set-up and linked to food markets. Practically, food close to expiry is donated to food banks for onward redistribution or dissemination to persons within the community that is in need of such food item(s). This food source could be provided to individuals who would otherwise go hungry. In consideration of how infrastructure affects the food security status of the Anambra people, it was found that the instability in the availability of electricity could affect food consumers' purchasing behaviour and the opportunities for store food. It is however important that the government of Nigeria invest in ensuring stable or near stable electricity across the state in order to prevent food waste. In addition to this food waste (either: inedible domestic waste or market waste) where it occurs could be composted and transformed into various forms of energy (further study may need to be done in this regard) as seen in developed countries. For example, Melikoglu et al., (2013) estimated that energy lost at landfill sites are equivalent to the 43% of energy required in the US for food preparation, 37% would yield hydroelectric power production (generation) in Japan and over 100% of the yearly renewable energy demand of industries in the UK. In the World today, different food waste processing and management methods/approach/or systems are being investigated for social/societal applications and benefits. Paritosh et al., (2017) found that the anaerobic digestion approach has become one of the most promising and eco-friendly solutions to food waste management, nutrient harvest and energy creation, which can add to the world's ever-growing demand for energy. Indeed, this study also recommends for provisions that would enable the development of food waste management models that works for the State (Anambra), Nigeria.

7.5 SUMMARY

This section contextualises the findings of this study that consists of infrastructure, household income/food marketing (price vs quality), gender issues at the household and farm level, extension service provision and waste management. These key findings from the framework of the study (see figure 7.2), addressed the four main pillars of food security (food availability, access/affordability, utilisation and sustainability). Another, important outcome of this study was the realisation of an additional holistic pillar that would indeed address other aspects of food security especially at the household level. The proposed additional pillar of food security is "food acquirability" i.e., it involves those factors that affects consumers' ability to acquire food; and farmers' ability to acquire productive resources. Some of the elements associated with socio-cultural consumer related food acquirability include, and are not limited to, household food decision making, taste, culture and change of diet, time poverty, and cooking skills/access to resources. Other elements of acquirability associated with farmer food production capabilities includes decision making, time, gender access to resources and farming systems (labour). Assessing these consumer and farmers-related factors would however require future studies to examine their interaction and the use of this pillar in the future within the food security construct.

Importantly, findings from this study were linked to the sustainable development goals (SDGs) see table 7.2 with emphasis on the importance of the findings to the delivery of the SDGs in practice and potential interventions that the government of Anambra state can make to support the achievement of some of the SDGs. These findings are a call to arm that the urban-rural sustainable development framework could deliver to the SDGs in the study location if the recommendations/programme of interventions are fully adopted. Interventions 2, 3, and 4 can and should be implemented within 1 to 5 years. Interventions 1 and 5 can be implemented between 1 to 10 years or more. In the order of implementation, I would recommend first for the implementation of recommendation 2 to address the cost-of-living expenses and assure that people within the study location are able to afford food in urban areas and productive resources in the rural areas. This study therefore hopes for the consideration of "food acquirability" as an addition to the other pillars of food security. Further or future empirical research needs to be

carried out to validate the elements associated with food acquirability emanating from this study, in order to enable its consideration as a construct in policy formulation in the study location, or indeed across the world.

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APPENDIX 1

*Table 2. 2**: Concept mapping***

CONCEPT	TITLE	ABSTRACT	CHAPTER 1	CHAPTER 2
Circularity		X		
Developmental challenge			X	X
Extension services		X		X
Food demand			X	X
- Balance between supply and demand			X	X
- Consumption			X	X
Food security	X	X	X	X
- Availability (presence, proximity)		X	X	X
- Accessibility (physical assess; economic access Chapter 1)		X	X	X
- Urban food access (affected by overcrowding, unemployment, infrastructural absence and decay, lack urban services)			X	X
- Rural food access (lack of investment in production, poorly developed market access)			X	X
- Utilisation (sufficiency, quality, quantity)		X	X	X
- Sustainability (uninterrupted access, stability)		X	X	X
- Acquirability		X		
- Social factors			X	X
- Economic factors			X	X
- Environmental factors			X	X
- Policy interventions			X	X
Food insecurity		X	X	X
- Mild			X	
- Moderate			X	
- Severe			X	
- Acute			X	

- Chronic vs transitionary			X	
Food supply			X	X
- Agricultural productivity decline			X	X
- Food production index			X	X
- Food production capacity			X	X
- Food importation			X	X
- Supply/demand deficit			X	X
- Price controls (affordability)			X	X
- Season-ability affecting availability			X	X
- Postharvest losses			X	X
Flow		X		X
- Commodities		X		X
- Goods and services		X		X
- Information		X		X
Food bank		X		
Food waste		X	X	X
- Municipal food waste			X	X
- Pre-consumer waste			X	X
- Post-consumer waste (domestic food waste)			X	X
- Food loss				X
- Resource circular economy				
- Reclaim				
- recycle			X	X
- incinerated				
- landfill			X	
- energy generation			X	
- composting			X	X
- anaerobic digestion			X	
- fermentation				
- waste picking			X	X
Rural food system	X	X	X	X
- Intense soil utilisation				X

- Climate change				X
- Soil erosion				
- Rural-urban migration			X	X
- Gender on food production				X
Urban food system	X	X	X	X
- Urban town planning for Agricultural purposes				X
- Urban local market				X
- Urban supermarket				X
Urban-rural food linkage(s)		X	X	X
- Linking through food supply			X	X
- Linkage to promote development			X	X
- Flow from rural to urban (food, materials, people, information, labour, ecosystem stability)				X
- Urban to rural (ditto factors, but also cultural, diet change, changing farming and agricultural models to feed the city)			X	X
Education			X	
- Nutrition				X
- Lack of budgeting skill				X
- Lack of technical Knowledge (Cooking Skill)				X
Gender inequality		X		X
- Household Decision Making (Urban)				X
- Food production Resources access (Rural)				X
Household decision-making		X		X
Household poverty	X	X	X	X
Household income		X	X	X
Household food security (defined in the context of the study Chapter 1)			X	X
Infrastructural development		X		X
- Health care facilities			X	X

Policy			X	X
- High level programmes			X	X
- Financial lending support			X	X
- Agricultural policy			X	X
- Structural transformation			X	X
Population			X	X
- Increasing			X	X
- Net migration			X	X
Poverty			X	X
- Abject			X	
- Urban poverty (urban poor)			X	
- Rural poverty (rural poor)			X	
- Household poverty			X	X
Resilience				X
Resources			X	
- Natural			X	
- Human			X	
- Financial				
- Social				
- Physical (links to infrastructure)				
Employment			X	X
- unemployment			X	X
- wage pressure			X	X
- migration			X	X
- rural labour			X	X
- household incomes			X	X
Cultural influences			X	X
- Taboos			X	
Urbanisation			X	X

Livelihood Strategy				X
- Migration			X	X
- Family remittance				X
- crop diversification				X

APPENDIX 2

Table 4. 21: Chai-Square: Association between Market Type and Respondent's Demography

	Type of Market		**Total**	**X^2**	**P-Value**
	Local market (Eke Awka)	Supermarket-A			
AGE OF RESPONDENT					
18-25	8	10	18	0.392	>.05
26-45	45	42	87		
46-65	7	8	15		
Total	60	60	120		
MARITAL STATUS					
Single	15	14	29	3.234	>.05
Married	38	42	80		
Widowed	6	3	9		
Divorced	0	1	1		
Widower	1	0	1		
Total	60	60	120		
HOUSEHOLD SIZE OF RESPONDENT					
1	14	11	25	1.797	>.05
2	6	8	14		
'3-6	27	32	59		
'7-10	13	9	22		
Total	60	60	120		

Source: Field Survey, 2020. N=120

Table 4.21: Chai-Square: Association between Market Type and Respondent's Demography ***(Continuation)***

	Type of Market		**Total**	**X^2**	**P-Value**
	Local market (Eke Awka)	Supermarket-A			
EDUCATIONAL STATUS OF RESPONDENTS					
Secondary School Leaving Certificate	33	22	55	4.083	>.05
Bachelor's Degree Certificate (BSc)	18	26	44		
Master's Degree Certificate and Above	9	12	21		
Total	60	60	120		
EMPLOYMENT STATUS					
Unemployed	3	8	11	4.579	>.05
Fully Employed	25	30	55		
Self Employed	32	22	54		
Total	60	60	120		

Source: Field Survey, 2020. N=120

Table 4.21: Chai-Square: Association between Market Type and Respondent's Demography ***(Continuation)***

	Type of Market		**Total**	**X^2**	**P-Value**
	Local market (Eke Awka)	Supermarket-A			
HOUSEHOLD INCOME PER MONTH AFTER TAX					
<N18,000	7	10	17	5.662	>.05
N18,000-N40,000	23	15	38		
N41,000-N80,000	20	18	38		
N81,000-N100,000	6	14	20		
N100,000>	4	3	7		
Total	60	60	120		

Source: Field Survey, 2020. N=120

Table 5. 19: Chai-Square: Farmers Gender on Socio-economic characteristics

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
SOCIO-ECONOMIC CHARACTERISTICS									
Age	20-40yrs	81	19	0.011	>.05	0.011	>.05	0.009	>.05
	41-60yrs	16	4						
Education	Primary	17	5	4.661	>.05	5.079	>.05	0.197	>.05
	Secondary	36	13						
	Tertiary	24	2						
	No Education	20	3						
Marital Status	Single	36	1	20.957	<.001	21.468	<.001	0.418	<.001
	Married	59	19						
	Widow	0	3						
	Widower	2	0						
Household Size	1	30	0	9.775	<.010	15.209	<.001	0.285	<.010
	‘02-05	49	18						
	‘06-09	18	5						
	No	83	22						

Source: Field Survey, 2020. N=120

Table 5. 20: Gender and Farm Labour

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
FARM LABOUR									
Bought in Labour Cost per Day	0	0	1	7.514	<.05	6.127	<.05	0.25	<.05
	N1,000 - N1,500	6	4						
	N1,600 - N2,000	91	18						
Labour Rated Out Per Day	0	22	23	47.423	<.001	54.91	<.001	0.629	<.001
	N1,000 - N1,500	2	0						
	N1,600 - N2,000	43	0						
	N2,000 - N2,500	30	0						

Source: Field Survey, 2020. N=120

Table 5. 21: Gender and Water Source

		GENDER							
		MALE	**FEMALE**	**X2**	**P-Value**	**LR**	**P-Value**	**Phi/or Cramer's V**	**p-value**
WATER AVAILABILITY VIA SOURCE OF WATER									
Borehole	-	11	0	12.407	<.05	15.86	<.01	0.322	<.05
Well		14	1						
Borehole+ Rainfall		4	0						
Well + Rainfall		50	21						
Rainfall		18	1						

Source: Field Survey, 2020. N=120

APPENDIX 3

Food Consumers Survey:

Royal Agricultural University, Stroud Rd, Cirencester GL7 6JS

Faculty of Agricultural Sciences

Contact detail of Supervisors: [redacted]

Invitation &

Participant Information Sheet

Study Title: POVERTY AND FOOD INSECURITY IN NIGERIA: A CASE STUDY IN LINKING URBAN AND RURAL FOOD SYSTEMS IN ANAMBRA STATE

I would like to invite you to take part in my research survey structured to:

(a) Examine food consumer's socio-economic background.

(b) Observe the current state of poverty and food security in Anambra state, and

(c) Determine consumer's market preference as well as the factors that influences this choice.

Participation is entirely voluntary, and you can feel free to withdraw at any time up to the data analysis of the survey. All responses are completely anonymous and will remain strictly confidential.

The survey has been through to the ethical review procedures of the University of Gloucestershire and Royal Agricultural University; therefore, you are guaranteed that all ethical issues have been taken into account. For any concern (s) please refer to the contact details of my supervisors provided above.

I would be very grateful if you could spare 3 minutes to be part of this survey.

Thank you!!!

Royal Agricultural University, Stroud Rd, Cirencester GL7 6JS

Faculty of Agricultural Sciences

Questionnaire

Market: _____ Date Administered: _____

SECTION A

1. Who makes the household food purchase decision:

(a) Father

(b) Mother

(c) Others: ……..

2. Who enacts the purchase decision?

(a) Father (b) Mother (c) Children (d) Others: ……

3. What proportion of your income is devoted to household food purchase? (a) 5% and less (b) 6%-10% (c) 11%-20% (d) 21%-30% (e) 31%-40% (f) 41%-50% and 51% and above

4. As a percentage, how much of the food you purchase comes from this market? (in %) ……

What other markets do you visit: ……

What are your other sources of food (e.g., relatives on farm) ……

5. What influences your choice of market: (open question, but prompts as below)

(a) Food price (b) quality of food (c) distance to market (e) loyalty (d) location

6. What is the distance that you travel to the market? (In Km): …….

7a. Do you incur transportation costs in coming to the market?

7b. If so, how much? (In Naira): ……..

8. How often do you visit the market? (a) Rarely, (b) once a month (c) once in two weeks (d) once a week (e) 2-3 times a week

9. Are there seasons when you visit the market more frequently? ……

If so, why?

10. What are the challenges faced with acquiring food (a) high transportation cost (b) bad road network (c) choice of market (d) others (please identify): ……..

11. What challenges do you face in preparing food and storing food as a consumer? (a) poor electricity (b) Water availability (c) high cost of cooking facilities (cooking gas etc.) (d) Others: (please identify) ……..

12. Domestic utilisation of food results in some level of food waste,

(a) What proportion of the food you purchase do you waste? (%) (1) raw food ……, (2) cooked food ……

(b) What do you do with food waste? ……..

13. Select from the list of possible challenges below that you have encountered in the use of this market: (a) Poor marketing facility (such as shade) (b) Poor mobility network (footpath way) (c) over crowding (d) High marketing charges/taxes (e) Delay in time of response by the seller (f) Poor preservation (g) Poor communication between the seller and yourself (buyers) (h) Others specify below: …….. (You can select more than one answer).

14. How can this market be improved for you? ……..

SECTION B. (SOCIO ECONOMIC CHARACTERISTICS)

13. Sex: (a) Male ( ) (b) Female ( ) (c) Prefer not to say ( )

14. Marital Status: (a) Single ( ) (b) Married ( ) (c) Separated ( ) (d) Widowed ( )

(e) Divorced ( )

15. Household Size: (a) 1 (b) 2 (c) 3-6 (d) 7-10 (e) 10+

16. Educational Status: (a) No formal education (b) Secondary school leaving certificate (c) BSc (d) MSc (e) PhD (f) Prof.

17. Occupation: (a) Unemployed (b) Partially employed (c) Full employed (d) Student (e) Self-Employed

18. Age range of respondent?
    A.18-25
    B. 26-45
    C. 46-65
    D. 66+

19. What is your household income per month after tax?
    A. less than N18,000 (minimum wage)
    B. N18,000-N40,000
    C. N41,000-N80,000
    D. N41,000-N100,000
    E. N100,000 and above

Thank you for your time!

Farmer Survey:

ROYAL AGRICULTURAL UNIVERSITY, CIRENCESTER, GLOUCESTERSHIRE-UK

Farmers Interview Questionnaire

To be completed by Interviewer		**To be completed by Team Leader:**
Please complete before the Interview		
0.1	*Interviewer Name:* **a.** |__|__|__|__|__|__|__|__|__|__|__| **b.** |__|__|__|__|__|__|__|__|__|__|__|	**0.4 – Date:** |__|__| / |__|__| / **2013** **Day Month** **0.5- Leader's Name:** |__|__|__|__|__|__|__|__|__|__|__|
0.2	**Date:** |__|__| / |__|__| / |__|__|__|__| *Day Month Year*	**Remarks:**
0.3	**Interview Location:**_____ **GPS Coordinates:**_____	

Please read / explain to the respondent the following consent information:

My name is (.....), I am part of an assessment team that is currently reviewing the **(Your research and field research areas).**.

We like to work with you and the community to enable us to gain a deeper understanding of the constraints and opportunities in relation to your family activities/household income.

Our discussion is expected to take about 45 minutes and I would also like to visit your plots to discuss how you farm and take some pictures if that is possible.

Any information that you provide will be confidential and will not be disclosed to other people. Your participation is voluntary and you can choose not to answer any or all of the questions if you wish; however, we hope you will participate since your views are important.

Do you have any questions?

Yes ☐ No ☐

If you are happy to proceed with this interview today, can you sign here:

Interviewee Signature: .....

Signature of Interviewer: .....

Date: .....

May I begin the interview now?

Signature of Team Leader:

To be completed by Data Entry

0.6 – Date: |__|__| / |__|__| / |__|__|__|__|
Day Month Year

0.7- |__|__|__|__|__|__|__|__|__|__|
Name of data entry operator

Remarks:

Signature of data entry:

Question No	Question	Response		
Q1	*Name of Respondent*			
Q2	*Are you the household Head?*	**Yes**		**Q3** *If not what is your relationship to the HH? (e.g., wife, son, brother)*

		No		
Q4	*Respondent Mobile Number*			
Q5a **Q5b**	*Name of Respondent Community* *Respondent – tribe/religion*	*Community……..* *Tribe ……Religion/Denomination ……..*		
Q6	*Respondent – Sex*	**Male**		**Female**
Q7a	*Respondent - Marital Status*	*Single [ ], Married [ ], Widow [ ], Widower [ ]*		
Q7b	*Respondent's number of spouses*	**Q7c.**	*Respondents Total Number of Children*	

Q8a	a) *Respondent Age (tick appropriate response)* b) *Family age/gender*	*Respondent age*	*Tick*	*Family age*	*No*	*Gender*	
						M	*F*
		Less than 20 Years		**Less than 5 yrs.**			
		20 – 40 Years		**5 - 25 years**			
		41 – 60 Years		**26 – 46 years**			
		61 years & above		**47 years & above**			
		Doesn't Know		**Doesn't know**			
Q8b	*Spouse Age*	**Less than 20 Years**					
		20 – 40 Years					
		41 – 60 Years					
		61 years & above					
		Doesn't Know					

Q9	a) *Respondent Highest Education Level* b) *Family Education*	**a) Respondent**	*Tick*	*b) No of family*	*Gender*	
					M	*F*
		Primary				
		Secondary				
		Tertiary				
		No Education				

Q10a	*Can you read and write?*	**Read**		**Q10b** *How many other members of HH can read/write?*	
		Write		**read (number)**	
				write (number)	

Q11		**1 meal**	**2 meals**	**3 meals**	**More**

	a) How many meals does your household normally consume in a day? b) How many meals each day contain protein (meat, fish, beans)				

Q12	**Household Assets** *Describe the build of your house* *a) What type of walls?* *b) What type of roof?* *c) How many rooms* *d) House water supply* *Take photo of house if possible*	*Mud brick [ ] Brick [ ] Wood [ ] other (state) .....* *Tiles [ ] Tin [ ] Wood/thatch [ ] other .....* *State room number .....* *In house [ ] Local standpipe [ ] Collect from well [ ]* *Collect from river/lake/stream [ ]* *Who collects? [ ]* *Distance.....*	
Q13	*Tick the assets that are owned by the household*	*Vehicle*	*Radio*
		Cart	*Mobile Phone*
		Bicycle	*Television*
		Plough	*Solar Panel*
		Irrigation equipment	*Other (state)*

Q14	**Main Livestock Assets**	**No**	**Yes**	**If yes – how many?**
	Do you own any cattle?			
	Do you own any sheep?			
	Do you own any goats?			
	Do you own any pigs?			
	Do you own any chickens?			
	Do you own any other livestock – list plus numbers			

Q15	**Please indicate at-least five important crops that you grow?**	*Crop*	*% Home Consumption*	*% to market*

Q16a	**Labour** *How many of the household work on the farm?*	*Full time (hours)*		*Part time (hours)*	
Q16b	*Do you have enough labour to facilitate crop and livestock production in your household*	*YES*		*NO*	
Q16.c	*If NO, why is labour a constraint (explain)*				
Q17a	*Do you buy in labour or rent out family members to other farms?*	*Labour bought in [ ] days per month; Cost per day [ ]* *Labour rented out [ ] days per month; Cost per day [ ]*			
Q17b	*Do any family members have secondary (non-farm) employment?*	*Yes [ ]* *No [ ]*	*If yes: who and what type of employment:*		

Q18a	**Land** *What is the size of your total production land? (Use appropriate measures community are familiar with).* *If uncertain then pace out when visiting plots*	*Less than 1 Ha*	
		≥1 Ha	
		≥2 Ha	
		≥3 Ha	
		Larger – state size	
		Is your land in 1 or several plots	*1 plot [ ] several [no …….]*
Q18b	*Do you have title deeds for the land?*	*YES [ ] NO [ ] Some with title deeds [ ]*	

Q19a	**Farming systems** *What system of farming do you practice?*	*You can tick more than 1….* *Mono-cropping [ ]* *Organic principles [ ]* *Mixed cropping [ ]* *Conservation agriculture [ ]* *Mixed farming [ ]* *Other (state) ……*

Q19b	*What components of the farming above do you mainly practice?*	*System ……..* *Why?.....* *.....*

Q20a	**Water** *Do you have a water source for your crop production activities and livestock?*	*YES*		*NO (Rain fed) [Go to Q30]*		
Q20b	*If yes what is your source of water?*	*River*		*Dam*		
		Stream		*Well*		
		Borehole		*Other*		
Q20c	*Does this source provide you with sufficient water for crop production throughout the year?*	*YES*		*NO*	*No. of months dry [ ]*	
Q20d	*Do you have irrigation equipment for your crop production activities?*	*Yes*		*NO (Go to Q 30)*		
Q20e	*Type of irrigation equipment*	*Shaduf*		*Sprinkler*		
		Drip		*Buckets*		
		Other (specify)				
Q20f	*What is your preferred irrigation method?*					
Q21a	**Other Crop Inputs** *a) Are the inputs required for crop production easily available to farmers in your community e.g., seeds, fertilisers, and pesticides?* *b) If no, what are the main reasons?*	*Seeds Yes [ ] No [ ]* *Fertilisers Yes [ ] No [ ] Type:* *Pesticides Yes [ ] No [ ]* *Reasons:*				
Q21b	*What is the main challenge that you face to access crop production inputs?*	*Finance*		*quality of inputs*		
		Distance from input markets		*Other (specify)*		

Q22	**Extension Support**	*YES*		*NO*	

	Do you receive extension advice from a trained extension officer regularly?				
Q23	*The extension officer that visits you – where are they from?* *(Take note of the extension officer's name: the organization of such officer would be preferable* *……..*	*Government*		*Private Company*	
		NGO		*Other (specify)*	
Q24	*How often do you receive visits by an extension officer for technical support linked to your vegetable production activities?*	*Weekly*		*Every 5 - 8 months*	
		Monthly		*Once every year*	
		Every 2 - 4 months		*Never/rarely visited*	
Q25	*Are you satisfied by the technical support that you receive from extension officers?*	*Very happy* [ ]	*Happy* [ ]	*Unhappy* [ ]	*Very Unhappy* [ ]
Q26	*If not happy, what are your main concerns?*				

Sample enterprise questions – vegetables.

V1	**Vegetables** **(if no vegetables go to Q)** *What is the size of your vegetable production plot?* *(Tick appropriate response)*	*Less than 10m²*					
		10m² 20m² (4m x 4m)					
		20m² to 50m² (up to 6m x 6m)					
		50m² to 100m² (up to 10m x 10m)					
		100m² to 400m² (up to 20m x 20m)					
		Larger – state size					
V2	*Do you grow vegetables for sale or home use at your farm?*	*All home uses (Go to QV4)*	*Some for sale [%]*		*All for sale*		
V3	*Are you involved in commercial vegetable production and marketing and for how long?*	*Less than 1 Year*			*3 – 4 Years*		
		1 – 2 Years			*4 – 5 Years*		
		2 – 3 Years			*More than 5 Years*		
V4	*Surplus vegetables,* *a) Do you store vegetables* *b) Do you take them to market*	*No [ ] Yes [ ] if yes, type of store ……..* *No [ ] Yes [ ] if yes, which market ……..* *No [ ] Yes [ ]*					

	c) Do you compost or feed to animals	if yes, Compost [ ] Animals [ ]			
V5	How far is this market from your production plot?	Less than 2 KMs		20 – 40kms	
		2 - 10 KMs		40 – 50kms	
		10 - 20 KMs		More than 50KMs	
V6	How long does it take you to get to this target market?	Less than 1 hour		3 – 4 hours	
		1 - 2 Hours		4 – 5 hours	
		2 – 3 Hours		More than 5 Hours	
V7	How do you get your produce to this target market?	Walk		Bicycle	
		Bus		Car	
		Other (specify)…….			
V8	How often do you supply vegetables to the market?	Daily		Only in the harvest season	
		Weekly		Occasionally	
		Every 2 weeks			
		Once a month			
V9	How long have you been supplying vegetables to the Market?	Less than 1 Year		3 – 4 Years	
		1 – 2 Years		More than 4 Years	
V10	How long does it take you to get your produce from your farm to the Green Market?	Less than 1 hour		3 – 4 hours	
		1 - 2 Hours		4 – 5 hours	
		2 – 3 Hours		More than 5 Hours	

Could do similar for other crop and livestock

Suggest we develop the following:

- **L1 – 10 Livestock to market**
- **C1 – 10 Field crops like maize and pulses to store, use or market**
- **T1 – 10 Tree crops for use or market**

Then we need questions for your particular research theme:

- **GAP's and climate smart practices**
- **ICT**
- **Others**

APPENDIX 4

Market Group Case Interview:

Royal Agricultural University, Stroud Rd, Cirencester GL7 6JS
Faculty of Agricultural Sciences

[redacted]

MARKET GROUP CASE INTERVIEW QUESTIONS

Purchasing

1. Purchasing protocols/sourcing

(1a) Where do you source your agricultural produce?
(1b) Who in the organisation makes the purchase decision?
(1c) Do you grow part or the whole agricultural-produce you sell? How much?
(1d) What quantity of your marketable produce comes from another state?
(1e) Do you have specific communities in Nigeria you source food from?
(1f) What can you say about the supply process, is it formal or informal?

Variables (n=6) sourcing; procurer; self-grown; state; communities; formal/informal.

Market support

2. Marketing activity

(2a) Do you get your supply directly from local farmers?
(2b) Do you operate with middle-men/agents?
(2c) Do you provide farmers directly with market information?
(2d) What logistic arrangements applies in your case?
(2e) Are there challenges experienced?
(2f) how much information is available to consumers about the agro-produce you sell?

3. Infrastructure

(3a) What is the frequency of produce supply to your stall?
(3b) What are their logistic challenges in the delivery of these agro-produce?
(3c) What challenges for storage are encountered on market day?
(3d) What can be said about the market environment in terms of hygiene?
(3e) Do you face electrical supply outage?
(3f) If yes, how has this affected your marketing operations?
(3g) What is your perception about the level of water supply in the market and how has this affected your marketing activity?
(3h) What measures can be taken to ensure that the market infrastructure functions better for you and your business?
(3i) What measures could be taken to improve consumer experience?

4.Market waste generation and management

(4a) Who is responsible for managing waste at the market?
(4b) How much waste is generated from your market stall?
(4c) What do you know about waste management and energy generation from food waste?
(4d) Are technologies present in the market aids the generation of energy from food waste?
(4e) How do you dispose of your market waste?
(4f) Does waste picking occur at the market?
(4g) If yes, how important is this activity as a local food source?

5. Mitigation

(5a) What do you feel is the biggest barrier to agricultural food-marketing of local produce?
(5b) How would you suggestion these barriers are overcome?
(5c) What feedback to you give on the quality of the product you receive, and to who?
(5d) How does the feedback system work in practice?

Variables (n=24) direct supply; middle men supply; market information supply; logistics arrangements; challenges; information to consumers; frequency of supply; logistics challenge; infrastructure challenge; storage; hygiene; electrical supply; effect of loss of electricity; water supply; options for improving infrastructure; improve consumer experience; waste management; waste volume; waste disposal; waste picking; importance; barriers to local food product; overcoming barriers to local food production; feedback link to farmers/middle men; nature of feedback system

Farmers Group Case Interview:

Royal Agricultural University, Stroud Rd, Cirencester GL7 6JS
Faculty of Agricultural Sciences

[redacted]

FARMERS GROUP CASE INTERVIEW QUESTIONS

Food production

1. **How many farmers operate in this community?**
   (1a) How many farmers operate in this community?
   (1b) Has the number of farmers increased or decreased in the last 10 years? By how many farmers?
   (1c) What crops do you grow?
   (1d) How has this changed over time?
   (1e) What livestock do you keep?
   (1f) How has this changed over time?
   (1e) How big is your mode of operation?
   (1f) How has this changed over time? [also check degree of autonomy/cooperation]

   Variables (n=8) number of farmers in community; how number of farmers has changed over time; crops grown; how crop mix has changed over time; livestock held; how livestock mix has changed over time; size of operation; how size of operation has changed over time

2. **Input supply**

(2a) Where do you source your farm inputs (seedlings, fertilizers etc.)?
(2b) How has this changed over time?
(2c) Where do you source your labour (family members and/or hired labour)?
(2d) How has this changed over time.
(2e) Do you have sufficient labour for your needs?
(2f) Does migration of labour affect your production?
(2g) If so, how?
(2h) is migration associated with hired labour, family labour, or both?

Variables (n=8) source of farm inputs; change of sourcing over time; source of labour; change in sourcing of labour; sufficiency of labour; migration a factor; impact of migration; who is migrating

3. **Post-harvest loss**

(3a) How do you store your produce?
(3b) how long do you store your produce for before you supply the market?
(3c) is there wastes generated during harvesting of produce?
(3d) If so what proportion of the harvest is wasted? [by crop type if appropriate]
(3e) What waste is generated from local processing of produce that does not then make it to the market?
(3f) What happens to these waste materials?

Variables (n=6) how produce is stored; how long is produce stored; harvest waste; quantity of harvest waste; processing waste; destination of waste

Market support

4. **Marketing Activity**

(4a) Which markets do you supply?
(4b) Why have you chosen these marketing channels?
(4c) What logistics arrangement is used to get agricultural produce to urban markets?
(4d) As a result of your supply activity, do you engage the effort of middle-men?
(4e) Do you feel comfortable with the nature of business the middle-men offer?
(4f) What information do you get back from middle-men that can help you to improve your ability to supply markets in the future?

Variables (n=6) market channel characteristics; reason for choice; logistics arrangements; use of middle-men; perceptions of middle-men; information feedback loop

5. **Infrastructure**

(5a) What infrastructural challenges do you face during agricultural food production?
(5b) What infrastructural challenges do you face during crop storage?
(5c) What are the infrastructural challenges do you experience in the distribution of agro-produce (e.g., road, vehicle capacity etc.)

Variables (n=3) production challenge; storage challenge; distribution challenge

Degree of co-creation of extension service and barriers and enablers for success

6. **Extension Services**

(6a) Do you use extensions services?
(6b) If yes do you feel that you benefit from the services of extension workers?
(6c) What services do they provide?
(6d) Does this extension activity enhance your agricultural productivity?
(6e) Does this extension activity reduce waste?
(6f) How frequently do you get visited by extension officers?
(6g) How can the extension service be improved?
Variables (n=7) use of service; perceptions of benefit; nature of service; impact on productivity; impact on waste; frequency of visit; factors that can improve

7. **Mitigation**

(7a) What do you feel is the biggest barrier to increasing food production?
(7b) How would you suggest farmers and others can overcome such barriers?
(7c) What feedback to you have on the quality of your product from urban markets?
(7d) What feedback do you have on your product quality from other marketing channels your produce is supplied to?
(7e) how does the feedback system work in practice?

Variables (n=5) barriers to increasing food production, options for overcoming; feedback link urban markets; feedback link other marketing channels; nature of feedback system

APPENDIX 5

Supermarket Interview:

Royal Agricultural University, Stroud Rd, Cirencester GL7 6JS
Faculty of Agricultural Sciences

[redacted]

SUPERMARKET INTERVIEW QUESTIONS

Purchasing

1. Purchasing protocols/sourcing

(1a) Where do you source your agricultural produce?

(1b) Who in the organisation makes the purchase decision?

(1c) Do you have specific protocols around purchasing agricultural-produce from Nigeria?

(1d) What quantity of your marketable produce comes from this State?

(1e) Do you have specific communities (States) in Nigeria you source food from?

(1f) If the business does not have "localised" purchasing protocols, why is this the case?

Variables (n=6) sourcing; procurer; agro-produce purchase protocol yes/no; state; communities supply; local/non-local position.

Market support

2. Marketing activity

(2a) Do you get your supply directly from local farmers?

(2b) Do you operate with middle-men/agents?

(2c) Do you provide farmers directly with market information?

(2d) What logistic arrangements applies in your case?

(2e) Are there challenges experienced?

(2f) how much information is available to consumers about the agricultural produce sold in your super-market?

3. Infrastructure

(3a) What is the frequency of produce supply to the store?
(3b) What are their logistic challenges in the delivery of these agricultural produce?
(3c) What other infrastructural challenges do you experience (e.g., electricity, water supply etc)?
(3d) What are the challenges that cause food waste in store?
(3e) How do you dispose of your food waste?
(3f) Does waste picking occur with the waste from your store?
(3g) If yes, how important is this activity as a local food source?

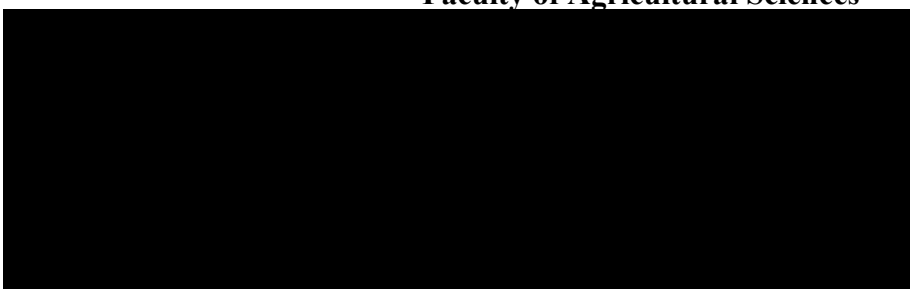
4. Mitigation

(4a) What do you feel is the biggest barrier to agricultural produce-marketing of local produce?
(4b) How would you suggestion these barriers are overcome?
(4c) What feedback to you give on the quality of the product you receive, and to who?
(4d) How does the feedback system work in practice?

Variables (n=17) direct supply; middle-men supply; market information supply; logistics arrangements; challenges; information to consumers; frequency of supply; logistics challenge; infrastructure challenge; food waste; waste disposal; waste picking; importance barriers to local food product, options for overcoming; feedback link to farmers/middle-men; nature of feedback system

Extension Interview (Fed. Govt. & ADP Officer)

Royal Agricultural University, Stroud Rd, Cirencester GL7 6JS
Faculty of Agricultural Sciences



INTERVIEW QUESTIONS FOR EXTENSION OFFICERS

1. Characterisation of extension service

(1a) What type of extension services do you offer to rural communities?

(1b) What type of extension services do you offer to individual farmers?

(1c) How do you select the farming communities that you work with?

(1d) How do you select individual farmers within a community that you work with?

(1e) Besides support for farming activities are there any other elements of livelihood support that you provide for communities?

(1f) Besides support for farming activities are there any other elements of livelihood support that you provide to farmers?

2. Food production

(2a) Do you provide farmers with support on farm inputs specifically?

(2b) If yes, what kind of inputs do you provide to farmers and how is it delivered?

(2c) How do you help farmers deal with postharvest loss?

(2d) Do you provide farmers with market linkage to enable them cut down on postharvest loss?

Variables (eight) assessed in 1+2 - extension service by community; extension service by farmer; selection criteria for communities; selection criteria for individual farmers; additional support mechanisms for communities; additional support mechanisms for farmers; input support for farmers (type); input support delivery mechanism.

3. Market Support

(3a) Do you provide farmers with market information?

(3b) If yes what kind of market information do you supply?

(3c) Do assist farmers with logistics support in getting produce from point of production the point of sale?

(3d) If yes, what kind of logistics support?

Variables assessed (n=4) provision of market information; characteristics of market information; provision of logistics support; characteristics of logistics support

4. Degree of co-creation of extension service and barriers and enablers for success

(4a) Are farmers involved in the decision-making process of providing a suitable extension service for them?

(4b) If yes explain how this happens.

(4c) What do you see as the barriers to providing effective extension services?

(4d) How can extension services be improved?

(4e) How can uptake of extension services be improved?

Variables assessed (n=5) degree of co-creation of extension services; characterisation of extension services; barriers to provision of extension services; factors that could improve extension services; factors that could improve uptake of extension services