

**ANALYSIS OF WOMEN GINGER PRODUCTION AS A MEANS FOR ACHIEVING
FARM HOUSEHOLD FOOD SECURITY IN KADUNASTATE, NIGERIA**

BY

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ABSTRACT

The study focused on analyzing women empowerment through production of ginger for household food security in Southern Kaduna. Two Local Government Areas were purposively selected in Southern Kaduna and six villages were randomly selected from these Local Government Area and 224 farmers were selected in this study area. Primary data were collected from 224 women ginger farmerst through the use of random sampling techniques with the aid of structured questionnaire. The statistical tools of analyses used were descriptive statistics, gross margin analysis, Foster Greer Thorbecks Indices; logit regression and t-test. The results shows that (80%) of the women ginger farmers are less than 50 years of age, the majority of the farmers (54%) had one form of formal education or the other. About 58% of the women ginger farmers have household size of 1-5 persons with an average of 5 persons. Majority of the farmers (75%) were not members of a cooperative society. Majority of the farmers (76%) had no access to extension visit. Average farming experience was 19 years, average farm size was 1 hectare and majority of the farmers (92%) financed their production through personal savings. The Gross Income (GI) was ₦182,799.00/ha while the Total Variable Cost was ₦82,649.00/ha. The Gross Margin (GM) was therefore ₦100,150.00/ha. The food security status was determined from the food security line of ₦122,475.30 that was established. Therefore, about 63.4% of the women ginger farmers were food secured, while about 15.2% were moderately food secured and about 21.4% were considered with severe food insecure. The determinants of food security status that was found to be significant were; age, educational level, extension contacts and farm size. These variables were all negative except age which is positive and influence the likelihood of a household being food insecure. Majority of the respondent attested to the fact that inadequate access to inputs (33%), insufficient capital (25%), high cost of labour (23%), poor storage facilities (10%) and shortage of extension visits (5%) were major constraints faced by the women ginger farmers. Based on the findings of this study, it could be concluded that majority of the farming households (63.4%) were found to be food secure and age, education, having access to extension visit and farm size improves the food security status of farming households. The study revealed that food insecurity status decreases with increase in extension services and education. Therefore, the agricultural development programme is advised to stimulate their extension staff through motivation to give the rural farmers the best needed assistance and innovation in ginger production.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Despite its reputation as petroleum resource-dependent, Nigeria remains an agrarian economy. Before the emergence of oil as her dominant economic sector, the agricultural sector contributed over 60 percent of Gross Domestic Product (GDP) and 90 percent of exports (UN 2009). The level of growth in the sector has lagged behind other sectors. Real annual GDP growth from 2000 to 2007 in the Nigerian economy averaged 8.8 percent, while the agriculture sector grew at 3.7 percent in 2007 (Phillip *et al.*, 2009).

Nigerian farmers produced 70% of Nigerian export and 95% of its food needs. Agriculture has contributed immensely by helping to maintain a healthy population; it has been a source of food and nutrition for households in Nigeria. However, it has not done well enough, especially from the time the country started the production of crude oil in commercial quantity in the mid 1960's till now (Alkali *et al.*, 1997). Histories have shown that no nation has actually become great without developing its agriculture and its concomitant institutions (Isife *et al.*, 2009).

Globally, there is enough food for all, but more than 925 million people are undernourished. Out of them, about 900 million people are living in developing countries (FAO, 2010). Nigeria is not left out as it has the highest number of undernourished people in West African. More than 70% of these people live in rural areas and depend, directly or indirectly, on agriculture for their living (FAO, 2003).

Food production increases annually at the rate of 2.5 percent, food demand increases annually at a rate of more than 3.5 percent due to high rate of annual population growth

of 2.83 percent (NBS, 1996). This apparent disparity between the rate of food production and demand for food in Nigeria has led to a food demand-supply gap, leading to a widening gap between the food available and the total food requirement and hence posing a threat to National food security. The problems enumerated above become more pertinent in view of the fact that Nigeria's agricultural production (of which ginger is one) is characterized by small scale women farmers who live in the rural areas.

According to FAO (1994) rural women constitute more than a quarter of the world's population, and are dually vulnerable group. The status and role of rural women is thus crucial, given their numerical strength and decisiveness. In Nigeria like many other developing countries, the role of women in national development has begun to attract attention in recent years. Nigeria faces enormous challenges to improve food security, provide employment and ensure that women are mainstreamed into economic activities. Similarly, there is increasing realization of the critical role of women in agriculture and food production and of the fact that the empowerment of women is necessary for bringing about sustainable development at a faster pace.

The concept of household food security refers to the ability of a household to assure all its members sustained access to sufficient quantity and quality of food to live active healthy lives. Such access is likely to be most threatened in times of economic deterioration. The reasons for linking women and household food security are by now well known. There appears to be a general consensus that the persisting food crisis is the consequence of a long-run neglect of women's food farming roles in West Africa where women perform 70% of labour in food production. Badly informed agricultural policies have undermined women's ability to fulfill their food obligations to their

families and have also undermined the achievement of national food security objectives. In some of the poorest areas of South Asia, on the other hand, cultural restrictions on women's ability to participate fully in food production activities have left them particularly vulnerable in times of economic crisis. I am referring here to the findings of marked sex differentials in access to food and other life preserving resources, of overall excess female mortality and to the extreme poverty of female-headed households.

Maximizing household income is not always sufficient to maximize the food security of all its members for the same reasons that national food availability does not necessarily translate into household food security. In Nigeria, there is evidence that women appear to take a much greater role in assuring the food requirements of their dependents in situations of economic deterioration. So that situations where women produce and/or control the resources by which their own nutritional needs and those of their families are met are likely to be associated with enhanced food security of all members.

1.2 Problem Statement

Gender inequalities and lack of attention to gender in agricultural development contribute to lower productivity, and higher levels of poverty as well as under-nutrition (World Bank, FAO and IFAD, 2009; FAO 2011). The 2012 World Development report dedicated to Gender Equality and Development warns that the failure to recognize the roles, differences and inequities between men and women poses a serious threat to the effectiveness of the agricultural development (World Bank, 2012).

The recognition and promotion of women's contribution in agricultural production requires tireless effort. Given women's crucial role in food production and provision, any set of strategies for sustainable food security must address their limited access to

productive resources. Women's limited access to resources and their insufficient purchasing power are products of a series of inter-related social, economic and cultural factors that force them into a subordinate role, to the detriment of their own development and that of society as a whole. The foregoing has shown that women are active participants in ensuring food security the world over and in Nigeria in particular. However, in doing this, women face a lot of challenges notable among these, are limited access to land, capital, credit, agricultural inputs, education and appropriate technology. Carr (1984) observed that since the substituting of the traditional barter system by cash economic, rural women have found it increasingly difficult to satisfy their cash needs, more so, as their hold on cash income is eroded by their displacement from their traditional income-earning activities. Such indigenous enterprises include clay pot-making, cloth weaving, cloth dyeing, palm oil processing, “gari” processing and so on. These activities used to provide not only employment to the women but also formed good linkages with the farm that enhance rural income and growth. The recognition of the role women play in agriculture and rural economics is fundamental to agricultural and rural development in sub-Sahara Africa. More importantly, recognizing and supporting this role economic potential (Booth *et al.*,1999). Rural women’s productive contributions tend to be undermined and even more difficult to carry out due to high population pressure, high agricultural densities, and high dependency ratios, low labour productivity, natural resource base. In particular, levels of time and human energy inputs required in women’s farm and home-based productive and reproductive chores are rising(Popin,1994).

The role that women play and their position in meeting the challenges of household food security are quite dominant and prominent. Their relevance and significance, therefore, cannot be overemphasized. Despite the immense participation of women in

agriculture specifically ginger production, there inadequate empirical information on the contributions of women to food security. This constitutes the gap in research that this study seeks to address. A reconnaissance visit shows that a lot of women are involved in the production of ginger in the study area and most households in the study area are dependent on this ginger production to meet with food security and other household needs.

In view of the foregoing, this research therefore, intends to analyze how women participation in ginger production aids in achieving household food security in the study area. Thus the following research questions have been put forward:

- i. what are the socio-economic characteristics of women cultivating ginger in the study area,
- ii. what is the profitability of ginger production by women in the study area,
- iii. what is the food security status of women cultivating ginger in the study area,
- iv. what is the impact of women participating in ginger production on their household food security status,
- v. what are the constraints influencing the production of ginger by women in the study area.

1.3 Objectives of the Study

The broad objective of the study was to evaluate women empowerment through the production of ginger for household food security in Southern Kaduna. The specific objectives were to:

- i. describe the socio-economic characteristics of women cultivating ginger in the study area,
- ii. determine the profitability of ginger production by women in the study area;
- iii. estimate the food security status of women cultivating ginger in the study area;
- iv. determine the impact of women ginger production on their household food security status,
- v. describe the constraints influencing the production of ginger by women in the study area.

1.4 Justification for the Study

The contributions of women in ginger production to agricultural development should be harnessed to enhance resource use as well as sustain both household and national food security. Maximizing household income is not always sufficient to maximize the food security of all its members for the same reasons that national food availability does not necessarily translate into household food security(Naila,2008). Therefore, women ginger farmers appear to take a much greater role in assuring the food requirements of their dependents in situations of economic deterioration.

It is expected that the information gathered from this study will serve as a relevant resource material to policy makers towards ensuring appropriate formulation of agricultural developmental policies aimed at improving agricultural productivity as well as income and improvement of food security status of households. It will also avail policy makers with information on the challenges facing women groups producing ginger in terms of credit facilities, training on modern best practices in ginger production. The result of this research work will assist extension agencies to design

appropriate strategies for removing barriers to higher production of ginger and also as a guide to extension agencies in forming a data base for continuous research on ginger expansion aimed at improving the nutritional requirement of ginger producing households and therefore, the findings from this research will serve as an empirical literature for further research on the empowerment of women through the production of ginger in the area. This research work will also be a base for statistical inference to other studies on the influence of ginger production on food security in Nigeria.

1.5 Hypotheses

The hypotheses of the study are stated in the null form as follows:

- i. There is no significant relationship between ginger production by women and their household food security.

- ii. Women empowerment through production of ginger has no significant influence on their income.

CHAPTER TWO

LITERATURE REVIEW

2.1 Concept of Women Empowerment

Attempts to define empowerment must contend with difficulties in respect to variation in viewpoints. One, however, may identify two perspectives that perceive it as a goal and as a process. Whether conceived in the former or the latter forms, empowerment is simply about acquiring the power to partake, or to exert significant influence in family and/or organizational process. It is as much about the right to be heard, be involved, to have a voice, as it is about the opportunity to question, resist or checkmate arbitrary policies, among others. If empowerment is about “being able to participate in society, to enjoy its fruits and fulfil one’s own potentials” as Veronica Couldshed and John Ovrme contends, then it is necessarily a multifaceted process (Rowlands, 1997).

In its broader sense, it entails changes in the social, political, psychological as well as cultural aspects of life of the people in such a way as to remove obstacles or hindrances that may militate against the development of the human potentials and talents necessary for human development (World Bank, 2003). Politically, empowerment of all people, women inclusive, may warrant, among other things, the putting in place of tangible and workable strategies aimed at propelling individuals to political and public positions at the Local, State and National arenas. At the local level, specifically, empowerment may equally involve devising measures that would increase the capacity of individuals and groups for self-reliance and self-actualization. For women, this requires making inroads into areas that have hitherto been the dominant prerogatives of men, including involvement in activities that possesses the capacity for uplifting, first, their economic status and, subsequently, serves as the spring-board for active involvement in political activities (Rowlands, 1997).

In the context of Women Empowerment, women studies that are aimed at addressing the multifaceted dimension of the problems women face in contemporary times have been monumental. The new concern for that may not be from the knowledge that neglecting this large segment of any country's population may impede the drive towards progress and development. It is little wonder, therefore, that several efforts have been made to critically address these main concerns with a view to effectively utilize the talents available to them. Education and employment are the measures of economic resources most often available for macro-level analysis. Micro-level analysis has pointed to the relevance of a range of other resources that might have similar impacts, including finance, land and housing (Sen and Grown 1988; Moser 1989; Batliwala 1993, Kabeer 1994 Rowlands 1997 and Agarwal 1994).

The concerns with women's empowerment have their roots in grassroots mobilizations of various kinds, feminist scholars helped to move these concerns onto the gender and development agenda. Their contributions drew attention to the unequal power relations which blocked women's capacity to participate in, and help to influence, development processes and highlighted the nature of the changes that might serve to promote this capacity at both individual and collective level. There were a number of features that distinguished these early contributions. First of all, there was a focus on women's subjectivity and consciousness ('the power within') as a critical aspect of the processes of change. Secondly, they emphasized the importance of valued resources (material, human as well as social) to women's capacity to exercise greater control over key aspects of their lives and to participate in the wider societies ('the power to'). Thirdly, these contributions attached a great deal of significance to the need for women to come together collectively as women, both to acquire a shared understanding of the institutionalized (rather than individual and idiosyncratic) nature of

the injustices they faced and to act collectively to tackle these injustices, a challenge beyond the capacity of uncoordinated individual action. Processes of empowerment were seen to have a strong collective dimension ('the power with') (Kabeer, 2008).

Finally, these contributions recognized that women did not form a homogenous group. Gender inequalities intersected with other forms of socio-economic inequality, including class, caste, race, ethnicity, location and so on, frequently exacerbating the injustices associated with them. The widely used distinction between women's practical gender needs and strategic gender interests partly helped to capture some of the differences and commonalities between women within a given context (Molyneux, 1985). Women's practical gender needs reflected the roles and responsibilities associated with their position within the socio-economic hierarchy, and hence varied considerably across context, class, race and so on. Strategic gender interests, on the other hand, were based on a deductive analysis of the structures of women's subordination and held out the promise of a transformative feminist politics based on shared experiences of oppression.

As gender equality concerns began to enter the mainstream of development policy, there were various attempts to conceptualize women's empowerment in ways that spoke to the mainstream policy discourse. My own contribution to these attempts sought to translate feminist insights into a policy-oriented analytical framework. It defined women's empowerment as the processes through which women gained the capacity for exercising strategic forms of agency in relation to their own lives as well as in relation to the larger structures of constraint that positioned them as subordinate to men (Kabeer, 2008). A later version of this definition sought to link change at the level of individuals with the more collective forms of agency needed to bring about sustained structural

change the conceptualization of empowerment that informs this (research) touches on many different aspects of change in women's lives, each important in themselves, but also in their inter-relationships with other aspects. It touches on women's sense of self-worth and social identity; their willingness and ability to question their subordinate status and identity; their capacity to exercise strategic control over their own lives and to renegotiate their relationships with others who matter to them; and their ability to participate on equal terms with men in reshaping the societies in which they live in ways that contribute to a more just and democratic distribution of power and possibilities (Kabeer,2008).

The conceptualization of women's empowerment in terms of agency proved influential in policy circles, although with varying degrees of attention to broader structures which constrained women's agency. Writing for the World Bank, Alsop and Heinsohn (2005) described individuals and groups as empowered when 'they possess the capacity to make effective choices: that is, to translate these choices into desired actions and outcomes. A more recent formulation in the WDR 2012 offered a broader notion of agency which included control over resources, decision-making, freedom of movement, freedom from the risk of violence and a voice and influence in collective decision-making processes. The Inter-American Development Bank (2010) defined women's empowerment in terms of 'expanding the rights, resources, and capacity of women to make decisions and act independently in social, economic, and political spheres'. The UN (2001) defined women's empowerment in terms of five components: 'women's sense of self-worth; their right to have and determine choices; their right to have access to opportunities and resources; their right to have the power to control their own lives, both within and outside the home; and their ability to influence the direction of social change to create a more just social and economic order, nationally and internationally'.

2.2 Women Empowerment through Agriculture

Women in Agriculture (WIA) came about in 1988 when it became obvious that in spite of a decade of World Bank's assistance in building up Nigeria's agricultural extension service, women farmers were still receiving minimal assistance and information from extension agents (World Bank,2003). Consequently, the WIA programmes within the existing state agricultural development programmes (ADPs) were created in 1990 to address the gender-related deficiencies within the existing extension programme. The programme was created to integrate women into development process with specific reference to agriculture since the participation of women farmers in planning and policy-making as well as the beneficiaries is important (Maigida,1992). A serious lapse in the country's agricultural extension system had hitherto being that it was pro-male and gender-insensitive towards women farmers. This arises from the fact that agricultural extension services in Nigeria had traditionally been focused on men and their farm production needs, while neglecting the female half of the production force.

Up until that point, the ADPs contained only a home economics wing responsible for home-related women's activities. The WIA programme, which was launched as a pilot, therefore sought to improve agricultural extension services for women. This entailed the retraining of existing home economics agents in agriculture and extension methodologies, with emphasis on women's activities.

The WIA programme was plagued by initial teething problems which threatened its success. Different WIA initiated in various states of the federation seemed to occur sporadically and in ad-hoc manner, some ADPs making tremendous progress and others doing nothing at all. To address this disparity, a National Planning Workshop in July 1989 brought stakeholders together to take stock of various WIA programmes initiated

country-wide, share lessons and experiences among regions and develop a 3-year action plan for each state (World Bank, 2003). There was determination to give female farmers a voice in the WIA policy reform process, even though they were uncertain as to the best way to achieve this. The clue seemed to lie with the female extension agents who interacted with women farmers on a regular basis. They were better able to articulate constraints faced by women farmers and proffer solutions on their behalf. They had first-hand knowledge of the situation and good working relations with women farmers. Bringing about change in favour of women farmers required ownership by both men and women at all levels. Consequently, each state ADP demonstrated commitment to taking action in improving services for women farmers. Establishment of the WIA programme ensured that extension service in each state in Nigeria has female extension workers at every level of operation from state headquarters down to the grassroots. The formation of WIA farmers' groups facilitates the dissemination of agricultural innovations and provides women farmers with better access to farm inputs and credit than they would have as individuals. A rural household survey in three parts of the country was conducted to monitor and measure achievement of the WIA programme. Positive results of recommendation and action plans manifested from the survey. The programme developed better than expected due to the dynamism and resourcefulness of Nigerian women.

2.3 Ginger Production in Nigeria

Ginger (*Zingiberofficinale*) is a herbaceous perennial grown as an annual for its spicy underground *rhizomes* or *stems*. It belongs to the family of *Zingiberaceae*. It is a slender perennial plant with thick and branched underground stem (rhizome). It is a spice grown across many climates in the world. In the world market, the current major five exporting countries have been China, Nigeria, India, Jamaica, and Brazil Asumugha (2002)

Ginger is likely to have originated from India, where it is being cultivated in commercial level(Hass,1998). Ginger was introduced to Africa and the Caribbean by the colonial masters; and it is now cultivated throughout the humid tropics. It got to Nigeria in 1927 and its cultivation started around Kwoi, Kubacha, Kafanchan and Kagarko areas of southern Kaduna State and around the neighboring parts of Plateau State (KADP, 2000). In recent times, ginger cultivation has been introduced into south eastern and south western agricultural zones of Nigeria. Worldwide over 25 varieties of ginger are grown. Most varieties have not been properly characterized. Varieties differ in size of the rhizome, flavour, aroma, colour and fibre content.

The plant has fibrous roots that emerge from the branches rhizomes. It takes about 6 weeks for shoots to emerge after ginger planted. Vegetative growth is maximized until flowering begins in September – October flowering marks the beginning of rhizomes maturity and increasing fibrous tissue development (Valenzuela *et al.*, 2005). According to the United Nations Food and Agriculture Organization (FAO, 2004), there are two major varieties of ginger grown in Nigeria which differ in the colour of their rhizomes namely, the reddish and yellow varieties. The yellow variety appears to be widely planted than the reddish variety. According to Chukwuet *al.*, (2003), the various cultivars available include UG1, UG2 and Maran. The UG1 (locally called Tafingiwa meaning elephant's foot type) yield higher than UG2 (Yatsunbiri meaning monkey's finger type) which was reported to be more pungent. Ginger is usually cultivated vegetative through its rhizome. Modern micro propagation is also being used where new plants are cloned from cells taken from a plant. The crop requires a good soil tilled for production of well-shaped rhizomes (NAERLS, 2004). In southern Kaduna where ginger is extensively grown in Nigeria, beds are preferred for rain fed ginger production while planting on ridges is recommended for irrigated ginger. (NAERLS, 2004)

recommended that rhizome for planting be cut into small pieces, each having at least 2 good buds or growing points and weigh 5 - 10 g. The recommended planting depth is 4 - 5 cm and distance of 20 by 20 cm to give a plant population of 250,000/ ha. It is expected that ginger should be planted early, March/April in the rainforest zone and April/May in the savannah zone of Nigeria to have enough rain for its 7 - 8 months of field life(NAERLS, 2004).

2.3.1 Economic importance of ginger (*Zingiberofficinale*Rosc)

Nigeria produces an average of 50,000 metric tonnes of fresh weight ginger per annum(Ezeagu,2006). About 10% of the produce is consumed locally as fresh ginger while the remaining 90% is dried for both local consumption and export. According to Ezeagu(2006) 20% of the dried ginger is consumed locally for various uses and 80% is exported. Traditionally, ginger is used in Nigeria for both medicinal and culinary (kitchen) purposes as well as in confectionery industry. Ginger throughout the world is used as a spice or fresh herb in cooking and a range of other value added products including flavoring in candies, beverages. In both modern and traditional medicine, Ginger has been used in treating health problems such as Nausea in pregnancy, Motion sickness, prevention of Diabetes, cold/flu prevention and treatment, menstrual cramp relief, digestive problems, fights ovarian cancer, Migraine relief. It also serves as Antibiotics. The oil property in Ginger can help relief arthritis due to its Anti-inflammatory properties. Young rhizomes that harvested early are also used in pickles and confectionary. Nigeria was among the countries that the global production of ginger in 2008 was over 1.4 million metric tons (MT) and the major exporting country to US in 2007(NAERLS, 2004).

2.4 Food Security in Nigeria

At the 1996 World Food Summit, food security was said to exist 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. This definition integrates access to food, availability of food, and the biological utilization of food as well as the stability of all these (World Bank, 1996). Observing that food security is generally defined in terms of food consumption and is thus subject to biomedical definitions and considerations, Maxwell and Wiebe (1998) described Food security as the state of having secure and sustainable access to sufficient food for an active and healthy life. Currently, a synthesis of these definitions with the main emphasis on availability, access and utilization, serves as the working definition in the projects of international organizations (Haile *et al.*, 2005). Developing policies and interventions to increase food security therefore requires an understanding of each of these factors, their interrelationships and their relevance to particular group of people (FAO, 2004).

Food security may be analyzed for units at different conceptual levels: regions, countries, households and individuals. Much analysis of the topic has focused on the macro levels (Lofgren *et al.*, 2003). Recognizing that the main problem of food security is lack of access rather than an aggregate shortage of supplies, focus on food security has since the World Food Conference of 1974 moved from a global and national perspective to that of household and individual (Diaz-Bonilla *et al.*, 2001). Even though food security for individuals is often the main focus of attention. Olayemi 1998 and Ajibola, (2000) reported that food security is however a measure of a household condition, not that of each individual in the household. Therefore, not all individuals in a food insecure or hungry household are food insecure. This issue is especially important

for young children who are often shielded from even the most severe forms of food insecurity and hunger (Hall,2004).

Although food insecurity is closely linked with poverty (Nord *et al.*, 1999), traditional income and poverty measures however do not provide clear information about food security (Bickel *et al.*,2000). Therefore, it is incorrect to assume that a state, country, region or municipality poverty prevalence rate is the same as its food insecurity or hunger prevalence rate, since the relationship between poverty and food insecurity is not a consistent one (Hall,2004). Accurate measurement and monitoring of food security situations can help public officials, policy makers, service providers and the public at large to access the changing needs for assistance and the effectiveness of existing programmes. While the determination of the food security situation of the households can provide an indispensable tool for assessment and planning, monitoring food security situation of a particular population may help in comparing the local food security situation to state and national patterns, assess the local need for food assistance or track the effect of changing policies or economic conditions (Bickel *et al.*, 2000).

Focus on food security ensures that the basic needs of the poorest and most vulnerable groups are not neglected in policy formulation (Ajibola,2000). This is because food security is one of the several necessary conditions for a population to be healthy and well-nourished(Nord *et al.*, 2001). One important aspect of the wealth of a nation is the ability to make food available for the populace. In this connection, food security therefore becomes an important factor in any consideration of sustaining the wealth of the Nations (Osundare,1999). Since it is a well-known fact that much of tropical Africa suffers from under nutrition and malnutrition and that annual increases in food production fail to cope with increases in demand arising from higher rates of population

growth; enough food to relieve hunger and build as well as maintain healthy bodies is therefore a necessary pre-condition for the attainment of better living standards and rising expectations under economic development and political independence (Olayide,1982).

Available statistics show that low average per capita food intake, as well as energy, constitutes perhaps the greatest obstacles to human and national development in Nigeria (Igene,1997). The cost of inadequate diets to families and nations are considerably high. This includes increased vulnerability to diseases and parasites, reduced strength for tasks requiring physical effort, reduction of the benefit from schooling and training programmes and general lack of vigour, alertness and vitality. The outcomes of these is a reduction in the productivity of people in the short and long terms, sacrifice in output and incomes, and increasing difficulty for families and nations to escape the cycle of poverty. Attempt to ensure food security can therefore be seen as an investment in human capital that will make for a more productive society. A properly fed, healthy, alert and active population contributes more effectively to economic development than one which is physically and mentally weakened by inadequate diet and poor (Igene, 1997).

In Nigeria, the percentage of food insecure house was reported to be 18 percent in 1996 and over 40 percent in 2005 (Sanusiet *al.*,2008). Although, figures released by Food and Agricultural Organization in 2005 on the state of food insecurity in the world, indicated that 9 percent of Nigerian population was chronically undernourished between 2000 and 2002 (FAO, 2005). Food security is an age long concept as the quality of life of a people, and as such, a household needs to ascertain how to feed, and continue to feed its

members (Food Africa, 2004). However, food security is said to exist 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 (Nyam,2005). Consequently, in Nigeria, food security which goes with food self-sufficiency and sustainability is still elusive (Nworgu,2006). This is because the agricultural sector has not been able to deal effectively with the problem of food security for the Nigerian people when viewed from the stand point of the nutritional status of Nigerians household food security and price (Vision, 2010).

The effective management of available resources through farming household gets as much income as possible from its production and consequently improves its economic access to food required by its members (Mohammed and Omotesho,2004). For this, food security refers to ability of a household to secure either from its own production or through purchases adequate food for meeting the dietary needs of its members (Maziya–Dixon *et al.*,2004)

2.5 Determinants of Food Security

Several authors have investigated the determinants of food security in sub-Saharan Africa. Nyangwesoiet *al.*,(2007) in a study of household food security in Vihiga district of Kenya found that household income, number of adults, ethnicity, savings behavior and nutrition awareness significantly influence household food security. In a similar study, Kahoiestablished that the significant determinants of food security in the Mwingi district of Kenya were participation of households in the food for work program, marital status of the household head and their educational level. In a study of food security in the Lake Chad Area of Borno State, Nigeria, Goni reported that factors influencing

household food security, including household size, stock of home produced food and number of income earners in the household, were positively related to food security. In addition, in a study of food security in Nigeria, Olayemi (2006) categorized factors affecting food security at the household level into supply-side factors, demand-side factors and stability of access to food, which includes household food and non-food production variability; household economic asset; household income variability; quality of human capital within the households; degree of producer and consumer price variability and household food storage and inventory practices. Despite the growing concern of improving food security, the measurement and determinants of food insecurity among the rural households of Nigeria is not well-documented. As a result, there is a need to empirically measure and examine the determinants of food insecurity among rural households in northeast Nigeria.

2.6 Measurement of Food security

The most commonly cited food insecurity indicator is “undernourishment” estimates generated by FAO (2010). FAO uses this indicator to document global and national food security status. It is also importantly used to track progress on the first Millennium Development Goal related to hunger.

The FAO measure of food deprivation, the prevalence of undernourishment, is based on a comparison of usual food consumption expressed in terms of dietary energy (kcal) with certain energy requirement norms (Naiken, 2003). By focusing on dietary energy intake, the FAO measure attempts to capture those whose food consumption is insufficient for body weight maintenance and work performance. These figures are derived from national-level food balance sheets and assumptions about intra-national distribution of food (Barrett, 2010). There are alternative measures such as generating

simulation models based on prices and national accounts and production equations (Barrett,2010). The approach of using food availability information, income distribution and energy requirement for estimating the global prevalence of food deprivation has been applied in other studies, including the (USDA, 2000), and by Senauer and Sur (2001). The surplus/shortfall measure, described in more detail below, is similar to the FAO method as well.

A central question is whether adequacy of dietary food energy intake and changes in this can actually be measured (Mason,2002). Three of the methods outlined previously focus on this as their central concern: the FAO method, household income and expenditure surveys, and individual food intake surveys (Mason,2002).The FAO methodology is concerned with the correlation between energy intake and need, but has adopted a “cutoff” approach. The issue is that until food availability is restricted, intake will tend to meet requirement, and taking account of this must be at the individual level, for which, there are virtually no data (Mason,2002). Undernourishment is measured by classifying households based on whether or not there are sufficient kcal available in the household typically using the daily per capita calorie intake of 2470 kcal (Ibrahim *et al.*,2009). The amount of available calories available data are derived from food balance sheets compiled every year by FAO based on the production and trade of food commodities data (Naiken,2003). Using these data and other information on seed rates, waste coefficients, stock changes, types of utilization (feed, food, etc.), a supply/utilization account is prepared for each commodity in weight terms. The food component refers to the total amount of the commodity available for human consumption during the year. Then, the total mean represented by the ‘per calorie’ available is obtained by aggregating the food component of all commodities

afterconversion into energy values (Naiken,2003). The estimated total household calorie availability is divided by the adjusted household size in adult equivalent, in order to estimate the per capita calorie intake (Ibrahim *et al.*, 2009). Households whose daily energy availability falls below that minimum energy requirement are regarded as “undernourished” (UN Stats, 2005). The estimate of the proportion of individuals with insufficient energy consumption is defined within a probability distribution framework, as it is not practical to determine energy consumption of individuals (UN Stats, 2005).

Trends in undernourishment are mainly driven by changes in energy availability as measured by country food balance sheets changes in the variance of the distribution of dietary energy consumption in the population, induced by changes in both the distribution of dietary energyconsumption due to income levels, and the distribution of dietary energy requirements based on weight for attained heights by sex and age; and changes in the minimum level of dietary energy consumption. A major problem with this measure concerns the use of energy requirement norms and energy consumption for individuals (UN Stats, 2005). Even after taking into account the leading factors such as age, sex, body weight and activity, differences exist in the energy requirement of individuals. The FAO method also assumes a low energy expenditure which may not be appropriate for countries where subsistence agriculture is a primary livelihood, resulting in an underestimated prevalence.

Another common issue with the FAO method is that those at risk of hunger often go through differing periods of dietary energy needs, there may be periods where they are adequately nourished for example, after harvests or when wages are obtained followed

by periods of deprivation. Food supply estimates, such as Months of Adequate Household Food Provisioning (MAHFP), typically use a reference period of one year (Mason,2002). Insufficient food for one day is too short a time period to be counted into an estimate of hunger, as individuals may be sick, traveling or fasting. Yet, other dimensions of hunger (e.g. health and economic) do not respond from low intake just for one day if it rebounds the next day. Transient hunger should be assessed by other methods, notably the qualitative measures (Mason,2002).

Food insecurity at the household level is realized as a series of experiences or decisions that takes place as resources diminish (Radimer *et al.*, 1992). Within the history of food security direct measurement, four instruments have been influential: the food sufficiency status question (Bickel *et al.*,2000); the community childhood hunger identification project instrument (Wehler *et al.*,1995), the Radimer/Cornell instrument (Radimer *et al.*,1990), and the U.S. Department of Agriculture's Food Security Survey Module (FSSM) (Bickel *et al.*, 2000).All consist of a question or a series of questions asked, generally as part of a telephone survey, to the person in the household most responsible for food preparation and provision. The Food Security Survey Module (FSSM) was develop on the preceding three instruments and now represents the most widely used and most tested food security direct measure. A thorough history of how each of these instruments advanced the research into direct household measurement of food insecurity is readily available at the USDA's Economic Research Service website (www.ers.usda.gov). The FSSM asks about experiences at any point in the previous 12 months. If 10% of households are found to be food insecure this does not necessary mean that all of them are experiencing difficulties each day. The inability to meet basic food needs can vary in frequency, duration and severity. For many it is a cyclical

condition with money available earlier in the month and less available at the end of the month (Tarasuk,2001).

There are no data estimating the daily food insecurity rate for Canada. However, according to an analysis of the 2002 U.S. Current Population Survey, the prevalence of hungry households on an average day during the 30 day period from early November to early December 2002 was approximately 0.5-0.7% (517,000 to 775,000 Households) (Nord, Andrews and Carlson,2003). While this percentage is low, the proportion of individuals that may experience some form of food insecurity at any point in their lives could be high. Based on an analysis of thirty years of Data from the U.S. Panel Study of Income Dynamics, Rank and Hirschl (2005) concluded that slightly over half (50.8%) of all Americans will, at some point, receive food stamps, an indirect indicator of food insecurity. Even more striking is the conclusion that approximately 64% of Adults with less than 12 years of education and 85% of Africa Americans will use food stamps sometimes between the ages of 20 and 65. This suggests that although food insecurity affects a minority of the population at any point in the developed world, a much larger proportion may be vulnerable to these experiences over time. The USDA's Food Security Survey Module is not without its limitations. Below are a number of limitations identified;

- The instrument measures annual household food security and is static, so it does not reflect unexpected changes in circumstances, variations in household decisions about how to handle competing demands for the limited resources, and geographic patterns of relative cost and availability of other basic necessities, such as housing (Bickel *et al.*, 2000).

- The FSSM focuses on the quantitative and qualitative dimensions of food insecurity with only one reference to the psychological dimension (worrying about the food supply running out) and on measurement of the social dimension (Tarasuk,2001).
- The module does not measure the women ginger farmers's baseline, in terms of anxiety about food supply. Those in Chronically deprived circumstances can become used to income-related compromises in food choices and eating patterns, and may not identify these behaviours as abnormal or problematic on a questionnaire Tarasuk (2001).
- The FSSM itself does not include many questions to capture details on the duration and frequency of food deprivation or compromised intake associated with food insecurity. These details are critical in trying to identify possible health implications. However, the Food Security Supplement that accompanied the FSSM annually in the U.S. Current Population Survey (CPS) collects a great deal of other information from which greater depth of analysis can be achieved (Bickel *et al* 2000). The full range of food insecurity and hunger cannot be captured by any single indicator. Instead, a household's level of food insecurity or hunger must be determined by obtaining information on a variety of specific conditions, experiences, and behaviors that serve as indicators of the varying degrees of severity of the condition. Household surveys, usually conducted in person or by telephone, are used to get this information. Research over the past two decades has identified a particular set of this kind of condition, experience and behavior pattern that consistently characterizes the phenomenon of food insecurity and hunger. Established questions for many of these potential

indicators were included in the 1995 CPS Food Security Supplement, which became the basis for the food security scale measure that then was developed from the CPS data. The key section of the CPS Food Security Supplement asks about the following kinds of households conditions, events, behaviors and subjective reactions (Bickel *et al* 2000):

- Anxiety that the household food budget or food supply may be sufficient to meet basis needs;
- The experience of running out of food, without money to obtain more;
- Perceptions by the women ginger farmers that the food eaten by household members was inadequate in quality or quantity;
- Adjustments to normal food use, substituting fewer and cheaper foods than usual;
- Instance of reduced food intake by adults in the household, or consequences of reduced intake such as the physical sensation of hunger or loss of weight; and
- Instances of reduced food intake or consequences of reduced intake, for children in the household.

2.7 Measurement of Profitability in Agriculture

Profitability is obviously related not only to cost of production but also to revenue. Profitability can be defined in several ways, such as the difference between revenue and cost (gross margin) or the ratio between cost and revenue. As Harrison and Kennedy

(1997) argue, firms with positive profits indicate that are able to create barriers preventing the entry of new firms (whose entrance would result in profits decreasing to zero for all firms in the industry), that is to say they are able to maintain their market shares and thus possess some type of competitive advantage. Market shares are sometimes mentioned as a way of assessing a firm's competitiveness, but the concept is often quantitatively measured by profitability variables.

This involves estimation of costs and returns of production. Gomez (1975) developed a farm level model to evaluate alternative cropping mixtures and patterns. These involves as follows: (i) profitability: this is measured as the differences between value of yield and cost of production, and (ii) Net return: this involves the difference between value of yield and cost of inputs, including hired labour. In choosing economic indicators on the basis of production factors affected by potentials innovation. Werner (1993) suggested the use of the following: (i) the gross margin and returns to variable cost, where only capital is affected. (ii) Yield/labour ratio, where only labour is affected, and (iii) Gross margin, return to variable costs and monetary return to labour, where capital and labour are affected.

The major problems associated with cost-return analysis as basis for profitability assessment are: (i) It does not indicate the relative importance of each of the resources in production and (ii) It is location bound and specific in applicability due to use of money as the common unit of measurement and the prevailing price for estimates. Gomez (1975). Said that in spite of the limitations. Cost-return analysis is a useful tool of enterprise comparison and indicating a profitability pattern of aggregate input use.

2.7.1 Gross margin analysis

Gross margin (GM) is the difference between the gross farm income and the total variable cost (Olukosi and Erhabor, 1989). Gross margin is a very useful tool in situations where fixed capital is a negligible portion of the farming enterprise as in the case of subsistence agriculture. According to Agboola (2011), gross margin of fish farming is the difference between the total value of production (total revenue) and the variable costs of production.

The total revenue refers to the gross income accruing to fish farms from the sales of table-sized fish. This is obtained by multiplying the unit price of average table-sized fish by the quantity sold. The variable costs are those costs that vary with the level of output. Therefore;

$$GM = GFI - TVC \dots\dots\dots (1)$$

Where GM = Gross margin (Naira)

GFI = Gross farm income (Naira)

TVC = Total variable cost (Naira)

Empirical studies that utilized gross margin analysis in estimating profitability of fish farming include Olagunjuet *al.* (2007); Agbebi (2012); Eleet *al.* (2013); Anyanwuet *al.* (2009).

2.7.2 Net farm income analysis

Net farm income is the difference between the gross farm income and the total cost of production (Olukosi and Erhabor, 1989). The general model for the Net Farm Income is as follows:

$$\text{NFI} = \text{GI} - \text{TC} \dots\dots\dots (2)$$

Where:

NFI = Net farm income (Naira)

GI = Gross farm income (Naira)

TC = Total cost (Naira)

Total cost = Total variable cost (TVC) + Total fixed cost

Empirical studies that utilized net farm income in estimating profitability of fish farming are as follows; Kudiet *al.* (2008); Oladeji (2010); Agboola (2011); Dawanget *al.* (2011); Awoyemi (2011); Akegbejo-Samsons and Adeoye (2012); Olasunkanmi (2013), Henri-Ukoha (2012); Williams *et al.* (2012); Baruwaet *al.* (2012); Olaoyeet *al.* (2013); Olayemiet *al.* (2013); Oluwemimo and Damilola (2013); Penda *et al.* (2013); Olasunkanmi and Yusuf (2014); Adeogunet *al.* (2014).

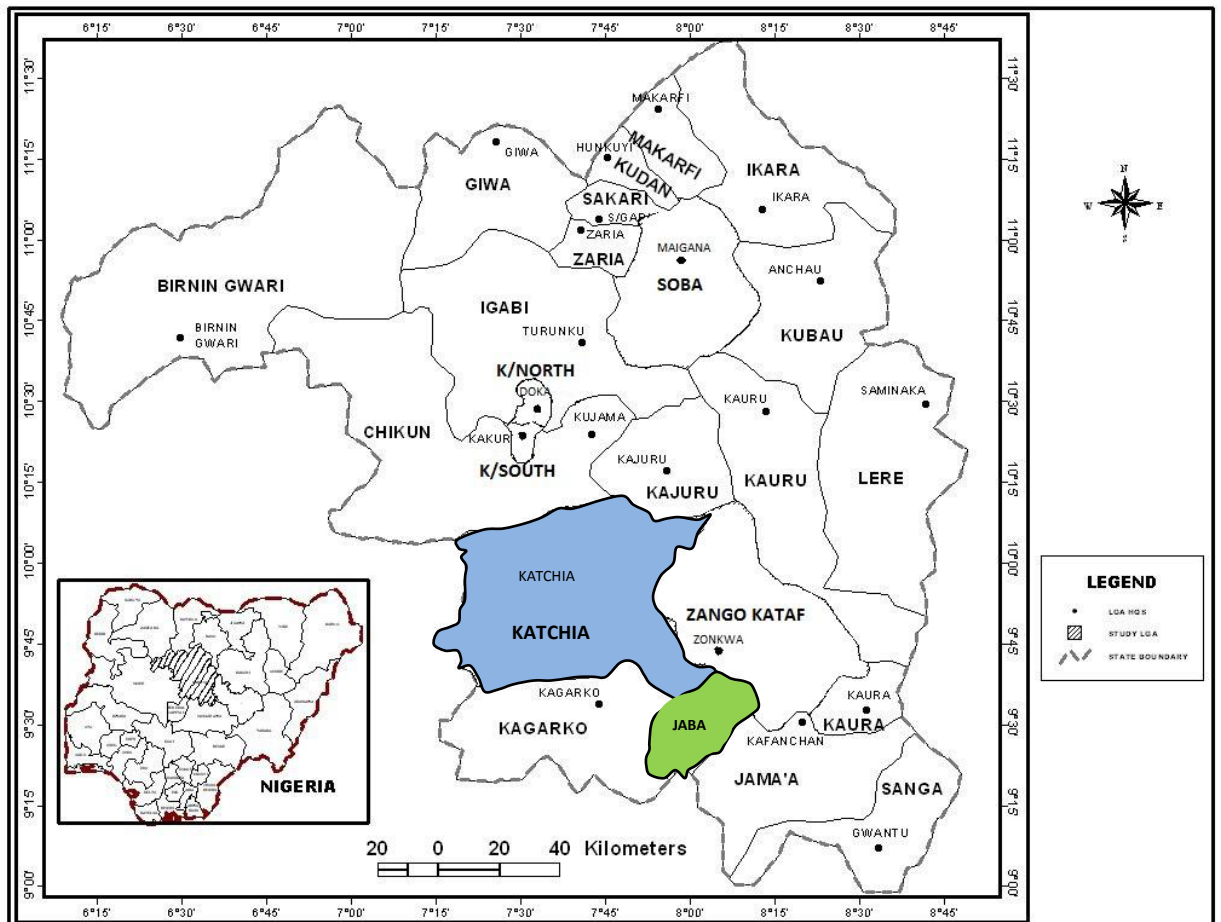
CHAPTER THREE

METHODOLOGY

3.1 The Study Area

Kaduna is divided into three agricultural zones namely, Northern zone, central zone and the Southern zone. The Southern zone is chosen for this work due to the large scale ginger production from the region. Southern Kaduna is situated within the central high plains of Northern Nigeria. It is located between longitude 5° E and 7° E of the prime meridian.

Southern Kaduna is made up of about 12 local governments which include: Jemaá, Jaba, Kaura, Kuru, Zango-Kataf, Kagarko, Kachia, Sanga, Kajuru, Chikun, Kaduna-South and Lere. With the respective populations: Economically, over 60% of the people engage in farming, hunting and trading. Although of the three, farming dominates the occupation practiced by the people are: livestock rearing, food and cash crops which includes; Ginger, Soya beans, Maize, Ginger (guinea corn), Millet, Cassava, Yam tubers, and acha among others. The rainfall is evenly distributed from the months of April to October with an average of 1,524mm. There are two marked seasons in the State, the Dry windy season and the Rainy (wet) Seasons. The wet season is usually from April through October with great variations as you move North-Wards. On the average, the State enjoys a rainy season of about five months (KADP, 2000). There is heavy rainfall in the southern parts of the state like Kafanchan and northern parts like in Zaria with an average rainfall of about 1016mm. The State extends from the tropical grassland known as Guinea Savannah to the Sudan Savannah in the North. The grassland is a vast region covering the Southern part of the State to about Latitude 11°00' North of the equator. The prevailing vegetation of tall grass and big trees are of economic importance during both the wet and dry season.



Map of Kaduna state showing the study Area.

3.2 Sampling Technique and Sample Size

A multi stage sampling technique was used. The first stage involved a purposive selection of two Local Government Areas (LGAs) which includes, Jaba and Kachia. The selection is due high concentration and intensity inginger production by women in these areas. The second stage involved a purposive selection of three villages from each of the LGAs. This gave a total of 6 (Nok, KurminJatau, Fai, Assako, Yarbung 1 and Gidantagwai) villages. The third and final stage, 10% of the sample frame of women ginger farmers in each village was selected. A total of 224 women ginger farmers were used for this study, 134 women from Kachia and 90 women from Jaba local governments respectively.

Table 3.1: Distribution of Sample Ginger Farmers Selected

LGAs	Villages	Sample frame	Sample size (10%)
Kachia	Assako	565	57
	Yarbung 1	476	48
	Gidantagwai	293	29
Jaba	Nok	421	42
	KurminJatau	210	21
	Fai	274	27
Total	6	2239	224

3.3 Data Collection

Primary data were used in this study. The primary data were obtained by the use of structured questionnaire administered to ginger farmers. Data collected include socio-economic characteristics of the women ginger farmers which include; age, educational status, farming experience, marital status, household size, farm size, access to credit, land tenure and extension contacts. Data was also collected on the costs and return of ginger production, food consumption and constraints encountered in ginger production by the women.

3.4 Analytical Techniques

Analysis of data collected from the field was done using the following analytical tools; descriptive statistics, gross margin analysis, United State Department of Agriculture (USDA) food security approach and Logit regression model.

3.4.1 Descriptive statistics

Descriptive statistics such as percentages mean and frequency distribution was used to achieve objectives (i) and (v) of the study.

3.4.2 Gross margin analysis

The gross margin analysis was employed to determine the profitability of ginger production (objective ii). The gross margin will be calculated as the difference between the gross farm income and the total variable cost Olukosi and Erhabor(1988).

Mathematically it is expressed as:

$$GM = GI - TVC \dots\dots\dots(3)$$

GM = Gross margin ₦/ha

GI = Gross farm income ₦ /ha

TVC = Total variable cost ₦/ha

3.4.3 USDA Food Security Approach

The United States Department of Agriculture (USDA) food security approach was used to achieve objective (iii) of the study. The USDA method categorizes households using a constructed food security scale (USDA, 2000). This scale is a number continuum in a linear scale that ranges between 0 and 10. The scale measures the degree of food insecurity/hunger experienced by a household in terms of a single numerical value. The procedure that determines a household scale fundamentally depends on the household responses to some structured survey questions. In determining the household food security status on the food security scale, the food security scale is first simplified into a small set of categories as in Table 3.2. Four categories can be defined for this purpose. These include:

Food secure households: These are households that show zero or minimal evidence of food insecurity. The group’s value ranges between 0-2.32 on the food security scale.

Food insecure without hunger households: This group of households shows concern about the adequacy of the household food supply. They therefore show adjustments in their daily food management. This group’s value ranges from 2.33-4.56 on the food security scale.

Food insecure with hunger (moderate) households: These groups of households have their food intake reduced such that the household adults have repeatedly experienced the physical sensation of hunger. The group’s value is between 4.57-6.53 on the scale.

Food insecure with hunger (severe) household: Households in this group have their children’s food intake reduced to an extent that the children have experienced hunger. The group’s value on the food security scale ranges between 6.54-10.0.

Table 3.2: Household food security status

	0-2.32	2.33-4.56	4.57-6.53	6.54-10.0
Food security	Food insecurity			
	Food insecure without hunger		food insecure with hunger	
			“moderate”	“severe”

3.4.4 Logit Regression Model

Logit regression model was used to achieve objective (iv) of this study. The model assumes that the probability of the women ginger farmers being food secured (P_i) is expressed as:

$$P_i = \frac{1}{1 + e^{-Z_i}} \dots \dots \dots (4)$$

P_i ranges between zero and one and it is non linearly related to Z_i . Z_i is the stimulus index which ranges from minus infinity to plus infinity and it is expressed as:

$$Z_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \dots \dots + \beta_9 X_9 + u \dots \dots \dots (5)$$

To obtain the value of Z_i , the likelihood of observing the sample were formed by introducing a dichotomous response variable. The explicit logit model is expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \dots \dots + \beta_9 X_9 + u \dots \dots \dots (6)$$

Where:

Y = food security status (1= food secured, 0 = food insecure)

X_1 = income (naira)

X_2 =Age (years)

X_3 =Farming experience (years)

X_4 = Education (years of formal schooling)

X_5 = Household size (number)

X_6 = Farm size (hectares)

X_7 = Amount of credit obtained (Naira)

X_8 = Membership of cooperative (years)

X_9 = Extension contact (Number of contacts)

$\beta_1 - \beta_9$ = The coefficients for the respective variables in the Logit function

3.5 Measurement of Dependent and Independent Variables

Nine explanatory variables measured as continuous and discrete variables were hypothesized for determinants of food security.

(i) Age: This refers to the number of years of an individual attained from birth. It is a continuous variable and it was measured in years. Hofferth (2003) argues that the higher the age of the household head, the more stable the economy of the farm household, because older people have also relatively richer experiences of the social and physical environments as well as greater experience of farming activities. More also, older household heads are expected to have better access to land than younger heads, because younger men either wait for a land distribution, or have to share land with their families.

(ii) Education level: Education is generally considered an important variable that could enhance farmer's acceptance of new technologies. Ogunbameru (2001) posited that education was likely enhance the adoption of modern farm technologies by youth and thereby sustaining a virile farming population. The more educated farmers are, the more likely they adopt technology and also translate into production experience. Level of education is measured by number of years spent in formal schooling.

(iii) Household size: This means the total number of people in the house which includes the wives, children and dependents that reside within the same house. Since food requirements increases with the number of person in the household and also because land and finance to purchase agricultural inputs are limited. Increasing family size, according to Brown (2004), tends to exert more pressure on consumption than the labour it contributes to production. The larger the family size the more favorably

disposed will be the members to food insecurity. The estimated coefficient of household size was expected to have positive sign on food security.

(iv) Amount of money received: This refers to amount of money received from both formal and informal sources. It was measured as the actual money/credit borrowed. Credit is a very strong important factor that is needed to acquire or develop farm enterprise (Ekong, 2003). Its availability could determine the extent of production capacity. This was measure as amount received in naira. The estimated coefficient of credit obtained is expected to have positive sign on the household food security. The a priori expectation for amount of money received is expected to be positive; this implies that the amount of money received by the farmer is increasing on household food security.

(v)Extension contact: Agricultural extension service constitutes a driving force for any agricultural development. The relationship between agricultural extension agent and the farmer is an important determinant in improving yield, income of the farmers as well as in ensuring food security (Chikezieet *al.*, 2012). The more number of visits of an extension agent to the farmers, the greater the chance for them to adopt innovation. It was measured in terms of number of visits made by an extension agent. The estimated coefficient of extension contact was expected to have positive sign on the household food security. This implies that the extension contact of the farmer will increase on the household food security.

(vi)Co-operative membership: Co-operative groups are organized for the promotion of special interest or meet certain needs that cannot be achieved by the individual efforts.

They contribute to the dissemination of new ideas, practices and products as well as in sourcing for loan and farm input (Chikezie *et al.*, 2012). Farmers that belong to a cooperative society are likely to adopt new technology easily than those not in any cooperative. Thus it influences the attitude of members towards food security. This variable was used to characterize farmers based on particular involvement in farming operation. The estimated coefficient of cooperative membership is expected to have positive sign on the on the household food security.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Women Ginger Farmers

In this section the general socio-economic characteristics of ginger farmers is provided. These include age, educational level, household size, farming experience, membership of cooperative, farm size, amount of credit received and extension visit.

4.1.1 Age distribution of women ginger farmers

The study revealed that about 42% of the women ginger farmers were within the age range of 40-49 years and about 38% are within the age range of 30-39 with a mean of 41 years. This implies that farmers in the study area were young women ginger farmers. The implication of this result is that there is likelihood of high productivity among farmers since majority of the farmers (80%) are less than 50 years of age which shows that they are strong, active and flexible to farming activities. Age is expected to have positive influence on the women ginger farmers' participation in improved ginger production that is why younger farmers are more active in the production of ginger. This agrees with the findings of Yusuf *et al.* (2008), that age can influence the adoption of improved agricultural practices.

Table 4.1: Age distribution of women ginger farmers

Age (years)	Frequency	Percentage
20-29	7	3.1
30-39	84	37.5
40-49	93	41.5
50-59	40	17.9
Total	224	100
Mean	41	

4.1.2 Educational level of women ginger farmers

The result in Table 4.2 shows that about 46% of women ginger farmers had no formal education, while about 7% of the women ginger farmers had only primary education, about 25% had secondary education, while about 14% had diploma/NCE and about 8% had up to degree level of education. This indicates that the farmers' educational level is high with about 54% having at least one form of education or another, which implies that women ginger farmers in the study area would be better exposed to more reliable information sources and will greatly influence the decision making in the farm production activities because educated farmers are better adopters of agricultural innovations and tend to have higher yields and income from cultivable areas. This finding is in line with Amaza (2000), in which he reported that education has a positive and significant impact on farmers' efficiency in production. Thus, literacy level will greatly influence the decision making and adoption of innovation by farmers, which may bring about an increase in productivity.

Table 4.2: Distribution of women ginger farmers according to level of education

Education Status	Frequency	Percentage
No formal education	103	46.0
Primary education	15	6.7
Secondary education	56	25
Diploma/NCE Education	32	14.3
Degree	18	8
Total	224	100
Mean	3	

4.1.3 Household size of women ginger farmers

Figure 1 shows the distribution of women ginger farmers by household size. Majority of the farmers (58%) had a household size that ranged from 1-5 persons; about 41% had

household size that ranged from 6-10 persons while about 2% had household size that ranged from 11-15 persons. The average household size was 5 persons implying that there is appreciable number of family labour supply to accomplish various farm operations. According to the report of Oladele (2011), there is a positive and significant relationship between the household size and farmers' efficiency in fruits and vegetable production. However, the absolute number of persons in a certain family cannot be used to justify the potential for productive farm work. This is because it can be affected by some important factor such as; age, sex, and health status of the persons in that family.

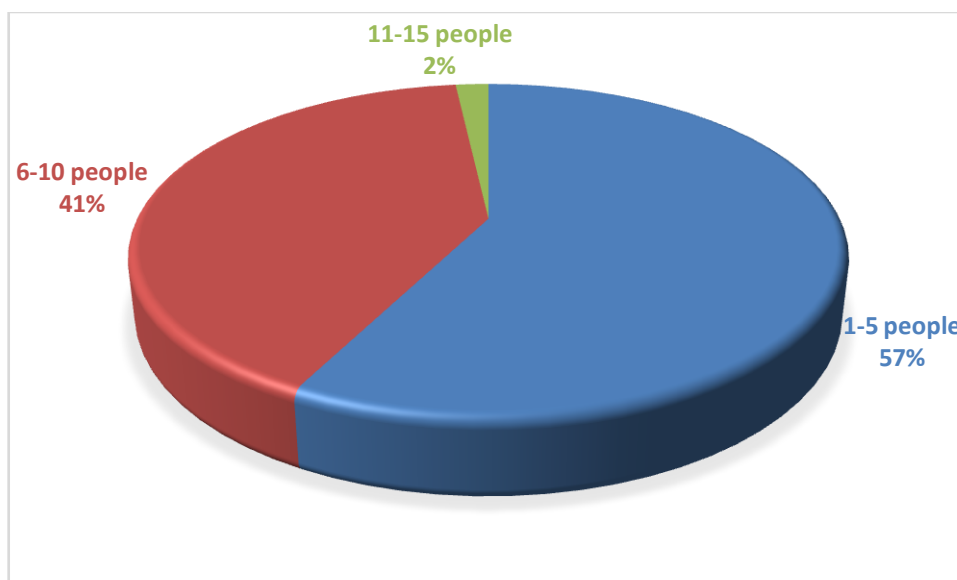


Figure 1 Distribution of women ginger farmers according to household size

4.1.4 Farming experience of women ginger farmers

The result in Table figure 2 revealed that majority about 59% of the women ginger farmers had between 1-20 years of farming experience. The mean farming experience for women ginger farmer is 19 years. This depicts good signal for high productivity. Farming experience is used as a measure of management ability, the more experience the farmer is, the more his ability to make farm decision. This result showed that most

of the women ginger farmers had long years of farming experience, implying that such farmers are likely to make decisions that would increase their output and income. This finding is in tandem with the findings of Adewumi and Okunmadewa, (2001), that, the more experienced a farmer, the more efficient the farmer might be in the use of productive resources.

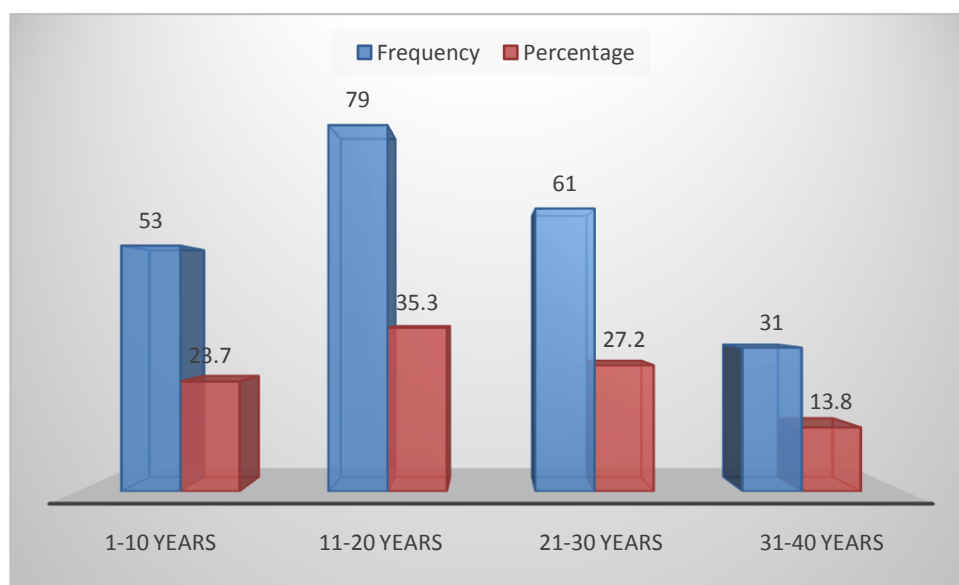


Figure 2: Distribution of ginger farmers according to farming experience

4.1.5 Membership of cooperative society

Membership of cooperatives influences adoption of improved technologies resulting in higher productivity and poverty alleviation Amazaet *al.*, (2009). The result in Table 4.5 revealed that majority about 75% of the women ginger farmers do not participate in any cooperative association probably because of unawareness of any association while about 25% have been in cooperative association for the period of 1-10 years. The average years of membership of cooperative society was 1 year. The effect of this result is that most of the ginger farmers in the study area do not enjoy the assumed benefits accrued

to co-operative societies through pooling of resources together for a better expansion, efficiency and effective management of resources and for profit maximization. Odebiyi (2010) and Gonaet *al.*,(2011), stated that membership of co-operative societies has advantages of ensuring that their members derive benefits from the groups such as they could not derive individually. Membership of clubs, association or cooperatives avails a farmer the opportunity of not only obtaining credit and agricultural inputs but also information on how to improve his farming activities.

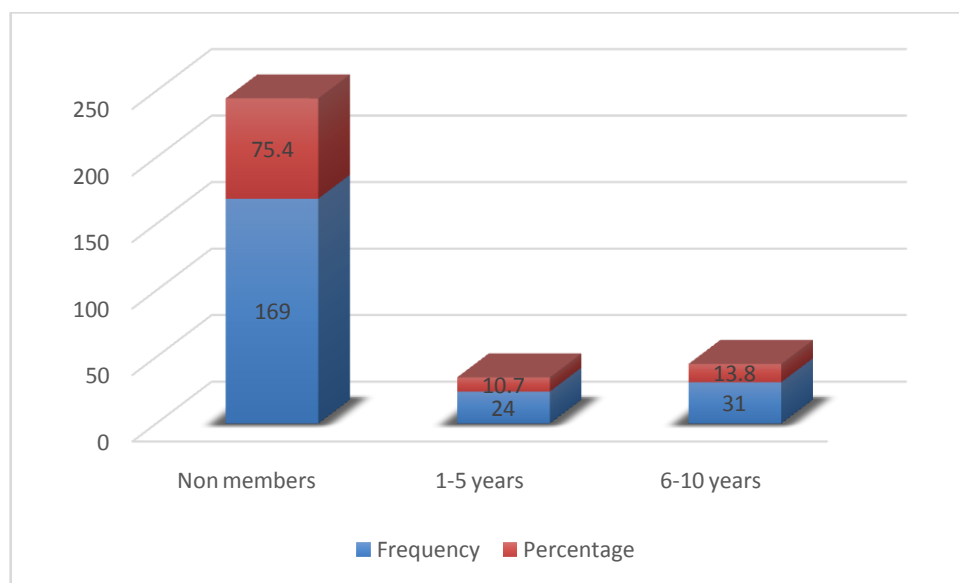


Figure 3: Distribution of ginger women farmers according to years spent in cooperative association

4.1.6 Distribution of women ginger farmers according to farm size

The result in Table 4.3 revealed that majority (69%) of the women ginger farmers had between 0.1-1.0 hectares of the same farmland while about 28% of the women ginger farmers had 1.1-2.0; about 3% of the women ginger farmers had 2.1-3.0 hectare of farmland and only 1% had above 3.0 hectare of farmland. The mean farm size for women ginger farmers is 1 hectare. This implied that farmers in the study area are purely

small scale farmers based on the Ojuekaiye's (2001) classification of farms. He classified farmers with 0.1 hectares and 5.9 hectares as small-scale. Since the majority (97%) of women ginger farmers has farm holdings between one and two hectares, it means that these farmers cannot achieve economies of large-scale production.

Table 4.3: Distribution of women ginger farmers according to farm size

Farm size	Frequency	Percentage
0.1-1.0	154	68.8
1.1-2.0	62	27.7
2.1-3.0	7	3.1
3.1-4.0	1	0.4
Total	224	100
Mean	1	

4.1.7 Credit obtained by women ginger farmers

Credit availability is a very strong factor that is needed to acquire or develop any enterprise which could determine the extent of production capacity. The result in table 4.4, Shows that majority (92%) of the ginger farmers financed their production from personal savings while about 8% obtained credit to finance their production activities, with an average of ₦21,500. The low access to credit could be attributed to the fact that Government or formal financial institutions seldom grants credit to farmers. This means that farmers in these communities relied absolutely on personal savings for farm business and must have acquired a lot of farming experience over time. According to FAO (1999), employment in non-farm activities is essential for diversification of the sources of farm household's livelihood. It enables households to modernize their

production by giving them an opportunity to apply for the necessary inputs and loan from financial institutions.

Table 4.4: Distribution of women ginger farmers according to credit obtained

Credit	Frequency	Percentage
No access to credit	206	92.0
Access to credit	18	8.0
Amount of credit obtained (n=18)		
₦1000-20000	8	44.4
₦20001-40000	7	38.9
₦40001-60000	3	16.7
Mean	21, 500	

4.1.8 Numbers of extension visit

The result in figure 4 revealed that 76% of ginger farmers had no extension visit or contact, and about 23% had access to extension visit ranging from 1-3 visits, while about 1% had extension visit range from 4-6 visits. The average was 1 visit per year. This implies that majority of the farmers in the study area do not have access to extension contacts which is one of the main source of information on improved farm activities because the ultimate aim of extension services is to enhance farmers' ability to efficiently utilize resources through the adoption of new and improved methods used in production activities instead of using traditional methods which are inefficient and resulting to low yield.

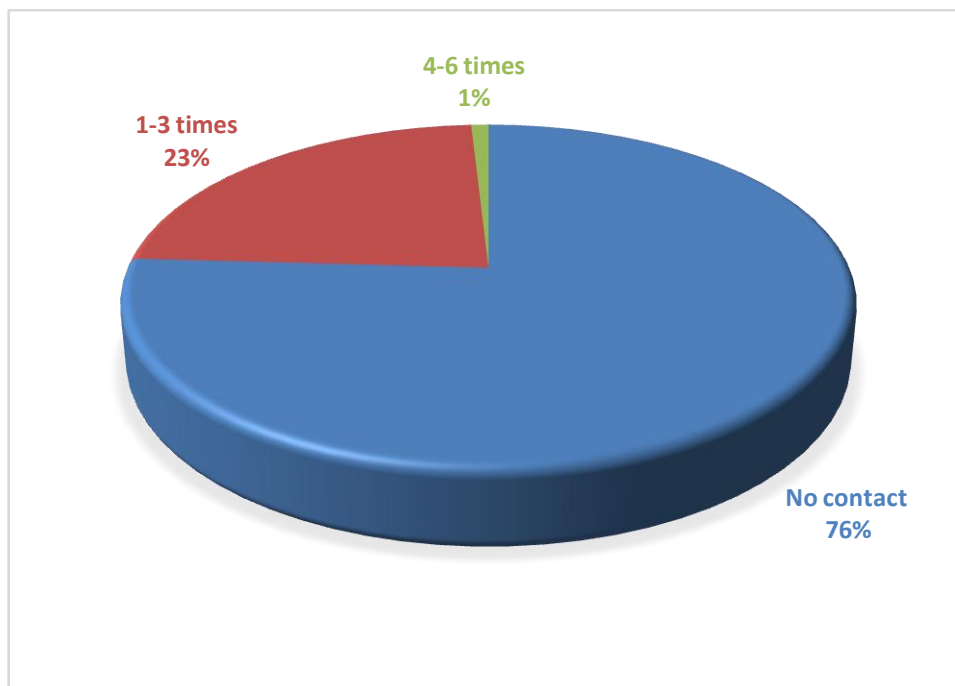


Figure 4: Distribution of women ginger farmers according to extension visit

4.2 Costs and Returns of Ginger Production in the Study Area

The level of inputs used and output realized in the study area are reported in Table 4.5. The inputs that were used in ginger production include; land, seed, fertilizer, herbicides and labour. It revealed the mean farm size was 1 hectare. The minimum and maximum land areas were 0.1 ha and 4 ha, respectively. The average quantity of seed used by ginger farmers was 260.63 kg/ha. The minimum and maximum seed used were 200 kg/ha and 1500 kg/ha, respectively. Average fertilizer used by ginger farmers was 200.89 kg/ha while the minimum and maximum were found to be 100 kg/ha and 3000 kg/ha, respectively. Average herbicides used by ginger farmers is 6.38 L/ha while the minimum and maximum were found to be zero and 75 L/ha, respectively. The mean labour recorded is 111.13 man-day/ha while the minimum and maximum were observed

to be 33.60 man/days/ha and 288man/days/ha, respectively.This shows that agricultural production in the study area is of small scale and labour intensive.

The wide variation in input used by the farmers could be attributed to the fact that they differ in purchasing power and size of production.

This however, contradicts the recommended rates per hectare for seed which is 1200-1800kg/ha, 300kg/ha of fertilizer and the average potential yield of 2000kg/ha. This implies that ginger farmers in the study area are underutilization their resources and that is why the potential yield was low by producing less than the potential yield.

Table4.5: Level of input utilized and output realized in ginger production

Variable	Mean	Stddev	Min	Max
Seed(kg/ha)	260.63	2142.17	200.00	1500.00
Fertilizer(kg/ha)	200.89	390.89	100.00	300.00
Herbicides(L/ha)	6.38	9.17	0.00	75.00
Labour(man/day/ha)	111.13	53.22	33.60	288.20
Yield(kg/ha)	330.61	532.08	2000.00	4400.00

4.2.1 Profitability of Ginger Production in the Study Area

Ginger seed used by the farmers in the study area were mainly unimproved seeds taken from the last harvest. The quantity of ginger seed is 260.63kg/ha with an average market price of ₦45 per kg was used and this constitutes 14.2% of the total cost of production as revealed in table 4.10. The quantity of fertilizer is 200.89kg/ha with an average market price of ₦100 per kg was used and this constitutes 24.3% of the total cost of production. The quantity of herbicides is 6.38L/ha with an average market price of ₦100 per L was used and this constitutes 7.7% of the total cost of production.

Labour costs consisted of cost of land preparation, planting, fertilizer application, weeding and harvesting. The family labour was computed on the basis of opportunity cost in man-days. The wage rate varied according to farm operation performed. An average wage rate of ₦400 per man-day was used, giving the average labour cost per hectare to be ₦44,452.00 and this constitutes about 54% of the total cost of production, and this shows how labour intensive ginger production is by constituting majority (54%) of the total cost of production. This could be attributed to the fact that the women alone cannot meet up with the farm operations therefore, the need to use a lot of hired labour.

Table 4.6: Cost and return from ginger production in(₦)per hectare.

Variables	Values/ha (₦)	% Contribution
A. Variable cost		
i. seed (kg)	11,728.35	14.20
ii. fertilizer (kg)	20,089.00	24.30
iii. herbicides (L)	6,380.00	7.70
iv. labour (man-days)	44,452.00	53.80
Total Variable Cost (TVC) = (i + ii + iii + iv)	82,649.00	
B. Gross Income(GI)	182,799.00	
C. Gross Margin (GM)= (GI - TVC)	100,150.00	
Return per Naira Invested (RNI)= (GM / TVC)	2.21	

Results presented in Table 4.6 indicated that the Gross Income (GI) was ₦182,799.00 while the total variable cost (TVC) is ₦82,649.00. The Gross Margin (GM) is therefore ₦100,150.00. The average rate of returns on investment (Return per

Naira Invested) is 2.21, indicating that for every ₦1 invested in ginger production in the study area; a profit of ₦1.21 kobo was made. Thus, it could be concluded that ginger production in the study area though on a small scale, was economically viable. This finding is similar to that of Oladele (2011), in Contribution of indigenous vegetables and fruits to poverty alleviation in Oyo State, Nigeria, observed that fruits production is profitable by returning ₦1.40 to every ₦1.00 spent.

4.2.2 Test of hypothesis I

The null hypothesis (H_0) which stated that there is no significant difference between costs and return in ginger production in the study area was tested using the result of a t-test presented in Table 4.7. From the result in the table 4.7, an average cost was ₦218204.40 and average return was ₦182798.95. The calculated t-value was 18.63 and exceeds the critical value (t-critical two tail) of 1.97, therefore H_0 is rejected at 5% level of significance. Therefore, the result of the analysis indicates that ginger production is profitable in the study area.

Table 4.7: t-test result of profitability of ginger production.

Variable	Average cost(₦)	Average return(₦)
Mean	218,204.4	182,798.9
Standard deviation	1.45E+10	21555072098
Observations	224	224
Pearson Correlation	0.25	
Hypothesized Mean Difference	0	
Df	223	
t Stat	18.63	
P(T<=t) one-tail	1.17	
t Critical one-tail	1.65	
P(T<=t) two-tail	2.34	
t Critical two-tail	1.97*	

*P<0.05

4.3 Food Security Status of Ginger Households

In order to measure household food security, a food security index (FSI) was constructed. To determine the food security level of women ginger farmers, a common base line was established. This base line is known as the food security line. The food security line was determined using two third mean per capita household incomes (MPCHI) of the women ginger farmers. From table 4.8, Food security status of farming households in the study area is presented. A relative food security line of ₦122,475.30 was established from the total income of the farming household. This implies that a household having an average annual income above ₦122,475.30 was considered food secure, those with income between ₦60,933.00 and ₦122,475.30 are considered as moderate food insecure while those having annual average income less than ₦60,933.00 were considered severe food insecure. Therefore, about 63.4% of the women ginger farmers were food secured, while about 15.2% were moderately food secured and about 21.4% were considered severe food insecure, which constitutes 34 and 48 of the women ginger farmers respectively. That is to say about 36.6% of the women ginger farmers were food insecure because their incomes level fell short of the mean household income used as food security line. The result indicates majority (63.4%) of women ginger farming households were food secure. This implies that the study area is potentially food secure since the number of food secure households (142) is greater than food insecure households (82).

Table 4.8: Food Security Status of Women Ginger Households

Food Security Category	Estimates	Percentage
Food Secured	142	63.4
Moderate Food Insecure	34	15.2
Severe Food Insecure	48	21.4

Food Insecurity Indices

FOOD INSECURITY LINES:

MPCHI	= ₦ 182,799.00 Per annum
2/3*(MPCHI)	= ₦ 122,475.30 Per annum
1/3*(MPCHI)	= ₦ 60,933.00 Per annum

To determine factors influencing food security status of farming households, socioeconomic characteristics of households were regressed on their food security indices and result was presented in Table 4.9. The result showed four variables: age, education, extension services and farm size, were relevant and significantly influencing food security status of farming households in the study area. With the exception of age which showed positive relationship with food security all the other variables that are significant had negative relationship with food security.

The result showed that age has a positive sign and significant at 10% which influence household food insecurity. This suggests that, the higher the age of the women ginger producers, the better the food security situation as there may be more options of making food available from both agricultural and non-farm opportunities. This is as expected because as the farmer increases in age, the more the farming experience and it determines his ability to make effective farm management decisions, not only adhering to agronomic practices but also with respect to input combination or resource allocation and farm production efficiencies because of accumulation of skills in order to have the

highest possible output which increases the farmer's income and consequently become more food secure. Adetula *et al.*, (2006) noted that the longer a person stays on a particular job, the better his efficiency level tends to be and the more revenue he or she generates with minimum cost.

The coefficient of years of formal education is statistically significant at 10% level and carries a negative sign, thus suggesting that the higher the educational level of the ginger women household, the less food insecure the household tends to be and vice versa. This is as expected, since the level of education should positively affect the income earning capacity and level of efficiency in managing the household's food resources. This result implies that women ginger households who have households with relatively better education are more likely to be food secure than those without formal education. Education stimulates entrepreneurial and management skills, and enhances productivity both in farm and non-farm sectors. It also provides other livelihood options in the event of farm failure or natural disaster that could lead to low income. This is because households with better education or skills have the capacity to seek employment in the wage sector while participating in farm work as well. Income from such employment opportunities can be used to invest in or expand farm and non-farm activities.

The result coincides with the theoretical evidences that educational improvement could lead to awareness of the possible advantages of modernizing agriculture and improve the quality of labor, efficiency and revenues and consequently reduces tendency of a household of being food insecure. It is similar with the findings of Adeyemi *et al.*, (2002), where they pointed out that educational status of farming household is attributed to the fact that educated household heads have the tendency to adopt improved farming

techniques better and faster than those with no formal education. This however, will raise the productivity and incomes of the educated households with subsequent improvement of welfare amongst them thereby, reducing their poverty status.

The coefficient of access to extension services is statistically significant at the 5% level and has a negative relationship with the food insecurity status of a household. This implies that households with access to agricultural extension services tend to have less food insecurity than those that did not have such access and vice versa. This is because contact with extension services tends to enhance the chances of a household having access to better crop production techniques, improved inputs, efficiency and maximized profit as well as other production incentives that positively affect farm productivity and income and thus household food security status. Asogwa *et al.*, (2012) observed that high level of technical inefficiency among small-holder farmers in the rural and peri-urban areas of Nigeria were highly attributable to low availability of extension services and information about technical aspects of crop technologies. This is true, because farm households with access to extension personnel are better exposed to improved farming methods, which are output increasing and capable of raising income and improving welfare. Etimet *et al.*, (2007) confirms similar result. This result is also in tandem with a priori and policy expectation which suggests that access to extension contacts should lower the odds of the household of being poor (Abaeze and Onwuka, 2014).

The coefficient of farm size is negatively sign and statistically significant at the 5% level of probability, meaning that farm size exhibits a negative relationship with the food insecurity status of a household. That is, households with larger farm sizes tend to be more food secure than those with smaller sizes, and vice versa because all things being equal, ginger production is a viable venture in the study area by returning ₦100,150.00

per hectare of production. As a household's farm size increases, food insecurity tends to decline. Reddy (2004) Observed that greater efficiencies in the use of resources are associated with the large farms than the small farms. They pointed out that the smallness of holdings deters the use of mechanization and does not allow the use of modern inputs due to lack of purchasing power in the hands of small farmers. In reality, households with small farm size have the tendency of having low productivity and low income, and consequently incidence of food insecurity among the farm households. This is in line with the findings of Sridhar (2007), who assessed the impacts in terms of changes in farm size and recorded a significant and positive impact on farm income due to increase in farm size and consequently reducing rural poverty.

Table 4.9: Determinants of Food Security Status among Households

Variables	Coefficients	Standard error	T-value
Constant	-0.2974	0.9729	-0.3057
Age	2.196	1.159	1.895*
Educational status	-0.3431	0.2038	-1.6849*
Household size	0.0362	0.0308	1.1748
Farming experience	0.0404	0.0319	1.2666
Extension contact	-0.6012	0.2962	-2.0297**
Cooperative association	0.0458	0.0768	0.5969
Farm size	-0.2079	0.0918	-2.2647**
Amount of credit received	-0.00003	0.00002	-1.5874
Log likelihood function	<i>L/f</i>	-114.87***	
LR test		26.8562	
Total number of observation	224		
DF	7		

*** P<0.001 ** P<0.05 and *P<0.1.

4.4 Impact of Women Participating in Ginger Production on their Household Food Security Status

The analysis found out that the calculated t-value is 18.31 was greater than tabulated t-value of 1.97 at 5% level of probability, indicating that there is an impact of the income of women participating in ginger production on their food security status. Looking at the proportion of those that are food secure (142) which is about 63.4% which constitutes the majority of the women ginger farmers as against those that are food insecure (36.6%) which constitute 82 of the women ginger farmers, it is an evidence that production of ginger had an impact on the food security status of the women ginger farmers. This is in line with the findings of Ayoade *et al.*(2011), whom investigated on the impact of National Programme for Food Security on poverty alleviation among women in three project sites of Oyo State, Nigeria. The women participation has significantly improve their poverty status by boosting their farm production as a result of loans given which increases their incomes and consequently alleviate their poverty. Also, a study by Oriola (2009), carried out on the determinants of food security in Nigeria, pointed out that there is the need to increase total domestic output of food, reduce level of food imports and increase agricultural funding which in turn increase famers income and probability of not being food insecure by impacting positively on the women ginger farmers food security status.

Table 4.10: t-test result of contribution of ginger production to household food security status in the study area.

Variable	Food Secured income	Food insecure income
Mean	2795.121951	3601.127
Variance	57773.44173	175068.2
Observations	82	142
Hypothesized Mean Difference	0	
Df	222	
t Stat	-18.31	
P(T<=t) one-tail	1.46	
t Critical one-tail	1.65	
P(T<=t) two-tail	2.92	
t Critical two-tail	1.97*	

*P<0.05

Test of Hypothesis II

The null hypothesis (H_0) which stated that there is no significant effect of ginger production on household food security in the study area was tested using the result of a t-test presented in Table 4.11. The calculated t-value was 18.31 and exceeds the critical value (t-critical two tail) of 1.98, therefore H_0 is rejected at 1% level of significance and H_1 is accepted. The result of the analysis therefore, indicates that ginger production has significant impact on food security status in the study area.

Table 4.11: t-test result of hypothesis II

Variable	Mean	Standard Deviation
Food secured income	57773.44	2795.12
Food insecure income	3601.13	175068.23
t Critical two-tail	1.98*	
t-stat	18.31	

4.5 Constraints Faced by Women Ginger Farmers

It was found that ginger farmers in the study area faced some constraints in their attempt to produce ginger and these problems were ranked according to their magnitude as stated by the farmers and as shown in Table 4.12. It was found that about 46% of the women ginger farmers' ranked inadequate access and high cost of farm inputs as the major constraints. This is because purchasing farm inputs such as seeds, fertilizers and pesticides are being limited by a lack of capital, or by the lack of access to credit facilities that would enable farmers to use more of these inputs. Family labour was mainly used in the area and during the planting period, there is usually the short of labour. The demand for labour is normally high and expensive at this time of the season. Accordingly, ginger farming is laborious without modern tools for little returns. All these make the cost of producing ginger to be high. This finding is in line with Ekong(2003), opined that most farmers have little or no access to improved seeds and continues to recycle seeds that have become exhausted after generations of cultivation.

About 35% of the women ginger farmers ranked insufficient capital as the second constraints in the study area. It agrees with findings of Nasiru, (2010) who noted that access to micro-credit could have prospect in improving the productivity of farmers and contributing to uplifting the livelihoods of disadvantaged rural farming communities.

Also, about 33.5% of the women ginger farmer's ranked high cost of labour as third constraints. It agrees with the findings of Ugbajah and Uzuegbuna (2012) which stated that labour shortage (58%) was responsible for causative factors of decline in ginger production in Ezeagu Local Government Area of Enugu State.

Farmers also lacked improved storage technology as reported by 13.8% of the women ginger farmers and ranked 4th. The time interval between harvesting (storage) and subsequent use of planting material is about 4 - 5 months. Usually, the price of ginger is

higher during the planting time and as a result, farmers would prefer to store immediately after harvest and sell later to reap the dividend of high price. Due to the absence of improved storage facilities or technologies, this dream is however unrealized and are therefore, forced to sell the produce immediately after harvest when the prices are low. As a result, the middlemen who buy produce from farmers have to offer low prices.

While lack of extension visits and pest, diseases and weed infestations were about 7% and 5.8% of the women ginger farmers were also ranked as fifth and sixth constraints respectively. This finding agrees with that of Hyun *et al.*, (2008), Tekana *et al.*, (2011) and Onuket *et al.*, (2010) who observed that high cost of farm inputs, inadequate capital, high cost of labour, inadequate storage/processing facilities and inadequate extension visits were among the constraints faced by farmers. This revealed that farmers in the study area are faced with constraints that can limit ginger production.

Table 4.12: Ginger Production Constraints among Women Farmers

Constraints	Frequency	Percentage	Rank
Inadequate access to Inputs	103	45.98	1 st
Insufficient Capital	79	35.27	2 nd
High Cost of Labour	74	33.03	3 rd
Poor storage Facilities	31	13.84	4 th
Shortage of extension visit	16	7.14	5 th
Pest, diseases and weed infestations	13	5.80	6 th

Multiple Response Allowed*

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study focused on women empowerment through the production of ginger for household food security in Southern Kaduna. Two Local Government Areas were purposively selected in Southern Kaduna and six villages were randomly selected from these Local Government Area and 224 farmers were selected in this study area. The purpose of the study was to evaluate women empowerment through the production of ginger for household food security in Southern Kaduna State, Nigeria.

Primary data were collected from 224 women ginger farmersthrugh the use of random sampling techniques with the aid of structured questionnaire. The statistical tools used to analyze the data were descriptive statistics, gross margin analysis, Foster Greer Thorbecks Indices; logit regression and z-test. A descriptive analysis of the sample farmers was done to understand and describe the socio-economic factors influencing women cultivating ginger as well as income made from the production in the study area.

The results of the socio-economic analysis shows that (80%) of the women ginger farmers are less than 50years of age, the majority of the farmers (54%) had one form of formal education or the other. The household size ranged from 1-5 persons with 58% and 6-10 with about 41%.Majority of the farmers 75% were not members of a cooperative society. Majority of the farmers (76%) had no access to extension visit. About 59% of the farmers had farming experience of between 1-20 years, about 69% had farm size that ranges between0.1-1.0 hectares and majority of the farmers (92%) financed their production through personal savings.

The average costs incurred and revenue obtained per hectare for ginger were estimated to determine the profitability of ginger production in the study area (Table 4.10). The

Gross Income (GI) was ₦182,799.00/ha while the Total Variable Cost was ₦82,649.00/ha. The Gross Margin (GM) was therefore ₦100,150.00/ha. The average rate of return on investment (return per naira invested) is ₦2.21, indicating that for every ₦1 invested in groundnut production in study area; a profit of ₦1.21 kobo was made. Thus, it could be concluded that ginger production in the study area though on a small scale was economically viable.

The food security status was determined from the food security line of ₦122,475.30 that was established. Therefore, about 63.4% of the women ginger farmers were food secured, while about 15.2% were moderately food secured and about 21.4% were considered with severe food insecure, which constitutes 142, 34 and 48 of the women ginger farmers respectively. That is to say about 36.6% of the women ginger farmers were food insecure because their incomes level fell short of the mean household income used as food security line.

The determinants of food security status that was found to be significant were; age, educational level, extension contacts and farm size. These variables were all negative except age which is positive and influence the likelihood of a household being food insecure. Age, educational level, extension contacts and farm size were significant at 10%, 5%, 5% and 5% level respectively.

The result of t statistics clearly shows that the calculate t is greater than the tabulated t implying that ginger production had an impact on the food security status of the ginger women farmers because majority (63%) which constitutes 142 of the sample farmers were food secured while about (37%) which constitutes 48 of the sample farmers were food insecure. the major constraints identified were inadequate access inputs (45.9%), insufficient capital (35.3%) and high cost of labour (33%).

5.2 Conclusion

Based on the findings of this study, it could be concluded that majority of the farming households (63.4%) were found to be food secure. Given that ginger is an important food crop in Nigeria, any attempt to increase its productivity would be a right step towards the resolution of food crisis; jobs can be directly created from enhanced ginger production with small improvement in the technology which will increase household income and consequently reducing food insecurity. Apart from ensuring a food security and empowering women, increased ginger production will provide more employment opportunities for the unemployed citizens in the country. This is in view of the importance of ginger.

5.3 Recommendations

In order to enhance the impact potentials of ginger production towards food security in the rural areas, the following recommendations are made:

- i. Income from the output of ginger production was found to be significantly influence food security; therefore, rural households should be educated on the need to diversify their source of income from agriculture by the available extension personnel. This will ensure regular incomes for the households.
- ii. Majority of the farmers financed their production through personal savings which are mostly not adequate for appreciable production. Agricultural loan facilities should be made accessible to ginger producers to ensure timely and adequate utilization of agricultural inputs for improvement in farm production by involving the private sector.

- iii. Food insecurity coping strategies adopted by the farming households have short term effect. Therefore, there is the need to increase the volume of food production as well as improve on access to income generating activities that are more sustainable.
- iv. The study also revealed that food insecurity status decreases with increase in extension services and education. Therefore, the agricultural development programme is advised to stimulate their extension staff through motivation to give the rural farmers the best needed assistance and innovation in ginger production.

5.4 Contribution of the Study to Knowledge

- i. The study revealed that ginger production in the study area is profitable with gross margin of ₦100,150.00 despite the problems identified.
- ii. The food security status was determined from the food security line of ₦122,475.30 that was established from the 2/3 mean income. Therefore, about 63.4% of the ginger farmers were food secure, while about 15.2% were moderate food insecure and about 21.4% were severely food insecure, which constitutes 142, 34 and 48 of the ginger farmers respectively.
- iii. The study found that inadequate access to inputs (46%), insufficient capital (35%) and high cost of labour (33%) were among the major constraints faced by the women ginger farmers.

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APPENDIX 1: QUESTIONNAIRE

Dear respondent,

This questionnaire will be used by a student of the Department of Agricultural Economics and Rural sociology, Ahmadu Bello University, Zaria. Please, fill as appropriate. All information will be treated with confidentiality and strictly for the purpose of research. Thanks for your co-operation.

SECTION A

Socio-Economic Characteristics

1. Village.....

2. Name of respondent (optional)

3. GSM no (optional)

4. Sex (i) Male [] (ii) Female []

5. Age in years.....

6. Educational qualification: (a) No formal education Yes [] No []

(b) Primary education.....years

(c) Secondary education.....years

(d) Tertiary education.....years

(e) Islamiya.....years

(f) Others (specify):.....

7. Marital status: (i) Married [] (ii) Single []

8. If single, tick the one that best describes your status

(i) Divorced [] (ii) Widowed []

(iii) Separated [] (iv) Single parent []

(v) Others, specify.....

9. What is your household size?.....

10. How many of your household members fall in the following age group?

Age(inyears)

11. What is your primary occupation?:.....

12. How much do you earn (income) per week or monthly ₦:.....

13. Any secondary occupations (Tick as appropriate)

(a) Farming [] (b) Trading []

(c) Others, specify:.....

14. How much do you earn (income) per week or monthly ?.....

B. INFORMATION ON INPUTS

(1) Farm size (Ha)

(1) How many ginger farm plots do you have? Indicate and the size in the table below.

Plot NO	Plot Size (Ha)
1	
2	
3	

(ii). How did you acquire your land? (*Tick below*)

Plot	Mode of Acquisition				
	(a) Inheritance	(b) Lease	(c) Borrowed	(d) Gift	(e) Purchased

1					
2					
3					

(iii). What does it cost to rent one Hectare of land per season in your village? Naira

(II) Variable inputs (Last production Cycle)

(ii)Seed (Kg)

Plot No	Quantity of Seed(Kg)	Cost (₦)
1		
2		
3		

(iii).Fertilizer.

Plot No	Fertilizer type	Quantity(Kg)	Cost(₦)
1			
2			
3			

(iv). Agrochemical.

Plot No	Agrochemical type	Quantity(litres)	Cost(₦)
1			
2			
3			

(v) Labour input

(a) Land preparation

Plot No	Hire Labour	Family Labour

	No of people	No of Hours	Cost (₦)	No of people	No of Hours	Cost (₦)
1						
2						
3						

(b) Planting

Plot No	Hire Labour			Family Labour		
	No of people	No of Hours	Cost (₦)	No of people	No of Hours	Cost (₦)
1						
2						
3						

(c) Fertilizer Application

Plot No	Hire Labour			Family Labour		
	No of people	No of Hours	Cost (₦)	No of people	No of Hours	Cost (₦)
1						
2						
3						

(e) First Weeding

Plot No	Hire Labour			Family Labour		
	No of people	No of Hours	Cost (₦)	No of people	No of Hours	Cost (₦)
1						
2						
3						

(f) Second Weeding

Plot No	Hire Labour			Family Labour		
	No of people	No of Hours	Cost (₦)	No of people	No of Hours	Cost (₦)
1						
2						
3						

(g).Replacement of dead ginger seed planted

Plot No	Hire Labour			Family Labour		
	No of people	No of Hours	Cost (₦)	No of people	No of Hours	Cost (₦)
1						
2						
3						

(h)Harvesting

Plot No	Hire Labour			Family Labour		
	No of people	No of Hours	Cost (₦)	No of people	No of Hours	Cost (₦)
1						
2						
3						

(i) Information on ginger output

Plot No	No. of output produced(Kg)	Total Qty sold	Price/Unit
1			
2			
3			

15. In the past 12 months, were there months in which you did not have enough food to meet your family's needs? Yes () NO ()

16. If yes, which were the months in the last 12 months that you did not have enough food to meet your family's needs?

Months	Did you have enough food to meet your family's needs 1=Yes,0=No
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

17. In which months does your household rely on food purchase for feeding?.....

18. Give the months when food prices are highest.....
19. How much do you spend on food purchase for last season?.....
20. How many times and quantity do you eat in a day?.....
22. What type of food and quantity do you eat for your breakfast?.....
22. What type of food and quantity do you eat for your lunch?.....
23. What type of food and quantity do you eat for your dinner?.....
24. Household expenses (LAST YEAR CROPPING SEASON)

Items	Amount (₦)/week	Amount (₦)/month
1. Food		
2. Rent		
3. Clothing		
4. Housing maintenance.		
5. Light/electric power		
6. Fuel		
7. Pharmaceutical products		
8. Hospital care		
9. Schooling		
10. Community levy/contribution		
11. Financial assistance/ monetary gifts (present)		
12. Travels		
13. Contributions to associations and groups		
14. Others (pls. specify)		

25. On-farm and off-farm income (*Provide estimation*)

Source	crop	Amount (₦)

1. ginger income	Value of ginger sold	
2. Income derived from other produce	1= Maize	
	2= Cowpea	
	3= Rice	
	4= Vegetable	
	5= Millet	
	6= Others (Specify)	
3. Off-farm income		

26. Wealth and Assets: LIVESTOCK

Kindly indicate how many livestock you own and also provide other related information.

	Number of livestock presently owned	How many did you have last year 2012?	How many have you sold this year 2012?	Amount realize (₦)	How many have you consumed this year 2013?	Amount of animal products consumed last week (Qty /unit)	Amount of animal product sold last week (Qty/unit)
Cattle							
Cattle meat							
Sheep							
Sheep meat							
Goat							
Goat meat							
Chickens							
Ducks							
Others							

SECTION E. Constraints confronting ginger farmers in the study area.

27. Do you have problems while producing ginger? a) Yes [] (b) No []

28. If yes, what are these
problems.....

.....

29. What problems do you encountered in harvesting of
ginger?.....

.....

.....

30. How can these problems be solved?.....

.....

.....

Thank for your cooperation