

**ANALYSIS OF FARM HOUSEHOLD AND COMMUNITY FOOD SECURITY
IN KADUNA STATE, NIGERIA**

BY

**Oluwaseun Adebayo OJELEYE
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JULY, 2015.

DECLARATION

I do hereby declare that this dissertation titled “**Analysis of Farm Household and Community Food Security in Kaduna State, Nigeria**” is the result of my own research work except where reference is made to published literatures which have been duly acknowledged. No part of this work has been presented in any previous application for another degree or diploma at any institution whatsoever. All borrowed ideas have been duly acknowledged.

.....
Ojeleye, Oluwaseun Adebayo

Date.....

CERTIFICATION

This dissertation titled “**ANALYSIS OF FARM HOUSEHOLD AND COMMUNITY FOOD SECURITY IN KADUNA STATE, NIGERIA**”, by **OJELEYE** Oluwaseun Adebayo meets the regulation governing the degree of the Doctor of Philosophy (Agricultural Economics) of the Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge and literary presentation.

.....

Prof. Zakari Abdul-Salam

Chairman, Supervisory Committee.

Date.....

.....

Prof. R.A. Omolehin

Member, Supervisory Committee.

Date.....

.....

Prof. T.K. Atala

Member, Supervisory Committee.

Date.....

.....

Prof. Zakari Abdul-Salam

Head of Department of Agricultural
Economics and Rural Sociology.

Date.....

.....

Prof. Z.A. Hassan

Dean, School of Postgraduate Studies

Date.....

Ahmadu Bello University, Zaria.

DEDICATION

This piece of work is dedicated to my father and father-in-law;

Revd. J.O. **Ojeleye** and Late Prof. J.J. **Bonire**.

I appreciate your intellectualism so very much.

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ABSTRACT

This study was conducted to analyze farm households and community food security in Kaduna state, Nigeria, by purposefully choosing two of the four agro ecological zones of the state's ADP; and the random choice of four LGAs and eight communities. The analytical tools used include descriptive statistics, Food Security Index (FSI), multiple regression (Tobit), Community Food Security Assessment Toolkit and Coping Strategy Index. Data were collected using structured questionnaire administered to 244 farmers and the use of focus groups. The result of the analysis revealed that about 80% of the respondents were in the age range of 21-50 years and 87% had farming experiences more than 10 years. In addition, about 66% of the farm households had farm income less than ₦200,000 with an average ₦180,914.50k per annum, while for non-farm income sources, only 69% of the respondents acquired income outside of farming activities at a yearly average of ₦130,407.10k. Average farm holdings was 2.05ha as 75% of the farmers acquired farmlands through inheritance. The expenditure pattern of households revealed that food expenditure accounts for 52% of total household expenditure, with a yearly average found to be ₦113,351.10k. The chunk (72%) of food expenses were on starchy food items, while for non-food expenditure, per capita household medical expenses, came highest at an average of ₦21,093.03k, accounting for 21% of total non-food expenditure annually. Most farmers sourced their food from both own production and market buying. Only 41% of the respondents had experienced food shortages in the last five years occurring mostly between July and August. Amongst others, the cause of food shortage was noted to be the inadequacy of money to procure food during lean seasons. Furthermore, the FSI of households obtained showed that 66% of respondents were able to meet the daily calorie intake of 2260 kcal per capita. The average FSI for food secured and insecure households were 1.45 and 0.85 respectively. The determinants of food security status as obtained from Tobit regression were food security status perception, adjusted household size, per capita annual expenditure on health of family members (at 1%), dependency ratio (at 5%), access and usage of consumer credit and total crop production in grain equivalent (at 10%). The assessment of community food security shows the profiling of each community's socio-economic and demographic characteristics, profile of community food resources, assessment of household food security, assessment of food availability and affordability and assessment of community food production. The result of food coping strategy analyses shows that the highly employed coping strategies during food crisis amongst others, included buying from market (90%), eating less preferred food (79%), borrowing money/food from friends/relations (72%) and sale of livestock (62%). The coping strategy index also shows that about 41% of those that employed various coping strategies had severe food crisis. Significant relationships were noted between food insecurity level of severity, level of commitment to commercial motorcycling and benevolent non-farm income (gifts). Based on the results of the survey, recommendations were given to the farmers and the government accordingly.

CHAPTER ONE

Introduction

1.1 Introduction

Reducing food insecurity continues to be a major public policy challenge in developing countries. Almost 1 billion people worldwide are undernourished, many more suffer from micronutrient deficiencies, and the absolute numbers tend to increase further, especially in Sub-Saharan Africa (FAO, 2008). Recent food price hikes have contributed to greater public awareness of hunger related problems, also resulting in new international commitments to invest in developing countries agriculture (Fan and Rosegrant, 2008). Global Hunger Index (GHI) ranking of Nigeria as 40th among 79 food deficient countries in 2011, 40th again in 2012, 39th in 2013 and 38th in 2014 remains unacceptably high and has indicated that no remarkable progress has been made from all efforts geared towards hunger reduction (GHI, 2011, 2012, 2013 and 2014). The GHI Report (2012) further posit that rising food prices, malnutrition and deaths as a result of wide-spread poverty is an indication of the prevalence of food insecurity in the country. It is also a sign of extreme suffering for millions of poor people.

Agriculture is however one of the most important sectors of the Nigerian economy, it contributes more than 40% of the total annual GDP in 2010 (NBS, 2012). The sector employs about 70% of the labour force and accounts for over 70% of the non-oil exports and, perhaps most importantly, provide over 80% of the food needs of the country (Adegboye, 2004 and NBS, 2012). Agriculture provided adequate food for the Nigerian populace both in quantity and quality during the era before independence in 1960. Helleiner (1996), showed that in Nigeria, between 1950 and 1960, food production was at subsistence but self-sufficient level. The economy was experiencing rapid growth of

4.5% between 1958 and 1963, the driving force being a booming trade in agricultural commodities export, growing annually at 5.5%. The first decade of Nigerian independence (1960-1970) opened the way to food shortages as a result of declining agricultural production and increasing population growth rate. The increase in population at a rate considerably higher than the rate of increase in food production has continued to widen the gap between domestic food supply and domestic demand. This disparity has led to rising food prices (85-125% increases in many Nigerian cities) and declining foreign exchange earnings from agricultural exports. The interaction of these factors has led to food insecurity and the idea of self-sufficiency is becoming more and more difficult to achieve due to declining agricultural production and inefficient food marketing system (Helleiner, 1996).

In order to ensure self-sufficiency and food security in Nigeria, a number of agricultural development institutions and reforms were embarked upon by the federal government since 1970. These programmes include: National Accelerated Food Production Programme, NAFPP (1973); Agricultural Development Project, ADP (1975); Operation Feed the Nation, OFN (1976); River Basin Development Authorities, RBDA (1977); National Seed Service, NSS (1977); Agricultural Credit Guarantee Scheme, ACGS (1977); Rural Banking Scheme, RBS (1977); Green Revolution, GR (1979); Directorate of Food, Road and Rural Infrastructure, DFRRI (1986); National Agricultural Land Development Authority, NALDA (1992); National Fadama Development Projects, NFDP (1992); Nigerian Agricultural Cooperatives and Rural Development Bank, NACRDB (2000); National Agricultural Development Fund, NADF (2002); Commodity Marketing and Development Companies, CMDC (2003), Root and Tubers Expansion Programme, RTEP (2002), and the Food Security Thematic Group, FSTG (2009).

According to Ihimodu (2004), empirical records of many of these programmes and projects are not impressive enough to bring about the expected transformation of the sector. The food self-sufficiency ratio has fallen from 98% in early 1960s to less than 54% in 1986. In 1990, 18% of the population (14.4 million) was estimated to be critically food insecure and this increased to 36% (32.7 million) in 1992 and further increased to 40.7% in 1996. As at 2004, over 40% of Nigeria's estimated population of 133 million people was food insecure (Idachaba, 2004). In 2014, the FAO's estimate of Nigerians living under the poverty line of less than \$1.25 a day was put at 68% (estimation for 2005-2012) while Ajayeoba (2010), put the figure for food insecure Nigerians at 53 million of the estimated 150 million population.

Given the above figures, it is obvious, that the continuous efforts of the government will not arrest the food insecurity situation and hence resort to complement its internal effort with importation of food. Table 1.1 shows the Nigeria's food imports indicators from 1981-2013. The idea of importing food to meet the food shortage was later dropped because food import bill grew substantially and was taking a larger share of the Gross Domestic Product. For example as indicated in Table 1.1, in 1989, Nigeria's food import bill was about N2.3billion (about 0.6% of the total GDP) while it stood at about N254.6 billion in 2003 (about 2.57% of the total GDP). It peaked very recently in 2011 when food importation was 8.01% of total GDP, but in 2012, it was as high as ₦1.4447 trillion which accounted for about 3.56% of the total GDP. The food problem was not peculiar to Nigeria. It attracted a global attention as more than 2 billion people throughout the developing countries and some other 40 millions in developed world do not have enough food to meet their basic needs and millions more experience hunger, malnutrition, growth retardation and sometime death due to starvation (FAO, 2010).

Table 1.1 Nigeria's Food Imports Indicators from 1981-2013 (Figures in billion naira)

Year	GDP at current Market Price	Food Import	Total Import	Food Import as % of Total Import	Food Import as % of Total GDP
1981	94.3	1.90	12.8	14.84	2.01
1982	101	1.80	10.8	16.67	1.78
1983	110.1	1.90	8.9	21.35	1.73
1984	116.3	1.50	7.2	20.83	1.29
1985	134.6	1.30	7.1	18.31	0.97
1986	134.6	0.90	6.0	15.00	0.67
1987	193.1	2.00	17.9	11.17	1.04
1988	263.3	2.10	21.4	9.81	0.80
1989	382.3	2.30	30.9	7.44	0.60
1990	328.6	3.90	45.7	8.53	1.19
1991	545.7	3.60	89.5	4.02	0.66
1992	875.3	15.00	143.2	10.47	1.71
1993	1,089.70	15.80	165.6	9.54	1.45
1994	1,399.70	15.60	162.8	9.58	1.11
1995	2,907.40	99.60	755.1	13.19	3.43
1996	4,032.30	85.00	562.6	15.11	2.11
1997	4,189.20	117.50	845.7	13.89	2.80
1998	3,989.50	116.40	837.4	13.90	2.92
1999	4,679.20	119.90	862.5	13.90	2.56
2000	6,713.60	134.70	985	13.68	2.01
2001	6,895.20	190.10	1,358.20	14.00	2.76
2002	7,795.80	179.30	1,512.70	11.85	2.30
2003	9,913.50	254.60	2,080.20	12.24	2.57
2004	11,411.10	239.80	1,987.00	12.07	2.10
2005	14,610.90	291.30	2,800.90	10.40	1.99
2006	18,564.60	323.30	3,108.50	10.40	1.74
2007	20,657.30	406.80	3,912.00	10.40	1.97
2008	24,296.30	493.00	5,189.80	9.50	2.03
2009	24,794.20	498.40	5,102.50	9.77	2.01
2010	33,984.80	759.20	7,614.70	9.97	2.23
2011	37,409.90	2,998.00	10,229.40	29.31	8.01
2012	40,544.10	1,444.70	9,426.10	15.33	3.56
2013	42,396.80	1,755.60*	8,808.10*	19.93*	4.14*

Source: CBN Statistical Bulletin, 2014.

*Provisional figure.

Food security exists when "all people at all times have access to safe nutritious food to maintain a healthy and active life" (FAO, 1996). Food security entails ensuring

sustainable access, availability and affordability of adequate quantity and quality food to all citizens to meet up with their physiological requirements (Okuneye, 2014). The main goal of food security is for individuals to be able to obtain adequate food needed at all times, and to be able to utilise the food to meet the body's needs. Food security is multifaceted. The World Bank (2001), identified three pillars underpinning food security; these are food availability, food accessibility, and food utilization. This infers from the concept that food security is not just a production issue.

Food availability for the farm household means ensuring sufficient food is available for them through own production. However, due to lack of adequate storage facilities and pressing needs, they mostly end up selling excess produce during the harvesting period, and sometimes rely on market purchases during the hungry season.

Food access means reducing poverty. Simply making food available is not enough; one must also be able to purchase it, especially the low-income households (Sen, 1981). Pervasive poverty among the rural population in Nigeria is an indication of low agricultural productivity and relatively low incomes (Abdullahi, 1999). D'Silva and Bysouth (1992), defined absolute poverty as lack of access to resources required for obtaining the minimum necessities essential for the maintenance of physical efficiency. This connotes that the poor farmers will have little access to food, either produced or purchased. Farm families with limited access to productive resources such as land, inputs and capital, required for attaining physical efficiency in food production could be food insecure i.e. resource poverty could lead to low productivity, food insufficiency, and lack of income to purchase the needed calories.

Food utilization means ensuring a good nutritional outcome, which is nutrition security. Having sufficient food will not ensure a good nutritional outcome if poor health results in

frequent sickness. Building this pillar means investing in complementary resources such as nutrition education, health care, provision of safe water and better sanitation, instituting gender symmetry, and removal of child abuse practices (Doppler, 2002).

Food security for a household in the overall would therefore mean access by all members at all times to enough food for an active healthy life. Food security includes at a minimum the ready availability of nutritionally adequate and safe foods; and an assured ability to acquire acceptable foods in socially acceptable ways in the community (that is, without resorting to emergency food supplies, scavenging, stealing or other coping strategies). Aside from food production, which a large proportion of the Nigerian populace is involved in, accessibility is very important to attain food security level. Food security at national level does not therefore guarantee that all people, especially the poor, will have access to the minimum nutrition requirement because of existing regional, economic and social inequalities (Alderman *et al.*, 1993).

Community food security exists when all community residents obtain a safe, personally acceptable, nutritious diet through a sustainable food system that maximizes healthy choices, community self-reliance and equal access for everyone (MHSABC, 2004). This research intends to evaluate food security status among farm household and communities in Kaduna state vis-à-vis the global interest to eradicate extreme poverty and hunger as reflected in the Millennium Development Goal.

1.2 Problem Statement

Worldwide, about 852 million men, women and children are chronically hungry due to extreme poverty; while up to 2 billion people lack food security intermittently due to varying degree of poverty (FAO, 2003). FAO report in 2010 put growing extreme

poverty figure at almost 2 billion people worldwide, while in Nigeria, more than two-thirds of the people are poor, despite living in a country with vast potential wealth (Omotesho *et al.*, 2010).

Food insecurity is a major risk for Africa. Of the 86 low-income and food deficient declared countries the world over, 43 are in Africa where the majority of the world's 6.7 billion people live under the poverty line. In sub-Saharan Africa, although agriculture accounted for 70 % of the labor force and over 25 % of GDP, the continent has continued to register low priority for investment in agriculture (Eluhaiwe, 2008).

The situation has resulted in a new global trend in the demand for food. Thus, there is therefore an urgent need to transform agriculture in Nigeria, to take advantage of these trends in food demand. For Nigeria to effectively increase its share in Africa's agricultural space and harness the market opportunities, the need to re-focus the country's agricultural financing policy to develop its agricultural food baskets and its commodity value-chains to meet the food market product demands, has become imperative.

Nigeria is still however, characterized by high reliance on food imports. Malnutrition is widespread in the entire country and rural areas and communities are especially vulnerable to chronic food shortages, malnutrition, unbalanced nutrition, erratic food supply, poor quality foods, high food costs, and even total lack of food. This phenomenon cuts across all age groups and categories of individuals in the rural areas. For example, there is a high level of malnutrition among children in rural Nigeria; the figures differ with geopolitical zones, with 56% reported in a rural area of South West and 84.3% in three rural communities in the northern part of Nigeria. Nationally, the

overall prevalence of stunting, wasting, and underweight are 42.0%, 9% and 25%, respectively (Akinyele, 2009).

A number of studies have been done to assess the determinants of food security vis-à-vis the socio-economics characteristics, mostly in the south western states in Nigeria (Adio, (2000), Adegboye, (2004), Agboola, (2004) Babatunde *et al.*, (2007) and Oyewole, (2012) but none from the community food security stand point. But then, there may be food insecurity for some rural populations because they do not produce sufficient food and/or do not have sufficient purchasing power to cover their food needs borne out of community food production resources and indices. The issues of adequate farm resources and supply could also come to play in determining food security status in communities. Rural poverty is a very important issue in Nigeria, that needs redress as over 90 of agricultural production is from the rural farming households with little access to productive resources (resource poverty) (Obamiro *et al.*, 2003). Many factors which may vary from region to region are known to be determinants of food insecurity. This study, therefore, sought to identify and address the following questions:

1. What are the socio-economic characteristics of the rural farm households and communities in the study area?
2. What are the expenditure and consumption patterns of farm households in the study area?
3. What is the nature of food system of farm households in the study area?
4. What are the food security indices of farm households in the study area?
5. What are the main determinants of food insecurity status among the farmers?
6. What are the community food resource indices in the study area?
7. What are the coping strategies adopted by farm households to minimize food insecurity during lean season?

1.3 Objectives of the Study

The broad objective of this study was to evaluate the food security status of farm households and communities in Kaduna State. The specific objectives were to:

- i. describe the socio-economic characteristics of the rural farm households and communities in the study area;
- ii. determine expenditure and consumption patterns of farm households in the study area;
- iii. assess the nature of food system of farm households in the study area
- iv. determine the food security indices of farm households in the study area;
- v. identify the major determinants of food security status among the farmers;
- vi. identify and assess the community food resources and community food security indices in the study area; and
- vii. describe the coping strategies adopted by farm households to minimize food insecurity during lean seasons;

1.4 Justification of the Study

Food security is national security, and any household head that is unable to feed his household is not deemed responsible. By extension, any nation unable to feed its populace cannot be said to be a responsible one. Beside, recent estimates has put the number of hungry people in Nigeria as over 53 million, which is about 30% of the country's total population of roughly 150 million; and of this figure, 52% live under the poverty line (Ajayeoba, 2010). These are matters of grave concern largely because Nigeria was self-sufficient in food production and was indeed a net exporter of food to other regions of the continent in the 1950s and 1960s. Things changed dramatically for

the worse following the global economic crisis that hit developing countries beginning from the late 1970's onward. The discovery of crude oil and rising revenue from the country's petroleum sector encouraged official neglect of the agricultural sector and turned Nigeria into a net importer of food. By 2009 for example the federal ministry of agriculture estimated that Nigeria was spending over \$3billion annually on food imports (Ajayeoba, 2010).

The loss of food sovereignty and the dependence on food importation is also making the country quite susceptible to fluctuations in global food crisis. This is why Nigeria was also strongly affected by the global food crisis in 2007/2008. The global food price crisis in 2007-08 had negative implications for food security in Nigeria. Prices of almost all food commodities were higher in 2008 as compared to 2007. Between May 2007 and May 2008, prices of major Nigerian staples such as rice increased by 107% and garri by about 60%. The rise in price has driven the general inflation so high that it rose from 5.4% in late 2007 to 9.7% in mid-2008. Thus, purchasing power and level of nutrition of the people has been drastically reduced (NISER, 2008).

The connections among dwindling food production capacity, rising food prices, and dependency on food importation and consequently food insecurity are nowhere more clearly demonstrated in recent times than in the Sahel food crisis, which also affected many of the 11 northern states of Nigeria situated in the Savannah belt: The National Emergencies Management Agency [NEMA] says roughly 30% of the population (about 15 million people) in this region are food insecure.

Reliable information on household food security is a pre-requisite for accurate and effective design, monitoring and development of development projects (Charletto, 2001). Hence many development agencies considered household food security a guiding

principle for designing interventions in rural areas. Measurement of food security at the farm family level will provide the basis for monitoring future progress and assessing the impacts of various projects, programmes and policies on the beneficiaries' food security status (Hoddinot, 2001). Also, the community based assessment measure, a relatively new concept of food security survey method, will ensure that underlying social, economic, and institutional factors within a community that affect the quantity and quality of available food and its affordability or price relative to the sufficiency of financial resources are evaluated and made fit for intervention projects.

This study hopes to contribute to the on-going debate in development literatures on the relationship between household food security status and community food resources with regards to helping policy makers in designing policies and programs implemented to improve community food security billed to address diverse range of issues, including participation in and access to Federal food/agricultural assistance programmes, economic opportunity and job security, community development and social cohesion, ecologically sustainable agricultural production, farmland preservation, economic viability of rural communities, direct food marketing, and diet related health problems.

1.5 Scope and Limitation of the Study

This research study was conducted in two of the four zones of the Agricultural Development Project (ADP) zoning of Kaduna state, particularly in four (4) LGAs of the twenty three (23) LGAs in Kaduna state, for budgetary limitations. Moreover, farm households sampled randomly were limited to eight (8) communities. The farm household heads were the respondents who gave households production, consumption and expenditure data used for analysis in this study. The data obtained were mostly from

memory as farmers are not in the habit of keeping farm records. From experience, data from memory recall are not absolute. The study is as well limited to the year 2014 survey period.

Also, the cultural disaggregation of women and children in the farm family by way of disproportionate access to more 'prize' food items like meat, egg, etcetera, was observed. The men in the family are served first and access more nutritional food items than women and children.

In one of the communities, our focus group discussions, when taking the community food resource indices, had to use three (3) women instead of the adopted number, six (6). It was the purdah cultural system that brought about the less number, as access to women in the community was denied. The participants we later got were brought about at generous compromise of the village head.

CHAPTER TWO

Literature Review

2.1 The Concept of Food Security

Food security is a ‘flexible concept’ as reflected in the many attempts at definition in research and policy usage. Even as early as the 1980s, there had been around 200 definitions in published writings, according to Maxwell and Smith (1992). That is impressive, given the short history of food security as a concept, but it makes coherent discussion more difficult. Whenever the concept is introduced in the title of a study or its objectives, it is necessary to look closely to establish the explicit or implied definition (Maxwell, 1996). The concept is a changing concept.

The continuing evolution of food security as an operational concept in public policy has reflected the wider recognition of the complexities of the technical and policy issues involved. The most recent careful redefinition of food security is that negotiated in the process of international consultation leading to the World Food Summit (WFS) in November 1996. The contrasting definitions of food security adopted in 1974 and 1996, along with those in official FAO and World Bank documents of the mid-1980s, are set out below with each substantive change in definition emphasized. A comparison of these definitions highlights the considerable reconstruction of official thinking on food security that has occurred over 35 years. These statements also provide signposts to the policy analyses, which have re-shaped our understanding of food security as a problem of international and national responsibility.

Food security was defined in the *Proceedings of the 1974 World Food Summit* as: ‘availability at all times of adequate world food supplies of basic foodstuffs to sustain a

steady expansion of food consumption . . . and to offset fluctuations in production and prices' (UN, 1975).

In 1983 FAO expanded its concept to include a third prong: 'Ensuring that all people at all times have both physical and economic access to the basic food that they need' (FAO, 1983).

In an influential World Bank (1986) report, *Poverty and Hunger*, this concept of food security is further elaborated in terms of: 'access of all people at all times to enough food for an active, healthy life.'

The 1996 World Food Summit in its *Plan of Action* adopted a still more complex definition: 'Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life' (FAO, 1996a).

This definition is again refined in *The State of Food Insecurity 2001*: 'Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life' (FAO, 2002).

2.1.1 The origin of food security

Food security as a concept originated only in the mid-1970s, in the discussions of international food problems at a time of global food crisis. The initial focus of attention was primarily on food supply problems - of assuring the *availability* and to some degree the *price stability* of basic foodstuffs at the international and national level. That supply-

side, international and institutional set of concerns reflected the changing organization of the global food economy that had precipitated the crisis. A process of international negotiation followed, leading to the World Food Conference of 1974, and a new set of institutional arrangements covering information, resources for promoting food security and forums for dialogue on policy issues (ODI, 1997).

The issues of famine, hunger and food crisis were also being extensively examined, following the events of the mid-1970s. The outcome was a redefinition of food security, which recognized that the behaviour of potentially vulnerable and affected people was a critical aspect. A third, perhaps crucially important, factor in modifying views of food security was the evidence that the technical successes of the Green Revolution in Asia did not automatically and rapidly lead to dramatic reductions in poverty and levels of malnutrition. Poverty and problems of related endemic hunger were recognized as a problem of lack of effective demand.

This new emphasis on consumption, the demand side and the issues of access by vulnerable people to food, was most closely identified with the seminal study by Sen (1981), who eschewed the use of the concept of food security and focused on the *entitlements* of individuals and households. In 1983, FAO expanded its concept to include a third aspect - securing *access* by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security equation.

The highly influential World Bank 1986 report *Poverty and Hunger* focused on the temporal dynamics of food insecurity. It introduced the widely accepted distinction between *chronic* food insecurity, associated with problems of continuing or structural

poverty and low incomes, and *transitory* food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict.

By the mid-1990s food security was recognized as an issue, from the individual to the global level. However, access now involved sufficient food, indicating continuing concern with protein-energy malnutrition. But the definition had been broadened to incorporate food safety and also nutritional balance, reflecting concerns about food composition and minor nutrient requirements for an active and healthy life. Food preferences, socially or culturally determined, were now a consideration. The potentially high degree of context specificity implies that the concept had both lost its simplicity and was not itself a goal, but an intermediating set of actions that contribute to an active and healthy life (Clay, 2002).

A broader perspective was adopted in the UNDP 1994 *Human Development Report*, which promoted the construct of human security, including a number of component aspects, of which food security was only one. The concept of human security is closely related to the human rights perspective to development that has, in turn, influenced discussions about food security (Dreze and Sen, 1989).

The international community has accepted these increasingly broad statements of common goals and implied responsibilities. But its practical response has been to focus on narrower, simpler objectives around which to organize international and national public action. The declared primary objective in international development policy discourse is increasingly the reduction and elimination of poverty. The 1996 WFS exemplified this direction of policy by making the primary objective of international action on food security the target for halving by 2015 the global numbers of hungry or undernourished people.

In Nigeria, the studies and literatures on food security have adopted a concept with the threshold for food security as the ability of the household to meet 2470 kcal of energy and 65g of protein per capita as benchmark (Olayide, 1982). On the other hand, the concept of insecurity is: a state of insecurity exists when members of a household have an inadequate diet for part or all of the year or face the possibility of an inadequate diet in the future (Agboola, 2004). In this concept, food insecurity is defined in terms of the household and relates to both the current and future adequacy of the household diet. Following Truman and Dophine (1990), the concept of food insecurity can be expressed mathematically as:

$$FS = CS + F(R, I, HT)$$

Where,

FS = Future State of Household Food Insecurity

CS = Current State of Household food Insecurity

I = Food insecurity insurance

R = Food Security Risks

HT = Household Type

This equation expresses the determination of the future state of food insecurity as an assessment of the current state of food insecurity and the likelihood of deviation from this state. This deviation is a function of food insecurity risks, food insecurity insurances and household types.

Current State of Household Food Insecurity (CS) refers to the adequacy of the household's present food consumption. The assessment is based on both the quality and

quantity of the household's diet and should indicate if the household is in a state of food security or a state of insecurity. States of food security may be defined in terms of types of food security (e.g. temporary, cyclical, chronic) levels of food insecurity (for example intake as a percentage of an acceptable standard) or a combination of both (Truman and Daphine, 1990).

Food Insecurity Risk (R) refers to event that increase food insecurity and lessen household food consumption. This can be measured in terms of damage caused by these events and by the likelihood that these events will occur. Examples of such risks include food shortages prior to harvest, temporary marketing problems, wastages due to inadequate storage facilities, seasonal or unforeseen unemployment, exceptional increases in prices, civil strife, chronic poverty etc. (Truman and Daphine, 1990).

Food Insecurity Insurance (I) refers to actions which decrease the likelihood that risky events happen, or their resulting damage. These may be actions taken by households, communities or nations. Examples are increasing employment opportunities, land reform, and use of improved agricultural production techniques, local charity, supplementary feeding programmes, and emergency food aid. These are usually provided through government policy interventions and programmes.

Household Type (HT) reflects the means and methods by which household acquired food for consumption. Household type can be market-food-oriented and non-market-food-oriented. Market-food-oriented household are those that acquire the bulk of their food through the exchange of resources such as cash, services or goods. A non-market-oriented household acquires the bulk of its food supplies through home food production. Household type can also be defined by sources of income, percentage of market dependence, resource based, location such as rural or urban etc.

2.1.2 Community food security concept

Community Food Security (CFS) is a relatively new concept with no universally accepted definition. For some purposes, community food security can be viewed as an expansion of the concept of household food security. Whereas household food security is concerned with the ability to acquire food at the household level, community food security concerns the underlying social, economic, and institutional factors within a community that affect the quantity and quality of available food and its affordability or price relative to the sufficiency of financial resources available to acquire it (Cohen, 2002 and Kantor, 2001).

The Economic Research Service (Cohen, 2002), further classify that communities may be considered to be food insecure if:

- a. There are inadequate resources from which people can purchase foods.
- b. The available food purchasing resources are not accessible to all community members.
- c. The food available through the resources is not sufficient in quantity or variety.
- d. The food available is not competitively priced and thus is not affordable to all households.
- e. There are inadequate food assistance resources to help low-income people purchase foods at retail markets.
- f. There are no local food production resources.
- g. Locally produced food is not available to community members.
- h. There is no support for local food production resources.
- i. There is any significant household food insecurity within the community.

Cohen (2002), further advanced that policies and programs implemented to improve community food security address a diverse range of issues, including participation in and access to Federal food assistance programs, economic opportunity and job security, community development and social cohesion, ecologically sustainable agricultural production, farmland preservation, economic viability of rural communities, direct food marketing, diet related health problems, and emergency food assistance access. She further gave some examples of such policies and programmes to include the following:

- a. **Food stamp outreach programs** that help increase the number of eligible households that participate in the Food Stamp Program.
- b. **Farmers' markets** that boost incomes of small, local farmers and increase consumers' access to fresh produce.
- c. **Community gardens** that help public housing residents and other low-income consumers supplement their diets with home-grown produce.
- d. **Asset development programs** that assist low-income families to accumulate funds for obtaining additional education, purchasing a home, or starting a business.
- e. **Food-buying cooperatives** that help families save money by pooling food purchases.
- f. **Community-supported agriculture programs** that can help provide small farmers with economic stability and consumers with high-quality produce, often at below retail prices.
- g. **Farm-to-school initiatives** that help local farmers sell fresh fruits and vegetables directly to school meals programs.
- h. **Community kitchens** that provide job training to the unemployed while converting surplus food to meals for the needy.

When implemented together with a strong Federal nutrition safety net and emergency food assistance programs that alleviate food insecurity and hunger over the short-term,

such community food security initiatives may, over the long term, increase the economic resources available to households to purchase food; strengthen local capacity for food production, processing, and marketing; and boost the effectiveness of Federal food assistance and education programs by increasing the availability of high-quality, affordable food within a community.

In this sense, community food security is most easily understood as a continuum. Communities are unlikely to be either entirely “food secure” or entirely “food insecure.” Rather, they can be placed on a continuum where the goal is to move from less food secure to more food secure. Ultimately, the end goal is a “food secure” community in which “all people in a community have access to a culturally acceptable, nutritionally adequate diet through non-emergency (or conventional) food sources at all times” (Biehler *et al.*, 1999).

The Ministry of Health Services and the Health Authorities of British Columbia, MSHABC, (2004), also opined that, community food security exists when all community residents obtain a safe, personally acceptable, nutritious diet through a sustainable food system that maximizes healthy choices, community self-reliance and equal access for everyone.

Systemic thinking about community food security is well encapsulated by Feenstra (1997): “The long term health of a community’s food system is an important indicator of its vitality and sustainability. A logical and appropriate way to revitalize a community is by the development of a local food economy. Not only does an adequate, varied diet contribute to individual health, but the way food is grown, distributed and eaten also profoundly affects the environmental, spiritual and economic well-being of the community. Ecological, cultural and political analyses over the last few decades hold in

common the vision of a more local, ecologically sustainable and democratically controlled food system” (Feenstra, 1997).

Community food security has an impact on all community members through an implicit recognition of the role of the larger food system in ensuring food security (Winne, 2005). Community food security promotes community-based food systems within the context of the food system continuum, from the local to the global level (Hohenschau, 2005). The food system encompasses a broad range of food chain components, including agriculture, fishing, hunting, gathering, other food production, manufacturing, distribution, marketing, the availability of affordable outlets for quality food, the involvement of citizens, food producers, and various organizational and governmental food-related policies. Community food security involves an acknowledgement that, despite many of the benefits of the dominant food production system, there are unintended negative consequences; these can be addressed by focusing on food system components in which ecological, health, and economic considerations share equal importance (Feenstra, (1997); Coveney, (2003) and Caraher and Coveney, (2004). Community food security involves a consideration of the underlying community social, economic, and institutional factors that affect these components, and emphasizes sustainability in community food systems through a variety of elements.

Community food security involves a recognition that within the dominant food production system, many communities depend on foods produced at a distance, while paradoxically producing foods that may be transported far away because of the increasing global and corporate nature of the food economy (Garrett and Feenstra, 1999). This reduces producer control over production, marketing, and labour decisions, and can reduce community economic self-reliance.

Community food security encourages community self-reliance and supports community economic development through innovative direct marketing, local processing, and other value-added activities that allow communities to strengthen their economic health by creating meaningful jobs and reinvesting financial capital locally (Garrett and Feenstra, 1999). Community food security also involves adequate wages and working conditions for those who earn their livelihoods from the food system (Winne, 2005).

2.1.3 The concept of consumption pattern

Consumption pattern describes the variation in goods and services consumed. An individual's decision on what range and type of food commodity to consume is influenced greatly by income and other factors such as social norms. The proportion of the total income spent on consumption is referred to as the average propensity to consume (APC). The marginal propensity to consume (MPC), on the other hand, is the increase in consumption expenditure per unit increase in total income.

Since the introduction of Keynesian consumption function many theories of consumption have been advanced. Keynes (1774), was the first to make consumption one of the central foci of macroeconomic theory. This theory, termed absolute income hypothesis, relates current consumption expenditure to current disposable income. According to the theory, the marginal propensity to consume (MPC) is less in the short run than in the long- run. Similarly a smaller proportion of income is consumed as income increases while at low level of income, income consumption expenditure will exceed income. Further the theory posits that the marginal propensity to consume diminishes as income increases. In other words, the richer a person is, the less he would consume out of any

absolute increase in income. The assumption of a diminishing MPC was an important part of Keynesian theory.

In recognition of the shortcomings of Keynesian theory especially in allowing expenditure to change as income changes, modern theories were postulated to incorporate longer view of expected income. These new theories include relative income hypothesis, permanent income hypothesis and life cycle hypothesis. The relative income hypothesis (Duesenabery, 1958), states that a household's consumption is not a function of its current absolute income. Rather, the household's consumption is dictated by its relative position in the income distribution among all the households in the neighbourhood. Hence, a rise in a household's income, which leaves its relative income unchanged, will lead to no change in the average propensity to consume (APC). Therefore, unlike the absolute income hypothesis, the relative income hypothesis allows the APC to vary in the short-run but remains constant in the long-run.

Under the permanent income hypothesis, it is basically assumed that permanent consumption (CP) is proportional to permanent income (YP). The permanent income is defined as the long run income generated in such a way that wealth remains fixed. According to the hypothesis, actual or measured income is composed of permanent income and transitory income. Transitory income refers to income arising from temporary and unexpected sources such as money from friends, relations and even, unexpected salary increases. In the same vein, actual consumption is treated as being equal to permanent consumption and transitory consumption.

The life cycle hypothesis as put forward by Ando and Modigliani (1963), states that a household or an individual maximizes its utility subject to its wealth. Wealth is viewed as the main determinant of current consumption. This wealth is nonetheless accumulated

through savings expected to allow individuals maintain consumption in later years when income from employment is relatively low. The hypothesis posits that in the early years of an individual, money is spent without any commensurate income. Over time, the individual gets to a stage he starts to work, earns and continues up to the stage when his earnings are in excess of spending. This excess is saved for the time when he is old and he can no longer work. Hence, he falls back on the savings.

Depending on the focus of the study, one or more of these hypotheses can be relevant. In a particular study by Yusuf *et al.* (2002), absolute income and relative income hypotheses were found to be relevant. Their emphasis was on current consumption of students who have relatively homogenous groups and live in the same environment (Community).

2.1.4 Food coping strategy concept

Generally, households that face the dilemma of food shortage do not sit back in despair. To combat food shortages, the households engage in food-acquiring activities or change their eating behavior; these responses are known as food-coping strategies.

Food-coping strategies are defined as the mechanisms employed by households when the means of meeting needs are disrupted by one or a combination of factors, including drought, low income, or high food prices (Ninno *et al.*, 2003). Devereux (2001), defines coping strategies as a response to adverse events or shocks. The definition by Snel and Staring (2001), captures the broad notion of coping strategies, namely that “all the strategically selected acts that individuals and households in a poor socio-economic position use to restrict their expense or earn some extra income to enable them to pay for the basic necessities (food, clothing, shelter) and not fall too far below their society’s

level of welfare” (Snel and Staring, 2001). The latter definition implies that coping strategies involves a conscious assessment of alternative plans of action. This does not necessarily mean that their choice of strategies is always successful in achieving their intended objectives. In fact, the coping strategies often have unintended negative effects.

Ellis (2000), on the other hand looks, at coping strategies as the methods used by households to survive when confronted with unanticipated livelihood failure. The strategies pursued by households differ in several aspects, that is, within the household and between households (Maxwell *et al.*, 2003). Due to varying degrees of wealth among households, different coping behaviors are adopted by households at different poverty levels. However, some coping strategies are common to all households although the extent to which such strategies enable a household to remain afloat depend on the assets at their disposal (Devereux, 2001). Above all, the general tendency is that the lower the household asset status, the more likely the household would engage in erosive responses such as selling off productive assets such as farm implements (Hoddinott, 2004).

All households employ Food Coping Strategy for different reasons, but the main aim usually is to preserve productive assets that are needed to sustain living in the future (Young and Jaspars, 1995). Households that do not experience severe food shortages may employ Food Coping Strategy to add variety to their monotonous diet, whereas households that run short of food employ strategies to increase the availability of food. Even though many families are caught up in the dilemma of food insecurity, girls and women, as the primary food producers and providers in African households, will struggle and devise means (strategies) to put food on the table and to keep the stomachs of the household members full (Maxwell *et al.*, 1999). It has been suggested by Kruger *et al.* (2008), that although many households may have enough staple food available to prevent hunger, there is a lack of high-quality protein and a variety of vegetables and fruits to

supplement the mostly starch-based diet. If these foods are available, they are diluted during cooking to be used as a relish in which to dip the starchy food during the meal. In this context, the Food Coping Strategy would be a plan of action adopted by a household to fulfill a specific goal, namely, to acquire enough food to live and to attempt to provide a varied diet.

For instance, Kruger *et al.* (2008), has opined that women, as the persons primarily responsible for the preparation and provision of food, use different strategies to cope with food insecurity, often to their own disadvantage. Administration of these Food Coping Strategies indicates a problem of household food insecurity, but not necessarily the intensity (severity) of the food insecurity. Thus, for example, a household that skips meals for the whole day is more food insecure than one that switches from consuming meat to consuming soya mince (Maxwell *et al.*, 2003).

Generally, there is no universal set of Food Coping Strategy; however, they tend to follow the same pattern and can be grouped into four categories: altering the diet, food rationing, food-seeking strategies, and altering the household as put forward by Kruger *et al.*, (2008).

Table 2.1 The Four Generic Categories of Food-Coping Strategies

Category	Explanation	Examples
Altering the diet (dietary change strategies)	Use of less preferred or cheaper food items	Substituting milk, fish, or eggs for meat
Food rationing (managing insufficiency)	Skipping meals Staying hungry the whole day, without meals Feeding working members at the expense of none working members (buffering) Limiting portion sizes	Eating 1 or 2 meals instead of at least 3 per day Giving fathers larger shares while other members (especially women and children) receive small portions
Food seeking (increasing the amount of food available in the short term)	Borrowing food or money Gathering wild food	Borrowing money to buy food Borrowing food Purchasing food on credit
Altering the household (household structure strategies)	Sending children away Decreasing the number of people to be fed in the short term	Sending children to eat or stay with friends or relatives

Source: Kruger *et al.*, (2008).

2.1.4.1 Coping strategy pattern

Patterns of coping strategies can be diagrammed to show the sequence of responses farm household typically employ when faced with a food crisis (Figure 2.1, Watts, 1988). These sequences of response are most frequently divided in the literature into three distinct stages (Corbett, 1998). In the earliest stages of crisis (*stage one*), household employ types of risk-minimizing and loss-management strategies. These typically involve a low commitment of domestic resources, enabling speedy recovery once the crisis has eased. As the crisis persists, household are increasingly forced into greater commitment of resources just to meet subsistence needs (*stage two*). There may be a gradual disposal of key productive assets, making it harder to return to a pre-crisis state. At this stage, a household's vulnerability to food insecurity is extremely high. *Stage three* strategies are signs of failure to cope with the food crisis and usually involve

destitution and distress migration (Corbett, 1988). This generalized pattern of coping strategies find practical application as tools for food security monitoring (Frankenberger and Goldstein, 1991).

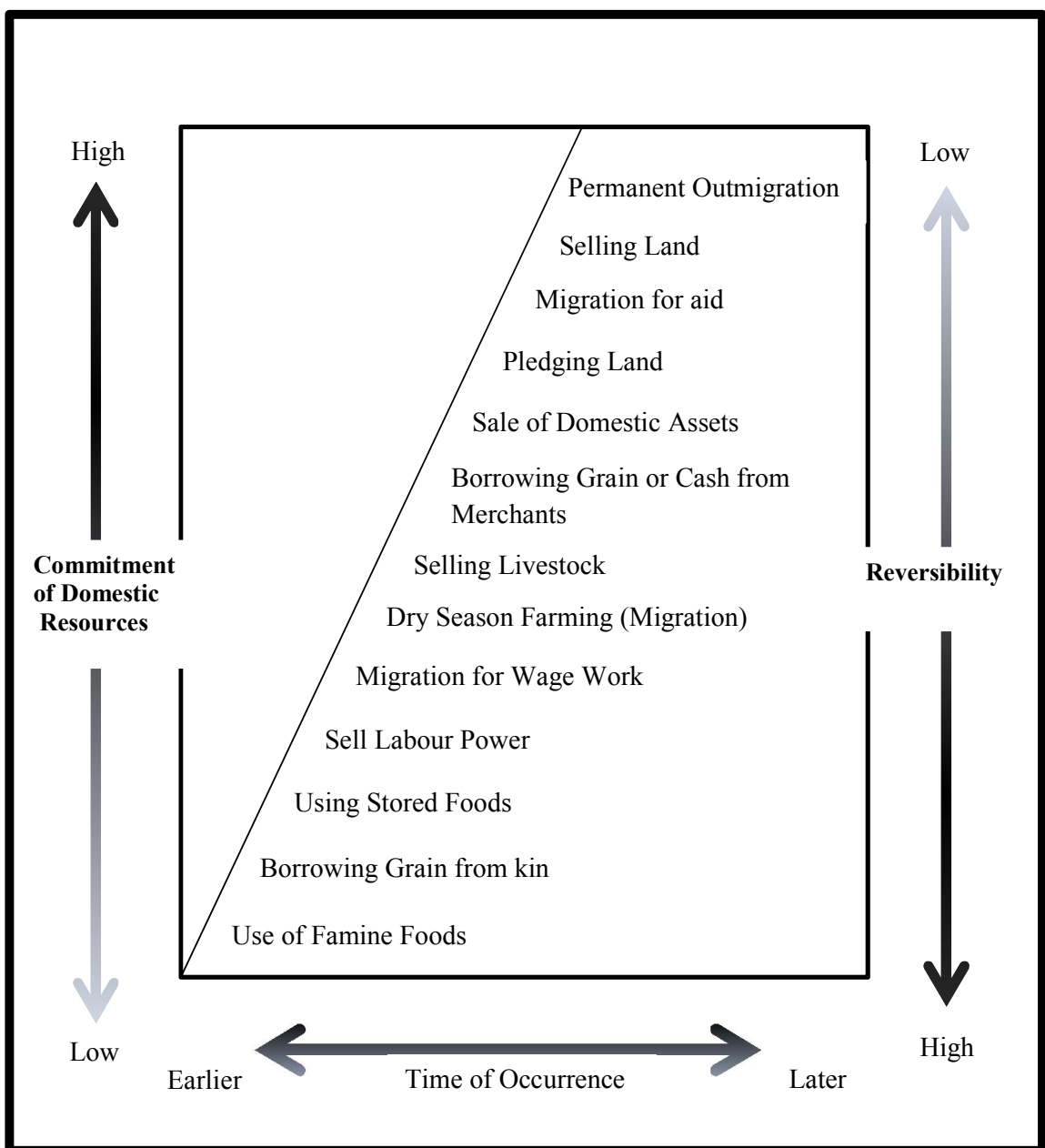


Figure 2.1: A Model of Response to Food Shortage Adapted from Watts, (1988)

2.2 Food Security Measurement: The Focus on Chronic Hunger and Poverty

The analytical implications of the commitment to halve the number of undernourished people are reflected for example in *The State of Food Insecurity in the World 2001, SOFI 2001*, (FAO, 2002). Hunger is an emotive and chronic hunger an ambiguous concept. But in the official literature hunger and undernutrition are assumed to be more or less synonymous. *Undernutrition* is the result of undernourishment, poor absorption and/or poor biological use of nutrients consumed. *Undernourishment* is when food intake is continuously insufficient to meet dietary energy requirements.

Ideally, estimates of undernutrition would be based on combined health and nutritional assessments, including anthropometry. Note that Undernutrition is a less intimidating concept than protein-energy malnutrition (PEM), its technical synonym. PEM is manifested through wasting, low weight for height, as an acute condition and a stunting, low height for age, as a chronic condition (Clay, 2002). The assessment would be for a representative cross-sectional sample population, stratified to ensure adequate representation of at-risk populations by category and region. Practically, such surveys are uncommon, especially in those countries where undernutrition is likely to be most pervasive. Consequently, measurement is typically indirect and based on food balance sheet and national income distribution and consumer expenditure data. The line of reasoning linking hunger and undernutrition with inadequate food intake allows the *measurement* of food insecurity in terms of the availability and apparent consumption of staple foods or energy intake (FAO, 2002). This definition is again broadly equivalent to the earlier narrower definitions of chronic food insecurity (World Bank, 1986).

Where international cross-sectional and national time series comparisons are undertaken, as in SOFI 2001, national estimates are based on average per capita availability of staple

foods, or apparent consumption. The estimates may also be weighted by evidence of food expenditure by income categories for countries where consumer expenditure surveys are not available. Because poverty lines, such as those calculated by the World Bank, also reflect assumptions about dietary energy intake, there is inevitably a high degree of correlation in these cases with estimates of poverty and extreme poverty (FAO, 2002).

The international comparison of country estimates of chronic food insecurity therefore reflect cross-sectional patterns and trends in food production, supplemented by what is recorded about trade in basic foodstuffs (effectively cereals) as incorporated into national food balance sheets. From these comparisons broad differences in food security are apparent between the development categories of low, middle and upper income countries and also considerable variance within categories. However, the attempt to explain such differences within categories and changes over time in the incidence of undernutrition have met with limited success. SOFI 2001 notes that groups of variables that reflect shocks and agricultural productivity growth are significant influences in explaining periodic differences in country performance but concludes: ‘...attempts to seek one simple cause for either good or bad performance are not very useful. The power of just a few variables to explain changes in highly diverse and indeed unique national situations is limited’ (FAO, 2002). Some of the factors should be noted which make this form of statistical investigation – the association of a single dependent variable to represent chronic food insecurity with proxy variables for differences amongst countries and changes in agricultural trade regime - unpromising for the study on trade and food security.

There is the unavoidable problem of unreliable data on production, and the incidence of unrecorded trade that may be most serious for many of the most food insecure countries in Sub-Saharan Africa. The current crisis in Southern Africa highlights that issue.

Apparently, Malawi has been one of the twelve best performing countries since the early 1990s in improving food security (FAO, 2002). However, there is currently much debate about the reliability of food production data, particularly for roots and tubers in food crisis affected Malawi. Trends for countries in which these are important staples, especially in subsistence, and comparisons between these and other countries are a source of ambiguity.

By the interplay of these factors, population may become more vulnerable, and so the economy more fragile and sensitive to ever-smaller shocks. This is also a reason for reassessing the importance of transitory, acute food insecurity.

2.2.1 Approaches to measurement of food security

From the literatures, there are basically two approaches to the measurement of food security. These are qualitative and quantitative approaches. The quantitative approach includes the Food and Agriculture organization (FAO) method, Household Income and Expenditure Survey (HIES) and the Food Intake Survey (FIS). The FAO method developed an aggregate Household Food Security Index (AHFSI), which attempt to incorporate the availability and stability of food supplies and access to them. The factors and processes that are assumed to influence the status of household food security causally have been used to assess the validity and relevance of the index (Gurkan, 1995). The AHFSI uses FAO's estimates of the prevalence of under-nutrition in developing countries and regions as its primary building block; it combines these estimates with measures of the extent of food gap between undernourished people and national average requirements for dietary energy, the inequality in the distribution of food gaps and the instability in the annual availability of dietary energy. It is given by the formula:

$$AHFSI = 100 - [H (G + [1-G] I^P) + \frac{1}{2} d \{1-H(G + [1-G] I^P)\}] 100$$

Where

H = Head count ratio that measures the proportion of undernourished people in the total population, expressing the extent of undernourished.

G = Food gap that measures the proportion of short fall in the average daily dietary energy intake of the undernourished from the national nutritional requirements, expressing the depth of undernourishment.

I^P = Measure of inequality in the distribution of the food gaps

D = Coefficient of variation in dietary energy supplies, measuring the likelihood of facing temporary food insecurity.

Household Income and Expenditure Survey (HEIS) and the Food Intake Survey (FIS) estimates dietary intake and tries to relate this to energy and protein needs. The measurement is typically indirect and based on food balance sheets and national income distribution and consumer expenditure data linking hunger and nutrition. Another quantitative method (anthropometrics) measures physical effects on growth and thinness (FAO, 2002). On the other hand the qualitative measures of food security include amongst others the following:

2.2.1.1 Food economy approach

According to Devereux (2002), this approach divides a geographical area into food economy zones, each representing a common livelihood system. Next, communities are stratified into three to six wealth groups in terms of locally defined characteristics (asset ownership, months of self-provisioning etc.) and households are allocated to these wealth

groups, which can then be used to generate estimates of food insecure populations for targeting purposes.

The food economy approach is most powerful as a diagnostic tool rather than as a source of precise statistics. Food economy analysts prefer to present data in ranges than point estimates. Disadvantages of the methodology include (1) it is resource and time intensive; (2) it generates relative proportions rather than absolute numbers and (3) it has not yet been validated against conventional measures of poverty and food insecurity.

2.2.1.2 Group ratings

This methodology evolved out of wealth ranking, so it shares a basic similarity with the Food Economy Approach. It has been tested recently for reliability by IFPRI in several countries including Honduras and Malawi. Essentially, single sex or mixed-sex groups assign members of their community to one of three categories—“food secure”, “intermittently insecure” and “food insecure”; the results from different groups are then compared. Unfortunately, the conclusion from Honduras was disappointing as the consistency of responses between sets of raters was alarmingly low (Bergeron *et al.*, 1998).

2.2.1.3 Dietary diversity

This is an extremely simple method, again pioneered by IFPRI; this method generates a list of locally consumed foods (about 30 to 40 items) and then households are asked if they have consumed each item in the past week. The numbers of the different items consumed are simply added not even weighed, for instance scoring meat higher than cereals, as most dietary assessments do and the higher the number, the more diverse the diet and the more food secure the household (Hoddinott and Johannes, 2001).

2.2.1.4 Coping strategy index

This was proposed by Maxwell (1996). He identified nine coping strategies by focus groups in urban Accra. Individual households were scored by frequency of adoption of these strategies, and then composite indices were constructed to rank households by degree of food insecurity. A coping strategy index is a food consumption related coping strategy instrument that includes the generic list of coping strategies. The basic idea of using the coping-strategy index tool is to measure the frequency of the Food Coping Strategy (how often is the coping strategy used) as well as its severity (what degree of food insecurity does the strategy suggest) (Maxwell *et al.*, 2003).

The type of Food Coping Strategy to be used is determined by the severity, type, and duration of the food stress. Hence, household coping behavior provides an earlier and much clearer signal of the actual level of distress, varying from poor variety to hunger. Even within the same location, the sequence of coping may differ markedly from one household to another (and from one household member to another) (Maxwell *et al.*, 1999).

The advantage of this method are that it is quick, cheap and simple to administer, yet complex in terms of its conceptualization and the information it generates about household behaviour under stress. But coping strategies are locally specific-urban and rural “coping” options are different and scaling up to national level present formidable challenges. The method also shares a limitation with the group rating approach (Maxwell *et al.*, 1999).

2.2.1.5 The food security module

The core module questionnaire contained a total of eighteen questions for households with children and ten questions for households without children. The series of questions

in the module are converted into food security scale using Rasch Measurement Model—a type of non-linear factor analysis that falls into family of Item Response Theory (IRT) models (Hamilton *et al.*, 1997).

The food security scale is a continuous measure ranging from a score zero to ten. The scaling model calculates value on the scale for each household. The value is based on the number of questions answered. These data also allow the population studied to be divided into four distinct categories of food security based on the differing conditions, experiences and behavioural patterns that characterize each range of security. These four categories include: Food secure—little or no evidence of food insecurity, Food insecure without hunger—food insecurity is shown by households' concern adjustment to food management. Food insecure with moderate hunger—food intake for an adult is reduced and adult are experiencing hunger owing to resource constraints. Food insecure with severe hunger—households with children reduce the children's food intake to an extent that implies that the children experience hunger as a result of inadequate resources within the household, while adult show evidence of more severe hunger (e.g. going entire day with no food).

2.2.2 Community food security assessment

A Community Food Security (CFS) assessment is a unique type of community assessment. It includes the collection of various types of data to provide answers to questions about the ability of existing community resources to provide sufficient and nutritionally sound amounts of culturally acceptable foods to households in the community. The result of the assessment is the generation of a community profile that

may highlight the negative and positive components of the community's efforts to satisfy households' food needs (Cohen, 2002).

According to the Community Food Security Coalition, components of CFS needs assessments include information on access to food; hunger, nutrition, and local agricultural data; an inventory of community food resources; and policy perspectives (Joseph, 1997).

These components can include factors such as the following:

- a. Effectiveness of local infrastructure for delivering Federal food assistance programs.
- b. Adequacy of supermarkets, barriers to food shopping, modes of transportation, selection and price, and local markets.
- c. Income levels and number of persons in poverty, use of the emergency food system, and Federal food assistance programs.
- d. Loss of farmland, farm start-ups, use of sustainable production methods, and availability of locally grown food in local stores.
- e. Number of community gardens, home gardens, farmers' markets, community supported agriculture programs; food coops or other alternative food production/distribution arrangements; and open space available for food production.
- f. Scope of food policies affecting the community and evidence of integration of food-related issues into the local planning process.

Also, community food security is concerned with the viability of the natural resource base that provides our food, as well as with the food system's dependence on non-renewable energy resources. Community food security promotes sustainable food production practices throughout the food chain (Winne, 2005).

Community food security promotes stewardship of land, air, and water through sustainable, community-based food systems and food production methods that reduce pollution and do not compromise the physical environment for future generations. CFS reduces dependence on fossil fuels and fosters closer connections between consumers and producers by encouraging the consumption of more locally produced foods when they are available. (PUBLIC POLICY STATEMENT 2007, *Community Food Security* Position of Dieticians of Canada).

2.2.3 Causes of food insecurity

Food crisis does not just occur. They were precipitated by remote or immediate causes. Some of the causes are individual-induced, some corporately caused, some societal problems, while others are national and international effects of some inadequacies and deficiencies, as argued by Fadji and Omokore (2010). They further advanced that some of the causes, worthy of highlighting, include:

- a) Population growth; an increment in the reproduction of humans without corresponding growth in crop production.
- b) Low food crop production; a low food production unable to match the demand for food.
- c) Continuous rise in prices; a continuous increase in the prices of food crops leading to low purchasing power.
- d) War/conflicts and crisis (refugee increase); instabilities and crisis in many parts of the world lead to refugee movement, displacement of work-force and abandonment of many families.

- e) Environmental disasters e.g. floods, desertification, global warming); due to unexpected natural causes.
- f) Shortage of water supply; many parts of the world experience inadequate supply of water leading to thirst and hunger.
- g) External debt over-load; due to indebtedness of many underdeveloped and developing countries, they are incapable of making significant progress.
- h) Over dependence on donations/aids/grants; many countries still depend on grants and aids from the advanced countries and could not harness their endowed resources.
- i) Biofuel development; the recent trend in generating biofuel from crops is putting stress on demand for energy at the expense of food crops.

Goodman (2008), had given signals of the world-wide food shortage with the following grim information/statistics, including its consequent manifestations:

- a) Total world stocks of all grains are close to their lowest level in 30 years.
- b) USDA predicts wheat surpluses to be the smallest in 60 years.
- c) A virulent strain of wheat rust that can reduce yields to zero is spreading worldwide.
- d) Wheat prices have risen well over 50% from 2007- 2008, and still rising.
- e) The FAO cites 37 countries as facing a food crisis due to rising prices.

He (Goodman) further quoted Josette Sheeran, the Executive Director of World Food Programmes (WFP) as follows: “Soaring food prices—up 55% from June 2007 to February 2008, including an 87% hike for rice in March—and dwindling global food stocks due to more world food consumption than production were seriously threatening the WFP’s ability to keep millions from starvation”. It is therefore of paramount

importance that attention be paid by various Governments of the world to prevent or avert situations that may generate or degenerate into imminent food crisis.

Idachaba (2004), also observed that food insecurity could be caused by supply-side factors and demand-side factors. One of the supply-side causes of food insecurity as identified by Idachaba (2004), is food-marketing problem. Idachaba (2004), further argued that the dwindling agricultural production in Nigeria is a confirmation of the unattractiveness of agriculture as a result of low returns and compensation being paid to farmers, which tend to discourage increased production. The food marketing problems are evidenced when farmers, (who are the primary producers and who reside mostly in rural areas) could not get their produce to the market at the right time (thereby incurring considerable post-harvest losses) and are not given better returns for their efforts. This perceived 'cheating' causes discouragement and leads to loss of interest in farming and consequently a reduction in food production.

2.2.4 Determinants of food security

The basic determinants of food and nutrition security are resources: human resources (for example, people and their knowledge, skills, and time); economic resources (for example, assets, land, and income); and organizational resources (for example, formal and non-formal institutions, extended families, and childcare organizations) (Akinyele, 2009). Also recently, the environmental dimension to agricultural production and climatic factors affecting food security are being considered determinants. The availability of food to individuals within the household may also be constrained by the prevailing religious, social and cultural norms. It is now becoming clear that the context of food security is very broad indeed. It encompasses issues pertaining to the physical

and biological, environmental and the current changes being brought to bear on these by increasing intensities of human activities (Adejuwon, 2006).

Resources are available at different levels of society and are controlled in many different ways. At the household level, men usually control more of the resources, which often constrain the achievement of adequate food, care, and health. The use of resources depends on the way a problem is understood as well as on the perception and priorities of those who control resources. Education plays a particularly important role in determining how resources are utilized to secure food, health, and care for children.

Food availability refers to sufficient quantities of appropriate, necessary types of food from domestic production, commercial imports, and other sources, that are consistently available to individuals or are in reasonable proximity to them. In this context, availability refers to the physical existence of food, from own production or in the markets. National level food availability is a combination of domestic food production, commercial food imports, food aid, and domestic food stocks, as well as the underlying determinants of all of these factors (Gross *et al.*, 2000).

Stability of food supplies means that households should not risk losing access to food as a consequence of sudden shocks (climatic crisis) or cyclical events (e.g. seasonal food insecurity). Food stability at the household level is thus critical to food security.

Access to food is defined by an individual's capacity (i.e., incomes or other resources) to purchase or barter to obtain levels of appropriate foods needed to maintain consumption of an adequate diet and nutritional level. Food access also is a function of the physical, social, and policy environment which determine how effectively households are able to use their resources to meet their food security objectives. Access is therefore ensured when all households and all individuals within those households have sufficient

resources to obtain appropriate foods for a nutritious diet (Riely *et al.*, 1999). The level of resources (capital, labor, and knowledge, and others) at the disposal of households and individuals to a large extent determines their economic access to required foods, in addition to the prevailing market prices of the food commodities. The ability of most households in rural and urban Nigeria to generate a sufficient income, which together with own production, can be used to meet food needs is however undermined as a result of high levels of poverty (Akinyele, 2009).

The component of food consumption refers to the proper use of food for consumption, proper food processing and storage, and possession and application of adequate knowledge of nutrition, childcare, and adequate health and sanitation services. The nutrition perspective here refers to the added components of caring practices and health services and healthy environments. This addition to the definition and concept of food security makes it whole, with the aim of achieving nutrition security, which is defined as adequate protein, energy, vitamins, and minerals for all household members at all times (Quisumbing, 1995).

Food and nutrition security can only be achieved if adequate food (quantity, quality, safety, and socio-cultural acceptability) is available, accessible, and satisfactorily used by all individuals at all times to live a healthy and active life. Food and nutrition security are combined in this definition, and it highlights the essential aspects of availability, accessibility and use of food. The inclusion of the use aspect underscores the fact that nutrition security is more than food security.

The underlying determinants of the framework indicate a set of outcome conditions necessary for adequate nutrition or, more precisely, for adequate dietary intake and absence of disease. Three such conditions can be identified: adequate access (household

food security); adequate care of children and women; and adequate access to basic health services, combined with a safe and healthy environment. Each of these conditions is necessary but not sufficient for adequate nutrition. If all three are fulfilled, however, it is likely that dietary intake will be satisfactory, disease will be controlled, and adequate nutrition will be secured (Akinyele, 2009).

Akinyele (2009), further posit that adequate care of children and women has only recently been fully recognized as having an important bearing on the nutrition status of mothers and children. *Care practices* in the framework refer to care-giving behaviors such as breastfeeding and complementary feeding practices, food and personal hygiene, diagnosing illnesses, stimulating language and other cognitive capabilities, and providing emotional support. Care practices, like household food security, is the outcome of complex processes in society, but are ultimately dependent on the availability, accessibility, and use of resources.

Bahiigwa (2002), used logistic regression model and his study revealed that the probability that a household will be food secure is dependent upon the fertility of its land, good distribution and intensity of rainfall, planting improved seeds, having adequate labour, and having neighbours that are food secure. On the other hand, large numbers of non-productive dependents, inadequate rains, and long distances to the market decrease the probability that a household will be food secure.

Scharr (2003), hypothesized that important determinants of food security are socio-economic development such as population growth, increase in income and diets with respect to sanitation; health and education. He further explained that population growth obviously increases the overall demand for food products, while a higher income

increases the demand for livestock products, as human diets tend to include more meat and milk products.

Cohen *et al.* (1999), used also logit regression model to estimate the marginal effects of household characteristics on food security. The study indicates that household characteristics do not appear to influence the food security level substantially. He noted that the only substantial apparent influencing factor is the presence of an elderly person in the household. While Donald (1999), in a study on economic determinant and dietary consequences of food insecurity in the United States, identified only income as a major determinant of food security.

From the foregoing, it can be observed that researchers have used multiple or logit regression models to estimate the determinants of food security status of households. However, in order for the different intensities of food insecurity among the Nigerian households to be reflected in the analysis of the determinants of food security, this study will make use of the Tobit models.

2.3 An Overview of the Food Situation in Nigeria: Current Level of Food Security in Rural Areas

There is an overwhelmingly large proportion of Nigerians who are food insecure. They are spread across both rural and urban settings in Nigeria, though most are in rural areas. This fact is corroborated by Famine Early Warning System Network, FEWSNET, (FMH, 2007), which stated that food security was constrained for many households in Nigeria. They postulated a worst-case scenario where food insecurity increased to high and extreme levels through September 2008 and that food insecurity became worse, especially in northern Nigeria, if prevailing circumstances remained; poor rainy season,

stockpiling, soaring food prices, etc. The decision of government to release cereal grains to states in Northern Nigeria confirmed the scenario. Also, findings from a recent study in Ibadan and Lagos showed that in Ibadan, 45.7%, 25.9%, and 4.7% and in Lagos, 37.2%, 22.8% and 12.0% were food insecure with no hunger, moderate hunger, and severe hunger, respectively (Sanusi *et al.*, 2006).

There is however no national dataset to use in mapping the specific locations of the food insecure except to use the proxy of poverty profile as an indicator of the food insecure.

Retrospectively, in 2007, FEWS NET highlighted persisting child malnutrition, mortality, and morbidity conditions in the northwest millet and sesame livelihood zone, especially in the states of Katsina and Jigawa and part of Yobe (Federal Ministry of Health, FMH, (FMH, 2007). Data from a joint food and nutrition survey conducted in August 2007 in this zone reported that 336,000 (56%) of the 600,000 children under five years of age living in this zone were stunted, while 252,000 (40%) were underweight, 62,400 were wasted (10.4%), and 5,400 (0.9%) were severely wasted (FMH, 2007).

According to a report of the nutrition assessment of a livelihood zone in northern Nigeria, cereals (millet and sorghum) were the main staples produced by the majority (85.5%) of households at the time of the survey in the Sahel savannah ecological belt while 11.7% of households produced maize. In the previous weeks preceding the survey, the main staples produced by the majority (85.0%) of households were still millet and sorghum while 12.7% of households produced maize. In those preceding weeks, 54.8% of households purchased their main source of staple food, 43.5% produced their main source of staple while 1.7% had other means of procuring their main staple foods. This was indicative of stability in food dynamism and recent harvest. However, two months following the survey, 63.3% of households anticipated that their food source would be

from their own production, 34.7% from purchase, and 2.0% from other sources (FMH, 2007).

2.3.1 Food consumption in Nigeria

Cereals are important staple foods in Nigeria and the consumption pattern shows that they are widely consumed across the regions of the country. The northern part of Nigeria shows the highest consumption of cereals as compared to the southern part of Nigeria. These cereals include guinea corn, millet, maize, rice, and sorghum. However, a higher consumption of starchy foods is seen among the southern parts of Nigeria as compared with the north. The northwest shows the least consumption of starchy foods (Akinyele, 2009).

The distribution of processed foods shows the highest consumption patterns in the South East (24%), South South (23%) and South West (18%) while a lower consumption pattern is seen in the North West (15%) North East (11%) and North Central (9%). The consumption of protein was higher in the South South (26%), South East (22%) and South West (15%) while it was lower in the North East (14%), North West (12%) and North Central (11%). The North West and South East regions had the highest consumption of vegetables while the South West, South South and North Central had the same consumption pattern of vegetables. The North East (27%) and the southern regions (25%), with the exception of the South West zone, had the highest consumption of fruits in the country. However, consumption was lower among the North West (9%) and North Central (8%). The South West zone had the lowest consumption pattern. These patterns were not disaggregated by urban and rural (Akinyele, 2009).

The consumption pattern of Nigerians differs across the nation. In the savannah eco-zones of Nigeria, Etkin and Ross (1994), documented about 119 food plants which were predominantly found in the forest. According to Okafor *et al.*, (1994), these forest foods form the major intake of protein, vitamins, minerals, fats, and carbohydrates among the majority of rural communities in the country. A recent study (NBS, 2007) showed that beef, rice, yam tuber, cassava, and bread constituted the main food items consumed in the southeastern part of Nigeria, while the South West household members consumed more of eko/agidi, bread, yam flour, yam tuber, and garri. Food items consumed in the South South zone included beef, garri, fresh fish, rice, yam tuber, and beans. In a similar manner, yam tuber, beef, rice, beans, and garri were the major food items consumed by household members in the North Central zone. The North East zone consumption pattern was dominated by rice, dried fish, beef, palm oil, groundnut, beans, maize grain, yam tuber, millet, and guinea corn. Rice, maize, beans, beef, guinea corn, millet, tomatoes, and yam tuber were the food items consumed by household members in the North West zone.

Information on consumption patterns and food preparation methods of the Igbo people in rural Nigerian communities from 242 households in two different ecological zones showed starchy staples were the main foods consumed by 100% of respondents, followed by cereals, legumes, fruits, and vegetables (60-80%), fish or meat (40-50%), with the meals usually consumed two times a day (Okeke, 1996).

As reported by Olarinde and Kuponiyi (2005), carbohydrates constituted the majority of prepared food items bought and consumed outside the households studied in Oyo state. The average amount spent on prepared and purchased carbohydrate food was ₦4,337.33 per household while protein food outside the home stood at ₦540 per month. This amounted to an average of ₦1469 worth of food per household member per month. It

also amounted to a monthly diet of 79% carbohydrate, 17% protein, and 4% vitamin per month. Comparing this with a related study of farming households in Oyo state, Adio (2000), found that energy intake was about 97% carbohydrate (from plant and animal products) and about 28% protein (from plant and animal products), this implies a shortfall of 18% and 11% in carbohydrate and protein intake respectively in three years.

Oluwatayo (2008), in a recent survey of inequality and welfare status of some households in rural Nigeria, revealed households had a diet made up largely of starchy foods with very little proteins and vitamins. Also, a greater share of the respondents (51.7%) ate twice a day, a little over one-third (34.2%) of the households ate three times a day, while 10% of the respondents only ate once a day.

Kushwaha *et al.* (2007), observed in Kano that the quantity of vegetables consumed (grams per household per week) in urban areas was higher (1,781.78 grams) than that of the rural areas (451.08 grams). A similar situation was reported by Gomna and Rana (2007), in a comparative study conducted between two different eco-zones (Niger and Lagos) in the country. The result showed consumption of fish was higher than that of meat in fishing communities in both states; fish consumption in Niger was almost twice that in Lagos, while meat consumption was also higher in Niger than Lagos state. Fish was the preferred protein, with an average daily household consumption 3 to 4 times that of meat, confirming its importance in the diet of rural people. The average daily weight of meat consumed per household in Niger and Lagos states was 61 grams and 38 grams, respectively. On a unit body weight basis, male heads of households consumed 59% more fish than their wives or children. The average weight of fish consumed by the male head of household was 0.27kg of fish per kilogram of body weight per year, compared with 0.17kg fish/kg body weight per year for the wife and child.

In terms of expenditure in naira terms, a recent study (NBS, 2012) has noted that, the North-West had the highest expenditure, consuming 25.1% of the total food expenditure at the zonal level, while the South-South recorded the lowest numbers with 12.2% of the total food expenditure. The South West takes up almost a third of the total non-food consumption for the nation. The South-West spent 53% more than the South-South, the second highest in the non-food section, and 225% more than the region with the lowest expenditure for non-food items, the North-East. This magnitude is however significantly less when we consider food expenditure. The North-West, the highest in food expenditure, was about N3.9 trillion, while the South-West was about N3.6trillion for food expenditure. The South-South had the lowest food expenditure with N1.9 trillion.

2.3.2 Sources of food

Gomna and Rana (2007), showed in their study that rivers were the major source of fish consumed (61%) by all the households, followed by lagoons (18%), creeks (5%) and the sea (2%), whereas local markets were the major source of meat (93%). About 5% of the meats eaten were bush meats. Some households had animals (2%) that were occasionally slaughtered and eaten, especially during festivals. Most of the fish and meats consumed during the study were cooked in fresh form. Smoked, frozen, dried, and roasted fish and meat were only consumed occasionally. Unlike fish, the market was the most important source for the meat consumed by fishing villages. Although a large number of aquatic species were consumed, a few species dominated consumption, Tilapia being the most important.

In a multiagency study on food consumption patterns in rural northern Nigeria, it was shown that millet, sorghum, and maize were the most important staples (FMH, 2007)

more often from purchases than from own production. This demonstrates the importance of food prices as a determinant of food security. Shifts in food prices occurred which favoured increased consumption of millet during the study period as opposed to sorghum in the previous four weeks.

2.3.3 Food consumption by livelihood measure of income

Studies in rural communities of the Ideato area of Imo State showed that 25% of the respondents received income from a combination of trading and farming (Eze and Ibekwe, 2004). This is similar to a recent study by Oluwatayo (2008), where respondents in the study area were predominantly farmers representing about 51.7% of the total respondents, and the majority was low-income earners. The study showed the welfare status of the respondents to be directly related to the household size, size of farmland, and income, while marital status and primary occupation were known to be negatively related to the welfare status of the households. In a study of the general livelihood pattern of households in Oyo State, farmers who produced more of the food consumed in their area of residence had the least disposable income to cater for their basic needs (Olarinde and Kuponiyi, 2005). Findings in Kano revealed that, unlike in the rural areas, income was the most important factor affecting vegetable consumption pattern in urban areas, and that the higher income earners (urban consumers) spent a greater proportion of their earnings on food than lower income groups (Kushwaha *et al.*, 2007). The mean expenditure on food in the urban areas was ₦3,120.47, when disaggregated by food items, urban areas spent more money (₦540.53) on vegetables (₦/household/week) than in the rural areas (₦153.96). The NBS (2007), indicated that about three quarters (64.3%) of Nigerian households spent their incomes on food and 35.7% on non-food items. The

study also showed that 14.9% of the households spent more of their income on protein rich foods, cereals (14.1%), starchy food (9.3%), processed food (9.5%), vegetables (6.5%), clothing and footwear (7.7%), household goods (7.6%), fuel/light (6.5%) and transport (4.1%). There were disparities in urban and rural household expenditure distribution. In urban areas, 57.6% was recorded for food items, while non-food recorded 42.4%. In rural areas, food recorded the highest percentage with 67.0% and 33.0% in non-food commodities. More income was spent on non-food in urban areas than in rural areas. It was noted that the households in the lower socioeconomic strata spent more of their income on fish than on meat (Gomna and Rana, 2007).

CHAPTER THREE

Methodology

3.1 The Study Area

This study was conducted in Kaduna State, located in the Northern Guinea Savanna ecological zone. It occupies almost the entire central portion of the Northern part of Nigeria and shares common borders with Zamfara, Katsina, Niger, Kano, Bauchi, Nassarawa and Plateau States. To the Southwest, the state shares border with the Federal Capital Territory, Abuja. The global location of the state is between longitude 06⁰⁰' and 09⁰⁰'E of the Greenwich Meridian and also between latitude 09⁰⁰' and 11⁰³⁰'N of the equator. The state occupies an area of about 48,473.2 square kilometers. It has a population of 6,066,562 people (National Bureau of Statistics, NBS, 2007); and a projected population of 8,068,761 in 2015 at about 3% growth rate. Kaduna state is the successor to the old Northern Region of Nigeria, which had its capital at Kaduna. In 1967 this was split up into six states, one of which was the North-Central State, whose name was changed to Kaduna state in 1976. This was further divided in 1987, losing the area now known as Katsina state.

Agriculture is the major occupation of the people. In fact, Kaduna state comes only second to Kano state in total number of farmers in the nation. Kano state ranks first with 5.67%, while Kaduna is 4.93% of the total national farming population (NBS, 2012). Agriculture accounts for an estimated 56% of Kaduna's GDP. Kaduna state produces 22% of the country's maize, 69% of soya bean, 36% of cotton and 10% of ground nuts (peanuts) and the state trades agricultural produce to neighbouring states. The sector is dominated by wet season planting and an irrigated dry season planting. Most farmers currently produce cereal crops such as maize, sorghum, millet and rice during the rainy

season. Cereal crops are exported to surrounding states and are an important source of cash. Kaduna state is one of the largest producers of rice in Nigeria and it exports substantial quantities to other Nigerian states and other neighbouring African countries. The state is also an important producer of fruits and vegetables (www.kadunastate.gov.ng/, 2012).

Farming is mainly traditional in nature, though this is gradually giving way to modern methods. Crops produced in the state include cotton, groundnut, soybean, tobacco, maize, yams, beans, guinea corn, millet, pepper, rice, cassava etc. The state is also one of the leading producers of ginger, sugar cane and maize in the whole country (KSG, 2000). The cropping pattern in the area is dominated by mixed cropping, although sole cropping is also practiced. Some farmers keep livestock like cattle, goats, pigs, sheep, donkey and poultry.

Some of the major ethnic groups in the state includes: Hausa, Fulani, Bajju, Ham, Gbagyi, Koro Kaninkon, Gure, Kurama, Atyap, Ikulu, Aegworok, Atakkad, Adara, Chawai, Kagoma, Kahugu, Ninzo and Numana. Kaduna state has 23 Local Government Councils.

The 2009 poverty incidence of the state given by the NBS states that; 8.8%, 43.5%, 39.2%, 9.0% and 0.5% of the population in the state are very poor, poor, moderately poor, fairly rich and rich respectively (NBS, 2014).

3.2 Sampling Procedure

A multi-stage sampling procedure was used for this study. The Kaduna state Agriculture Development Project being a state wide project operates in 4 zonal offices namely

Maigana, Samaru Kataf, Birnin Gwari and Lere Zones. Of the four zones, two of them were purposively selected namely Maigana and Samaru Kataf, representing two senatorial zones of the state and geographically, Maigana is in the northern part of the state while Samaru Kataf in the southern part. Only two of the ADP zones were chosen because of budgetary limitations.

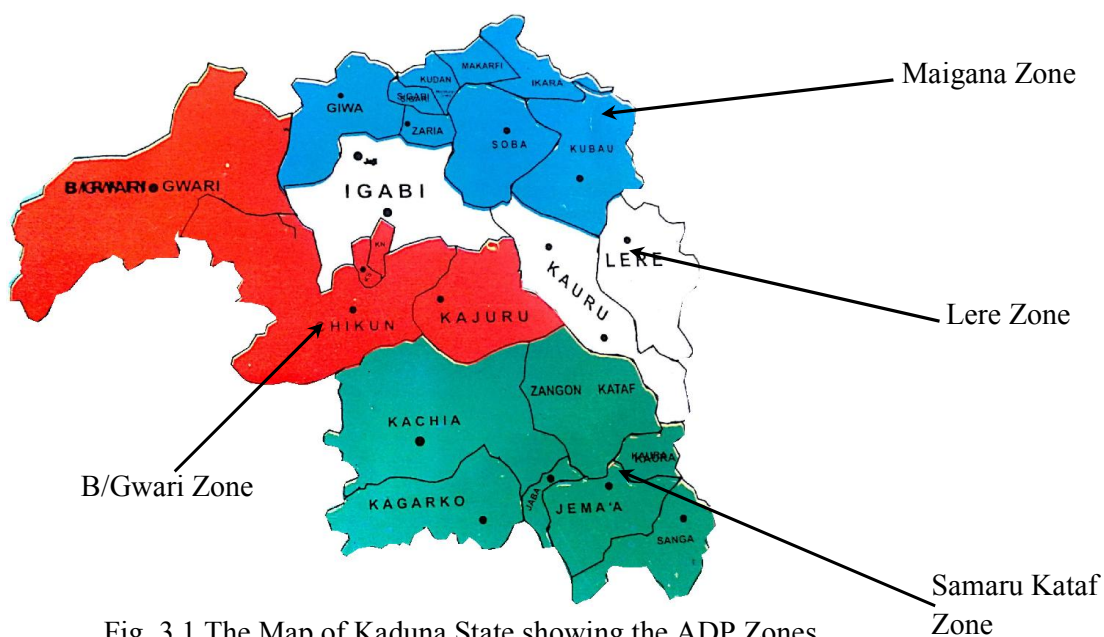


Fig. 3.1 The Map of Kaduna State showing the ADP Zones

Two LGAs were then selected within the chosen zones at random giving a total of four (4) LGAs altogether sampled for the study. The randomly sampled LGAs are Giwa, Ikara, Zango Kataf and Kachia. In each of these randomly sampled LGAs, two communities were then chosen with efforts made to exclude urban centers because consideration for our assessment is giving to the rural areas as community food security analysis for urban areas can be inconsistent; making a total of eight (8) communities that were sampled. These communities are; Gangara and Angwan Kanawa in Giwa LGA,

Furana and Angwan Yari in Ikara LGA, Fadan Kaje and Ungwan Wakili in Zango Kataf LGA and Gidan Tagwai and Laduga in Kachia LGA.

The total number of eight (8) communities selected had their farm households randomly sampled for questionnaire administration at 10% total number of farm families (FFs) in the community (Table 3.1):

Table 3.1 Sample Frames and Sample Sizes of Respondents

LGA/Community	Farm Families (FFs)	No of Respondents (10%FFs)
Giwa	21,184	
Gangara	257	26
Angwan Kanawa	249	25
Ikara	17,680	
Furana	238	24
Angwan Yari	192	19
Zango Kataf	64,603	
Fadan Kaje	662	66
Ungwan Wakili	311	31
Kachia	27,397	
Gidan Tagwai	209	21
Laduga	321	32
Total		244

3.3 Data Collection

Primary data mostly were used for this study. Primary data on agricultural operations of the farmers were collected from the field using structured questionnaires. Data on socio-economic variables, food production, consumption, expenditure, loan use, and individual income, were collected. Also collected were data on the communities with regards to the economic opportunities, community development and marketing integration, community

agricultural production, economic viability of rural communities, and direct food marketing. Other data such as the villages/communities and number of farm families in each village/community were sourced from the Kaduna state Agricultural Development Project (ADP).

3.4 Analytical Techniques

The analytical tools that were used to achieve the research objectives include Descriptive Statistics, Food Security Index (FSI), Regression Analysis (Tobit Regression Model), the USDA Community Food Security Assessment Toolkit and Food Coping Strategy Index.

3.4.1 Descriptive statistics

Descriptive statistics such as percentages, frequency distribution tables, pie and bar charts, graphs, arithmetic mean and coefficient of variation were used to achieve objectives i, ii, and iii.

3.4.2 Food security index (FSI)

The approach taken in this study for the determination of food security index is to follow the identification and aggregation procedures. Identification is the process of defining a minimum level of nutrition necessary to maintain healthy living. This is referred to as the ‘Food Security Line’, below which people are classified as food insecure and subsisting on inadequate nutrition. The food security line was used in this study based on the daily-recommended level of calories and protein, which are 2260 Kcal and 65g respectively

(Olayemi, 1998). In order to generate food security indices, the nutrient content of the food items consumed were used to derive calorie availability and this served to achieve objective iv.

$$\text{Food Security Index } (Z_i) = \frac{\text{Household Daily per Capita Calorie/Protein Consumed } (x)}{\text{Household Daily per Capita Calorie/Protein Required } (y)} \dots \text{Eq.1}$$

For a household to be food secured, Z_i must be greater than or equal to 1 ($Z_i \geq 1$). If Z_i is less than 1 ($Z_i < 1$), the household is food insecure. The quantity of crops produced, purchased and received as gifts were converted to kilogram and further to calorie consumed per day per household and then compared with the standard (2260kcal).

For the purpose of this study a Farm Household is a group of individuals who contribute to and share a common economic resources base and relied on the income from that base for the greater part of their food acquisition and utilization (Adebayo, 2010).

The nutrient composition of commonly eaten foods in Nigeria (Babatude *et al.*, (2007) was used to estimate the calorie intake of household (See Appendix1). On the other hand, the equivalent male adult scale to determine adjusted household size computed by Falusi (1985), was used (See Appendix 2).

Most studies focus attention on calorie availability and consumption in assessing food security status of respondents (Makinde, 2000 and Lawal, 2003); because according to them most diets contain adequate amounts of all other nutrient required for good and healthy living once it is taken in quantity that is enough to meet the individual's energy requirements. The indicators by FAO (2004), were adapted for this study namely:

3.4.3 Multiple regression analysis

Multiple regression analysis, Tobit model was used to achieve objective v. To identify the determinants of food security status of farming household, two stages of analyses were involved; one, we constructed a food security index (FSI) and secondly, used the Tobit regression model, as a lead model, to estimate the food security of household as a function of a set of independent determinants.

The Tobit Regression Model is a hybrid of the discrete and continuous dependent variables. It measures the parameter of the conditional probability of being food secure and the effects of the marginal changes in the explanatory variables on the food security status of the households. According to McDonald and Moffit (1980), Omonona (2001) and Agboola (2004), the model can be expressed as:

$$Z_i^* = X_i\beta + \varepsilon_i \dots \dots \dots Eq. 2$$

Where;

$\varepsilon_i \sim N(0, \sigma^2)$. Z_i^* is a latent variable that is observed for values greater than τ and censored otherwise. The model can be generalized to take account of censoring both from below and/or from above. It can also take account of interval censored data. The observed Z is however defined by the following measurement equations:

$$Z_i = \begin{cases} Z^* & \text{if } Z^* > \tau \\ \tau_z & \text{if } Z^* \leq \tau \end{cases} \dots \dots \dots Eq. 3$$

In the typical Tobit model, it is assume that $\tau = 0$ i.e. the data are censored at 0. Thus, we

have

$$Z_i = \begin{cases} Z^* & \text{if } Z^* > 0 \\ 0 & \text{if } Z^* \leq 0 \end{cases} \dots \dots \dots Eq. 4$$

Note that:

X_i = vector of explanatory variables

ϵ_i = the error term

β = vector of the parameter estimates

The explanatory/independent variables are:

X_1 = Food Security Status Perception (0 is insecure and 1 is secured)

X_2 = Age of Household Head in years

X_3 = Education Level of Household Head

X_4 = Adjusted Household Size

X_5 = Amount Spent on Healthcare per Head of Family Member/year in naira

X_6 = Total Farm Size (Ha)

X_7 = Consumer Credit access (₦)

X_8 = Membership of Farmers Association in years of membership

X_9 = Market Accessibility (0 is non-access and 1 is access)

X_{10} = Household Total Income (Farm + Non-Farm Income) (₦)

X_{11} = Household Annual Crop Production in Grain Equivalent

X_{12} = Dependency Ratio

3.4.4 Community food security assessment

Community food security has an impact on all community members through an implicit recognition of the role of the larger food system in ensuring food security (Winne, (2005). The food system encompasses a broad range of food chain components, including agriculture, fishing, hunting, gathering other food production, manufacturing, distribution, marketing, the availability of affordable outlets for quality food, the involvement of citizens, food producers, and various organizational and governmental food-related policies. But for this study, our assessment covers the profiling of the following using the United State Department of Agriculture (USAD) Community Food Security Assessment Toolkit, developed in by a team of multi-disciplinary experts drawn from the fields of economics, agricultural economics and extension, nutritionists, social workers and statisticians in 2002 (Cohen, 2002); and it was used to achieve objectives vi under:

1. Profile of community socioeconomic and demographic characteristics
2. Profile of community food resources
3. Assessment of household food security
4. Assessment of food availability and affordability
5. Assessment of community food production

3.4.4.1 Profile of community socioeconomic and demographic characteristics

The first step in the development of a community food security assessment is the gathering of information on the residents of that community. The questions guiding this part of the assessment include;

- i. Who are the people in the community?
- ii. What are their demographic characteristics?

- iii. What is their economic status?

The analysis plan for the profile of community characteristics focuses on descriptive analyses, using tables and graphs to present the data. The simplest analysis involved presenting the data as compiled or using them in graphic displays.

3.4.4.2 Profile of community food resources

To understand the adequacy of community food resources, you must begin by creating a profile of all existing resources. The questions guiding this profile include:

- i. Are Federal agricultural assistance programs available to help farmers in production?
- ii. What food resources and avenues are available in the community to help farmers procure food?

This profile helped us to understand how well equipped the communities are to meet the food-related needs of their residents. And few indicators would be participation in government assisted agricultural programmes, retail stores availability, number and types, consumer cooperatives society's number and types, market forms, number and types.

The analysis plan is as with the profile of community characteristics, the presentation of data collected for a profile of community resources are descriptive.

3.4.4.3 Assessment of household food security and coping strategy

The main questions driving this assessment are these:

- i. Is household food insecurity a problem that is directly or personally experienced for a significant number of farm households in the community?

- ii. How severe is the households' food insecurity among the farming members of the community?

Accurate measurement of household food security can help public officials, policymakers, service providers, and community groups assess the need for assistance, judge the effectiveness of existing programs designed to help such households, and identify population subgroups with unusually severe levels of food insecurity.

3.4.4.4 Assessment of food availability and affordability

Community food security also depends on the availability and affordability of a variety of food items sold through, production, retail and other food resources. The key questions for this assessment include:

- i. Is a variety of food available in retail stores and local markets?
- ii. Are the available foods affordable to low income households?
- iii. Are there farmers groups (consumer cooperatives) making thrifty purchases below prices sold by these retailers?

The assessment begins by using a food retail store survey to determine whether retail stores used by low-income residents and markets offer a variety of affordable foods. And simple descriptive statistics and presentation of results in charts and percentages helped in this assessment.

3.4.4.5 Assessment of community food production

Local agricultural and food production resources play a very important role in community food security. Key questions include

- i. Does the community have food production, value-added processing, or food distribution resources?

- ii. Do low-income households have unhindered opportunity to participate in food production activities?
- iii. Are locally produced foods sold through local food retailers?
- iv. What form of marketing integration is available for locally produced crops?
- v. How dependent is the community on food “importation”?

The data required for the community assessment survey relied on the use of Focus Group Discussion in two splits of six (6) persons each for men and women, to acquire qualitative data from each of the sampled communities. This is churned from Morgan (1992a) as quoted in SAGE Research Methods’ (2013) rules of thumb that, focus group projects most often (a) use homogeneous strangers as participants, (b) rely on a relatively structured interview with high moderator involvement, (c) have 6 to 10 participants per group, and (d) have a total of three to five groups per project. Also, qualitative approach to research as suggested by Kothari (2004) is concerned with subjective assessment of attitudes, opinions and behaviour. Research in such a situation is a function of researcher’s insights and impressions.

Such an approach to research generates results either in non-quantitative form or in the form which are not subjected to rigorous quantitative analysis.

3.4.5 Coping strategy index (CSI)

This was used to achieve objective vii. The basic idea of using the coping-strategy index tool is to measure the frequency of the coping strategies—how often is the coping strategy used, as well as its severity—what degree of food insecurity does the strategy suggest (Maxwell *et al.*, 2003).

Each item was ranked in order of severity and responses weighted so that greater weight is given to more severe measures. Items are then summed and the summed score represents the severity of food insecurity. The values are dimensionless and higher scores imply greater food insecurity.

For our construction of a coping index, twelve strategies or responses to food insecurity were identified on the basis of extensive literature survey in Nigeria. These are:

1. Buying from market
2. Eating less preferred food (e.g. fish for meat)
3. Borrow money or food from friends/relatives
4. Consumption of seed stock for next year
5. Reduced number of meals for adults
6. Work for food or money
7. Send out children for paid jobs
8. Sale of livestock
9. Gather wild food like hunting/scavenging
10. Sale of assets like land
11. Stealing
12. Migrate to cities

The scoring procedure is as shown in Table 3.2. The more severe coping strategies are allocated higher score while the less severe coping strategies scored lower. For instance migration to city strategy is scored 8 while buying from market is scored 1. Weights were assigned to each Food Coping Strategy (FCS) used in the communities according to the method of Maxwell *et al.*, (2003) (See Table 3.2).

The score of each FCS was obtained by multiplying the numeric value presented from the frequency of usage by the weighted number (severity ranking, as indicated in Table

3.2) of a coping strategy. For example, respondent 1 employed and reported frequency of use of only FCS 1, 4, and 5, and by multiplying frequencies by score weights, the FCS score is calculated as follows:

$$\text{FCS 1: } 3 \text{ (frequency of usage)} \times 2 \text{ (weight)} = 6 \text{ (FCS score)}$$

$$\text{FCS 4: } 2 \text{ (frequency of usage)} \times 6 \text{ (weight)} = 12 \text{ (FCS score)}$$

$$\text{FCS 5: } 1 \text{ (frequency of usage)} \times 7 \text{ (weight)} = 7 \text{ (FCS score)}$$

The total FCS score for respondent 1 is therefore 25. This sum is rather referred to as the Coping Strategy Index (CSI) score for each respondent.

The foregone were weighed considering usage of strategy on basis of every day, very often, very rarely and never by 3, 2, 1 and 0 multiples respectively.

The severity level of food insecurity can then be computed from the FCS scores of respondents. All FCS score greater than the average (mean) score is rated severe food crisis while those less than the averages FCS score is rated not severe (Devereux, 2001 and Mjonono *et al.*, 2009). The mean FCS is the cut-off mark.

Table 3.2 Ranking Procedure of the Food Coping Strategy

Ranking	Severity Weight	Severity Ranking
Buying from Market	1	2
Eating less preferred food	2	4
Borrowing money/food from friends/relatives	2	4
Rationing adult meal	3	6
Sale of livestock	3.5	7
Working for money	4	8
Consumption of seed stock	4	8
Sending out children to work for money	4.5	9
Scavenging/Gathering wild food	5	10
Sale of asset like land, house	6	12
Stealing	7	14
Migration to city	8	16

Source: Computed from Literature Survey, 2014

3.5 Selected Variables and Their Measurement

The variables selected and included in the Regression model are as follows:

1. Food Security:- Two objective methods of food security measurements have been widely used in most security studies (Maxwell, 1996). One is to estimate gross household production and purchases over time, estimate the growth or depletion of food stock held over that period of time and presume that the food that has come into the household's possession and "disappeared" has been consumed. The other method is to undertake food consumption recall for individual members of a household or for the household as a whole and analyze each type of food mentioned for calorie content. Then a 7-day or 3-day recall method may be used. This study will use the first approach.

2. Age of Household Head:- Age is the number of years of household head which is measured in years. It is assumed that the older a farmer, the more experienced he will be; this invariably might lead to increased production and income.
3. Household Farm Income:- This is the total income accruing to the household from farming activities (crop and livestock production). The *a priori* expectation is that there is a positive relationship between farm income and food security.
4. Household Non-Farm Income:- This is the total Income from other sources apart from farming. It is expected that with increasing Non-farm income, the farmer is economically more empowered to purchase food and therefore directly increases the chances of food security status.
5. Household Consumer Credit Access:- This was measured as the sum of consumer credit accessed during the production year. It is expected to positively affect food security status.
6. Household size:- The total number of persons living with the respondent at the time of survey. A negative relationship is expected to exist between household size and food security.
7. Farm Size:- It is the size of the respondents' farm in hectares. It is expected that a household with more land will produce more crops and more marketable surplus thereby being food secured.
8. Household Annual Crop Production:- Total Crop production by the household in Kg grain equivalent (See Appendix 3). Availability of food is one of the very important food security indices. Therefore, the more a household annual crop production the higher the probability of being food secured.
9. Household Head Educational Level:- This was measured in stages and level of schooling by farm household head. It is expected that as the years of education of household head increases, so does his range of work-related skills and ability to

acquire new skills. Thus, it is expected that higher education will be associated with higher crop production, more commercially oriented agriculture. Therefore, a highly educated household head is expected to have a food secured household.

10. Number of dependents:- Number of persons in a farm household who cannot contribute to the economy of the household. A negative relationship with food security status of household is the *a priori* expectation in this instance.
11. Adjusted Household Size:- This measurement is adopted from Appendix 2. It is expected to have a negative relationship with the food security status of farm households.
12. The Error Term:- The error term is included in the models to account for specification errors arising from incorrect inclusion of variables or inaccurate recording of observations.

CHAPTER FOUR

Results and Discussion

This chapter discusses the results of the socio-economic characteristics of respondents as they relate to the food security status of households and the communities. Also, results of the expenditure and consumption patterns, food system and food security indices, determinants of food security status, community food security assessment and coping strategies of household are also presented and discussed.

4.1 Demographic and Socio-Economic Characteristics of Respondents

Socio-economic information of the farmers with regards to food security is very important as studies have shown that outstanding factors which include age of farmers, gender, level of education, household size, farm size, non-farm income, extent of involvement in farming have been shown to affect the productivity of farmers and invariably their wellbeing (Sanni, 1991 and Ojeleye, 2002).

4.1.1 Age of household heads

The age distribution and the years of farming experience of farmers in the study area are presented in Table 4.1. The age of the farmer is expected to have effect on his level of activities. It determines the quality and quantity of work he can do on the farm. This is an important measure of farm productivity. The age grouping can be divided into say the active group and dependent age group. It can be seen as shown in Table 4.1 that about 80% of the respondents were between the age ranges of 21-50 years which is the active age range. At this age, the respondents are expected to be virile and able to do a lot of farm work if given proper incentives. About 20% of the sampled respondents were of

not-so-active age group of less than 20 years and above 50 years, though some farmers even in their fifties can be very actively involved in farming. The mean age was 39.1 years and the standard deviation was 10.765. This result implies that the farm households were active, virile and productive. Babatunde *et al.*, (2007) found out that the older the household head, the lower the probability that the household would be food insecure.

Table 4.1 Age Distribution of Household Heads in Years

Age Group	Frequency	Percentage
<20	4	1.64
21-25	16	6.56
26-30	33	13.52
31-35	55	22.54
36-40	47	19.26
41-45	28	11.48
46-50	16	6.56
51-55	16	6.56
56-60	22	9.02
61-65	5	2.05
>65	2	0.82
Total	244	100
Range 18-68,	Mean 39.1,	Standard Deviation 10.765

4.1.2 Years of farming experience of household heads

Table 4.2 shows that 87.3% of the respondents had farming experience of more than 10 years. This represented a sizeable percentage of farmers in the sampled area. It is expected that with increasing years of farming, farmers gained experience in the art of farming to the advantage of gaining understanding and increasing productivity. This also assists to identify the respondents as farmers who had perhaps lived all their lives farming. From Table 4.2, only 12.7% of the respondents had been into farming for less

than 10 years. The mean years of farming experience was 22.9 years and so they can therefore essentially be categorized, the population, as a farming population.

Table 4.2 Years of Experience Distribution of Household Heads

Yrs. of Exp. Class	Frequency	Percentage
<5	9	3.69
6-10	22	9.02
11-15	27	11.07
16-20	58	23.77
21-25	42	17.21
26-30	30	12.30
31-35	16	6.56
36-40	21	8.61
41-45	11	4.51
>46	8	3.28
Total	244	100
Range 3-55,	Mean 22.9,	Standard Deviation 11.077

4.1.3 Sex distribution of household heads

The sex distribution of the respondents is given in Table 4.3. The gender of the household head is expected to have effect on the level of involvement in farming activities and so food security. This also determines the kind of activities involved in on the farm and the type of crop cultivated. From the survey conducted, it was observed that only 12.3% household heads were women and 87.7% of the respondents were men.

Table 4.3 Sex Distribution of Household Heads

Gender	Frequency	Percentage
Male	214	87.70
Female	30	12.30
Total	244	100

4.1.4 Marital Status of household heads

Among the sampled farmers, only 9.4% were unmarried as shown in Table 4.4. About 91% of the respondents were married and 4.51% were widowed. The widowhood status may have some economic implications particularly in some cultures where little or no regards is accorded women when it comes to the acquisition of certain factors of production like land. This of course have negative consequences on food security status particularly if the household is large. For single households, the number of mouth to feed is one and the likelihood of food insecurity is almost non-existent particularly if the farmer has access to factors of production *ceteris paribus*.

Table 4.4 Marital Status of Respondents

Marital Status	Frequency	Percentage
Single	9	3.69
Married	221	90.57
Widowed	11	4.51
Divorced	3	1.23
Total	244	100

4.1.5 Household size

The distribution of respondents based on household size is given in Table 4.5. The household size means the number of people in the house, which includes wives, children and dependents who reside within the family and eat from the “same pot”. In subsistence agriculture as practiced in the study area, household size is very important as it determines to a large extent the supply of labour to the farm. However, large households with many dependents (children and the elderly) could be of little or no advantage to the farming household when it comes to food security. In fact, it can be a disadvantage as this would mean having more none productive mouths to feed. As shown in Table 4.5,

65.6% of the respondents had household sizes ranging between 6 -15 persons. This was the predominant range of the family sizes. Household size ranging between 16 and above amounted to 2.9%. Of course, this could mean higher family and cheap labour contributing to the farm family economy but for closer examination of distribution of children above and below 14 years of age.

Table 4.5 Distribution of Respondents Household Size

Household Size	Frequency	Percentage
<5	77	31.56
6-10	115	47.13
11-15	44	18.03
>16	7	2.87
Class Total	244	100
Range 1-27,	Mean 7.5,	Standard Deviation 4.019

4.1.6 Children age distribution

Looking closely at the distribution of the number of children below and above 14 years of age, and their gender, a better assessment of family labour with respect to family size could be deduced. This is presented in Table 4.6

The distribution of respondents' number of children with respect to age of less or greater than 14 years is a very important factor when the household size, dependent age group and family labour availability are to be considered. The male children with ages above 14 years are expected to be more actively involved in farming activities than those below 14 years of age or even females below or above that same age bracket. The culture and tradition of the people also allow for female children above the age of 14 years to be married out while the male children are made to marry while still in their father's

compound. Consequently, more male children above age 14 years may mean more family labour and more farming activities which can lead to higher agricultural production and consequently food security.

As shown in Table 4.6, the number of male children above 14 years, which is an important factor in family labour availability, ranged from 0—11 among the farmers. It is expected that these children would contribute to the farm family economy and by that increase the likelihood of household food security status. For the children with ages below 14 years, the male children ranged between 0—7 and female 0—5. This could mean more consumers who did not contribute substantially to the household food economy, and could potentially lower food security.

Table 4.6 Distribution of Number of Children in the Households

Variables	Male Children \leq 14	Male Children $>$ 14
Population Mean	1.50	3.21
Standard Deviation	0.955	1.735
Population Range	0—7	0—11
Variance	0.911	3.012
	Female Children \leq 14	Female Children $>$ 14
Population Mean	1.53	1.76
Standard Deviation	0.848	0.899
Population Range	0—5	0—6
Variance	0.799	0.808

4.1.7 Household heads' level of education

Education in agricultural production would assist the farmer to test and accept innovations available to him. It would enhance his ability to make informed and accurate decisions on the management of the farm. This also could be a source of additional

income. The level of literacy among farmers in the study area as measured by ability to read or write in Arabic or Hausa languages was high. The level of education of the respondents is given in Table 4.7. Few of the farmers were also observed to have little knowledge of English language acquired through some formal or informal means. This could aid in the interpretation and understanding of extension messages, influence the rate of adoption of new technologies and efficiency of resources in agricultural production. These are all positive factors to the household food economy. It was found that 10.3% of farmers had no formal education. About 24% had Quranic (Arabic) education while 7.4% had adult education. About 24.2, 27.9% and 6.6% had primary, secondary and post-secondary education level respectively (See Table 4.7).

Table 4.7 Distribution Household Heads by their Level of Education

Education Level	Frequency	Percentage
No Formal Education	25	10.25
Arabic Education	58	23.77
Adult Education	18	7.38
Primary Education	59	24.18
Secondary Education	68	27.87
Post-Secondary Education	16	6.56
Total	244	100
Standard Deviation 1.516		

4.1.8 Respondents level of involvement in agriculture

About 71% of the respondents had farming as their primary occupation. In other words, farming was their full-time job while 28.6% had farming as part-time job, meaning farming was secondary occupation. The implication of undertaking farming as a part time activity might be manifested in the level of commitment of the farmers to farming, that is, in terms of productivity. It is arguable that the farmers in part-time farming tend to divide their attention, thus instead of concentrating fully on their farming activities and

carry out necessary operations at the right time, they ration their time, delaying the performance of such operations as weeding, fertilizing, etcetera. Since farming is a time specific activity, this tends to affect performance of the crop and thus the yield and income of such farmer. Some farmers may use hired labour to perform such functions with little supervision, this in turn impedes the good performance of crops and hence, the risk of food insecurity.

4.1.9 Household farm income

The Income from farming is a major determinant of per capital household expenditure and food security status. Majority of the respondents (66.4%) had farm income less than ₦200,000:00 per year (Table 4.8). The reason for this relatively low income could be due to the fact that farm household usually satisfy their food needs before excess are sold in the market. The result also shows that average farm income was found to be ₦180,914:50k—lower by ₦35,085.50, that is 16.2%, to the national minimum wage of ₦216,000 per annum (at ₦18,000 per months). Only just 7.8% of the respondent had farm income above N500,000:00. Farmers major sources of farm income include income from arable crop farming, tree crops and livestock production. Babatunde, *et al.*, (2007), have strongly suggested that the higher the farm income of the household, the higher the probability that the household would be food secure. This is as expected owing to the *a priori* view that increased income, other things being equal, leads to increased access to food. Besides, this result suggests that an average farmer in the study area was not obtaining from his/her farm, the nation's minimum wage. The implication of this is that labour in agriculture can easily be lost to other sector offering higher wage as it seems that those offering their services to other sector are better off than an average farmer, a

disincentive to agriculture. This is particularly so for those farmers who have opportunity of getting off-farm employment.

Table 4.8 Distribution of Households by their Farm Income per Year (₦)

Farm Income/Year (₦)	Frequency	Percentage
< 100,000	73	29.92
100,001-200,000	89	36.48
200,001-300,000	47	19.26
400,001-500,000	16	6.56
500,001-600,000	15	6.15
600,001-700,000	3	1.23
>700,000	1	0.41
Total	244	100
Range ₦20,000 - ₦655,000 Mean ₦180,914.10k Stand. Dev. 120021.752		

4.1.10 Household non-farm income

Table 4.9 shows that only 68.9% of the respondents had non-farm income, the remaining 31.2% did not have additional income other than income earned from sales of farm produce. Even amongst the respondents that had non-farm income, 55.4% of them had income less than ₦100,000. Only 22.6% of these respondents had income between ₦100,00 to ₦200,000, while only 4.8% had non-farm income above ₦400,000. Table 4.10 however shows that the least profiting non-farm activity was commercial motorcycling with average income of ₦67,458.82k, while Civil service accounts for the highest at ₦321,083.41k. The average income was given as ₦130,407.10k per annum. Tom Reardon in an undated e-book titled Rural Non-farm Income in Developing Countries, has suggested the following usefulness of non-farm income vis-à-vis food security. First, evidence shows that non-farm income is an important factor in household economies and therefore also in food security, since it allows greater access to food. This

source of income may also prevent rapid or excessive urbanization as well as natural resource degradation through overexploitation. Second, in the face of credit constraints, non-farm activity affects the performance of agriculture by providing farmers with cash to invest in productivity-enhancing inputs. Furthermore, development of non-farm activity in the food system (including agro processing, distribution and the provision of farm inputs) may increase the profitability of farming by increasing the availability of inputs and improving access to market outlets. In turn, better performance of the food system increases rural incomes and lowers urban food prices. Third, the nature and performance of agriculture, themselves affected by agricultural policies, can have important effects on the dynamism of the non-farm sector to the extent that the latter is linked to agriculture. This sector grows fastest and most equitably where agriculture is dynamic – where farm output is available for processing and distribution, where there are inputs to be sold and equipment repaired and where farm cash incomes are spent on local goods and services.

Furthermore, it is expected that non-farm income will have a direct effect on food security status as farmers are well disposed to economic power to buy food. Babatunde and Qaim (2009), as best illustrated this when they found that high-value food such as fruits, vegetables and animal protein are positively linked to non-farm income. Consequently upon which higher income causes a better access to more nutritious food.

Table 4.9 Distribution of Households by their Non-Farm Income per Year (₦)

Non-Farm Income/Year (₦)	Frequency	Percentage
< 100,000	93	55.36
100,001-200,000	38	22.62
200,001-300,000	29	17.26
400,001-500,000	5	2.98
>500,000	3	1.79
Total	168	100.00
Range ₦15,000–₦835,000	Mean ₦130,407.10k	Stand. Dev.109791.182

Table 4.10 Distribution of Households by their Non-Farm Activities & Income per Year (₦)

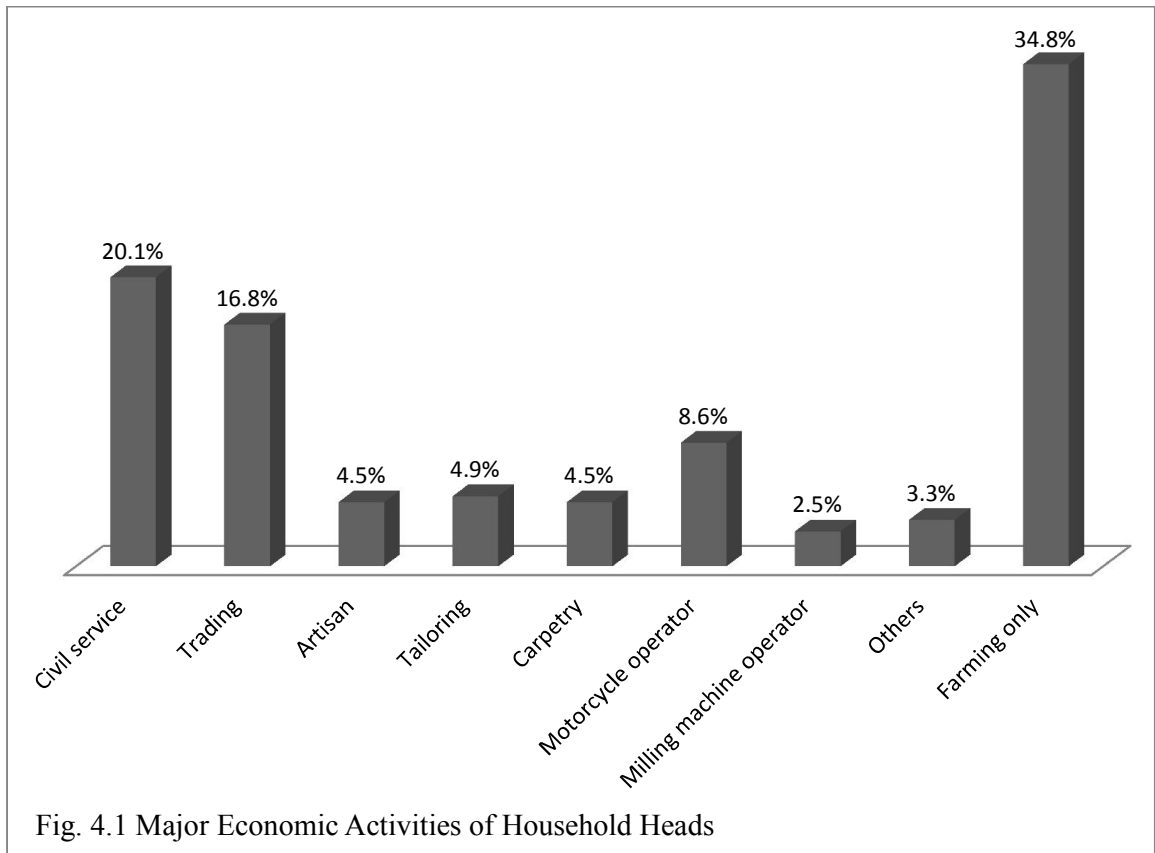
Non-Farm Activity	Mean (₦)	Range (₦)	Respondents
Civil service	321,083.41	229,200-780,000	49
Trading	154,179.50	36,000-850,000	41
Artisanship	74,000.08	38,000-156,000	11
Tailoring	98,000.01	30,000-160,000	12
Carpentry	116,230.82	48,000-240,000	11
Commercial Motorcycling	67,458.82	35,000-108,000	21
Milling	104,400.00	54,000-156,000	6
Other(s)	295,428.60	120,000-908,000	8

4.1.11 Major economic activities of household heads

Figure 4.1 shows that about 35% of respondents, representing 85 farmers, were full time farmers who partook in no additional economic activity than farming. This set of farmers depended solely on farming for their livelihood. 49 respondents, representing 20.1% of the sampled farmers, were engaged in civil service other than farming activity. The figure for traders was also high as there were 41 farmers (16.8%) involved in trading. 4.5%, 4.9%, 4.5%, 8.6% and 2.5% of the respondents were also involved in other

occupations like artisanship, tailoring, carpentry, commercial motorcycling (achaba riding) and milling machine vocations respectively. Other respondents' economic activities include clergy, cobblers and mechanics which sums up to about 3.3% of the respondents.

It has been mentioned earlier in the effect on non-farm income, that there exist a direct relationship with food security, there may also be however, more indirect effects when non-farm activities have an influence on farm income through inter-linkages in factor use. When there are labor constraints, non-farm activities will reduce the labor input in farming (Pfeiffer *et al.*, 2009; Huang *et al.*, 2009). On the other hand, when capital is scarce, non-farm activities and income can contribute to higher agricultural input use by relaxing liquidity constraints. The outcome also depends on development opportunities and household strategies in a specific context. For instance, Kilic *et al.*, (2009), found that rural households in Albania tend to use their non-farm earnings to move out of agriculture, whereas Oseni and Winters (2009) showed that non-farm activities in Nigeria help households to improve their farm production through higher input use, including more employment of hired labor. This is consistent with our results as will later find out that non-farm income is positively and significantly related to household food security.



4.1.12 Households farm size distribution

Farm size is the total land cultivated by household head in hectares. Farm size is an important fixed factor in agricultural production. This is because it determines to a large extent the level of agricultural production (that is, small or large scale production). The size of the farm cultivated by a farmer is a function of population pressure, family size, labour availability and experience of the farmers (Imonikhe, 2004). Apart from these factors, source of farm land and ownership determine to a large extent the farm size of the farm holding. As indicated in Table 4.11, majority of the farmers had farm sizes less than 3 hectares (86.5%). Only just about 13% had farmlands in excess of 4 hectares. The average land holding was 2.05 hectare. This implied that most of the farmers were small scaled despite the large family size, young and energetic household heads. Small farm

size impedes productivity, crop diversification and consequently food security status of farm households.

Table 4.11 Respondents' Distribution of Land Size (Ha)

Land Size (Ha)	Frequency	Percentage
<1	66	27.05
2-3	145	59.43
4-5	27	11.07
>5	5	2.05
Total	244	100
Range 0.5-6.5Ha,	Mean 2.05Ha,	Standard Deviation 1.207

4.1.13 Land ownership structure and fragmentation

Closely related to farm size is the land tenure system practiced in the area. Ownership of land determines level of production of farm household. Table 4.12 shows that 75.4% of the farmers acquired their farmlands by inheritance. Those that obtained farmlands through gifts were just about 21%. Purchase of farmland was the lowest, accounting for just about 5% of the sampled farmers in the study area and the average purchase per hectare was ₦20,714.29k by a range of ₦15,000 to ₦25,000. Rent of farmland per hectare is presented in the table, Table 4.10, as ₦1595.00 on the average, ranging from ₦400 to ₦4,000 per hectare.

The implication of this result indicating majority farmland acquisition through inheritance is that, the right to use land is more indigenous for farm households. Ownership in this way have impediments to increasing production especially for households who do not inherit lands and have little or no money to acquire one. In fact, from the survey conducted, 72.1% of the total sample farmers desired to acquire more

farmlands for cultivation. Only about 28% of the respondents indicated that they did not have desire to acquire more farmlands.

Table 4.12 Respondents' Distribution of how the Acquire Land &Rate of Acquisition (₦)

Farmland Access Type	Frequency	Percentage
Inheritance	184	75.41
Purchase	12	4.92
Gift	51	20.90
Rent	43	17.62
Total	290*	100
Purchase rate per Ha	₦15,000 to ₦25,000	Mean ₦20,714.29
Rent per Ha	₦500 to ₦4, 000	Mean ₦1,595.00

*Multiple responses

Table 4.13 however, presents the distribution of the fragmentation of farmlands. It is to be noted that the majority of the farmers, about 82.4% had fragmented farmlands in the excess of 3 plots. Fragmentation of farmlands impedes large scale production and disallows farmers from enjoying the advantage of the economics of scale. In other words, productivity is impeded with increasing land fragmentation and consequently food security status of farm households.

Table 4.13 Respondents' Distribution of Land Fragmentation Structure

Farmland No	Frequency	Percentage
<2	43	17.62
3-5	181	74.18
>5	20	8.20
Total	244	100
Range 1-7,	Mean 3.6	

4.2 Expenditure and Consumption Pattern of Farm Families

The consumption pattern of a household is the combination of qualities, quantities, acts and tendencies characterizing a community or a human group's use of resources for survival, comfort and enjoyment (Eionet Gemet Thesaurus (online), 2012). In determining living standards and invariably food security, determination of income and consumption levels are the most popular approaches. By the reason of the complexities in the measurement of income and how it varies, consumption and expenditure pattern are being used to give a better indication (NBS, 2012). The NBS (2012), further posit that consumption pattern depicts the level of welfare and poverty. Tables 4.14 and 4.15 give the food and non-food expenditure pattern of respondents.

4.2.1 Household annual food expenditure pattern

As shown in Table 4.14, it was found that for the total expenditure of the respondents, food items expenditure accounted for 52.6% while non-food accounted for 47.4%. Note that this did not take into account, own production the farm families produced and consumed. Also as indicated, not all household responded to have consumed all the items. For instance, only 11.5% of the sampled farmers responded to have bought Maize for family consumption. This is simply because most farmers cultivate maize and so there is little or no need to buy this particular food item in the market.

From the results presented in Table 4.14, the food commodities with high expenditure included tubers, 24.7% of food and 13% of total expenditure, meats having 21.7% of food and 11.4% of total expenditure and Rice with 17% of food and 8.9% of total expenditure. The mean food expenditure of the farmers per annum is given as ₦113,351.10k. It is to be noted that fruits, beverages and dairy products consumption

was rather on the low side. Fruits consumption reflected from amount expended on it was just 1.5% of total expenditure with only just 37.3% of the sampled farmers responding to consuming the food item. This may not be unconnected with the cultural value attached to fruits. In most rural communities, fruits are not seen as part of whole diet required for proper and active lifestyle. They are mostly seen as dessert, something eaten only to pass the time and of no real significant nutritive value of worth. So, most farmers consume fruits as the occasion presents. Hardly will a farmer offer to pay for or buy fruit for consumption. It is also to be noted that 71.7% of total expenditure on food were on high starch food items like rice, maize, other cereals, tubers, bread and sugar. These results leave a pattern of skewedness towards highly starchy food consumption to the detriment of adequate balanced diets needed for an active and healthy lifestyle. The reason for this may not be farfetched. Agriculture in the study area is indigenous and mode of operation is traditional requiring largely human labour. The farmers therefore consume high energy giving foods to be able to meet up with the high labour demands of farm operations. Besides, most farmers are not aware of what is referred to balanced diet. They would rather prefer bulky, much-filling starchy food.

Table 4.14 Distribution of Respondents Household by their Annual Food Expenditure Pattern (₦)

Commodity	Range (₦)	Responses (%)	Mean (₦)	Expend. Per Day(₦)	% of Food	% of Total Expend.
Rice	2,880-43,200	193 (79.1)	19,221.76	52.66	16.96	8.91
Maize	4,000-13,000	28 (11.5)	7,250.00	19.86	6.40	3.36
Other Cereals	1,500-36,000	81 (33.2)	7,346.91	20.13	6.48	3.41
Cowpea & Soybean	1,000-20,000	68 (27.9)	9,919.12	27.18	8.75	4.60
Tubers	6,000-96,000	166 (68.0)	27,942.41	76.55	24.65	12.96
Bread	1,350-22,500	195 (79.9)	9,858.46	27.01	8.70	4.57
Meats	8,100-56,000	204 (83.6)	24,647.45	67.53	21.74	11.43
Poultry products	1,000-26,100	141 (57.8)	5,193.61	14.23	4.58	2.41
Sea Food	2,700-35,100	198 (81.2)	14,638.64	40.11	12.91	6.79
Oil, fat & oil rich nuts	600-24,000	243 (99.6)	8,225.51	22.54	7.26	3.81
Vegetables	750-15,000	244 (100)	5,394.88	14.78	4.76	2.50
Fruits	700-8,000	91 (37.3)	3,256.04	8.92	2.87	1.51
Condiments	150-16,000	244 (100)	6,528.12	17.89	5.76	3.03
Sugar	750-30,000	237 (97.1)	9,606.33	26.32	8.47	4.45
Bev. & dairy prods.	600-27,000	90 (36.9)	6,601.11	18.09	5.82	3.06
Total	27,100-272,800	Of 244	113,351.1	310.55	100.00	52.56

The more developed a society becomes, the less it spends on food and the more it spends on non-food items (NBS, 2012). However, as mentioned earlier, skewedness is shown in the consumption pattern presented in the Tables 4.14 and 4.15 in favour of food item. This is a feature noted with developing economy.

4.2.2 Household annual non-food expenditure pattern

Looking at the non-food expenditure pattern, the singular item with the highest rate of response and amount expended was medical expenses. The mean amount expended for medical expenses among the respondents was ₦21,093.03k per annum, accounting for

20.6% of non-food and 9.8% of total expenditure. Educational expenses came second as 74.2% of farm families spent an average amount of ₦16,718.23k on school fees, material and school uniform yearly. This accounted for 16.3% of the non-food expenditure and 7.8% of the total expenditure. Expenditure on clothings, beddings and foot wares came very close to education expenses, as this amounted to 15.6% of non-food and 7.8% of total expenditure of farm families in the study area.

About 91% of the respondents sampled expended ₦10,309.50k on ceremonies yearly while 93.85% of the farmers spent ₦8,419.21 on religious activities. Just about 19% of the respondents expended an average rent of ₦16,195.65 within the range of ₦4,000 to ₦40,000 per annum. The result shows that these farmers were highly indigenious, who build their houses themselves on family-inherited lands and live essentially within a homogenous community. Communication expenditure is presented as 9.3% of the non-food and 4.4% of total expenditure. Despite the low communication expenses, this is a positive indication for the farmers as the result showed that 98% of the respondents accessed communication facilities. Communication can assist the farmers and the community to improve their marketing system as they are better disposed to performing marketing functions as they take communication advantages. This suggests that farmers in the study area were more likely and predisposed to the use and taking the vast advantage of information technology largely encompassed in communication system.

Table 4.15 Distribution of Respondents by their Pattern of Expenditure on Non-Food Items (₦)

Commodity	Range (₦)	Responses (%)	Mean (₦)	Expend. Per Day(₦)	% of Non-Food	%Total Expend.
Rent	4,000-40,000	46 (18.9)	16,195.65	44.37	15.83	7.51
Educ. expenses	2,000-11,0000	181 (74.2)	16,718.23	45.80	16.34	7.75
Transport	2,000-112,000	241 (98.8)	13,216.60	36.21	12.92	6.13
Fuel/Kerosene	1,000-22,000	236 (96.7)	4,906.35	13.44	4.80	2.28
Medical expenses	1,200-105,000	244 (100)	21,093.03	57.79	20.62	9.78
Cloth. & footwear	2,000-47,000	208 (85.3)	15,913.46	43.60	15.56	7.38
Elect. appliances	150-35,000	147 (60.3)	6,125.51	16.78	5.99	2.84
Furniture	1,800-48,000	56 (23.0)	11,648.21	31.91	11.39	5.40
Ceremony	1,000-95,000	221 (90.6)	10,309.50	28.25	10.08	4.78
Religious activities	1,200-45,000	229 (93.9)	8,419.21	23.07	8.23	3.90
Communication	1,000-22,000	239 (98.0)	9,540.17	26.14	9.33	4.42
Gift	500-30,000	104 (42.6)	3,371.15	9.24	3.30	1.56
Total	17,200-293,300	Of 244	102,297.70	280.27	100.00	47.44

4.2.3 Farmers daily expenditure

Poverty and household welfare are sometime measured in amount expended daily by households. Table 4.16 presents the distribution of household heads daily expenditure in Naira. Only 23.8% of the respondents spent between ₦100 to ₦300 per day. About 58% of the farmers spent between ₦300-₦700 per day while only about 3% of the respondents accounted for by just 7 farmers in the total of 244 respondents, spent over ₦1,000 in a day. The mean score of farmers daily expenditure on food was ₦521.80k and this ranged between ₦100- ₦2,000 daily. As much as it might seem that a mean daily expenditure of ₦521.80k is higher than the \$1-\$1.25 of the established World Bank standard of daily expenditure per day, it is to be noted that this expenditure was at the family-household level. Earlier, the average farm-household size in the study area was

given as 7.5. The average daily expenditure per capita would therefore be ₦69.57k, a sum less than the 1\$ a day (at ₦157 rate of exchange) by ₦87.43k. The per capita daily expenditure was a paltry 44.3% of established World Bank standard, therefore the poverty level among the farmers can be said to be high.

Table 4.16 Distribution of Respondents Daily Expense in Naira (₦)

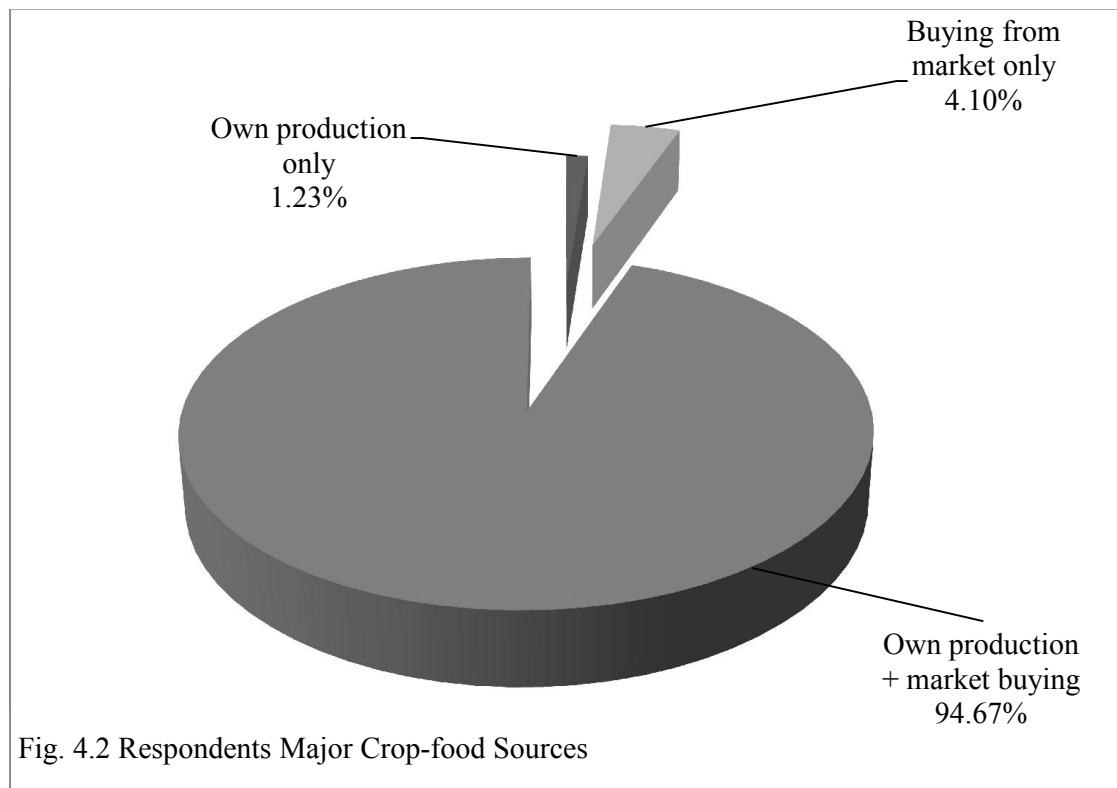
Expenditure (₦)	Frequency	Percentage
100—300	58	23.77
301—500	87	35.66
501—700	54	22.13
701—900	30	12.30
901—1100	8	3.28
1,101—1,300	3	1.23
1,301—1,500	3	1.23
>1,500	1	0.41
Total	244	100
Range ₦100-₦2,000 ,	Mean ₦521.80k,	Standard Deviation 272.25

4.3 Household Food System

Food system refers to a complex system that describes how food is delivered from the farmers to the consumers in relation to how consumers source for food. It includes approaches that advocate seeking comprehensive solutions to solve the national, regional and community's food and farming crises as suggested by Hendrickson (2001). The food systems are part of community based economics; producing, processing and eating food where it is grown keeping benefits in the local community to be shared among all its members (Kloppenburger *et al.*, 2000).

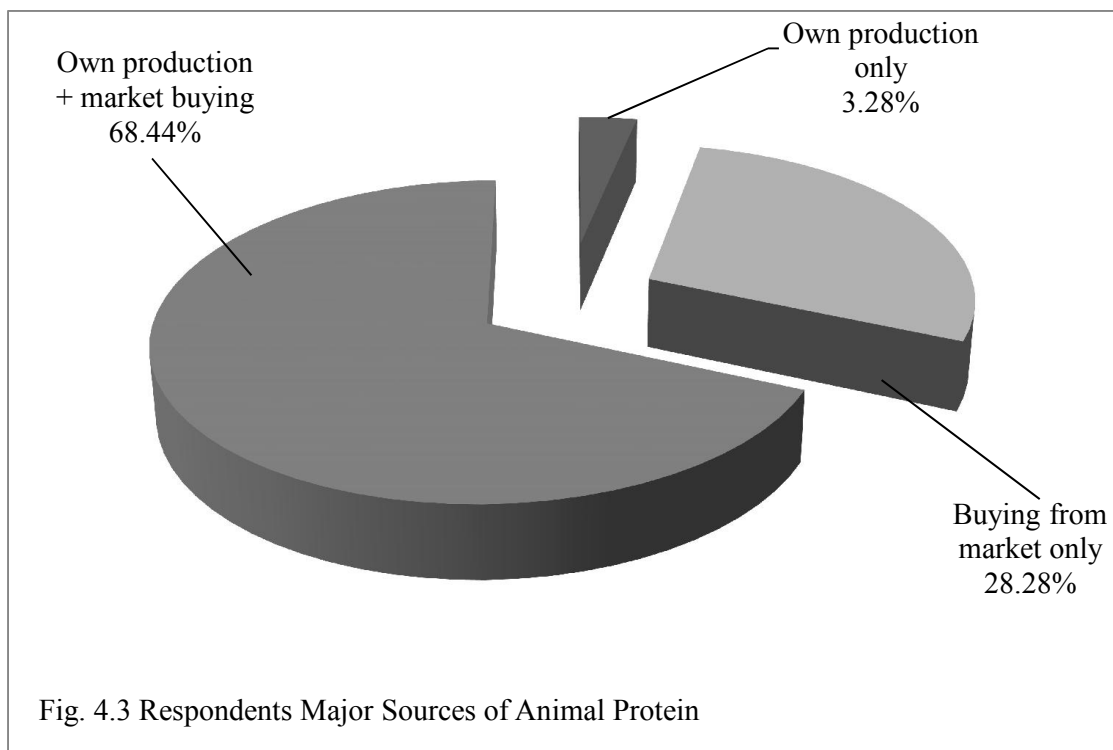
4.3.1 Source of crop food

Figure 4.2 presents a pie chart of respondents' major sources of crop food. Only 1.2% of the sampled farmers sourced their food from own production only. About 4.1% of the respondents from market only, while 94.7% accessed crop food from both own production and market. This result shows that the respondents were well dependent on food sourced from the market as well as from the one produced from their farms. This means that the farmers are not immuned to fluctuations and changes resulting from market indices either to the negative or otherwise. It might be important also to mention that the effect of trade globalization can be felt by the farmers in the study area. Webb and von Braun (1994) have opined that this can result in "a catastrophic disruption of society as manifested in a cumulative failure of production, distribution and consumption systems", when community food source is largely affected by trade globalization.



4.3.2 Source of animal protein

Closely related to the above is source of animal protein by the respondents. Figure 4.3 presents the result of the survey conducted, showing that 8 of the sampled farmers, representing 3.3% of the total sample, sourced their animal protein from their own production. 69 farmers used the market only for their animal protein needs while for the combination of own production and market, 68.4%, representing 167 farmers sourced their animal protein needs from the market and own production.



4.3.3 Use of crop surpluses

It has been well documented that due to the dearth of infrastructural facilities such as good roads, processing and storage equipment as well as inadequate marketing information; huge quantities of agro – raw materials waste uncontrollably (Fakayode *et al.*, 2008 and Gernah *et al.*, 2013). In Nigeria, an excess of 10 million tonnes of grain

equivalent of food per annum conservatively estimated at over N825 billion was reported to be lost to spoilage and wastage occasioned by the lack of post-harvest management (NIFST, 2011). Assessment of food system in the area of study entails also the evaluation of what the farmers put their food surpluses to. Table 4.17 shows a distribution of what the farmers used their excess farm produce for. Multiple responses were observed in their response. About 93% of the total number of sampled farmers stored their food crops for future use in the form of consumption. This essentially portrays that the farmers were more or less into subsistence farming before anything else. Their production is first and foremost for immediate family consumption before whatever is left is sold in the market. Only 7.8% of the respondents noted that, most times, the excess farm produce waste away. It is to be noted however that 79.9% of the farmers sold their farm produce at a low price to avoid spoilage and for the fact that they did not have access to processing and storage infrastructure required to adequately store their produce or process to attract higher marketing margin. Agricultural Production at this level is largely term peasantry. This trend of partly commercial agricultural production is not new to small scale farmers as suggested by Pingali *et al.* (2005). Most developing countries have witnessed agriculture “moving away from traditional self-sufficiency” to an activity where “farm output is . . . more responsive to market trends” (Pingali and Rosegrant, 1995). The experience can lead to the goal of profit-making and income-oriented decision making as farm output is accordingly more responsive to market needs. This in the long run will have positive effect on the food security status of household and the community in general.

Table 4.17 Distribution of Respondents by what they do with their Crop Surpluses

Choice of	Frequency	Percentage
Storage for future use	227	93.03
Give excess away as gift	17	6.97
Most times excess waste away	19	7.79
Sale in the market at a low price	195	79.92
Total	458*	

*Multiple responses

4.3.4 Food shortage and causes

One of the indices of Food Insecurity Risk (R), which refers to event that increases food insecurity and lessens household food consumption, is the measurement of food shortages and causes which come from such factors as temporary marketing problems, wastages due to inadequate storage facilities, poor harvest, etcetera, are considered here. Table 4.18 presents the distribution of respondents' experience of food shortages, period of experience and causes. It was observed that 59.4% of farmers did not experience food shortage in the last five (5) years. Only 40.6% had experienced food shortage. Of the 99 farmers, 85 of them noted that the experience of food shortage had been between July-August, the months preceding harvest of new crops, while 14.1% noted that, their shortages were experienced between April and June. The relevance of this observation is to note when intervention program could be target to help out the farmers experiencing food insecurity. At this period, the stored food from the last harvest are largely depleted and at this time, farmers experience food shortages. It is to be noted however that it is at this period in farming that further commitment is needed from the farmers in the cultivation of food crops in terms of labour, application of fertilizer, etcetera. If at this period of increased agricultural activity is when the farmer experiences food insecurity, his health and wellbeing may be affected thereby impeding his involvement in

production activities. Coping strategies that involve working for money or food and sending our children to work for money or food may further impair the farmer's involvement in his own production activities, and a vicious cycle may result.

Looking at the response of farmers to their perceived causes of food shortage, inadequate money to buy food items during the lean periods ranked foremost, accounting for 72.7%. This has to do with farmers' economic empowerment as against their ability to procure food items, indicating the need for alleviation of poverty. Others include inadequate farm inputs such as fertilizer, pesticides, credit facilities etcetera. This accounted for 57.6% responses from the respondents. Inadequate storage facilities ranked second as a major cause of food shortage while, lack of innovation knowledge on appropriate technology or improved farm management practice and others like lack of assistance from friends and relations accounted for 4% cause of food shortage (See Table 4.18). In a similar study by Cohen and Garret (2009), they found out that the most important determinants of household food access are income and prices of food item, while in some food crisis and development literatures, the growing population pressures, land degradation, climate change, reduced income-generating opportunities, and a complexity of other factors, including the low status of women, are some of the factors working together to cause food crisis in some poorest countries in the world (Baro and Deubel, 2006).

Table 4.18 Distribution of Respondents by their Experience of Food Shortage, Period & Causes

Response	Frequency	Percentage
Never Experienced	145	59.43
Have Experienced	99	40.57
Total	244	100
Standard deviation	0.492	
Period of shortage		
April-June	14	14.14
July-September	85	85.86
Group Total	99	100
Causes of shortage		
Inadequate storage facilities	26	26.26
Inadequate money to buy food during lean period	72	72.73
Inadequate farm inputs e.g. fertilizer, pesticides	57	57.58
Lack of innovation knowledge on technology	17	17.17
Others	4	4.04
Group Total	176*	

*Multiple responses

4.3.5 Food shortage solution

As mentioned earlier, food system includes approaches that advocate seeking comprehensive solutions to solve the national, regional and community's food and farming crises. The farmers' response to what they perceived could be done to avoid food shortage is presented in Table 4.19. It is to be noted here that the response came from the 99, that is, 40.6% of sampled farmers who indicated that they had experienced food shortage of some kind in the last 5 years. About 57% of the respondents believed government intervention in food production activities will go a long to combat the menace of food crisis. It is expected that production inputs such as fertilizer, herbicides, pesticides, and improved seeds could be provided through institutional sources in good

time, in enough quantities and affordable costs. Such institutions could include Ministries of Agriculture at federal and states levels, the local governments, research institutes, NGOs and organized farmers group/associations to bail out farmers' weak links in these production essentials. Furthermore, 42.4% were of the opinion that what was needed to avoid food shortages was to make improved technological farm inputs and productivity enhancing practices available at affordable prices. About 28.3%, 13.1% and 9.1% of the respondents opted for acquisition of credit facilities, provision of storage facilities and better health care services respectively as laudable effort to tackle the issue of food shortage in the food system and economy of farmers. Other possible efforts like provision of farm inputs (particularly fertilizer) at suitable time and the subsidizing of these inputs, accounting for about 16.2% is believed to be one of the engagements capable of combatting food shortage. Only 5.1% of the respondents were of the opinion that better extension services will answer for the food shortage problem.

Table 4.19 Distribution of Respondents by their Choice of how to avoid Food Shortage

Responses	Frequency	Percentage
Give loans to farmers	28	28.28
Government intervention in food production	56	56.57
Provision of improved technology at affordable prices	42	42.42
Provision of more storage technology	13	13.13
Better healthcare facilities	9	9.09
Improvement in extension services	5	5.05
Others	16	16.16
Total	169*	

*Multiple responses

4.3.6 Market patronage

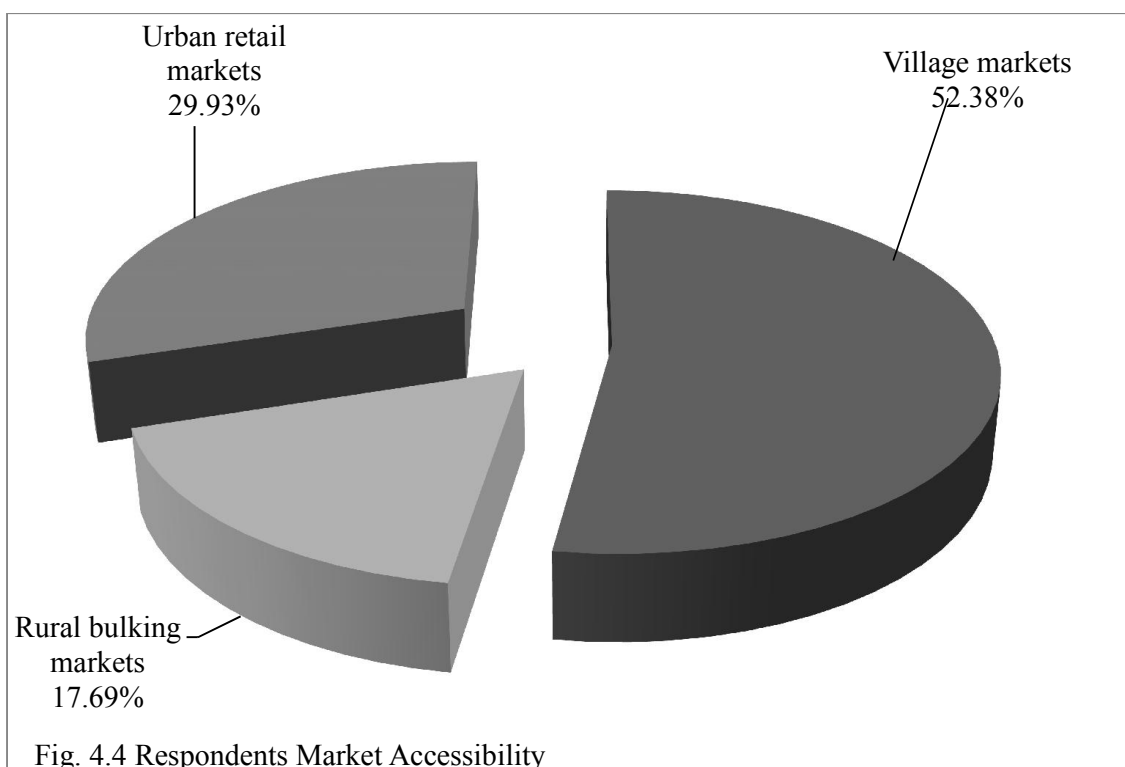
Markets patronage and participation provide both opportunities and pressure for farmers with regards to food access, consumption and type consumed. Engagement in markets

may lead to higher standards of living or diverse consumption, but at the same time, it exposes farmers to the possibility of ruin either from adverse price trends or from the exercise of unequal market power. The use of co-operative societies especially for cash crops to check the excesses of middlemen, use of marketing boards, nearest markets, roadside and middlemen are some and forms of the marketing system available to farm households. From the survey conducted, 60.3% of the respondents sampled, had access to one form of market or the other. About 40% however, did not have free access to markets either because markets to them were too far of, or the means of transportation to distant markets was inadequate.

Figure 4.4 presents the types of market accessed by the farmers who readily patronized one form of market or the other. It is to be noted that 52.4% of these farmers accessed village markets, usually characterized by fixed day(s) of observance. This is the most common form of market access but does not offer the best. At this level of marketing system, marketing efficiency is very low as farmers are less organized to performing adequate marketing functions. This undoubtedly affects their productivity in view of the low incentives received from this type of marketing system. The access farmers have to rural bulking market and urban markets (47.6%) provide a better marketing efficiency as these markets are more organized at performing marketing functions. Marketing functions namely pricing and exchange, physical functions and facilitating functions by agents, middlemen, commission agents, brokers, and merchant middlemen are better performed at these rural bulking and urban markets. There is however, the risk of exploitation by these middlemen but this notwithstanding, their roles in marketing channels and contribution toward higher marketing efficiency and invariably better standard of living, is so imperative and offers good incentives to higher productivity for farmers, which rural marketing system may not offer. About 30% of these farmers

patronized urban retail markets nearest to them. This type of urban markets is usually accessed all days of the week. While about 18% of the farmers make use of rural bulking markets.

The implication of this to the farm household and food security is that participation in efficient markets serves to encourage more agricultural production to meet with the market demands which may be at the detriment of stable food. This situation as suggested by Pigali *et al.* (2005), can instigate a rapid, increased pressure on small farmers to diversify away from staples and harness the lucrative gains that derive from the production and trade of high-value crops. This often seems to imply that small farmers face an either/or option in terms of their crop choice. Small farms either stay in staples, which are regarded as unprofitable, or they make the changes to shift to alternative high-value production. The potential gains from high-value crops tend on average to be higher than those for staples even though production of high-value crops can be accompanied by greater uncertainty and risk.



4.4 Household Food Security Status.

In order to measure household food security, a Food Security Index (FSI) was constructed. The quantity of crops produced and purchased for consumption was converted to kilogramme and further to calorie and then divided by household size adjusted for adult equivalence using the equivalent male adult scale weight in Appendix 2. To obtain the calorie consumed per day per household, the result was further divided by 365 days and then compared with the standard (2260kcal). The nutrient composition of commonly eaten foods in Nigeria was used to estimate the calorie intake of household (Appendix 1). The households whose daily per capita calorie intake was up to 2260kcal were regarded as food secure while those below 2260kcal were regarded as food insecure.

The result presented in Table 4.20 shows that about 66.4% of the respondents were food secure while 82 of the 244 farmers sampled, representing 33.6% were found to be food insecure. The average Food Security Indices for the insecure and secure households were given as 0.85 and 1.45 respectively, while the average Food security index for the 244 sampled farmers was 1.26. Also, the average daily calorie consumption for food secure households is given as 3303kcal. That of the insecure households was 1926kcal as the mean score daily calorie consumption for the entire respondents was 2840kcal. It is to be noted that based on the recommended daily calorie intake of 2260kcal, the food secured household had 1043kcal in excess of the recommended intake while for the insecure household, their average daily household per capita calorie consumption was 334kcal short of the recommended value.

Further analysis revealed that the average crop production figure for food secure households is given as 2264.48kg grain equivalent while those of the households experiencing food insecurity was 1903.50kg grain equivalent. The average total farm

family incomes computed from farm and non-farm income are presented for the food secure and insecure households. Furthermore, the adjusted household sizes were also presented. For food secure households, the average total income, adjusted household size and per capita income are given as ₦288,020.23k, 7.02 and ₦41,028.52k respectively. In the same order, those of insecure households were found to be ₦236,189.24k, 9.50 and ₦24,862.02k respectively. Household size is seen to affect the per capita income of the individual household member and invariably, it impacted on the food security status of the farm family.

In a study of food security measurement and income diversification strategies carried in Oyo state by Oyewole (2012), he found that the average per capita calorie consumption was 1547.66kcal for the insecure farm households, and for the food secure households, the average daily per calorie intake was found to be 4816.69kcal. He also reported 31.5% and 66.4% food insecure and secure households respectively. Babatunde *et al.* (2007), in his study of the socio-economic characteristics and food security status of farming household in Kwara state reported that based on recommended daily calorie intake of 2260kcal, it was observed that 37.2% of the households were food secure and 62.8% were food insecure. Adebayo's (2010) evaluation of UN development programmes on food security in Kaduna state however revealed that 61% and 63% of beneficiary and non-beneficiary households were food secured respectively. He further reported, similar to this study, that the average food security index for food secured households for the beneficiaries and non-beneficiaries are 1.83 and 2.15 respectively. His reported average crop production (grain equivalent) was also 2325.32kg and 3056.43kg for beneficiaries and non-beneficiaries.

Table 4.20 Summary of Households Food Security Analysis

Variable in Average	Value
Food secured households (No)	162
Food security index	1.45
Average Household daily calorie consumption (kcal) for food secure H.	3303
Average Calorie consumption in excess of recommended (2260kcal)	1043
Average Total Crop Output (grain equiv.) for food secure households (kg)	2264.48
Average Total income of food secure households (₦)	288,020.23
Average Adjusted household size of food secured households	7.02
Per capita income of food secure household (₦)	41,028.52
Percentage of food secure households	66.39
Food insecure households (No)	82
Food insecurity index	0.85
Average Household daily calorie consumption (kcal) for food insecure H.	1926
Average Calorie consumption in short of recommended (2260kcal)	334
Average Total Crop Output (grain equiv.) for food insecure households (kg)	1903.50
Average Total income of food insecure households (₦)	236,189.24
Adjusted household size of food insecure households	9.50
Per capital income of food insecure household (₦)	24,862.02
Percentage of food insecure households	33.61

4.5 Determinants of Household Food Security Status

Empirical results of the determinants of household food security status were obtained by means of Tobit regression model (STATA Package^(R)). Several socio-economic factors are known to influence household food security. The purpose of this analysis is to determine the extent to which these factors explain and influence the food security status of households. These factors (independent variables) are: Food security status perception, age of household head, education level of household head, adjusted household size, total annual medical expense per capita, total farm size, consumer credit, membership of

farmers association, market accessibility, household total income (farm + non-farm income), household crop production in grain equivalent and dependency ratio.

The result of the analysis presented in Table 4.21 shows that sigma (disturbance standard deviation) was 0.3450609 with a t-value of 22.031 found to be statistically significant at 1% level. The model had a high negative Log likelihood of -87.260863, altogether describing a model displaying a good fit and normal distribution of the error term.

Variables that had significant coefficients were food security status perception, adjusted household size, household per capita medical expenditure, (at 1% level of significance), dependency ratio (at 5% level of significance), access and usage of consumer credit total and total crop production (grain equivalent) (at 10% level of significance). Some of the coefficients were positive while some were negative. A positive coefficient indicates that a higher value of the variables tends to increase the likelihood of being food secured. Similarly, a negative value of coefficients implies that higher value of the variables would decrease the probability of food security.

By the significance of food security status perception (X_1) at 0.4152648 regression coefficient, the implication is that the farmers seem to be able to judge and perceive well their food security status. It simply tells that the household head whose responsibility is to feed his household can tell to a high degree what the state of his household is. They may not be able to present a thorough analysis of indices relating food security status; they however, have a kin perception of their status when it comes to food security.

Household size has long been noted to be a determinant of food security status. Variable X_4 (adjusted household size)'s negative coefficients of -0.0596508 and its t-value significance at 1% level shows the relevance of how the variable determined food security status. The negative sign of the regression coefficient indicates that, increasing

number of household size significantly caused a decrease in the food security status of the household. This result follows *a priori* expectation that with more mouth to feed and fixed means of production, the chances of less food security ensues.

The other variable that was found significant at 1% level was the amount expended on health care for family members per person per annum, (X_5). This was as expected as health comes first in the household consideration. Farmers will even prefer to go hungry in order to be able to care for a sick family member. With increasing amount of money committed to healthcare, our study shows that a strong relationship exists as the likelihood is that, such household will tend to food insecurity. In other words, the average amount of money expended yearly on each family member's health is significantly related to the food household security status. The regression coefficient showed a negative value of $3.69e-5$ as presented in Table 4.21. Furthermore, a situation where a family member(s) falls sick, its effect can be felt on family labour as the sick will no longer contribute to the family economy. In fact other members of the family may be drafted to care for the sick likewise reducing the family labour. In addition to these, certain income that could have been channeled to feeding the household are used to care for the sick, a situation where stored food for future consumption are sold to care for the sick may even ensue, further endangering the chances of household food security status. Therefore, as it has been found out, the health status and in fact the total amount expended on medical care of farm family significantly affect the its food security status.

Dependency ratio (X_{12}) was also found to be significantly related to food security status of households (at 5% level of significance). This is the ratio of dependents that are unable to do farm work to those who are able to do farm activities, those contributing to the family economy. From the *a priori* expectation, it is probable that this will be negatively related to food security status of households, meaning the higher the

dependency ratio, the lower the household security status. The result presented a negative regression coefficient of -0.0975618, confirming that increasing dependency with the attendant lack of contribution to the family economy was found to lower food security status of households sampled. This is similar to the findings of Adebayo (2010).

One of the two variables found to be significant at 10% level was access and usage of consumer credit, X_7 . The regression coefficient was found to be negative. This result further confirms the earlier findings that access to credit in the study area have very little significance to the food security status of farm households. The reasons for this could be due probably to the smallness of credit—a microcredit. Consumption credit worth just about ₦10,000 for a poor farmer can hardly make any significant impact on food security status. This is in agreement with the findings of Adelokun (1998) and Adebayo (2010). Also, loan diversion—many that accessed credit do not use the loans for the purpose for which they were advanced, for example, some either sell or share with their friends, loans that they advanced without directly using it for what they are meant for. These possibilities tend not to impart on food security status of households as would be expected.

The total crop production in grain equivalent X_{11} was also found to be positively and significantly related to the food security index of farm families (at 5% level). This fit *a priori* expectation. The more farm produce, in total, a farmer harvest from his farming endeavours, the higher the likelihood that the farm family will be food secured. The otherwise also holds true. Therefore, every factor that relates directly to higher production and cultivation directly affects food security status of households. Land availability, accessibility and fertility, farm management and use of technological innovations are some of the factors directly affecting the volume of production and harvest. These will invariable affect food security status of household, though indirectly.

Education level of household head (X_3), total farm size (X_6), membership of association (X_8), market accessibility (X_9) and total household income (X_{10}) were all found to have positive regression coefficients and so positively but not significantly related to the household food security status.

Table 4.21 Maximum Likelihood Estimates of Tobit Regression for Household Food Security Status

Food Security Index (FSI).	Reg. Coef.	Std. Err.	t-Value	P> t
Food Security Status Perception (X_1)	0.4153*	0.0514	8.08	0.000
Age of Household Head (X_2)	-0.0030	0.0036	-0.83	0.409
Education Level of Household Head (X_3)	0.0256	0.0178	1.45	0.148
Adjusted Household Size(X_4)	-.0597*	0.0097	-6.14	0.000
Medical Expense per Capita (X_5)	-3.69-05	1.03-05	-3.59	0.000
Total Farm Size (X_6)	0.0425	0.0367	1.16	0.248
Consumer Credit (X_7)	-3.41e-06***	1.74e-06	-1.97	0.051
Membership of Farmers Association (X_8)	0.0070	0.0053	1.33	0.185
Market Accessibility (X_9)	0.0499	0.0581	0.86	0.391
Household Total Income (X_{10})	2.67e-07	2.00e-07	1.33	0.185
Total Crop Production in Grain Equiv. (X_{11})	6.59e-05***	3.49e-05	1.89	0.060
Dependency Ratio (X_{12})	-0.0976**	0.0423	-2.31	0.022
Constant	1.3020*	0.1478	8.81	0.000
/sigma 	0.3450609*	0.0156626	22.031	0.000

Log likelihood = -87.26086 Note *, **, *** t-significance at 1%, 5% & 10% levels respectively

4.6 Assessment of Community Food Resources and Community Food Security

Community food security has an impact on all community members through an implicit recognition of the role of the larger food system in ensuring food security (Winne, (2005). The food system encompasses a broad range of food chain components. Community Food Security is used to express the notion of community food systems. Community food security is a holistic approach to the food system, and advocates

seeking comprehensive solutions to solving the community's food and farming crises from the community food resources.

Table 4.22 presents the socio-economic profile of the communities sampled. Demographically, the general experience was that we had more male household heads than female household heads. This is expected to positively influence the food security status of the families, and even the communities in general. The gender of household heads could limit the type of farming activities and even the amount of energy that could be put into the activities. It was noted however that, Ungwan Wakili of Zango Kataf L.G.A., had more female household heads. The result showed that about 19% of the farmers in Ungwan Wakili were women. This was similar to that of the respondents in Gidan Tagwai in Kachia L.G.A. (19.1%), but the communities that had the least female household heads were Gangara and Furana in Giwa and Ikara L.G.A. respectively.

Farmers in Ikara L.G.A. were the least educated. In Angwan Yari community, 79% of the farmers had less than primary school educations as Furana community farmers had 62.5%. In fact in Angwan Yari, it is to be noted that no singular respondents had up to neither secondary nor tertiary education. In Furana however, just 8.3% of the respondent had secondary education. The survey result was a little similar to that of Giwa L.G.A. communities. In Gangara community, 65.4% had less than primary school education while in the Angwan Kanawa community, 57% of the farmers have got between no formal education, Arabic and adult education. Fadan Kaje and Gidan Tagwai communities in Kachia and Zango Kataf L.G.As, are the most educated farming communities. In Fadan Kaje community, 69.7% had between secondary to tertiary education, while in Gidan Tagwai, 61.9% of the farming community had education up to secondary school and above. It is to be noted that the singular community that had the highest number of Arabic educated farming members of the community was Laduga in

Kachia L.G.A., a largely nomadic populace of Fulani herdsmen, followed by Gangara and Angwan Kanawa communities with 62.5%, 53.9% and 44.0% respectively.

In years of farming experience, it is expected that with increasing years of farming, farmers gained experience in the art of farming to the advantage of gaining understanding and increasing productivity and consequently food security. The community that had the highest mean years of farming experience is Furana with 29.1 years, closely followed by Angwan Yari (27.3 years) community in Ikara L.G.A. The least community was Gidan Tagwai with 19.8 years as average years of respondents farming experience.

Household size affects family labour, productivity, dependency ratio and invariably food security status. Households with higher sizes tends to be less food secured particularly when the number of dependents is higher, straining the family economy. The communities that have the highest household sizes were Angwan Yari, Angwan Kanawa and Gangara with 10.1, 9.5, and 9.4 average household sizes respectively. Ungwan Wakili in the Zango Kataf L.G.A. had the lowest average household size of 6.7 (See Table 4.22).

The health status of the household heads is also very imperative to food security status. Ill-health is directly detrimental to productivity. It also affects the family economy as income that would have been used for consumption purposes are diverted for medical bills. Generally, the communities sampled spent averagely between ₦5,182.54k to ₦9,744.44k on household heads annually as medical bills. On family members, an average of ₦12,650.00k to ₦25,171.86k is expended annually as medical expenses. The Laduga community in Kachia L.G.A. came highest on family medical expenses while Angwan Yari in Ikara L.G.A. came lowest.

Profiling the Socio-economic characteristics of communities in Community Food Security assessment also entails the assessment of the economic status of farm families in the community. Farm and non-farm incomes are good measures of economic status, and these are presented in Table 4.22. The income sources for farm income included all sales made from farm produce, while for non-farm income, income from civil service, trading, commercial motorcycling, artisanship, milling, tailoring, carpentry and others like clergy, as other rural farm activities, form the sources that constitute non-farm income. The two sampled communities in Kachia L.G.A. had the highest average total income of ₦374,142.86k and ₦327,529.69k for Gidan Tagwai and Laduga communities respectively. Gangara community farmers had the lowest average farm income of ₦158,615.38k and Angwan Yari community in Ikara L.G.A. equally had the lowest non-farm income of ₦64,846.15k.

Further demographic and socio-economic characteristics of a community include the presence or otherwise of federal and state institutions, educational institutions and healthcare service centers. The result for these community characteristics are equally presented in Table 4.22.

It is to be noted that no Federal presence was observed for any of the communities sampled. Same goes for State institutional presence, except for the Fadan kaje community. There were however, at least a primary schools in each of the communities sampled, which presents opportunities for basic form of education for the populace, or at least the children of farmers. In the same light, only Ikara LGA communities (Angwan Yari and Furana) had no secondary schools. The other communities had secondary schools. It is to be noted also that none of the sampled communities had tertiary schools. The implications of these to community food security is simply reflected in the quality of decisions that farmers who are educated versus those who are not, are prone to make

with respect to farming activities relating to food production and food security. Quality education is expected to positively influence productivity.

Presence or otherwise of healthcare facilities are related to the wellbeing and health status of community members. Only a healthy and virile farmer can be actively involved in food production activities. Our survey however found that about three communities did not have any form of basic healthcare facilities, predisposing the community members to health risks at the expense of food production. These communities were Furana, Angwan Yari and Laduga. Even for maternal healthcare services, Angwan Kanawa, Agwan Yari, Fadan Kaje and Ungwan Wakili communities had no Clinics and Maternities (See Table 22).

Cooperative societies have prospects for farmers and community members in the form of social capital and provide them with the opportunity of benefiting from the interplay of group dynamics, which can lead to higher productivity. When farmers come together, they are able to pull resources for both individual member's economic empowerment and communal cohesion. They are many times a contact point for extension services and form linkages even with government institutions responsible with agricultural development programmes. The communities sampled all had some form of cooperative societies ranging from 2 to 6. Additional information obtained from the communities however indicated that many of these cooperative societies were not always functional. Many of them became active or hurriedly formed for political gains or when the farmers perceive that a government programme is on the way that might require them access only as a cooperative. Table 22 however presents also the number of the more viable cooperatives from each of the sampled communities.

The socio-economics and demographic features of a community predispose it or otherwise to economic viability and opportunities. These in turn have effect on community productivity and food security. Communal efforts at establishment of educational institutions, viable self-empowering cooperative societies, and policy frames that promote non-farm economic activities, particularly those that are associated with the smallholder agricultural sector, and strategy that pays attention to the strengthening of farm/non-farm linkages, will benefit farming households in the communities in terms of income generation and food security. Government effort at providing basic healthcare facilities in the communities could also go a long way to better predispose these communities to basic healthcare, and substantially reduce amount spent on medical bill and the attendant risk that ill-health poses to agricultural production and productivity.

Table 4.22 Profile of Community Socioeconomic and Demographic Characteristics

Socio-Economic/Demographic Characteristics (Average)	Gangara	Angwan Kanawa	Furana	Angwan Yari	Fadan Kaje	Ungwan Wakili	Gidan Tagwai	Laduga	Pooled
Gender of Household Heads (%)									
Male	96.15	92.0	95.83	89.47	81.82	80.65	80.95	93.75	87.70
Female	3.85	8.0	4.17	10.53	18.18	19.35	19.05	6.25	12.30
Level of Education (%)									
No formal education	3.85	12.0	33.33	26.32	3.03	19.35	0.0	0.0	10.25
Arabic education	53.85	44.0	16.67	42.10	0.0	3.23	0.0	62.5	23.77
Adult education	7.69	12.0	12.50	10.53	3.03	16.13	0.0	3.13	7.38
Primary education	19.23	24.0	29.17	21.05	24.24	32.26	38.10	9.37	24.18
Secondary education	15.38	8.0	8.33	0.0	57.58	29.03	42.86	12.5	27.87
Tertiary education	0.0	0.0	0.0	0.0	12.12	0.0	19.04	0.0	6.56
Years of Farming Experience	22.12	22.32	29.08	27.32	21.56	22.90	19.76	21.91	22.9
Household Size	9.42	9.52	9.13	10.11	8.09	6.71	7.52	8.87	7.50
H.Head Medical Expenditure (₦)	5,920.83	8,281.82	7,982.61	9,744.44	5,182.54	4,307.14	7,895.00	8,750.00	6818.70
Household Medical Expenditure (₦)	16,045.45	13,891.30	15,204.55	12,650	13,666.67	10,560.71	20,375.00	25,171.86	15833.63
Farm Income (₦)	158,615.38	162,180.00	197,708.00	192,736.84	160,625.00	165,046.77	273,095.24	190,779.69	180,914.50
Non-Farm Income (₦)	92,562.50	85,771.43	80,071.43	64,846.15	170,444.44	89,017.68	132,625.00	182,333.33	130,407.10
Total Income (₦)	215,576.92	210,212.00	244,416.67	237,105.26	300,079.55	219,606.00	374,142.86	327,529.69	271,238.88
Institution Presence									
Federal institution	0	0	0	0	0	0	0	0	0
State institution	0	0	0	0	1	0	0	0	1
Educational Institution									
Primary Schools	2	1	1	1	4	5	6	4	24
Secondary Schools	1	1	0	0	2	1	2	1	8
Tertiary Schools	0	0	0	0	0	0	0	0	0
Healthcare Services									
Primary Health Care Centre	1	1	0	0	2	2	1	0	7
Clinic and Maternity	1	0	1	0	0	0	1	1	4
Co-operative societies	6	2	5	3	2	2	3	4	27

4.6.1 Profile of community food resources

To understand the adequacy of community food resources, we begin by creating a profile of all existing food resources, both crop based and animal sources for protein needs of the community. The underlying principle is to focus on assessing and building up the community's food resources to meeting its own needs. If the community food resources are largely depleted, for the community to meet her food need, she will have to depend on another or other communities for the food needs. This dependence comes with its own merits and demerits. The best position is still for a community to be self-sustaining and independent of other community(ies) for her food needs. When a community is independent, she is more prone to community food insecurity than when she is dependent. In other words, the less dependent a community is, the more food secured it tends.

The sampled communities' food resources are presented in Table 4.23. Virtually all the communities sampled produced substantial amount of the cereals for their community's need. Maize and sorghum were the major cereals culturally required and consumed in the communities. These crops were well cultivated and readily available in the communities. Two communities however did not cultivate rice. These are Gidan Tagwai and Angwan Kanawa. Equally, two other communities were not readily involved in the cultivation of millet, and they are Angwan Yari and Gidan Tagwai. Ugwan Wakili in Zango Kataf L.G.A. was however noted for sugar cane and acha cultivation in addition to the other cereals.

Cowpea and soybean were cultivated and readily available in all the communities sampled. Also available was ground nut, a good vegetable oil and protein source. However, for vegetable crops like tomato, pepper, onions, spinach and eggplant, fewer communities like Gangara, Furana, Fadan Kaje and Laduga cultivated other vegetable

crops like onions and spinach. Tomato and Pepper seemed to be the mostly cultivated vegetables (See Table 4.23). Angwan Kanawa cultivated only Tomato as vegetable crop and this could adversely affect the community food security status. It could undoubtedly limit access to other vegetable crops and their nutritional benefits. Should traders “import” other vegetable crops into the community, the issue of affordability comes in. This scenario predicates the community to negative food security status.

From the results as presented in Table 4.23, root tubers were not popularly cultivated crops in Giwa and Ikara L.G.As. In Furana community, cassava, sweet potatoes and cocoyam were cultivated and in Gangara, only Sweet potato was cultivated. However, in Zango Kataf and Kachia L.G.As., yam, cassava sweet potatoes and cocoyam were largely cultivated in the communities sampled. In addition, Ginger, used largely as energy drinks and cultivated primarily as a cash crop, was also largely cultivated in the communities sampled in these L.G.As. It is however, worthy to note that in Angwan Kanawa and Angwan Yari communities, root tubers cultivation were not popular.

From the foregone, the communities seemed to have a variety crop based food resources that can be sustainable even in the long run. They however need to consider the cultivation of more vegetable crops, particularly in Angwan Kanawa, Angwan Yari, Ugwan Wakili and Gidan Tagwai. Crops like onions, carrot, spinach and eggplant whose cultivation is suitably adapted to the climate of the entire northern region of the country should be encouraged. Community awareness to this and nutritional education would go a long way to get farmers cultivate these crops for the good of all within the community, and invariably and positively affect community food security.

Table 4.23 Profile of Community Food Resources (Crop based)

Food Crop Resources	Gangara	Angwan Kanawa	Furana	Angwan Yari	Fadan Kaje	Ungwan Wakili	Gidan Tagwai	Laduga
Cereals								
Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize
Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	Sorghum
Millet	Millet	Millet	Millet	Rice	Millet	Rice		Millet
Rice	Rice		Rice		Rice	Acha		Rice
Wheat						Sugar cane		
Acha								
Other(s)								
Pulses								
Cowpea	Cowpea	Cowpea	Cowpea	Cowpea	Cowpea	Cowpea	Cowpea	Cowpea
Soybean	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean
Ground nut		Ground nut	Ground nut	Ground nut	Ground nut	Ground nut	Ground nut	Ground nut
Mellon								
Other(s)								
Vegetables								
Tomato	Tomato	Tomato	Tomato	Tomato	Tomato	Tomato	Tomato	Tomato
Pepper	Pepper		Pepper	Pepper	Pepper	Pepper	Pepper	Pepper
Onion	Onion		Onion		Onion			Onion
Carrot	Spinach		Spinach		Spinach			Egg plant
Spinarch					Egg plant			
Egg plant								
Others								
Root Tubers								
Yam	Sweet potatoes		Cassava		Yam	Yam	Yam	Yam
Cassava			Sweet potatoes		Cassava	Cassava	Cassava	Cassava
Sweet potatoes			Cocoyam		Sweet potatoes	Cocoyam	Sweet potatoes	Sweet potatoes
Cocoyam					Ginger	Ginger	Ginger	
Irish potatoes					Cocoyam			
Other(s)					Ginger			

4.6.1.1 Animal protein sources

Community food resources assessment is incomplete without the assessment of the community source of animal protein. Protein intake is very vital to food security analysis. In the measurement of food security index, the measuring rod is 2260kcal and 65g of daily calorie and protein intake respectively (Olayemi, 1998). The result of the communities' sources of animal protein was as presented in Table 4.24.

Virtually all the communities sampled reared Goats and these were readily available as source of animal protein. Mutton which is meat from Sheep was also available in most of the communities sampled except for Fadan Kaje, Ugwan Wakili and Gidan Tagwai communities. Beef was also readily available in Gangara, Angwan Kanawa, Furana and Laduga communities. Pork and dog meat was available in Fadan Kaje and Ugwan Wakili communities of Zango kataf L.G.A while goats' meat and pork were one of the readily available sources of animal protein in Gidan Tagwai community.

All the communities rear local chicken. Broilers and layers were available in Fadan Kaje, Ugwan Wakili and Gidan Tagwai. Protein source from Guinea fowls were available in Gangara, Angwan Kanawa, Ugwan Wakili and Laduga. Ducks were also raised for meat in the sampled communities except Furana, Angwan Yari, Fadan Kaje and Gidan Tagwai communities.

Fishing (wild) was done only in Angwan Kanawa, Fadan Kaje, Ugwan Wakili and Gidan Tagwai communities and likewise small game hunting in these communities, and Gangara (See Table 4.24). It is to be noted that none of these community sourced its animal protein from large games and fish farming (pond).

It is obvious from the table, Table 4.24, that poultry food resources excluded the production from high bred broilers and layers in most of the communities sampled. The communities' food production players need to start looking in the direction of this, as local poultry efficiency in production is low. Likewise is the idea of looking at the

possibilities and adaptation of fish farming. Wild fishing is not sustainable and are many times done in manners hazardous to the environment. In the same light, game hunting is mostly done by bush burning, a practice that destroys soil micro-nutrients, causes deforestation with the attendant erosion and soil degradation. Community food resources players in these communities ought to be looking at the viability of intensive or even semi-intensive poultry production and fish farming, to set the communities on the part of accessibility and adequacy of these food resources, as consideration is equally given to the environmental factors of production and their effects in the long run.

Table 4.24 Profile of Community Food Resources (Animal Protein Sources)

Animal Food Resources	Gangara	Angwan Kanawa	Furana	Angwan Yari	Fadan Kaje	Ungwan Wakili	Gidan Tagwai	Laduga
Ruminant								
Goats	Goats	Goats	Goats	Goats	Goats	Goats	Goats	Goats
Sheep	Sheep	Sheep	Sheep	Sheep	Pigs	Pigs	Pigs	Sheep
Rabbit	Cattle	Cattle	Cattle		Dogs	Dogs		Cattle
Cattle								
Other(s)								
Poultry								
Local chicken	Local chicken	Local chicken	Local chicken	Local chicken	Local chicken	Local chicken	Local chicken	Local chicken
Guinea fowl	Ducks	Ducks			Broilers	Guinea fowl	Broilers	Guinea fowl
Duck	Guinea fowl	Guinea fowl			Layers	Ducks	Layers	Ducks
Broilers						Broilers		
Layers						Layers		
Other(s)								
Fishery								
Fish farming (ponds)		Fishing (stream)			Fishing (stream)	Fishing (stream)	Fishing (stream)	
Fishing (river/stream)								
Other(s)								
Hunting of Games								
Small games (rats, grass cutter)	Small games	Small games			Small games	Small games	Small games	
Large games (antelope...)								

4.6.2 Assessment of household food security

In Community Food Security analysis, the assessment of the household food security is imperative. Using the per capita daily calorie calculation a Food Security Index (FSI) was used to assess individual household food security status within the community. The result is as shown in Table 4.25. The table shows the number of respondents sampled within the community, the total average production in grain equivalent for each of the community and the total average food security index calculated for each community. The table also shows the number of food secure household, its percentage of sampled respondents within the community and the average food security index for the food secure households. The analyses for the food insecure households are also presented in the table (Table 4.25) while the number of food security severity and percentage of food insecure households are indicated in the table. The severity analysis was computed from the coping strategy indexing in section 4.7 of same chapter.

From the table (Table 4.25), it is to be noted that Kachia and Zango Kataf L.G.As communities had the most food secured households. The two sampled communities in Kachia L.G.A., Laduga and Gidan Tagwai, had each, 78.1% and 76.2% food secured households within the communities, respectively. Ugwan Wakili and Fadan Kaje communities, both in Zango Kataf L.G.A. had 71% and 66.7% of households sampled, food secured respectively. The least percentage of food secure households was observed in Furana (54.2%) in Ikara L.G.A. followed by Gangara in Giwa L.G.A., as only 57.7% of the sampled households were found to be food secured. Invariably in Furana and Gangara communities, 45.8% and 42.3% of farmers in these communities were not food secure respectively.

It is to be noted also that in average total production per community in grain equivalent, Gidan Tagwai came highest (3,601.93kg), while Ungwan Wakili noted least average total production per community (1,709.59kg).

The coping strategy indexing revealed that the farmers in the Furana community of Ikara L.G.A. that were food insecure, seemed to experience a higher number of severity of food insecurity, as 7 households of the 11 food insecure households, representing 63.6% experienced severe food insecurity. Angwan Yari and Ugwan Wakili households that were food insecure also experienced 57.1% and 55.6% severe food insecurity respectively; as 4 of the 7 households as well 5 of the 9 households of those that experienced food insecurity had a severe experience as computed.

Food security indexes among food secure households for Laduga community in Kachia L.G.A. came highest and the least was Angwan Yari community farmers. It is however interesting to also observe that Laduga food insecure households also got the least food security index of 0.759. There seemed to be a wide gap between food secure and insecure households in that community (Laduga). The community being a highly nomadic settlement and the fact that Fulani herdsmen move from one place to another from time to time, access to land for cultivation by new entrants could be a major factor in their food insecurity index and severity of food insecurity experience. Land reforms that allow for access even for new entrants could counter this situation in Laduga. While family planning education will be a very good strategy to control both household size (extrapolating these indices with Table 4.22) and pressure in the use and accessibility to land, the most important factor of production.

Asset accumulating strategies like the institution of cooperative societies where farmers can save and gradually accrue for themselves capital that will better dispose them to production activities and their implications, can be advocated for virtually all the communities sampled. As it will be further found and discussed that many of the

cooperative societies formed were not viable but were many a times only tools for political gains. Farmers ought to realize the usefulness of cooperatives and be well integrated into them as a veritable tool for economic advancement. For community like Furana that has about 64% of the food insecure households to have severe food crisis, judging from the coping strategies adopted, this might be a call for intervention from the government.

In general, a sound all-inclusive economic empowerment policy for these communities would be a step in the right direction to seeing to the solving of food crisis experience by farmers in these communities.

Table 4.25 Household Food Security by Community

Food Security Indices and Coping Strategy Severity	Gangara	Angwan Kanawa	Furana	Angwan Yari	Fadan Kaje	Ungwan Wakili	Gidan Tagwai	Laduga	Pooled
Number Of Household Sampled	26	25	24	19	66	31	21	32	244
Total Average Prod. (Grain Equiv.)	1816.26	2009.26	2129.27	2083.58	2122.17	1709.59	3601.93	2099.06	2147.61
Total Average Food Security Index	1.158	1.185	1.070	1.035	1.284	1.193	1.437	1.552	1.257
Food Secured Household (No)	15	15	13	12	44	22	16	25	162
Food Secured Households (%)	57.69	60.0	54.17	63.16	66.67	70.97	76.19	78.13	66.39
Average Food Security Index	1.592	1.410	1.265	1.171	1.490	1.305	1.528	1.698	1.450
Food Insecure Household (No)	11	10	11	7	22	9	5	7	82
Food Insecure Households (%)	42.31	40.0	45.83	36.84	33.33	29.03	23.81	21.87	33.61
Average Food Insecurity Index	0.840	0.849	0.839	0.801	0.873	0.917	0.896	0.759	0.853
Severity Of Food Insecurity (No)	4	4	7	4	12	5	2	3	41
Severity Of Food Insecurity (%)	36.36	40.0	63.64	57.14	54.54	55.56	40.0	42.86	50

4.6.3 Assessment of food availability and affordability

Food availability and affordability are major components of food security analysis. Community food security also depends on the availability and affordability of a variety of food items sold through, production, retail and other food sources (Cohen, 2002).

Table 4.26 presents the availability and affordability indicators in the communities sampled. It was observed that the communities all had access to one form of market or the other. Even when there were no markets within the community, other communities' markets close by were patronized by farmers in the study area. Some of these markets accessible can span between three to five kilometers range. Even at that, the respondents admitted participation in these markets. In communities where there were no markets like Fadan Kaje and Ungwan Wakili, these communities accessed urban markets nearby. Both of these communities mentioned accessed Zango market. This situation is similar to the accessibility of markets for Gangara and Angwan Kanawa. These two communities also participated and accessed the Giwa rural bulking market.

Retail stores are provision stores where farmers can buy food items in small quantities for consumption. Such retail stores sell bakery products like bread, baby formulas, poultry products, fish products, milk and beverages. Other household items are sold in these stores but our primary concern was some basic food items like as mentioned earlier. The higher the number of these stores, the less the monopoly tendencies of retailers and consequently, the more competitive retail prices for food items and affordability by farmers in the community. Invariably, these retail stores-factors affect the affordability of food items of households and consequently, food security status of the household. Owing to the size of the community, Fadan Kaje community had the highest number of retail stores. As is expected, this community had the least prices for the noted food items (See Table 4.26). It is however to be noted that the two

communities sampled in the Ikara L.G.A had no retail store of any kind. To source for their food and provision needs, the farmers in the two communities made use of stores in other communities away from there's. The distances was said to be between 3-4 kilometers away from their communities. The absence of retail store seemed to affect the food security status of households in these communities. From the earlier assessment of number of households that were food secured, it was observed that Furana had the least number of food secured household within the community (54.2%, See Table 4.25). Angwan Yari which had food secured households of 63.2% within the community also had no retail store. Laduga community which had the highest number of food secured households was noted to have a high number of retail stores (second largest) and the prices of the food items were equally competitive (See Table 4.25).

It is however to be noted that no single community had consumer co-operative societies where it is expected that thrifty purchases will be made and sold to members at prices below that which the retailers would sell. The patronage of consumer co-operatives is expected to give an edge to farmers with regards to food affordability. Farmers ought to form consumer cooperatives that will get them to save money by pulling purchases. There were however, other forms of cooperative societies within the communities. Information was further obtained that these cooperatives were sometimes seasonal, only used to acquire fertilizers and other farm inputs and incentives from the government and politicians.

Since most farmers in the communities accessed and participated in one form of market or the other, all structural and institutional infrastructures that aid the performance of marketing functions should be pursued. The government, particularly local government authorities could come to the rescue of the communities in this regard. Communal efforts to put these infrastructures in place can also be encouraged within the communities.

Table 4.26 Community Food Availability and Affordability

Food Availability and Affordability	Gangara	Angwan Kanawa	Furana	Angwan Yari	Fadan Kaje	Ungwan Wakili	Gidan Tagwai	Laduga
Market accessibility (markets not more than 3 km away/patronized)	Rural bulking market	Rural bulking market	Village market	Village market	Urban market	Urban market	Urban market	Urban market
Market types in the community	Village market	No market	Village market	No market	No market	No market	Village market	Village Market
Retail stores	11 stores	3 stores	None	None	21 stores	13 stores	11 stores	17 stores
Food items (prices in ₦)								
Milk products/kg	1,520.00	1,560.00	Not available	Not available	1,520.00	1,560.00	1,600.00	1,580.00
Tea products/kg	1,500.00	1,600.00	available	available	1,500.00	1,600.00	1,600.00	1,800.00
Baby formula/kg	2,400.00	2,500.00			2,400.00	2,500.00	2,500.00	Not avail.
Bakery products/kg	230.00	220.00			200.00	220.00	220.00	250.00
Poultry products (egg)/create	900.00	950.00			850.00	900.00	900.00	850.00
Fish products (fresh)/kg	500.00	550.00			460.00	480.00	480.00	480.00
Fish products (smoked)/kg	850.00	950.00			850.00	850.00	850.00	950.00
Other(s)								
Consumer co-operatives	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available
Co-operative societies	6	2	5	3	2	2	3	4

4.6.4 Assessment of community food production resources

Local agricultural and food production resources play a very important role in community food security. Its dynamics work to strengthen community's agricultural system over the long term, offering small farmers an opportunity to maintain economic viability by supplying the local and probably regional markets, and gaining understanding of the structure of demand for food within their own community in relation to others and the nation at large.

The assessment of community food production resources survey is presented in Table 4.27. The average total production figure for all the communities and the most important factor of production of food, land—suitability and access forms are presented in the table. Processing opportunities for locally produced food, various marketing integration of these food, and the food items the communities were dependent upon, produced outside their own communities are also presented in the table, Table 4.27.

Access to land and forms of access are very important determinants of food production. It determines level of production of farm household. From the survey conducted as presented from the table, most access to land for food production in the communities was by inheritance. The implication of this result indicating majority farmland acquisition through inheritance is that, the right to use land is more indigenous for farm household. Access in this way have impediments to increasing production especially for household who do not inherit lands and have little or no money to acquire one. Also, the general responses from the two focus group discussions from each of the communities sampled produced what the members of the communities perceived was the general soil condition of their agricultural lands.

The Giwa L.G.A. communities noted that they cannot do reasonable crop cultivation without using fertilizer, and so their land is not so fertile in itself. Similar to this is the

responses from the two communities sampled from Ikara L.G.A. Their land is characterized with rocky granules and hard soil. This was however different from the responses from the other communities in both Zango Kataf and Kachia L.G.As. The community residents were of the opinion that their farmlands were relatively “not bad” for agricultural production, as they can be considered fertile.

Assessing processing opportunities available in the communities, milling of cereals happens to be common to all the communities. It is essential to describe the processing form of milling observed. The type noted was actually for small quantities of cereal to be used for family consumption, not as if the communities had large mills where cereal products are milled, bagged, transported and sold to consumers. The processing forms observed from the survey conducted were just that that farm families organized for their own consumption only, using petrol or diesel powered engine mills. Three other communities however had Cassava processing facilities in addition to cereal milling in their communities. These communities are Fadan Kaje, Ugwan Wakili and Laduga. Cassava processing involves adding value to raw Cassava tubers, turning them into Cassava flakes otherwise known as gari.

When consideration was given to study how integrated the communities were, into marketing of their locally produced foods, maize was the food crop that all the communities cultivated in large quantity and sold through and for markets outside their communities. Another cereal common to Giwa and Ikara L.G.As sampled communities was sorghum, as cowpea and tomato were equally common to these communities. However, for Zango Kataf and Kachia sampled communities, ginger seemed to be the major cash crop largely sold to other communities even exported outside the country. Cocoyam appeared common to Zango Kataf L.G.A. communities, that is, Fadan Kaje and Ugwan Wakili, and equally, Pigs from these communities were transported and sold

to as far as eastern part of the Nigeria. Laduga community, being a Fulani settlement readily sold Cattle.

The communities however happened to depend on rice brought in from other communities for their consumption. Only Gangara and Angwan Kanawa seemed not to so depend on rice outside their communities among the eight sampled communities. These communities were however dependent on other communities for their root tubers food needs. Also, a common food item that all the communities sourced outside of their own production is ice fish (See Table 4.27). Understandably, this is not locally available as this product comes in into the country itself only by importation. This may mean that the farmers are not immuned to fluctuations and changes resulting from market indices either to the negative or otherwise. It might be important also to mention that these communities can feel the effect of trade globalization's merit or demerit with regards to the ice fish products consumption.

Land reforms can come in handy to combat the inaccessibility issue to land for production, to challenge the largely access by inheritance. This could further open up the communities to the production of food crops that they rely on other communities for, that is, food items 'exported'. Processing opportunities that were not in certain communities could also be acquired through communal efforts in those communities that they were absent. The feat lies on the key food production and distribution players in the communities like the marketers and traders to take the initiative in the adding of value to food items produced in the communities.

Table 4.27 Community Food Production Indicators

Food Production Resources	Gangara	Angwan Kanawa	Furana	Angwan Yari	Fadan Kaje	Ungwan Wakili	Gidan Tagwai	Laduga
Total Average Production in Grain Equiv.	1816.26	2009.26	2129.27	2083.58	2122.17	1709.59	3601.93	2099.06
Land Fertility	Not so fertile	Not so fertile	Rocky land	Rocky land	Fertile	Fertile	Fertile	Fertile
Land Accessibility/Acquisition in %								
By inheritance	84.61*	76.0*	79.17*	73.68*	66.67*	77.42*	80.95*	78.12*
By purchase	3.85*	8.0*	4.17*	0.0	4.55*	6.45*	4.76*	6.25*
By gift	15.38*	20.0*	16.67*	15.79*	18.18*	22.58*	38.09*	18.75*
By rent	11.54*	20.0*	8.33*	15.79*	22.73*	22.58*	9.52*	18.75*
Food Processing Opportunity								
For Cereals	Milling	Milling	Milling	Milling	Milling	Milling	Milling	Milling
For Pulses					Cassava processing (Gari)	Cassava processing (Gari)		Cassava processing (Gari)
For Vegetables								
For Local milk products								
For root tubers								
Food 'exported' from community								
Cereals	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize
Pulses	Sorghum	Sorghum	Sorghum	Sorghum	Ginger	Sugar cane	Pepper	Goats
Vegetables	Cowpea	Cowpea	Cowpea	Cowpea	Cocoyam	Ginger	Yam	Cattle
Root Tubers	Tomatoes	Tomatoes	Tomatoes	Tomatoes	Gari	Cocoyam	Ginger	
Animal products	Pepper	Goats	Pepper	Pepper	Pigs	Goats		
Fish products	Goats	Sheep	Onion	Goats		Pigs		
Other(s)	Sheep		Goats	Sheep				
Food 'imported' into community								
Cereals	Cassava	Cassava	Rice	Rice	Rice	Rice	Rice	Rice
Pulses	Yam	Yam	Soybeans	Soybean	Tomato	Tomato	Soybeans	Cowpea
Vegetables	Ice fish	Ice fish	Cassava	Cassava	Onions	Onions	Cassava	Tomato
Root Tubers			Tomato	Tomato	Cattle	Cattle	Cattle	Onions
Animal products			Ice fish	Ice fish	Ice fish	Ice fish	Ice fish	Ice fish
Fish products								

4.7 Food Coping Strategy Analyses

The study showed that households employed coping strategies to mitigate food shortages which resulted from insufficient crop production. These strategies are the following: buying from market, eating less preferred food, borrowing money/food from friends/relatives, rationing adult meal, sale of livestock, working for money, consumption of seed stock, sending out children to work for money, scavenging/gathering of wild food, sale of asset like land, stealing, and migration to city.

4.7.1 Frequency of food coping strategy (FCS)

About 41% of the total sample of the survey in the study area used one form of FCS or the other as a means to combat food shortage. The coping strategies that households employ to manage rising food crisis have implications for nutritional status. In the short-term, households have few choices for coping food shortage. As food crisis persist, poor households which are already struggling to afford basic foods can be pushed deeper into poverty. The following FCS were engaged by the respondents in study area

4.7.1.1 Buying from the market

This is the simplest form of FCS employed by household to combat food shortage. It falls under the first category of the four generic categories of FCS. This strategy is a readily engaged tool when farm household noticed that household food supply from its store is depleted. As presented in Figure 4.5, 87.9% of the respondents that employed FCS engaged the strategy of buying from market to combat food shortage. It is a simple strategy and does present serious risks to the food production capacity of the farm family in the long run.

4.7.1.2 Eating less preferred food and rationing adults meals

Among current adjustment strategies for food shortage, adjustment to meals is one of the most common strategies adopted by farm families to cope with food shortage. These adjustments to meals include reducing the number of meals eaten in a day or going a whole day without eating, substituting less preferred and less expensive foods and limiting portions at meal times especially for adults in the family. The adoption of this strategy is even more prevalent among the poorest of the households, as would be expected given the poverty level and vulnerability to shocks and stresses (Rashid, 2002). These strategies however have significant consequences in the health and virility of the farm family as it predisposes the family members to nutritional deficiencies and the attendant health risks. Our study showed that 78.8% of the respondents that indicated employing FCS engaged in eating less preferred food while 55.6% rationed their meals for children. This is similar to a study conducted in Umbumbulu community in South Africa as 61.4 % of the respondents were found to employ the strategy of eating less expensive food to cope with food shortage from own production (Mjonono *et al.*, 2009). Rashid *et al.* (2006) also in a study of livelihood shocks and coping strategies in Bangladesh households found out that 75.3% of the respondents adopted meal adjustments strategy against coping with food shortage.

4.7.1.3 Borrowing money/food from friends or relations

The analysis of the household data set confirmed that unsecured borrowing was one of the main coping mechanisms used by households in response to food shortage. The most common source of loans during a shock is relatives and neighbors. Food vendors and provision stores are also the avenues for obtaining food loans. The poorer households borrow from local money lenders (*kudinruwa*) with a high interest as formal micro-

finance credit is relatively inaccessible to most of the respondents in the study area. The idea of borrowing by households during a period of food crisis is essentially for food purchases. From the result as presented in Figure 4.5, 71.7% of the respondents who adopted coping strategies for food crisis employed the borrowing of money or food from relatives, friends, food vendor and local money lenders. Other studies by Mjonono *et al.* (2009) and Rashid *et al.* (2006), have also indicated similar results as 52.8% and 63.8% respectively being results observed in their studies in South Africa and Bangladesh as figures for borrowing food and money FCS employed.

4.7.1.4 Sale of livestock and consumption of seed stock

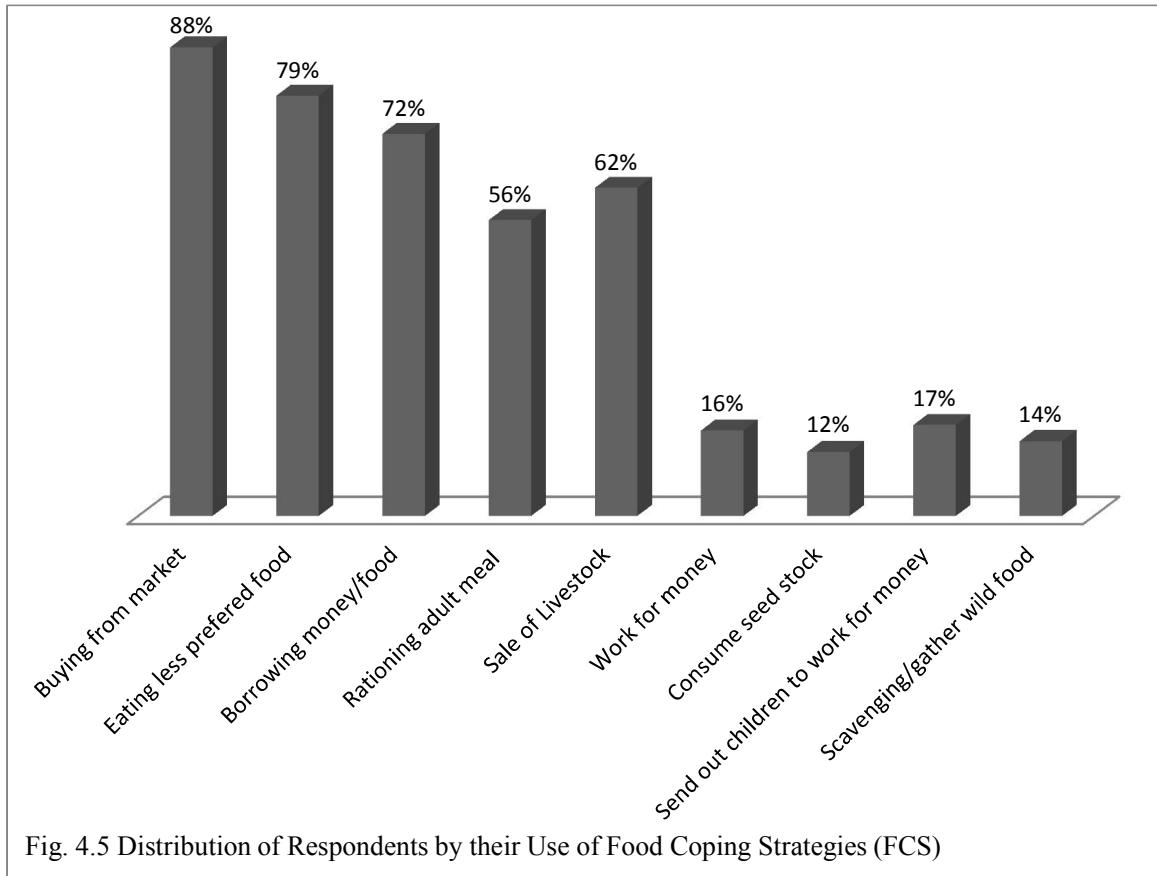
Due to varying degrees of wealth among households, different coping behaviors are adopted by households at different poverty levels. However, some coping strategies are common to all households although the extent to which such strategies enable a household to remain afloat depend on the assets at their disposal (Devereux, 2001). Above all, the general tendency is that the lower the household asset status, the more likely the household would engage in erosive responses such as selling off productive assets such as farm implements (Hoddinott, 2004). One of such responses of disposing off of productive assets is destocking of livestock. This is to be noted that it is not the same thing as selling, for instance, male livestock as a source of farm income by farm households. This is more like selling female, productive livestock to cope with food shortage. From the result as presented in Figure 4.5, 61.6% of the respondents employed the sale of livestock against coping with food shortage. This is not without the effect on the farmers' current and future productive livelihood as this shows an increasing commitment of resources to meeting subsistence needs. The result however further presents that just about 12% of the respondents were involved in the consumption of seed stock for the following year. This means that these farm families will literally have no

seed to plant for the coming year except to probably borrow seeds or money to purchase seed for next production. A vicious cycle of poverty may ensure if no intervention come to the aid of these farm families as this is indicative of high degree of food insecurity.

4.7.1.5 Working for money, sending out children to work and scavenging

Amongst the strategies that entails altering the household structure is going to work for money and sending out children to work for money. Here, food crisis has persisted and the family goes out to take a drastic action to save the situation. Going out to scavenge for food either in the wild or gathering food around falls under this category of household structure altering. Watts (1983), suggests that, “households do not respond arbitrarily to a food crisis for which they are in some sense conceptually prepared; rather they do so serially, with respect to the intensity of what one might call famine signals.” At this level, the food crisis has deepened and future production commitment is less the concern compared to meeting the immediate family needs. Figure 4.5 presents that 16.2% of the household sampled showed that labour was sold for money in the family while 17.2% of the households sent children out to work for money. If labour sale was at the time that the farm family is also involved in production activities, which is very likely, then the farm family production will be limited in no small measure. The family commitment to its own food production will be affected thereby predisposing it more to food insecurity.

It to be noted also that 14.14% of the respondents adopted scavenging as a means of coping with food shortage, while no responses were observed for sale of assets like land, stealing and migration to cities.



4.7.2 Coping strategy index (CSI) and severity

Given that the CSI monitoring tool is a comparative tool, rather than absolute measure of food insecurity, the CSI score alone has no meaning (Maxwell *et al.*, 2003). However it establishes a baseline within sampled comparative measure from which changes in food security among households can be monitored over time (Maxwell *et al.*, 2003). Comparing CSI scores and averages gives a good picture of overall household food security and establishes baseline for monitoring trends and the impact of interventions (Devereux, 2001). The analysis presented in Table 4.28 used the mean CSI score to compare the relative food insecurity severity between households defined by one or more household characteristics, in this case the use of FCS. Later on, the comparisons

described associations between household economic and comparable food security status (who is comparatively food insecure).

Table 4.28 shows the severity of food crisis and otherwise of households who employed food coping strategies. The range of the CSI is between 6 and 62, while the mean score is given as 29.05. Further analysis in comparism with the mean score reveals that about 41% of the respondents who adopted various forms of coping strategies had severe food crisis, a situation that calls for concern.

Table 4.28 Coping Strategy Index and Severity Score

Mean of Index	29.05	Severity	Frequency	Percentage
Minimum score	6	Not Severe	58	58.59
Maximum score	62	Severe	41	41.41
		Group Total	99	100
Standard Deviation	11.83		0.503	

4.7.3 Correlation of income shocks with CSI

Spearman’s correlation showed that respondents’ committed to commercial motorcycling and trading activities, were strongly and positively correlated to CSI score, though only commitment level to commercial motorcycling was found to be significant at 5% level (See Table 4.29). This may be interpreted as, the more a farmer abandons farming activities to be committed to commercial motorcycling, the more coping strategies he employs to combat food insecurity. Commercial motorcycling seems to be the survival strategy of low poor farmers, as a quick source of income to meet family food needs. The income sourced from this is weakly but positively correlated to SCI score but the level of commitment to this temporal vocation can be said to affect adequate commitment to production activities and consequently food insecurity ensues. Farmers who spend more

time sourcing income from commercial motorcycling have less time for agricultural production activities. It is also indicative that farmers' amount of time spend in this trade does not tend to equate the amount of income they get from it. Another vocation offering better income level could therefore be advocated judging by this result.

Income from civil service and outside sources, (e.g. remittances from children and/or relatives) were however found to be negatively and very strongly correlated to the CSI score, meaning these income sources have proven to succor food shortage experiences (Table 4.29). Both income sources showed high correlation with the CSI score, indicating that farmers who are civil servants are highly more likely to be food secured as the correlation coefficient indicates (-0.693). The correlation coefficient of income from outside sources even shows a higher negative correlation (-0.907) found to be significant at 1% level. The implication of this result is that any form of aid given to farmers as assistance or remittance to increase the financial capacity goes a long to lessen CSI score and invariably their food insecurity status.

The table also shows that income sourced from trading activities was found to be negatively and strongly correlated to the SCI score. This also indicates that traders' income volume caused them to be relatively food secured, with less CSI score, though the relationship is not significant at both 1 and 5 percent levels of significance. The enormous amount of time spent in trading may be the reason why this result is so indicated. Another reason could actually be that the level of trading the farmers undertake might not be so sophisticated to attract high income significant enough to affect their food security level. All the same trading farmers are likely to be more food secured as indicated by the result presented.

Income sourced from carpentry has a correlation coefficient of -0.600, though not found to be significant at either 1 or 5 percent levels. The implication of this is also that income from this vocation buffers household from food insecurity. Same can be said for income sourced from artisanship like shoe cobbling, barbing, handicraft as well as bricklaying. Income sourced here however shows a weak correlation with the CSI score (0.249).

Table 4.29 Coping Strategy Index Correlation for Income Sources

Additional Income Sources	Spearman's Correlation-CSI Index
Coping Strategy Index	1
Level of severity	0.867**
Civil service level of commitment	0.000
Civil service income	-0.693
Trading level of commitment	0.517
Trading income	-0.540
Artisanship income	0.249
Carpentry income	-0.600
Commercial motorcycling level of commitment	0.665*
Commercial motorcycling income	0.189
Milling level of commitment	0.000
Outside remittance income e.g. from children	-0.907*

**Significant at P<0.01 (2-tailed),

*Significant at P<0.05 level (2-tailed)

4.7.4 Correlation of food coping strategies with CSI

Spearman's correlation showed that food shortage coping strategies were significantly correlated to the cumulative CSI scores of households (See Table 4.30). The strong and positive correlation of most of the food coping strategies to the cumulating CSI implies households continued to apply the coping strategies despite using their income and consumption of food from their own production. The survey indicated that as CSI scores increased, households relied more often on the food coping strategies showing high level

of food insecurity. Households with low CSI scores applied these food coping strategies less frequently than households with high CSI scores.

All of the coping strategies employed except two which are, buying from market and working for money, were found to be significantly correlated to the CSI score. This result is indicative that most of the coping strategies employed by household were effective in mitigating the food insecurity situation. The coping strategies employed were mostly not detrimental to livelihoods and future food security and this is an indication of resilience to income shocks. The coping strategies employed by households were reversible, i.e. they were not mostly detrimental to livelihoods and future food security situation of the households. However, some of the coping strategies were not reversible, meaning that they were detrimental to the livelihoods and future food security situation of the households.

The negative, weak but insignificant correlation coefficient of buying from the market (-0.163) is indicative of less food insecurity measure of this strategy. This is indicated as not significant and the measure negatively correlated to the CSI score.

Table 4.30 Coping Strategy Index Correlation for Food Coping Strategies

Food Coping Strategies (FCS)	Spearman's Correlation-CS Index
Coping Strategy Index	1
Level of severity	0.867**
Buying from Market	-0.163
Eating less preferred food	0.623**
Borrowing money/food from friends/relatives	0.311**
Rationing adult meal	0.625**
Sale of livestock	0.499**
Working for money	0.079
Consume seed stock	0.356**
Send out children to work for money	0.296**
Scavenge/Gather wild food	0.486**

**Significant at $P < 0.01$ (2-tailed), *Significant at $P < 0.05$ level (2-tailed)

CHAPTER FIVE

Summary, Conclusion and Recommendations

5.1 Summary

This study was conducted to evaluate the food security status of farm families and communities in Kaduna State. In order to achieve this, a multistage sampling technique was employed to select the farm households. Two of the four agro-ecological zones were purposively selected in the state, based on the state's ADP zoning. Likewise, two Local Government Areas were randomly selected from the two purposively selected zones, then samples were drawn from two villages/communities from these Local Government Areas; random sampling was done to give equal opportunity to every member of the strata.

Data were collected using structured questionnaires administered to 244 farmers to achieve the objectives of the study. The analytical tools used were descriptive statistics, Food Security Index (FSI), multiple regression analysis (Tobit regression model), the Community Food Security Assessment Toolkit and the Food Coping Strategy Index.

About 80% of the respondents in the sample area were found to be in the age range of 21-50 years and 87.3% had farming experience of more than 10 years. Only 12.3% of the farming population had female headed households, while about 88% were men. Of these farmers, 71% undertook farming as primary occupation. About 24%, 7%, 24%, 28% and 7% had Arabic, adult, primary, secondary and post-secondary education levels respectively. The average household size was found to be 7.5.

Household farm income in the sample area was assessed and about 66% of the farmers earned less than ₦200,000 with an average of farm income of ₦180,914.50k, while for

non-farm income sources, only 68.9% of the respondents acquired income outside of farming activities. Of these, only 22% had income in excess of ₦200,000 with a yearly average of ₦130,407.10k. The major economic activities among the respondents in the study were farming (35%) exclusively, followed by civil service (20.1%) and trading (16.8%). It was also found that the average farm holding was 2.05 hectares as 75.4% of the farmers acquired farmlands through inheritance. The average farm plots number was found to be approximately 4.

The analyses of the expenditure pattern of households revealed that expenditure on food items accounts for 52.4% of total household expenditure, not taking into account the food produced by the households. The yearly average expended on food was found to be ₦113,351.10k as the large part of these expenses was expended on carbohydrate food items (71.7%). Non-food expenditure was however found to have a singular highest item, medical expenses, as the entire respondents expended an average of ₦21,093.03k, accounting for 20.6% of total non-food expenditure annually. It was followed by educational expenses. Communication expenditure of respondents was noted to account for 9.3% of non-food expenditure. The average daily expenditure on food for farm household was found to be ₦521.80k as the per capita expenditure was found to be ₦69.57k.

About 95% of the respondents' source and meet their family food needs from both own production and the market as 68.4% of animal protein needs were equally sourced from own production and buying from market. About 93% of the farmers store food for future use and 70.9% of them participated in one form of market or the other to sell their produce. About 41% of the respondents had experienced food shortages in the last five years. The most frequent of the periods of food shortages was between July and August as explained by 85.9% of the farmers who had experienced food shortages. The highest

singular cause of food shortage was noted to be the inadequacy of money to buy food during lean season, as 72.7% of the farmers so observed, with inadequacy of farm inputs coming second at 57.6%. About 57% of farmers who had experienced food shortage believed government intervention in food production would solve the problem of food crisis while 28.3% opted for access to credit facilities.

The result of food security indices of households obtained in the study area could be regarded as moderately food secure given that 66.4% of respondents were able to meet the daily calorie intake of 2260 kcal per capita. The average food security indices for the food secure was found to be 1.45 while for the insecure households, the index was 0.85.

The determinants of food security status as obtained from Tobit regression were food security status perception, adjusted household size, per capita annual expenditure on health of family member (at 1% level of significance), dependency ratio (at 5% level of significance), access and usage of consumer credit and total crop production in grain equivalent (at 10% level of significance).

The assessment of community food security shows the profiling of each community's socio-economic and demographic characteristics, profile of community food resources, assessment of household food security, assessment of food availability and affordability and assessment of community food production.

The result of food coping strategy analyses shows that the highly employed coping strategies during food crisis includes buying from market (90%), eating less preferred food (79%), borrowing money/food from friends/relations (72%), sale of livestock (62%), and rationing of adults meal (56%). The coping strategy index also shows that about 41% of those the employed various coping strategies had severe food crisis. Worthwhile relationships were discovered between food security level of severity, level

of commitment to commercial motorcycling and non-farm income sourced outside, e.g. from children, religious groups and benevolence, with coping strategy index. Farmers equally tended to continue to apply coping strategies with increasing food crisis as the coping strategies employed were found to be effective in mitigating food crisis.

5.2 Conclusion

Food security status perception, adjusted household size, dependency ratio, per capita expenditure on health of family members, access and usage of consumer credit, and total crop production, were found to be the most determining factors of household food security. The coping strategies employed to combat food shortages were mostly not detrimental to livelihoods and future food security and this is an indication of resilience buffered by non-farm income sources like civil service and trading. Community Food Security however relies on the cooperation of all within a local regional food system, producers, consumers, community agencies and co-operative groups, government organizations, businesses and marketing integrations to build a community food system where access to enough, safe, nutritious, culturally appropriate food is available to all. The system works to provide a sustainable food production, processing, distribution and consumption, all integrated to enhance the environmental, economic, social and nutritional health of a particular place. It is a long-term goal toward which many communities should strive.

5.3 Recommendations

Based on the findings in this study, the following recommendations were made, first for farmers and then for the government:

5.3.1 The farmers

1. The need arises for farmers to embrace improved food production technologies in line with complementary practices like use of farm inputs like fertilizer, pesticides, hybrid seeds, farm management practices etcetera in order to raise their current level of production and of course their access to food for family consumption. This is because a large part of food consumption of farm household is own production, therefore any attempt to improve production will directly and positively affect the amount of food available to farmers, increasing their chances of food security.
2. Population pressure is increasingly limiting the access to land for agricultural purposes. Indigenous system that promotes access largely by inheritance is also not helping matters in this regard. The uncontrolled increase in population raises the issue of increasing household size, which has been strongly indicated to negatively affect food security status of households. Though this matter of controlled population is a sensitive one, the fact still remains that farmers need to understand the effects of unbridled birth rate. If the vicious cycle of poverty is to be evaded, population related factors have to be checked. In other words, family planning measures have to be adopted by farmers so as to be able to control large family size which has been found to negatively impact food security status of households.
3. As it has been identify as a major issues in community food assessment done, farmers need to be involved in asset building projects by the accumulation of funds to argument income to buy food and support their production activities and expenses. The institution of viable cooperatives comes to play in this regard where farmers can save and possibly obtain loans from their pulled resources. A situation where cooperatives are only made a political tool is decried; but rather a forum for collective and individual economic empowerment for the members is desired.

4. Food buying cooperatives or cooperation is also recommended to the farmers in line with saving money by pooling food purchases. Where consumer cooperative is workable, it could be looked into to enhance food accessibility.
5. Community food security involves all food system stakeholders working with the goal of ensuring that all community residents obtain a safe, culturally acceptable, nutritious diet through a sustainable food system that maximizes community self-reliance and social justice. This is obtainable only by conscious communal efforts geared in the right direction. In other words, farmers will have to team together to promote this understanding in the form of farmers associations to pursue a common front. From the producers to the processors, the distributors, marketers and even the consumers, conscious efforts must be garnered to ensuring the encouragement and promotion of local food resources and self-reliance. Viable co-operatives and farmers association are worthy tools in this regard.

5.3.2 The Government

1. The farmers have raised the need for government to intervene in food production matters. Production inputs such as fertilizer, herbicides, pesticides, and improved seeds should be provided through institutional sources in good time, in enough quantities and affordable costs. Such institutions could include Ministries of Agriculture at federal and states levels, the local governments, research institutes, NGOs and organized farmers groups/associations. Currently, the Growth Enhancement Support (GES) Scheme, a critical component under the Agricultural Transformation Agenda (ATA) of the Nigerian government seems to be targeted at this. The effort however needs to be doubled as not all farmers are reached yet and have access to adequate farm inputs. The relevance of this is further shown from the

fact that this intervention package will go a long way to assist farmers in agricultural production, hence secure their food needs.

2. There seem to be the need to improve the rural marketing system that is readily accessible to the farmers by the provision of basic infrastructure like roads, electricity, water and machines for processing and adding value to farm produce. This will undoubtedly aid the performance of paramount marketing functions and of course improve marketing efficiency to the advantage of the farmers in the study area whose sizeable percentage access and patronize these markets, and as it has been shown to have positive relationship with household food security status in our model.
3. Health statuses of both household heads and particularly the household members as reflected in the amount expended yearly on health related matters came significant but negatively related to household food security status. The government intervention in community healthcare facilities to provide at least basic, primary health care for farmers so as not to allow ill-health impede production activities of farmers is recommended. Public enlightenment on birth control measures should also be pursued and directed at farm households. This will reduce the risk of overpopulation and the attendant food crisis risk.
4. Land use and accessibility largely by inheritance, is a major hindrance to adequate food production. Land use should be reformed as soon as possible because it limits access to land by residents. Policy issues addressing environmental sustainability and a healthy stimulating environment must also be given priority by the government. Also, worthy efforts at achieving food security should address income poverty by providing safety nets for households, especially in the rural areas of Nigeria are desired.

5.4 Contribution to Knowledge and Suggestion for Further Studies

This study has been able to make a connection between community food security assessments as a template for household food security of farm families. The issue of food availability and accessibility which are functions of community food resources predispose or otherwise, households to food security. For a position where all community residents obtain a safe, culturally acceptable, nutritious diet through a sustainable food system that maximizes community self-reliance and social justice to be achieved, awareness about community food security connecting people and actors of food production and food related initiatives in communities must be put in place. This study therefore conducted community food security inventory for eight (8) communities in Kaduna state. From here, individual and community capacity building strategies and initiatives can begin, with the aims of achieving a sustainable food system in the community.

This study has also found out that the farmers' perspective of their household food security status can be significantly accurate despite their lack of empirical know-hows on food security indices, measurements and techniques. Farm families tend to keenly observe their household food situation and equally respond with a number of combating strategies, dependent upon food situation severity, more like a survival instinct.

The household health status, measured by the amount expended on health care and medications of both the household head and its members significantly determined the food security status of the household. A household that would have been food secured by its food production volume and store of food may become food insecure owing to unforeseen expenditure on healthcare of household members or its head. Ill-health in itself further limits food production capacity of households.

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Appendixes

Appendix 1 Nutrient Composition of Commonly Eaten Foods in Nigerian—Raw, Processed and Prepared.

Food items	Kcal/Kg	Food items	Kcal/Kg
Staple Foods		Mango	590
Cassava Tuber	1500	Pawpaw	300
Cassava Flour	3870	Pineapple	320
Cassava Chips	3000	Apple	570
Garri	3840	Coconut	580
Yam Tuber	1100	Guava	730
Yam Flour	3810	Sugarcane	360
Yam Ships	3000	Meat and Animal products	
Sweet Potato Tuber	1100	Cow meat	2370
Sweet Potato Chips	900	Goat meat	2370
Irish Potato	1200	Sheep Meat	2370
Cocoyam Tuber	3830	Pork	2370
Maize Green	3100	Bush meat	2370
Maize Grain	4120	Chicken	2380
Maize Flour	4120	Turkey	2380
Sorghum Grain	3500	Fish	2230
Sorghum Flour	3500	Snail	2245
Millet Grain	3500	Shrimps	2230
Millet Flour	3500	Crayfish	2200
Rice	1230	Crabs	2200
Wheat Grain	3400	Eggs (pieces)	1400
Wheat Flour	3300	Dairy Products	
Cowpea (Beans)	5920	Milk	4900
Ground Nut	5950	Cheese	4000
Soybeans	4050	Yoghurt	4100
Soybean Flour	2600	Ice cream	4100
Melon (Shelled)	5670	Beverages	
Plantain	770	Cocoa	1200
Banana	960	Tea (Leaves)	1200
Vegetables		Tea (liquid)	1200
Okra	4550	Coffee (Powder)	1340
Tomato	880	Coffee (Liquid)	1340
Pepper	3930	Drinks	
Onion	440	Soft drinks	620
Carrot	400	Orange juice	400
Egg Plant	440	Apple Juice	550
Cucumber	270	Pineapple Juice	560
Cochorus/Ewedu	500	Local Beer	740
Spinach	220	Bottled Beer	460
Bitter Leaf	220	Wine	330
Water Leaf	180	Condiments and Spices	
Cabbage	230	Maggi	220
Pumpkin	440	Salt	180

Source: Babatude *et al.*, (2007)

Appendix 2 Equivalent Male Adult Weight to Determine Adjusted Household Size

Age Category(Years)	Male	Female
Under 1	0.00	0.00
1—4	0.25	0.20
5—9.9	0.60	0.60
10—14.9	0.75	0.75
15—59.9	1.00	0.90
60 and above	0.80	0.65

Source: Falusi, (1985)

Appendix 3 Indices for Conversion into Kg-Grain Equivalents

Crop	Index	Crop	Index
Cassava Tuber	0.43	Pepper	1.12
Yam Tuber	0.31	Onion	0.13
Sweet Potato Tuber	0.31	Carrot	0.11
Irish Potato	0.34	Egg Plant	0.13
Cocoyam Tuber	1.09	Cucumber	0.08
Maize Grain	1.17	Cochorus/Ewedu	0.14
Sorghum Grain	0.99	Spinach	0.06
Millet Grain	0.99	Bitter Leaf	0.06
Rice	0.35	Water Leaf	0.05
Wheat Grain	0.97	Cabbage	0.07
Cowpea (Beans)	1.68	Pumpkin	0.13
Ground Nut	1.69	Mango	0.17
Soybeans	1.15	Pawpaw	0.09
Melon (Shelled)	1.61	Pineapple	0.09
Plantain	0.22	Apple	0.16
Banana	0.27	Coconut	0.16
Okra	1.29	Guava	0.21
Tomato	0.25	Sugarcane	0.10

Source: Computed from Literature Survey, 2014

Appendix 4 Farmer's Questionnaire

Questionnaire No _____ Village/Community _____ Date _____

Note: Please, kindly answer the following questions with total and utmost sincerity. God bless you!

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS OF HOUSEHOLD HEADS

1. Age of Respondent: _____ **2. Gender of Respondent:** (a) Male [] (b) Female []

3. Marital status: (a) Married [] (b) Divorced [] (c) Widowed [] (d) Single []

4. Level of Education: (a) No Formal Education [] (b) Arabic Education []

(c) Adult Education [] (d) Primary Education [] (e) Secondary Education []

(f) Post-Secondary Education []

5. Years of Farming Experience _____ **6. Number of Wife/Wives** _____

7. Household Size

Categories	Males (No)	Females (No)
Children (Not capable of farm work, 1-15 yrs)		
Children (Capable of Farm work, 16-30)		
Dependents (Not capable of Farm work, > 60yrs)		
Dependents (Capable of farm work, 15-49 yrs)		

8. Respondent's Occupation: Farming as Primary Occupation []

Farming as Secondary Occupation []

9. What other economic activities apart from farming are you engaged in?

Economic Activities	1*	2*	3*	4*	5*	Income/day (₦)	Income/month (₦)
Civil Service							
Trading							
Artisan							
Tailoring							
Carpentry							
Achaba (Motorcycle)							
Milling Machine							
Others (Specify)							

1—least important, 2—less important, 3*—important, 4*—very important, and 5*most important.

10. Does any of your children/relations outside the village send you money regularly, and if so how much? ₦ _____ per week, ₦ _____ per month, ₦ _____ per annum.

11. Which of these group(s)/societies do you belong?

	Farmers Group	Yes	No	Years of membership
(a)	Fadama Crop Farmers			
(b)	Processor			
(d)	Marketers (Crop)			
(c)	Livestock Keepers Group			
(e)	Cooperative Society			
(f)	Others (specify)			

12. Do you have access to consumer credit? Yes [] No []

13. If yes, state source and how much:

- | | |
|--|------------------|
| (a) From government financial institutions | How much ₦ _____ |
| (b) Micro finance | How much ₦ _____ |
| (c) From co-operative society(ies) | How much ₦ _____ |
| (d) From money lenders | How much ₦ _____ |
| (e) From friends/relatives | How much ₦ _____ |
| (f) Others (specify) | How much ₦ _____ |

14. How would you consider your health status? (a) I hardly fall sick []

(b) Fall sick once in a while [] (c) I often fall sick []

15. How much do you spend on your health? (a) Weekly ₦ _____

(b) Monthly ₦ _____ (c) Yearly ₦ _____

16. How much do you spend on your family members' health? (a) Weekly ₦ _____

(b) Monthly ₦ _____ (c) Yearly ₦ _____

SECTION B: CROPS AND LIVESTOCK PRODUCTION AND CONSUMPTION INFORMATION

17. How many plots of land do you have? _____

18. What crops combinations and sizes of plots do you cultivate?

Plot No	Crop Combination(s)	Size of Plot
1		
2		
3		
4		
5		
6		
7		
8.		
9.		

19. How did you acquire the Farmlands (plots)? (a) Inheritance [] (b) Purchased []

(c) Gift [] (d) Rent []

20. If land was purchased, how much? ₦_____ If rented, how much? ₦_____

21. Do you think you would have preferred you had more farmlands for farming?

Yes [] No []

22. Please complete the table below in with respect to the average crop output, quantity sold, given out, reserved for planting and quantity consumed from last season?

Crops	Output (kg/bags)	Quantity sold (kg)	Qty Given out(kg/bags)	Qty reserved for planting (kg/mudus)	Qty consumed (kg/bags)
A. Sole crop					
1.					
2.					
3.					
4.					
5.					
6.					
B. Mixed crops					
1.					
2.					
3.					
4.					
5.					
6.					
7.					

23. Please complete the table below in respect of crops usually purchased last year to supplement your family consumption from own production.

Food items	Quantity purchased	Quantity consumed	Cost per unit	Cost weekly	Cost monthly	Cost yearly	Couldn't afford Sometimes	Couldn't afford at all
Rice								
Maize								
Sorghum								
Millet								
Cowpea								
Soyabeans								
Yam								
Cassava								
Cocoyam								
Gari								
Acha								
Bread								
Meat/cow/goat/...								
Chicken								
Fish								
Eggs								
Cooking oil								
Vegetables								
Fruits								
Salt								
Maggi/Dawadawa								
Sugar								
Beverages								
Milk/Kindirimo								
Others (specify)								

24. What are you major sources of food crops? (a) Own harvest []
 (b) Purchase from market [] (c) Gifts from friends [] (d) Exchange labour for food []
 (e) Others (specify)_____

25. What are your major sources of animal protein? (a) Own production []
 (b) Gifts from friends [] (c) Purchase from market [] (d) Others (specify)_____

26. What types of livestock do you keep and how much sales did you make and consumed from them last year?

Livestock type	Number	No consumed last yr.	No sold last yr.	Amount sold(₦)
Chicken				
Sheep				
Goat				
Cows				
Bulls				
Donkeys				
Others (specify)				

27. How many of your livestock was given out as gift last year? No _____ Value in naira per each one ₦ _____ Total value in naira of livestock given out ₦ _____

SECTION C: FOOD SECURITY STATUS OF HOUSEHOLDS

28. Have you ever experienced food shortages/less to eat in the last 5 years?

Yes [] No []

29. If yes, usually in which months of the year?

Seasons	Duration	Response (tick)
A. January-March		
B. April-June		
C. July-September		
D. October-December		

30. Do you think that your household is currently food secure? Yes [] No [].

31. Please complete the table below with respect to your food consumption during these seasons.

Food items	Quantity of Food Consumed During each Season			
	Jan—March	April—June	July—Sept.	Oct.—Dec.
Rice				
Maize				
Sorghum				
Millet				
Cowpea				
Soya beans				

Yam				
Cassava				
Cocoyam				
Gari				
Acha				
Bread				
Meat/cow/goat/sheep/etc				
Chicken				
Fish				
Eggs				
Cooking oil				
Vegetables				
Fruits				
Salt				
Maggi/Dawadawa				
Sugar				
Beverages				
Milk/Kindirimo				
Others (specify)				

32. What do you think is the cause of the food shortage?

- (a) Inadequate food storage facilities []
- (b) Inadequate money to buy during those periods []
- (c) Inadequate farm inputs such as fertilizer, pesticides, improved seeds etc []
- (d) Lack of knowledge of innovations such as improved technology []
- (e) Others (specify) _____

33. How did you fend for the household during the period(s) of food shortages?

	Coping Strategy	Daily	Very often	Very rarely	Never
(a)	Buying from market				
(b)	Eating less preferred food (e.g. fish for meat)				
(c)	Borrow money or food from friends/relatives				
(d)	Consumption of seed stock for next year				
(e)	Reduced number of meals for adults				
(f)	Work for food or money				
(g)	Send out children for paid jobs				
(h)	Sale of livestock				
(i)	Gather wild food like hunting/scavenging				
(j)	Sale of assets like land				
(k)	Stealing				

(l)	Migrate to cities				
(m)	Others (specify)				

Note that you can mark more than one strategy used.

34. What do you think can be done to avoid food shortages?

- (a) Increase loans to farmers []
- (b) Government should intervene in food production []
- (c) Provision of improved technology at affordable prices []
- (d) Provision of more storage facilities [] (e) Better healthcare facilities []
- (f) Improvement in extension services [] (g) Others (specify)_____

35. What is the average number of meals per day of family members (a) During time of food shortage?_____ (b) During time of surplus?_____

- 36. What do you do with crop surpluses?** (a) Store for future use []
- (b) Give excess out as gifts [] (c) Most times excess waste away []
 - (d) Sell in the market at a giveaway prices []
 - (e) Other (specify)_____

37. On the average, how much do you spend on feeding your household daily?

₦_____

38. Do you have good markets where you sell your farm produce? Yes [] No []

39. If yes, what type of market do you have? (a) Village Markets []

- (b) Rural Bulking Markets [] (c) Urban Retail Markets []

(d) Others (specify)_____

40. If no, why? (a) Good markets available are too far []

- (b) No good transportation facilities to markets []

(c) No good roads to markets [] (d) Others (specify)_____

41. Household expenditure on basic needs.

	Item(s)	Cost per month(₦)	Cost per year (₦)
(a)	Housing (rent/maintenance)		
(b)	School fees/Materials		
(c)	Transportation/ Petrol		
(d)	Kerosene/Charcoal/Firewood		
(e)	Healthcare/Medicine		
(f)	Cloths/ Shoes/ Beddings		
(g)	Furniture		
(h)	Ceremonies		
(i)	Electrical appliances		
(j)	Radio/Television		
(k)	Religious functions		
(l)	Telephone/Communication		
(m)	Gifts/ Others		

Appendix 5 Community Questionnaire

Community _____ Group _____ Date _____

SECTION A: DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF COMMUNITY

1. Presence of Federal and State Institutions:

Federal Institutions Yes [] No [] If yes, how many? _____
State Institutions Yes [] No [] If yes, how many? _____

2. Educational institutions in the Community:

Primary schools Yes [] No [] If yes, how many? _____
Secondary Schools Yes [] No [] If yes, how many? _____
Tertiary Institution Yes [] No [] If yes, how many? _____

3. Health care services:

Primary Healthcare Canters Yes [] No [] If yes, how many? _____
Clinics and Maternity Yes [] No [] If yes, how many? _____

4. Are there co-operative societies? Yes [] No []. What types?

- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____
- vi. _____

5. Would you consider the land for agriculture fertile in your Community?

Yes [] No []

6. Do you think that there are many in your Community who cannot afford food?

Yes [] No []

SECTION B: COMMUNITY FOOD RESOURCES AND PRODUCTION CHARACTERISTICS

1) What types of markets are in and around the Community (distance of not more than 2 kilometers)?

(a) Village Markets [] (b) Rural Bulking Markets [] (c) Urban Retail Market []

(d) Others (specify)_____

2) Major food crops produced in the Community.

Grains(a) Maize [] (b) Sorghum [] (c) Millet [] (d) Rice [] (e) Wheat []
(f) Acha [] (g) Others (specify)_____

Pulses (a) Cowpea [] (b) Soybean [] (c) G/nut [] (d) Mellon []
(e) Others (specify)_____

Vegetables (a) Tomato [] (b) Pepper [] (c) Onion [] (d) Carrot []
(e) Egg Plant [] (f) Spinach [] (g) Others (specify)_____

Root tubers (a) Cassava [] (b) Yam [] (c) Sweet Potato [] (d) Cocoyam []
(e) Irish Potato [] (f) Others (specify)_____

3) What are you're the major challenges with crop production?_____

4) Major animal types reared in the Community.

Ruminants (a) Goats [] (b) Sheep [] (c) Rabbit [] (d) Cow []
(e) Others (specify)_____

Poultry birds (a) Local chicken [] (b) Guinea fowl [] (c) Ducks [] (d) Broilers []
(e) Layers [] (f) Others (specify)_____

Fish farming and fishing (a) Fish farming (ponds) [] (b) Fishing from river []
(c) Others (specify)_____

Hunting of games (a) Small games e.g. rats, grasscutter [] (b) Large games e.g. antelope []
(c) Others (specify)_____

5) What are your major the challenges with animal production?_____

6) Are there retail stores? Yes [] No [] If yes, how many?_____

7) Are the following available in the retail stores, and at what price?

- i. Milk products/Kg_____
- ii. Tea products/Kg_____
- iii. Baby formula/Kg_____
- iv. Bakery products (bread)/Kg_____
- v. Poultry products(Eggs) in crates_____
- vi. Fish products (fresh)/Kg_____ Smoked Fish/kg_____
- vii. Others (specify)_____

8) Are there food processing facilities/opportunities in the Community, and what type?

- i. For Cereals_____
- ii. For pulses_____
- iii. For vegetables_____
- iv. For local milk products_____
- v. For root tubers_____

9) Does the Community ‘export’ some of her locally produced crops to other communities/List crops and the places farm produce are taken to:

- i. Grains_____
- ii. Pulses_____
- iii. Vegetables_____
- iv. Root tubers_____
- v. Animal products_____
- vi. Fish products_____
- vii. Others (specify)_____

10) List the major food items the Community ‘import’ and how important are these food items?

- i. Grains_____
- ii. Pulses_____
- iii. Vegetables_____
- iv. Root tubers_____
- v. Animal products_____
- vi. Fish products_____
- vii. Others (specify)_____

Kindly state freely, any other important information not captured above.