



UNIVERSITI PUTRA MALAYSIA

***INCOME DIVERSIFICATION IN ENHANCING FOOD SECURITY AMONG
RURAL HOUSEHOLDS IN NIGERIA***

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By

MUHAMMAD SANI MUHAMMAD

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirement for the Degree of Doctor of Philosophy**

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DEDICATION

This thesis is dedicated to the entire members of my household, including my late father Abubakar Sarkin Askin Jabo (of blessed memory, may his soul rest in perfect peace) and my beloved mother Nana Asma'u Shehu Korau.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfilment of the requirement for the degree of Doctor of Philosophy

INCOME DIVERSIFICATION IN ENHANCING FOOD SECURITY AMONG RURAL HOUSEHOLDS IN NIGERIA

By

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April 2015

Chairman: Professor Mohd Mansor Ismail, PhD

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Food security is now fundamental to the development policies of Nigeria. The country is faced with a challenge of feeding its ever-increasing population. Even though, Nigeria is a rich country with abundant natural and human resources, overwhelmingly large segment of its citizens are food insecure in both urban and rural communities. Studies have shown that most of the socioeconomic indicators for the country are very low. The food insecurity indices in Nigeria keep increasing with passage of time, for example, only 18 percent Nigeria population were food insecure in 1986, but the figure rose to 40 percent in 2005 and over 70 percent in 2013. This could be due to fact that, rural areas where most of the agricultural productions take place suffered many years of neglect; rural households were deprived of basic social infrastructure such as electricity, portable drinking water, health care and educational facilities. Many rural communities are still not connected urban centres. Discovery of oil in Nigeria also led to the neglect of agricultural sector, hence recent increase in imports bills. Successive governments in Nigeria have failed to diversify the country's economy away from oil sector. Due to the failure of the agricultural sector to occupy its rightful place in the Nigerian economy and its increase inability to provide the needed livelihoods to the rural households, the smallholder farmers adopt to diversify their portfolios away from agriculture. The diversification is seen as not only key to consumption smoothing but as a strategy to deal with different shocks.

A nationally representative sample of 3372 rural households from General Household Survey-panel data that adopt the World Bank Living Standard Measurement Survey (LSMS) technique was used for this study. Based on 2120 kcal Food and Agricultural Organization (FAO) recommended per adult equivalent and 0.87 USD purchasing power parity (PPP), an annual food poverty threshold of (₦50, 331.67) equivalent to 317.55 USD per annum was derived for Nigeria. This threshold is the cost for purchasing recommended daily food allowances (RDA) of an adult equivalent for healthy life in rural Nigeria.

Chi-square analysis and t-test revealed that diversified households were relatively more food secure than undiversified at 0.05 per cent level of significance. The food security situation in Nigeria was examined using the Foster Greer and Thorbecke (FGT) class of

decomposable food poverty measures that satisfy both monotonicity and transfer axioms. The coefficient of α , 0, 1 & 2 measures the incidence, depth and severity of food insecurity. The food insecurity indices at national level as measured by α ($\alpha=0$, $\alpha=1$ and $\alpha=2$ measure the incidence, depth and severity of food insecurity respectively) shows that ($\alpha=0$, 46.36, $\alpha=1$, 0.43 and $\alpha=2$, 1.11 for and $\alpha=0$, 42.78, $\alpha=1$, 0.348 and $\alpha=2$, 7.45) for post-harvest seasons respectively. This implies that almost half of the rural households in Nigeria are food insecure subsisting on less the RDAs, however, depth and severity of food insecurity also differ. The results of econometric analysis using logistic regression model revealed that the age of the household head, education up to tertiary level, household size, the value of the household's livestock holdings, participation in non-farm enterprise, access to formal credit, distance to the urban centres and total remittances received by a household had statistically significant influence on food security. We conjecture that, the higher incidence of food insecurity during post harvesting season might likely be due to inability of smallholder farmers to utilize their time into non-farm income generating activities due to high demand for labour for farm operations.

The results PSM suggested that on the average food consumption expenditure of the non-diversified households were less than that of participating households, and therefore more likely to be less food secure. Overall, the average increase in food expenditure due to diversification into non-farm income generating activities ranges between ₦1571.52 (10 USD) to ₦11654.07 (73.53 USD). The study recommends public policy initiatives that ensure credit availability, access to road, portable water, extension services and skill acquisition in rural areas as vital for ensuring food security and as well as encourage participation into non-farm sector. Further studies for panel data analysis was recommended using subsequent GHS. Subsequent panel waves could be adopted to look at the dynamics of food security over time. The study concludes that, variation in food exist between post-plant and post-harvesting seasons in Nigeria, diversification into non-farm activities has a positive impact on food security and food consumption expenditure in rural Nigeria.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**KEPELBAGAIAN SUMBER PENDAPATAN DI DALAM MENINGKATKAN
KESELAMATAN MAKANAN DI KALANGAN ISI RUMAH LUAR
BANDAR DI NIGERIA**

Oleh

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Di dalam perkembangan semasa, Nigeria telah menjadikan keselamatan makanan sebagai asas kepada perkembangan dasar pembangunan Nigeria. Di samping itu, Nigeria menghadapi cabaran dalam memenuhi atau menyediakan makanan yang cukup kepada populasi penduduk yang semakin meningkat. Walaupun Nigeria adalah sebuah negara yang kaya dengan sumber asli dan sumber manusia, majoriti rakyatnya menghadapi masalah kekurangan dan kenaikan harga bekalan makanan asasi bagi masyarakat bandar dan luar bandar. Kajian menunjukkan bahawa kebanyakan indikator sosioekonomi bagi negara ini adalah sangat rendah. Indeks tidak selamat makanan atau ketidakcukupan makanan di Nigeria semakin meningkat seiring dengan peredaran masa, sebagai contoh, hanya 18 peratus penduduk Nigeria mengalami ketidakcukupan makanan pada tahun 1986, tetapi angka itu meningkat kepada 40 peratus pada tahun 2005 dan lebih daripada 70 peratus pada tahun 2013. Ini mungkin disebabkan oleh hakikat bahawa, berlakunya pengabaian kepada kawasan luar bandar terutama bagi kawasan pengeluaran pertanian sebagai sumber utama; isi rumah luar bandar telah mengalami kekurangan infrastruktur asas seperti bekalan elektrik, bekalan air minuman mudah alih, penjagaan kesihatan dan kemudahan pendidikan. Masih banyak komuniti luar bandar masih tidak dihubungkan dengan pusat-pusat bandar. Penemuan minyak di Nigeria juga membawa kepada pengabaian sektor pertanian, ini terbukti dengan peningkatan terkini dalam bil import negara. Sekian lama kerajaan Nigeria masih gagal untuk mempelbagaikan ekonomi negara selain sektor minyak. Oleh kerana kegagalan sektor pertanian untuk menduduki tempat yang kukuh dalam ekonomi Nigeria dan peningkatan ketidakupayaan untuk menyediakan kehidupan yang diperlukan untuk isi rumah luar bandar, pekebun kecil mempelbagaikan portfolio aktiviti ekonomi mereka selain pertanian. Kepelbagaian itu dilihat sebagai bukan sahaja penting kepada melancarkan perjalanan mereka tetapi juga adalah strategi dalam menghadapi pelbagai kejutan ekonomi.

Sebanyak 3372 sampel isi rumah luar bandar diambil bagi mewakili negara yang diperolehi dari *General Household Survey-panel data* yang mengamalkan teknik *World Bank Living Standard Measurement Survey (LSMS)* telah digunakan untuk kajian ini. Berasaskan 2120 kcal yang disarankan oleh Pertubuhan Makanan dan Pertanian (FAO)

bagi setiap orang dewasa dan 0.87 USD pariti kuasa beli (PPP), sebuah skala kemiskinan makanan tahunan (₦50, 331,67) bersamaan dengan 317,55 USD setahun diperoleh untuk Nigeria. Skala ini adalah kos yang disarankan untuk membeli elaun harian makanan (RDA) untuk orang dewasa yang setara untuk hidup sihat di luar bandar Nigeria.

Analisis khi kuasa dua dan ujian-t menunjukkan bahawa isi rumah yang pelbagai secara relatifnya memperolehi secukupnya sumber makanan berbanding tidak pelbagai pada 0.05 peratus aras signifikan. Keadaan keselamatan makanan di Nigeria telah diperiksa menggunakan Foster, Greer dan Thorbecke (FGT) kelas memisahkan ujian tahap kemungkinan makanan yang memenuhi kedua-dua monotositi dan pemindahan aksiom. Koefisien α , 0, 1 & 2 menguji kejadian, kedalaman dan tahap kekurangan makanan. Indeks kekurangan makanan di peringkat kebangsaan diukur seperti berikut oleh α ($\alpha = 0$, $\alpha = 1$ dan $\alpha = 2$ langkah kejadian, kedalaman dan tahap kekurangan makanan masing-masing) menunjukkan bahawa ($\alpha = 0$, 46,36, $\alpha = 1$, 0,43 dan $\alpha = 2$, 1,11 untuk dan $\alpha = 0$, 42,78, $\alpha = 1$, 0,348 dan $\alpha = 2$, 7,45) masing-masing untuk musim lepas tuai. Ini menunjukkan bahawa hampir separuh daripada isi rumah luar bandar di Nigeria adalah mengalami ketidakcukupan makanan iaitu kurang dari RDAs, bagaimanapun, kedalaman dan tahap ketidakcukupan makanan juga berbeza. Keputusan analisis ekonometrik menggunakan model regresi logistik menunjukkan bahawa usia ketua isi rumah, pendidikan sehingga peringkat pendidikan tinggi, saiz isi rumah, nilai jumlah ternakan isi rumah itu, penyertaan dalam perusahaan bukan ladang, akses kepada kredit formal, jarak ke pusat-pusat bandar dan jumlah kiriman wang yang diterima oleh isi rumah yang mempunyai pengaruh statistik yang signifikan ke atas keselamatan makanan. Daripada kajian kami jangkakan bahawa semakin kerap kejadian sekuriti makanan semasa musim lepas tuai mungkin disebabkan oleh ketidakupayaan pekebun kecil untuk menggunakan masa mereka dalam menjana pendapatan dari aktiviti bukan ladang kerana permintaan yang tinggi untuk tenaga kerja untuk operasi ladang.

PSM mencadangkan bahawa purata perbelanjaan penggunaan makanan bagi isi rumah yang tidak turut serta dalam NFIGA adalah kurang daripada isi rumah yang mengambil bahagian, dan oleh itu ia cenderung untuk mengalami kekurangan kecukupan makanan. Secara keseluruhan, purata kenaikan perbelanjaan makanan kerana kepelbagaian ke dalam pendapatan aktiviti bukan ladang menjana aktiviti di antara ₦1571.52 (10 USD) kepada ₦11654.07 (73.53 USD). Kajian ini mencadangkan pembentukan dasar awam yang memastikan ketersediaan kredit, akses kepada jalan raya, sumber air mudah alih, khidmat pengembangan dan peningkatan kemahiran di kawasan luar bandar sebagai penting bagi memastikan keselamatan makanan dan juga menggalakkan penyertaan peserta dalam sektor bukan pertanian. Kajian lanjut untuk analisis data panel telah disyorkan berikutnya dengan GHS. Gelombang panel seterusnya boleh diguna pakai untuk melihat keselamatan makanan secara dinamik dari masa ke masa. Kajian ini merumuskan bahawa variasi dalam makanan wujud antara musim pasca penanaman dan pasca penuaian di Nigeria, kepelbagaian bagi aktiviti bukan ladang mempunyai kesan positif ke atas keselamatan makanan dan perbelanjaan penggunaan makanan di kawasan luar bandar di Nigeria.

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I certify that a Thesis Examination Committee has met on 13 April 2015 to conduct the final examination of Muhammad Sani Muhammad on his thesis entitled "Income Diversification in Enhancing Food Security among Rural Households in Nigeria" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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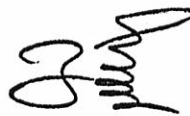
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LIST OF ABBREVIATIONS

ACGS	Agricultural Credit Guarantee Scheme
ADP	Agricultural Development Project
AHM	Agricultural Household Models
ATE	Average Treatment Effect
ATT	Average Treatment Effect on Treated
ATU	Average Treatment Effects on Untreated
BMGF	Bill and Melinda Gates Foundation
CBN	Central Bank of Nigeria
CESCR	Committee on Economic, Social and Cultural Right
CFSM	Core Food Security Module
CGIR	Consultative Group on International Agriculture and Research
CSI	Coping Strategy Index
DFA	Developmental Fund for Africa
DFID	Department For International Development
DFRRI	Directorate of Food Roads and Infrastructure
EA	Enumeration Area
FCT	Federal Capital Territory
FEAP	Family Economic Advancement Program
FEW.NET	Famine Early Warning System Network
FGT	Foster, Greer and Thorbecke
FIVIMS	Food Insecurity Vulnerability Information Mapping System
FMA&RD	Federal Ministry of Agriculture and Rural Development
FNS	Food and Nutrition Surveillance
GATT	General Agreement on Tariff and Trade
GHS	General Household Survey
GIEWS	Global Information and Early Warning System
GMM	General Method of Moment
GR	Green Revolution
HHID	Household Identifier
IDS	Institute of Developmental Studies
IEFR	International Food Emergency Reserve
IFAD	International Fund for Agricultural Development

IFPRI	International Food Policy Research Institute
IFNS	International Food Aid Information Systems
INTERFAIS	Inter-Agency Food and Nutrition Surveillance
LEEDS	Local Government Economic Empowerment Development Strategies
LSMS	Living Standard Measurement Survey
MDG	Millennium Development Goal
MLE	Maximum Likelihood Estimation
NACRDB	Nigerian Agricultural Cooperative and Rural Development Bank
NARE	Nonagricultural Rural Employment
NBS	National Bureau of Statistics
NCHS	National Centre for Health Statistics
NDE	National Directorate of Employment
NEEDS	National Economic Empowerment Development Strategies
NFIGA	Non-farm Income Generating Activities
NFRA	National Food Reserve Agency
OFN	Operation Feed the Nation
OID	Overseas Development Institute
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
PSM	Propensity Score Matching
RBDA	River Basin Development Authorities
RDA	Recommended Daily Allowances
REB	Rural Electrification Board
SAP	Structural Adjustment Program
SEEDS	State Economic Empowerment Development Strategies
SFIG	Squared Food Insecurity Gap
SMEs	Small and Medium Scale Enterprises
SSA	Sub-Saharan Africa
SSE	Small Scale Enterprise
TFIG	Total Food Insecurity Gap
UDHR	Universal Declaration of Human Right
UNDP	United Nation Development Program
UNICEF	United Nation Children Fund

UPE	Universal Free Primary Education
USAID	United State Agency for International Development
USDA	United State Department of Agriculture
VIF	Variance Inflation Factor
WB	World Bank
WFP	World Food Program
WHO	World Health Organization



CHAPTER 1

INTRODUCTION

This chapter gives a brief motivation for studying food security and non-farm income generating activities in general, it started looking at the food security issue in global perspectives and narrowed down to Africa and Nigeria in particular. It discussed on the research issues or the research problem. It presents the research questions raised by the study and set out the objectives to be achieved by the study and finally discussed significance of the study.

1.1 Background of the study

Food is one of the important necessities of life as it ranks first within the Maslow's hierarchy of needs. Todaro and Smith (2011) stressed that, all people have certain basic needs without which life would be impossible. These life-sustaining basic needs include the basic goods such as food, clothing and shelter, while self-esteem, and freedom are among the high needs category. Lack adequate food inhibits growth and development of a given individual, food insecurity have been shown to affect many dimensions of human wellbeing such as: the likelihood of poor growth attainment among children, recurrent infections, inadequate energy and nutrient intakes, impairment in learning ability and other psychosocial problems (Oh & Hong, 2003). Hence, food security has become a long-standing issue for both developed, emerging and developing countries. Food security is an old concept linked to the history of the human race, which took its root from the times of early men who lived as hunters of wild animals and gatherers of nuts and fruits in the period referred to as the Stone Age. During that time, there was no market for exchange of goods and services, storage and processing techniques were absent.

In recognition of the importance of food to the wellbeing of the people that, Food and Agriculture Organization/ World Bank/ University of United Nations FAO/WB/UNU (1985) recommends per adult daily intake of between 2500-3400 Kcal of energy and 65-86g of protein from which at least (40%) must come from animal sources for healthy growth and productive life. This calorie plays an important role in the health status and human productivity of individual. Human body need calorie to maintain normal body functions and to live a healthy life. Maxwell & Frankenber (1992) defined enough food in terms of calorie requirement for an active and healthy life rather than simple means of survival. This recommended minimum per capita calorie intake has been very far from being achieved in many developing countries, especially in Sub-Saharan Africa and south Asia. The evidence of lack of sufficient calorie, protein and vitamins could be seen in the high cases of stunted growth and underweight especially among the children below the age of five years.

Many literatures suggest that, there is a strong, positive, but non-linear relationship between per capita calorie intake and household income after controlling for household and demographic variables (Subramanian & Deaton, 1996). While on the contrary, Maxwell & Frankenber (1992) reported the linkage between income and calorie intake to be weak, as such increase in income through non-farm diversification will not substantially improve calorie intake. To the first category of scholar, increase in income

because of participation in non-farm activities is expected to reduce food insecurity among rural households (Alderman, 1986). Many studies reported that, per capita calorie intake among farming households in rural Nigeria to be below the FAO 2500 kcal standard daily minimum recommended level (Alderman, 1986 and Babatunde, Raphae & Qaim, 2010).

The food insecurity became an issue that started to gain prominence during the 1974 first World Food Conference, the (WFC) aimed to address the adequacy of global and national food supplies, which also served as the first global summit on food security. However, food right was recognized since 1948 Universal Declaration of Human Rights (UDHR) and the 1966 Committee on Economic, Social and Cultural Right (CESCR). Later in 1996, Food and Agricultural Organization, Rome declaration reaffirmed that access to safe and nutritious food as the right of everyone. Reduction of hungry people to half by 2015 was declared as United Nations Millennium Development Goal number one during the 67th General Assembly Meeting in Rome. The 1996 world food summit marked a turning point in the global history of food security where 186 countries met in Rome to brainstorm on how to tackle the issue of hunger and food insecurity. This underscored the importance of food security to the development agendas of the global community. During this summit, all the countries committed themselves to reduce hunger, poverty and malnutrition by at least half between 1996 to 2015.

Nigeria and G77 developing countries and China called for an urgent action to address the global food crisis that threatened millions of people. Nigeria identified climate change, severe floods, desertification and drought as the major causes of frequent food shortages being experienced in the region. Several countries across the globe also declared food to be a fundamental right of every citizen in their respective countries. The respective heads of governments also made commitments to free people in their countries from hunger through establishment of non-discriminatory and non-political laws that ensure equal access to adequate food. Despite these commitments and declarations, however, only few countries have redeemed their commitments and pledges. (Mechlem, 2004).

1.1.1 Food Security Situation the Global Perspectives

Despite the global abundance of food, food related crises continue to occur in many countries (Adeniyi & Ojo, 2013). It was asserted that, for every five seconds a child dies of hunger, in each year about 6 million children are also dying of hunger (FAO, 2012). The population of global food insecure stood at 1 billion today, this could be due to lack of food affordability, unavailability or because they are too unhealthy to make use of it or in some cases interaction of the above (Burke & Lobell, 2010). More recently, Food and Agriculture Organization, FAO (2012) reported that, nearly 870 million people were suffering from chronic undernourishment between 2010 and 2012 majority whom are living in developing countries. Progress is made in the fight against hunger in different parts of the world including Nigeria, but the problem still persist especially in SSA and South Asia. The figure of people living with chronic hunger dropped from 870 people between 2010 to 2012 to about 868 million people in 2013 (FAO/IFAD & WFP, 2013). These global statistics of hunger and undernourishment is still alarming, hence eradication of hunger remains the major global challenge facing

both developed and developing countries, but the task is enormous in developing world.

Scholars contend that, solution to food insecurity lies exclusively on improving the performance of agriculture through the adoption of science and technologies. Other development economics believed that, hunger and food insecurity are beyond the realms of agriculture, but are rather linked the issue to tackling poverty through generating enough income to access food since the world has enough stock for all people. It is a common believe that, producing more food may not necessarily alleviate hunger due to the fact that, access to food depends to a large extent on the financial ability of the nation or household to access the food. DFID (2004) viewed agricultural productivity three dimensions: First direct impact on the income of smallholder farmers; secondly in terms of increasing the rural employment and rural wage, including those of non-farm economy and thirdly, wider influence poverty reduction and economic growth.

On a global scale, population was reported to grow at 1.8 % per annum between 1970 to 1982, while the cereal production, which constitutes 94% of the total grain production, grew at 2.3% per annum, outstripping population growth rate of 0.5% per annum. FAO further argued that, agricultural growth is particularly effective in reducing hunger and malnutrition in poor countries, since most of them depends on agriculture and related activities for their livelihood. A number of factors such as government trade and food production policies and programs can influence food security. Income of individuals in a given country could also have significant impact on food security. Sasson (2012) attributed the cause of food insecurity to inadequate food production. Raising the productivity and income-generating capability of small farmers and reinforcing their resilience to shock can often play a key role in cutting the incidence of hunger (FAO, 2001).

The relationship exists between food security and the level of poverty in a given household, individual, a region or a nation. The two issues are intertwine and interwoven so much that it is quite difficult to differentiate clearly between the two concepts. Hunger is the cause and has extreme negative effect on poverty, as long as there is a wide spread hunger, little progress can made in the aspects of poverty reduction (FAO, 2001). Global food demand is likely to increase by 70% during the next 40 years (Andersen, 2012). Producing enough food to meet demand at reasonable prices is necessary but not sufficient to achieve good nutrition, neither is it sufficient to achieve food security. Based on this, it is clear that, food security at the household and individual level depends on access to food. Food insecurity could exist in situations where plenty of food is available, but not accessible to some households and individuals, possibly due to economic, financial and other social of preferential reasons. Many analysts argued that, food security at the household and individual levels depends on not only availability but also access to food. Though, food is accessible but might not meet the dietary diversity and nutritional requirements of a particular household or individuals. However, with political will, appropriate policies and programs in place, this increasing food demand for many food insecure countries can be met. Currently the world has enough food to meet the needs of the population Smith & Jensen, (2000) the issue is that many countries failed to access this global stock due to the lack of enough financial resources (Maxwell, 1996).

The major challenge facing the world today is that of feeding the ever-increasing population of over 7 billion people subject to climate change and natural resource constraints. Reporting on the state of food security in the world, FAO (2012) asserted that, “the global demand for food is expected to increase by 60 percent between 2005/2007 and 2050”. The global food demand is further increased by the production of biofuels in the industrialized countries; this posed a major challenge to agriculture and food systems. To cope with these challenges, smallholder agriculture needs to play a key role in addressing these challenges especially in developing countries. Also to compete favourably, smallholder agriculture need to be strengthened and supported through the provision of new innovations in the form of input, research and development, food processing and marketing techniques so as to increase their productivity and efficiency which in turn will also improve global food security and nutrition.

1.1.2 An overview of food security in Africa

According to FAO (2012) reports, the African continent is having about 35 percent of its population malnourished. Furthermore, the UN World Food Program (WFP) reported that 19 out of 53 countries of Africa face serious hunger problems because of failure of these countries domestic supplies to cater for their domestic needs. This trend of food insecurity in Africa is worrisome as the head counts of food insecure people are actually on increase in Sub-Saharan Africa (SSA). Hunger is a pervasive problem in developing countries, undermining people’s health, productivity, and often their very survival. Therefore, much of the development agenda of countries especially in SSA focused on directing scarce resources to providing food to people in need or enabling them to acquire it themselves (Smith, Alderman & Aduayom, 2006). The reports about progress on food security from SSA have been particularly discouraging. The records showed that South Asia is still having the highest number of food insecure (around 300 million undernourished). However, in terms of prevalence SSA is in the lead with 35 percent food insecure, a rate that has shown a little deviation over the last four decades (Burke & Lobell, 2010).

It is becoming increasingly difficult to ignore the current global rhetoric about the global food insecurity and its attendant consequences, especially in the developing countries. Abdullahi (2008) opined that global food shortage with its attendants rise in food prices in various parts of the world, including countries, which, hitherto, were regarded as food secure, is causing different reactions in several countries such as mass protests especially in Africa. Abdullahi (2008) further argued that this situation of aggravated hunger and poverty is fertile breeding grounds for various crimes and social vices including sophisticated forms of terrorisms within and across the national borders. Nigeria as a region of the Africa is not an exception to this phenomenon, despite its potentials of becoming a food secure nation given its climate, water and human resource endowments. This situation called for sober reflection and action among the world leaders as it affects hundred millions of people especially in the affected countries.

1.1.3 Food Security Situation in Nigeria

Food security today is fundamental to the development policies in Nigeria. Nigeria as in the case of many developing countries is face with a major challenge of feeding its ever-increasing human population, which currently stood at about 167 million. It is feared that with high fertility of the Nigerian women put at 5.7 children per women and an annual population growth rate of 3.5 percent between 1961 and 2011, the population figure might significantly rise due to a number of factor. According to United Nations Development Program United Nation Development Programme (2011) with this rapid population growth rate, Nigerian population is expected to double from 158 million in 2010 to 389 million by 2050. It was asserted that out of 1.1 billion forecasted SSA populations by 2050, Nigeria would account for 20% of the total (UNDP, 2011). Akinyele, (2009) reported that, there are overwhelmingly large proportion of Nigerians who are food insecure that spread across both urban and rural communities, though most food insecure are found in the rural areas. This was corroborated by FEWS.NET (2007) that described food insecurity to be rampant among many households in Nigeria. Even within the same region of the country people appeared to face different levels of food insecurity, this fact is supported by the National Bureau of Statistics (NBS 2012 & Mensah & Tuffour, 2013).

Even though, Nigeria has great agricultural potentials and abundant natural resources for all round development, however, most indicators of the economic well-being are still very low. Food insecurity and poverty are still widespread across different parts of the country. Food insecurity situation in Nigeria is worsening with the passage of time due to the wide gap between the national supply and demand for food. For example the percentage of food insecure households were 18 percent in 1986, but the figure rose to over 40 percent in 2005 (Sanusi, Adebukola & Oyindamola, 2006). NBS (2012) also found that about 35 per cent of households in Nigeria “never had difficulty in satisfying their food needs”, while 34.6 percent “sometimes had difficulty”. Regional desegregation shows that North-west had 46.6 percent and North-central 48 percent never “had difficulty” in food accessibility. Southeast and South-west had 42.9 percent and 59.9 percent respectively. Households with only two members never had difficulty at all, while those households with 6-members size had 37 percent sometimes difficulty (Akinyele, 2009).

Although domestic food production is increasing, however, the demand remains quite above production. This shortfall in production will equally push up the food imports. Since 1991, there is ever persistent increase in food importation. Evidences from Nigeria have showed that, the country relied on food imports to meet its domestic consumption. FAO (2010) indicated food import values of \$4.585 billion where the export value of foodstuff stood at \$2.932 billion in 2010. Malnutrition and hunger are still widespread in the entire country and rural areas are especially vulnerable to chronic shortages, malnutrition, unbalanced nutrition, erratic food supply, poor quality food, high food cost and total lack of food, (Akinyele, 2009). Food insecurity affects all categories of people in both rural and urban Nigeria, but the problem is more pronounce in the rural areas where the main source of livelihood is agriculture and related enterprises. Food insecurity situation in Nigeria seems to be paradoxical given the country’s human, agricultural, petroleum and mineral resource potentials (Goni, 2011). However, there was no evidence of food crisis in the entire Nigeria throughout

the history of its nationhood, but food crisis situations were recorded in different parts of the country especially the north.

1.2 Problem Statement

Even though, the role of agriculture plays an important role in alleviating food hunger and attainment of the much-needed economics growth. The rural areas where most of the agricultural productions take place suffered many years of neglect; the rural households and were deprived of basic social infrastructure such as electricity, portable drinking water, health care and educational facilities. Many rural communities are still not connected urban centres. Hunger is seen by many scholars to be a predominantly rural problem. Rural people who are the main food producers are those who go hungry. Other issues that have contributed in the worsening food insecurity status among many rural households in Nigeria as in the case of many SSA countries are; high population growth rate (highest in Africa), low life expectancy and high infant and maternal mortality. Low productivity of most crops in Nigeria as compared to other SSA countries, climate change and weather vagaries are having a negative impact on food supply in the country. Another important issue that has a serious implication on food security in Nigeria is a very low fertilizer consumption currently put at less than 20kg per hectare coupled with limited use of agricultural machinery for example a tractor density of 0.03-horse power per hectare. Based on these issues, it is clear that food insecurity statistics in Nigeria since last three decades is on the increased. For example, food insecurity in Nigeria increase from 18 percent in 1986 to 41 percent in 2006 and to 70 percent in 2013.

Food security for a given country is achieved when there is a reliable food supply at a reasonable cost. It is on record that smallholder farmer in Nigeria usually experience the incidence of hunger for 2-3 months after harvest. Owing to this scenario, access to enough food at all times for an active and healthy life could hardly be achieved. Seasonal gluts and its attendants low food prices are common features post-harvest season, while in post-planting which is regarded as periods of food scarcity and food prices are usually high this trend is in accordance with the law of demand and supply. There is an annual pattern in food prices and stock across the seasons of the year in Nigeria. Bumper harvest, though having its positive side, does not always translate into a commensurate increase in the income of the farmers in most developing countries due to poor prices and post-harvest losses being experienced by farmers. Food access for farming households usually improves cyclically during every harvest where the food security for most households improves to at least 80 percent at the peak of harvest season. As the time progresses away from harvest period, especially towards the next harvest the prices of grains hike up, thereby further worsened the food insecurity status of rural households.

The agricultural sector, despite being the mainstay of the Nigerian economy by employing over 70 percent of the country's population and 40 percent GDP but contributes less than 5 percent to Nigerian exports. For a sustainable growth, food security and poverty reduction, it requires at least 10 percent growth in GDP. Out of 79 million hectares of arable land, however, only 32 million hectares were put into cultivation. The agricultural production system is based on smallholder subsistence production and more than 80 percent rain-fed. Nigeria is a rich country with abundant natural and human resources, overwhelmingly large segment of its citizens are food

insecure in both urban and rural communities. Studies have shown that most of the socioeconomic indicators for the country are very low. Discovery of oil in Nigeria led to the neglect of agricultural sector, hence recent increase in imports bills. Successive governments in Nigeria have failed to diversify the country's economy away from oil sector. Due to this failure Nigeria that used to be the largest exporter of for example cowpea, yam, cassava, groundnut and other staple foods in SSA now became the net importer of the same commodities.

Failure of the agricultural sector to occupy its rightful place in the Nigerian economy and its increase inability to provide the needed livelihoods to the rural households in Nigeria, the smallholder farmers adopt to diversify their portfolios away from agriculture. The diversification is seen as not only for consumption smoothing but as a strategy to deal with different shocks. Different aspects of diversification including its patterns and determinants were fully documented in the literature, where over 62 percent of rural households in Nigeria have a diversified portfolios and deriving between 30 to 50 percent of their income from non-farm sector. Going by these statistics, diversification into the non-farm activities of farming households in Nigeria is critical and vital to the general wellbeing of rural dwellers in Nigeria.

Largely missing from previous literatures, however, is the study that links food security, food consumption expenditure and non-farm activities in a systematic way among the rural households in Nigeria. It is in this context that, this research attempt to evaluate the impact of non-farm income diversification on food consumption expenditure and food security in rural Nigeria. This research is worth doing to expand the existing narrow frontier of knowledge in this field. This study tries to disprove the assumption that farm outcome growth is sufficient for achieving food security. Therefore, this study examines more closely the impact of non-farm diversification on the food consumption expenditure and food security of rural households in Nigeria using the 2010 GHS-Panel data set.

1.3 Research Questions

Based on the issues raised in the sections preceded, this study attempted to answer the following research questions:

- i. What is the incidence, depth and severity of food insecurity in rural Nigeria?
- ii. What are the determinants of food security among rural households in Nigeria?
- iii. What are the coping strategies adopted by rural households in dealing with food insecurity in rural Nigeria?
- iv. Does participation in Non-farm Income Generating Activities (NFIGA) have any impact on the food consumption expenditure and food security status of the rural Nigerian household?

1.4 Objectives of the Study

The general objective of this study is to analyze the food security situation and assess interrelationships between non-farm income diversification and food security among rural farming households in Nigeria.

The specific objectives are:

- i. To determine the incidence, depth and severity of food insecurity among rural farming households in Nigeria
- ii. To assess the determinants of food security among rural households in Nigeria
- iii. Determine the coping strategies against food insecurity among the rural households in Nigeria; and
- iv. To evaluate the impact of non-farm diversification on food security and food consumption expenditure in rural Nigeria.

1.5 Significance of the Study

Despite huge amounts of money spent on food security programs in Nigeria, very little success has been recorded on this problem so far. The food security issues in the country have not been analyzed adequately and critically, especially at national levels despite various approaches adopted in addressing the challenges (Akinyele, 2009). Therefore, it is quite important to conduct an in-depth study to assess the interrelationship between income diversification and food security in the rural Nigeria. This will help policy makers to come up with policies and programs that will reduce rural-urban drift especially during off-farming seasons.

To add in the existing knowledge in this field, this study provides a comparative analysis at the national level between hungry period (post-planting) and food abundance period (post-harvesting) has contributed in the existing niche in the literature. Coping strategies to mitigate the effects of food insecurity were also not fully addressed in the rural Nigeria. As a result, there is a need for the study to examine the magnitude of food insecurity in the entire Nigerian rural sector. This study attempted to adopt the alternative method in assessing food insecurity using coping strategies cumulative index. The seasonal variability in food security between post-planting and post-harvesting seasons was also evaluated. The outcome of this study will provide important information for the formulation of relevant policies that can mitigate the food insecurity especially among the rural households.

Agriculture is still the second most important sub-sector in the Nigerian economy next only to petroleum, it employs between 70 to 80 percent of the population that is also rural. Although of central importance, farming on its own is increasingly unable to provide a sufficient means of survival in rural areas (Ellis & Biggs, 2001; OID, 1999 & Ellis, 1999). Therefore, it is becoming increasingly difficult to ignore the importance of income diversification to the livelihoods of rural households in Nigeria. Financial capital seems to be one of the most important limiting factors in the Nigerian farming system, where agriculture received only 1 percent of the total commercial loans, which is inadequate to take rural people out of poverty. The vicious cycle of poverty facing the farming communities in Nigeria is making it difficult for the smallholder farmers to get out of hunger. Poverty head count revealed that 46 percent of Nigerians were poor in 2004, the figure rose to 48.4 percent in 2010 and subsequently became more severe reaching about 71.5 percent 2011 (NBS, 2012). Non-farm diversification can

potentially provide needed capital to boost farming and livelihoods of smallholder farmers in Nigeria. Non-farm activities have become the most important component of livelihood strategies among rural households in most developing countries (Babatunde, Raphael and Qaim, 2010). Diversification of income sources is becoming an important means of rising rural household's income and cushioning the effects of the risk associated with environmental and climatic changes. It is equally use to mitigate the adverse effects caused by changes in government policies and market related problems such as price, input prices increase and other shocks. Diversification into non-farm activities has recorded a tremendous increase in importance in many developing countries including Nigeria in the past two decades with the share in the total household income ranging from 30 percent and 50 percent (Adewunmi, *et al*; 2011). Specifically, NBS (2011) reported that 62 percent of the rural households have at least someone in the household running at least one business.

The research will also be useful to program managers who will be interested in monitoring and evaluating of food policy programs and interventions. It will serve as a policy guide in their fight in reducing hunger and poverty to half by 2015, MDG goal number one. It will also be of interest to research students who may have a peripheral interest in assessing, evaluating and analyzing food security issues based on statistical theory to make inferences. The research will provide a framework for Non-governmental Organizations and donor agencies targeting to intervene in food security programs, especially at national, regional, community and even household levels in Nigeria.

1.6 Organization of the Thesis

This thesis was organized into six independent but related chapters. The first chapter dealt with the general background of the study, a statement of the research problem (main issues on food security and income diversification in the study area), research questions, objectives and significance or justification of the study. The second chapter reviewed previous works on food security and income diversification in methodological issues such as theoretical, conceptual and empirical literature related to the study, empirical evidences statistical tools and techniques used for data analysis used by the previous researchers. Policies and programs by Nigerian governments in addressing poverty and food insecurity and general rural development were also briefly reviewed.

Third chapter addresses the general methodology adopted in the research; it covered the detailed description of the data set used in the study, theoretical framework for the study based on utility theory. The study area, analytical tools and statistical procedure employed in the study, including pre and post estimation test were addressed in chapter three. Chapter four presents and discusses the findings of the study. It starts with a description of the socioeconomic characteristics of the rural households; determinants of food security between post-planting and post-harvesting seasons were presented and also discussed in this chapter were incidence, depth and severity of food insecurity. Results of different coping strategies to deal with food insecurity were tackled in this section. Furthermore, chapter five dwells on the evaluation of the impact of non-farm income diversification on food consumption expenditure and food security using propensity-matching techniques. Chapter six provides a summary and conclusion of the whole thesis; policy implication and policy recommendations based on the study were

put forward, area for further studies was also recommended. The major limitations of the study were also highlighted in this chapter.



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