AN EMPIRICAL ANALYSIS OF HOUSEHOLDS' FOOD SECURITY IN GOMBE STATE, NIGERIA.

BY

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BEING A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, AHMADU BELLO UNIVERSITY ZARIA, AS A PARTIAL FULFILMENT FOR THE AWARD OF MASTER OF SCIENCE (Msc) ECONOMICS.

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DECLARATION

I, ABUBAKAR MUHAMMAD SAIDU, hereby declare that the whole of this work submitted for Master of Science Degree (Msc) in Economics, of Ahmadu Bello University Zaria, is the result of my Research and has not been presented to any University for the award of Degree. All references in the work have been duly acknowledged; all errors and omissions in the work are mine.

Sign..... Date.....

CERTIFICATION

This thesis titled "***AN EMPERICAL ANALYSIS OF HOUSEHOLD FOOD SECURITY IN GOMBE STATE, NIGERIA)"*** meets the regulation governing the award of the Degree of Master of Science (M.Sc) in Economics, Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to family members, friends, relatives, colleagues and the rest of well wishers. I am grateful to the Almighty ALLAH for assisting and guiding me throughout the period of study and life time.

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Abstract

Food security is one of the targets of the Millennium Development Goals (MDGs) and is widely considered a useful measure for evaluating the progress of a country in terms of wellbeing. Despite, various concern by governments all over the world on ensuring that every household can at least provide three square meals per day, food insecurity continues to be a major development problem across the globe, undermining people's health, productivity, and often their very survival. Evidence suggests that Nigerians food production is increasing at less than 2.0% while population growth rate is estimated to be 2.5% per annum. The suggested theoretical disparity indicate that low rate of food production and high rate of population growth will generate high rate of food demand, thereby causing food Demand-Supply gap which can give rise to food insecurity. Thus the study analyzed household food security in Gombe state using household expenditure and consumption surveys containing both objective (quantitative) and subjective (qualitative) data. The study revealed that on average, only 14 percent of the households are food secure. Hence, 46 percent of the households are food insecure without hunger and 35 percent are food insecure with hunger. On the other hand, the outcome showed that on average, less than 50 percent of the households could afford to consume the minimum dietary requirement of 2400kcal. Furthermore, the findings also showed that at least 27 percent of the household live below one Dollar (1$), 54 percent are fairly living on a dollar while only 19 percent live above one dollar. A number of factors such as assets, income, and occupation level of education indicators are correlated with perceptions of greater food adequacy.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Food security is one of the targets of the Millennium Development Goals and is widely considered as important measure for evaluating the progress of a country in terms of wellbeing (Vasco, 2007). Despite, various concern by governments all over the world on ensuring that every household can at least provide three square meals for their family, food insecurity continues to be a major development problem across the globe, undermining people's health, productivity, and often their very survival (Smith and Subandoro, 2007). Global hunger is severe, as nearly 30 per cent of the world's population is currently suffering from one or more forms of malnutrition, including inadequate caloric consumption, protein deficiency, poor dietary quality, and inadequate concentrations of protein and micronutrients (Basudeb, Acharya, and Davis, 2007). Worldwide, approximately 840 million people are undernourished or chronically food insecure, and as many as 2.8 million children and 300,000 women die needlessly every year because of malnutrition in developing countries. (Basudeb et al, 2007). The situation is particularly worrying in Sub-Saharan Africa and South Asia. While lack of sustained economic growth is an important determinant of hunger, the persistence of hunger also feeds back to limit economic growth. Basudeb, Brinda and Meenakshi (2007), provide empirical evidences which point to the negative impact of hunger and malnutrition on labour productivity, health, and education, which ultimately leads to lower levels of overall economic growth. Hunger is thus as much a cause as an effect of poverty. These studies suggest that hunger has a direct effect on poverty and good nutrition is an investment in human capital that raises output as well as the returns on investments in education and health care. Taken together, these findings provide

powerful evidence that public spending in reducing hunger is an investment with high returns and should constitute a top priority for developing countries.

According to (Maxwell, 1996) as cited by Mauro, Davis, Calogero, and Kathleen (2007), the conceptualization of food security has evolved over time, partly preceding and partly paralleling similar evolutions in poverty. Since the World Food Conference (WFC) of 1974, food security paradigms have shifted from the global and national level to the household and individual level. Measuring food insecurity at the individual/household level rather than the national level differs from the more traditional approach of identifying food insecurity as the inadequacy of aggregate supply of and accessibility to food. Given the weaknesses of the supply side approach to food insecurity, several different methods have been put forward including measuring variables (e.g. household income, height to weight ratios) generally thought to be correlated with food insecurity. Recently, however, dissatisfaction with these measures has led to the use of direct measures of food insecurity such as household food consumption and expenditure data (based on recalls) and qualitative measures.

According to Webb et al, (2006) as cited by Mauro (2007) argued that Measuring and assessing food insecurity hinged on two contending views; objective-quantitative methods and subjective-qualitative techniques for the measurement of food insecurity. However, more recently, these two methods have been increasingly viewed as complementary, and it has become evident that a suite of indicators is necessary to capture the multifaceted nature of food security. Towards this end, the use of household expenditure and consumption surveys containing both objective and subjective information on the same household potentially provides a valuable workbench for this type of study.

1.2. Statement of Problem

Evidence suggests that Nigerians food production is increasing at less than 2.0% while population growth rate is estimated to be 2.5% per annum, (NPC and Aku, 2012). Thus the increasing evidence of change in population and available food production has generated contention and empirical question. This suggested theoretical disparity indicate that low rate of food production and high rate of population growth will generate high rate of food demand, thereby causing food Demand-Supply gap which can give rise to food insecurity. According to Njoku (2012) as cited by (Aku, 2012), Nigeria spends over 13 trillion Naira annually on the importation of basic food items including; Wheat, Rice, Sugar and Fish. More so, Malnutrition is widespread in the entire country and rural areas are especially vulnerable to chronic food shortages, unbalanced nutrition, erratic food supply, poor quality foods, high food costs, and even total lack of food (Isaac, 2009). There is a high level of malnutrition among children in rural Nigeria and the figures differ with geopolitical zones, with about 56 percent reported in a rural area of South West and 84.3 percent in three rural communities in the northern part of Nigeria (Isaac 2009). However, these distributions differ across state in Nigeria. Gombe state has an estimated population growth of 3.2 % per annum while food production is growing at slow rate. According to (UNICEF, 2012), Gombe State has prevalence rate of 8.1% severely malnourished children, and the continuing degree of malnutrition with stunting affecting 41 per cent of the children under five; 14 per cent are wasted, 23 per cent are under weight, 13.7 per cent of new born are born with birth weight below 2500 grams. This outcome along with high level of poverty and falling output of agricultural suggest that hunger has a direct effect on poverty and good nutrition which is an investment in human capital that raises output as well as the returns on investments in education and health care.

1.3. Research Questions

This study formulates the following questions:

i. What is the nature and magnitude of food insecurity in Gombe State, Nigeria;

ii. What are the causes of food insecurity Gombe State, Nigeria;

iii. What is the relationship between food security, poverty and income;

1.4. Objectives of the Study

The broad objective of this study is to analyze food security situation of households in Gombe State, Nigeria. The specific objectives are

i. To estimate the extent and magnitude of household food insecurity in the study area;

ii. To find out the causes of food insecurity and;

iii. To also access the relationship between food security, poverty and income.

1.5. Research Hypotheses

The hypotheses underlying this research that would be tested to achieve the above specific objectives are stated as follows:

H_0: There is no significant relationship between income and food insecurity Gombe State, Nigeria

H_1: There is significant relationship between income and food insecurity of household Gombe State, Nigeria

1.6. Scope and Limitation of the Study

This research is limited to Gombe state, a state within Nigeria the Sub-Saharan Africa; it focuses on food security. The work seeks to analyze the food security situation in the state, using both qualitative and quantitative methods. This approach was based implicitly on the assumption that the non-subjective measure itself is a more direct and accurate measure of the 'true' food security status. In that sense, the objective measure would serve as the benchmark, or gold

standard measure, something that approximates 'the true' food security status of households. However, this approach to validating subjective measures is problematic when the benchmarks themselves are problematic, for example if per capita food expenditure is measured with error or systematically misreported among households. Moreover, food security is a multidimensional phenomenon and cannot be captured by a single measure, thus testing alternative indicators against a single benchmark is not a definitive critique of the measure tested.

1.7. Justification for the Study

Theoretically and methodologically, this study is significant in the current parlance of development economics, especially in extending similar studies, such as; Omotesho et al (2006), Babatunde (2007), Abiodun (2010) and Ayantoye (2011) among others. Most of these studies have not attempted to use Household expenditure method to determine or analyze the extent and magnitude of food insecurity. Hence, there is need to remedy some of their methodological shortcomings. This opens spaces for research to attempt to provide an analytical tool for food security situation in Nigeria. Therefore, the foregoing is practical gap that will contribute to knowledge and practice. Moreover, studies into food security have become increasingly important due to world development focus on it as a panacea for ending poverty, hunger, reducing diseases, improving education, equity, restoring the environment and global collaboration. In line with that, ensuring the future food security in developing economies has been an area of interest in food insecurity literature. The overwhelming significance of planning development in less developed countries is compelling especially at this period of African food crisis. For example the 2005-2008 recent food crises in Nigeria demonstrated the difficulties the region has to ensure food security through own production. Poor households typically make economically rational decisions in the face of a wide variety of risks and opportunities. Thus,

forecasting these most valuable indicators is essential for short, medium and long term strategic economic growth and development for Nigeria to accomplish it vision 2020. In addition, governments, NGOs (especially those dealing with poverty reduction), CBOs, CDAs, international organizations, academics, students, economic planners and policy makers are intended to benefit from the findings of this research. Academics and students particularly those in the field of development economics, agricultural economics and health economics will also benefit from this work. Again, because of the multi-dimensional pattern of food insecurity, that call for interdisciplinary studies, historians, politicians, environmentalists and others interested in development economics are expected to see this work as containing contemporary knowledge on poverty, inequality, and malnutrition. Literature in this aspect of development economics is vital in this important sub-region of West Africa, Nigeria. Work of this kind will certainly contribute to knowledge and will spur similar researches.

1.8. Organization of the Study.

The study is structured as follows. The next chapter reviews the concept of food security, presents some empirical works and highlights the theoretical framework. Chapter 3 describes the methodology, and chapter 4 presents the empirical results. The final chapter provides a discussion of the results and concludes.

CHAPTER TWO

LITERATURES REVIEW AND THEORITICAL FRAMEWORK.

2.1. Introduction

The literature review is done in three parts. The first part looks at the conceptual literature. The second part of the literature review presents the theoretical literature and depicts the framework of food security. The last part reviews studies carried out on food security.

2.2. Conceptualization of food security

Conceptually, food security is generally broken down into four different components—availability, access, utilization, and vulnerability—each capturing different, but overlapping, dimensions of the phenomenon (Mauro et al, 2007). Firstly, Food availability is achieved when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through household production, other domestic output, commercial imports or food assistance. Secondly, Food access is ensured when households and all individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends upon income available to the household, on the distribution of income within the household and on the price of food. For persons living in urban areas, food access hinges primarily on the household's ability to purchase food. Most urban poor neither have large food stores, nor do they have access to areas for own food production. The urban poor often pay more for food purchases than do wealthier urban counterparts, as they are obliged to buy small quantities of food daily because they do not have the resources or living conditions which permit them to purchase and store large quantities of food at home. Thirdly, Food utilization is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and

adequate sanitation. Effective food utilization depends in large measure on knowledge within the household of food storage and processing techniques, basic principles of nutrition and proper child care. The primary factor effecting food utilization is individual health status. Illness and disease can lead to loss of appetite and poor absorption of the nutrients ingested. Child caring practices are another important component of food security for children as they are reliant on parents and other caretakers to provide safe and nutritious food of adequate quantity and quality. Environmental contamination is a large factor contributing to poor food utilization. The safety of food in the urban environment is a subject of concern. Street foods are often prepared under unhygienic conditions, and can contribute to outbreaks of food- borne illness. The health status of any group will be influenced by access to services, including primary health care and education, as well as potable water, sanitation systems and general environmental conditions.

Fourthly, another concept is increasingly becoming accepted namely, "Vulnerability'' (the risks that can disrupt anyone of the first three factors). There are therefore, four major elements of food security. They are food availability, food access, food utilization and not loosing such access. Availability, access and utilization are hierarchical in nature. Food availability is necessary but not sufficient for food accessibility and access is necessary but not sufficient for utilization. In a larger sense, two broad groups of factors determine food security. These are supply side factors and demand side factors. The supply-side factors are those that determine food supply or food availability. In other words, they are determinants of physical access to food at national, household and intra-household levels. The demand side factors on the other hand are factors that determine the degree of access of countries, households and individuals to available food. They are, in other words, determinants of economic access to food or determinants of entitlement to available food.

As will be discussed below, there is a consensus that no single indicator can capture all aspects of food security while also providing policymakers with relevant and timely information in a cost-effective manner. Thus, Food security is a flexible concept as reflected in the many attempts at definition in research and policy usage. Even a decade ago, there were about 200 definitions in published writings. Whenever the concept is introduced in the title of a study or its objectives, it is necessary to look closely to establish the explicit or implied definition.

According to Africa Leadership Forum, (1989) National food security should be defined within the context of national food self-reliance. It must imply adequate access by all people at national and household levels to adequate and largely domestically produced food at all times. It involves regular and sustainable access without dependence on commercial and foreign-exchange-consuming imports or food aid detrimental to local production in Africa. In this context, food security should not hinder Intra-African trade as a policy instrument; rather it should encourage and emphasizes the full utilization of Africa's productive food resources. Alamgir and Arora (1991), Maintain that a food secure household should be defined as one which has enough food available to ensure a minimum necessary intake by all members. The minimum is related to, among other things, body size, weight, sex, nature of work and, for women, pregnancy or lactation status. Food security at the sub-national level means the assured availability of food for individual households to draw on to meet their minimum consumption requirements during a given period. To be operational, the concept of "minimum" has to be modified here to reflect, at least partially, tastes and preferences and household status. National food security is the sum of household and sub-national food security, and more. At the national level, food security can be defined as assured national availability of food to meet current minimum requirements per capita during a reference period (a year normally) and, also, to meet any unexpected shortfall over a

limited period (say three months). Global food security is the assurance of an adequate food supply and/or access to it for all, both at national and sub-national levels.

While the concept of food security was highlighted during the World Food Conference 1974, emphasis was essentially on increasing food production in food-deficit countries and on creating a coordinated system of national and issue, especially the access of vulnerable groups to enough food for a normal life. Currently, the widely accepted definition of food security is "access by all people at all times to enough food for an active, healthy life." Its essential elements are the availability of food and the ability to acquire it. Food security thus defined in much broader terms than food self-sufficiency which emphasizes increasing domestic food production to meet domestic consumption. (Adedeji, 1989)

"Food security generally implies arrangements whereby people are assured a minimum adequate level of food grain supply in periods of normal as well as poor harvest. It can be defined at rural, national, regional and international levels. It can also be seen from the viewpoint of either developed countries (the food surplus areas) or developing countries (food deficit areas)." International Food Security: "World food security includes the general attainment of food security in individual countries, and introduces the concept of collective or collaborative policy-making. As production changes, either stocks or consumption (or both) have to vary in response. The extent of trade liberalization commodity price agreement, food aid and the like are powerless to alter this reality." (Amiti, 1982).

According to (Cathie and Dick, 1987) Food security can be refined to consider both its long-term and short-term aspects. Long-term food insecurity or chronic insecurity is defined in terms of the persistent existence of malnutrition and the associated lack of development and growth in low-

income developing economies or regions of those economies. The inability to attain food security in the short-term, or transitory food insecurity, is defined as a temporary decline in a household's or region's or nation's access to food.

Food security may be defined as the ability of countries to meet target consumption levels. The choice of the target consumption levels is perhaps the most important aspect of a developing country's food policy, and it can be viewed under two frames. First, there is problem of chronic and persistent malnutrition that is caused by low productive capacity and secular problems of poverty. This constitutes a long-term problem that can be overcome only by a steady continuing rise in productive capacity and the real income levels of the poor… The second problem is that of short-term variability of entitlements of consumers to food. Food insecurity in this sense is ultimately a problem that stems from real income fluctuations that affect the ability of people to command adequate food through legal means. (Chisholm and Tyers, 1982).

The term "food security" has two senses: national and individual. At the national level, typically it means the availability in the country of sufficient stocks of food to meet national needs (however defined) until such time as stocks can be replenished from harvests or imports. At the individual level, it means that all members of society have access to the food they need, either from the market, from their own production, or from the Public Food Distribution System (ration system, or Food-for-Work). (Clay et al, 1988).

Economic Commission for Africa, (1991), believes that, the concept of food security has gradually gone beyond reserve stocks to the final objective of ensuring that every individual can not only have access at all times to the food he needs but that he also has the necessary means to acquire it. Essential elements of food security include adequate levels of food production,

stabilization of food supplies and guarantee of food availability for all. For the ECA, food insecurity in Africa is mainly due to low levels of production.

(Falcon etal, 1987)), maintain that A nation's food security is achieved when it can assure both physical and economic access to food for all its citizens over both the short and the long run. Behind this simplified definition, however, lie a number of complex and overlapping components involving agricultural production, international trade and economic interdependence, national stocking policies, development aid, and a range of direct measures designed to enhance household consumption levels.

According to IFAD, (1991) Food security is associated with food intake at the individual, household, sub-national, national and global levels. A food secure household can be defined as one which has access to enough food to ensure the minimum necessary food intake for all individual members to lead a healthy life. At the sub-national level, the concept has to reflect the assured availability of food during a given period for individual households to draw on to meet their minimum requirements. A food secure nation is able to assure availability of food nationally, to meet current and future per capita requirements. Finally, global food security implies universal access to an adequate food supply. It is critical to understand that food security relates equally to purchasing power and entitlement as to production/supply. Food security is directly related to the structural problems of poverty.

Food security may be defined as the ability of countries and regions or households to meet adequate levels of food consumption on an annual basis. Two features are salient in this definition. First, the pursuit of policies, using the available resources to those countries, regions or households to be able to provide or make available the total complement of food required by

the population. The total food complement is calculated on the basis of the calorific requirement of each member of the population. The total food requirement can therefore be met either from domestic food production or imports or a mixture of the two. The second feature of the definition is the capacity of those countries or regions to make available all the food requirements of the population to be able to purchase quantities to satisfy their consumption requirements. (Kenya, Republic of, 1982)

The term food security is used in this draft in its most fundamental sense, meaning that everyone has enough to eat at any time – enough for life, health and growth of the young, and for productive effort. In assessing food security, the paper adopts the concept of "economic entitlements," which are the goods and services over which people can establish command through the economic, political and legal mechanisms in operation in a given country. (Kracht, 1981).

Food security is defined in terms of national food supplies probably positively related to self-sufficiency. National food security is when a country can ensure that even in the worst years, their populations have adequate food and water, and at the same time, the national environment is preserved so that it may be used to sustain time, the national environment is preserved so that it may be used to sustain their needs over an indefinite period of time. This definition requires further clarification: what is meant by "adequate food and water." For example, this might alternatively imply the physiological minimum required for survival or that which permits worker productivity to be maintained, or the minimum subsistence which is socially acceptable within any given "historical and cross-cultural context." There is also the question of for whom must food and water supplies be adequate, at what point does the increase in the numbers of the normally food insecure become critical. Variations in supply constitute a further dimension, as

do fluctuations in price and the availability of foreign exchange and food aid. It is recognized that food security may conflict with self-sufficiency, and economic growth and efficiency. (Stryker, 1978).

According to Muhammad (1987), Food security has been defined as the ability of food-deficit countries or regions, or household to meet target consumption levels on year to year basis. Food security has two facets:

a) The real family income of the vulnerable groups may be too low to provide the basic food requirements for all members of the family even in years of normal and above normal domestic food production.

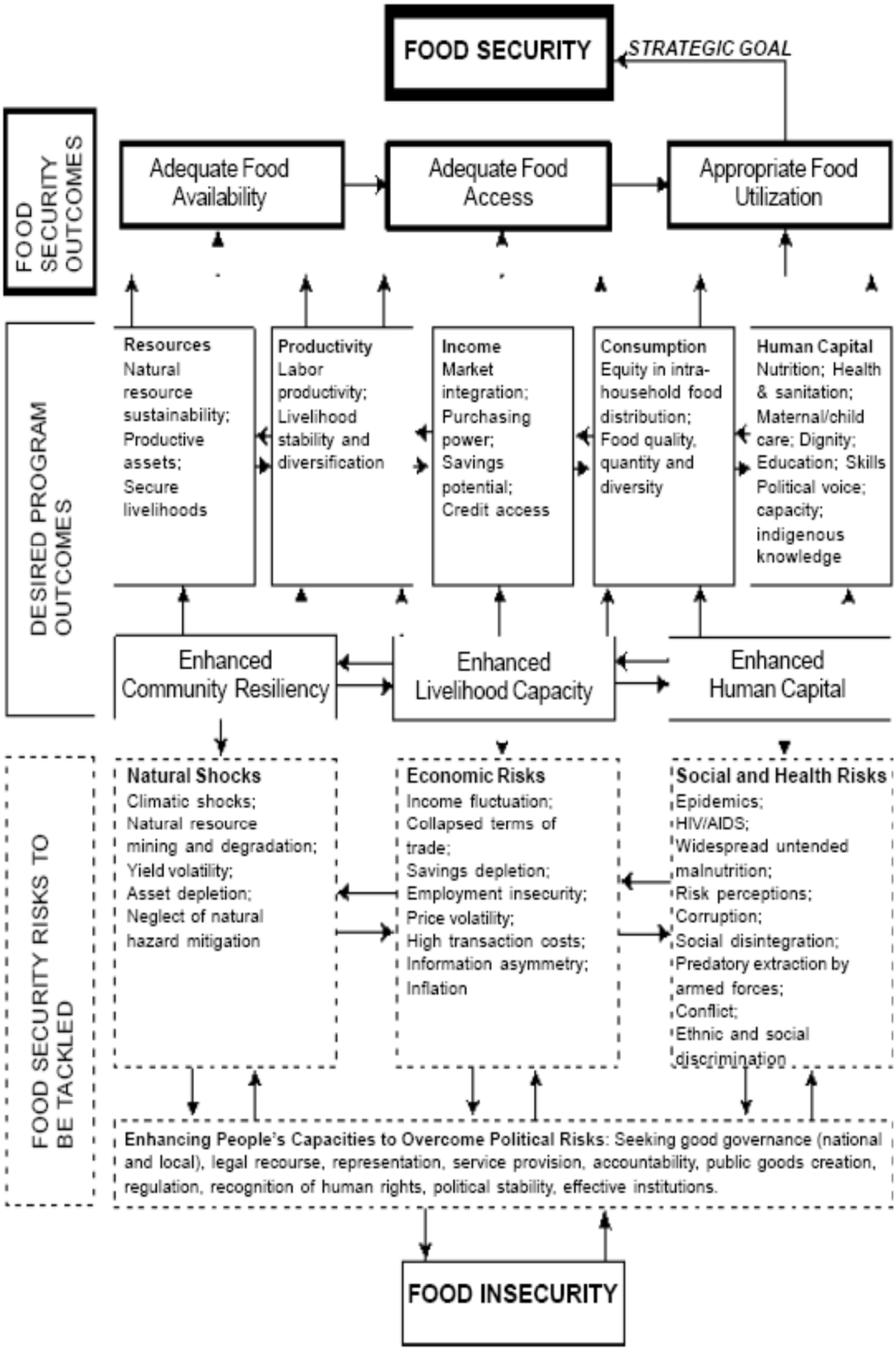
b) It may be due to reduced domestic production or policy changes and a major dislocation in food imports, which reduces the overall per capita availability of food in the country, even though the average income is adequate to purchase food at normal prices, if available.

Food security is the inability of poor countries, poor families and poor individuals to purchase sufficient quantities of from existing supplies. Improving food security requires both increasing the purchasing power of the poor and boosting overall food production. Developing countries can develop a two-pronged strategy to promote food security. In the long run, efforts must be made to increase the purchasing power of the poor by raising the overall level of food production in the third world. Increased food supplies and purchasing power must be inextricably linked to elements of any long-term food security efforts. In the short run, redistributing food supplies from the developed to the developing world is likely to be the best way to meet the more immediate food security needs of the poor. (Mellor, 1988)

According to Siamwalla (1994), food security is the ability of countries regions or households to meet targeted level of food consumption on a yearly basis. The international conference on Nutrition (ICN) held in Rome (1992), defined food security as access by all people at all times to the food needed for a healthy life. According FAO, food security is a state of affairs where all people at all times have access to safe and nutritious food to maintain a health and active life. Admittedly, food security to strategic in that if is a measure of stability of the Nigerian Agriculture, the achievement of food self-sufficiency and self-reliance objectives of Nigerian, government (Olayemi 1996).

According to (USAID 1992), People are "food secure" when they have regular access (either through production or purchasing power) to sufficient food for a healthy and productive life. Various schools of thoughts have attributed food security problems to different things including distribution, storage and marketing. Further, some believe that the Nigerian food security problem is the product of Structural Adjustment Programme (SAP), which simultaneously made food sufficient income to demand for it. Food availability is a function of the combination of domestic food stocks, commercial food imports, food aid, and domestic food production, as well as the underlying determinants each of these factors. Use of the term availability is often confusing since it can refer to food supplies available at both household level and at a more aggregate (regional and national) level. However, the term is applied most commonly in reference to food supplies at a regional or national level. Food access is influenced by the aggregate availability of food through the impact of the latter on supplies in the market and therefore, on market prices.

2.4. Figure 1: Food Security Framework



Source: adapted from occasional paper no. 1 USAID office of food for peace (2006)

Figure 1 above, is a conceptual framework depicting the linkages to desired outcomes (central and upper half of the diagram) and potential risks (lower half). This framework proposes that food availability derives from domestic agricultural output (cash crops, livestock and food crops), ideally through sustainable use of natural resources (water, land, vegetation). Total food availability from domestic sources is enhanced at the national level by net food imports (commercial or concessionary). Food access refers to the ability of households to secure food in the marketplace or from other sources (transfers, gifts, etc.). Household purchasing power is the key to access and this varies in relation to market integration, price policies, and temporal market conditions. Food utilization incorporates issues of food safety and quality, sufficiency of intake at the individual level, and the conversion efficiency of food by the body, which results in sound nutritional status and growth. In the latter instance, the disruption of health infrastructure, lack of nutrition education and discrimination against women in controlling resources all have a detrimental impact on individual outcomes.

These factors interact over time resulting in conditions ranging from acute insecurity (a famine), through seasonal discontinuities (lean seasons), to guaranteed access and utilization for all individuals. Yet, the fourth element, risk, is crucial to our understanding of the term "insecurity." The widely accepted definition of food security mentions the phrase "at all times." This relates to expectations and uncertainty. Without viable expectations of availability, access and utilization at all times, a household is subject to deep-seated uncertainty that affects all of its investment and disinvestment decisions. Poor households typically make economically rational decisions in the face of a wide variety of risks and opportunities. They adapt local knowledge to multiple scenarios and balance possible gains against required investments in the form of their own labour, capital and natural resources. But risks arise in many quarters. Food supply can be

affected by climatic fluctuations, soil fertility depletion, or the loss of a household's productive assets. Market access can be affected by changing global terms of trade, market disruption during crises, or non-farm employment insecurity. Food access can be negatively influenced by physical insecurity (conflict), loss of coping options (such as border closure preventing seasonal job migration), or the collapse of safety net institutions that once protected people with low incomes. Food utilization is often impaired by epidemic disease, lack of appropriate nutrition knowledge or culturally prescribed taboos that affect access to nutritious foods according to age or gender. Households become food insecure when they are unable to mitigate negative impacts on food availability, access, and/or utilization. Such households balance their uses of private and community resources (including soil, water and vegetation) in an attempt to meet immediate consumption needs while reducing the risk of future shocks. They often face disincentives to longer-term investment in the productive base, including unclear or impermanent land tenure systems (customary or formal), high and unpredictable covariate risks in agriculture, imperfect factor markets, and extractive taxation of rural products.

2.3. Theoretical literature review

Three families of theories have been prominent in literatures that explain the causes/pattern of food insecurity in underdeveloped countries; Population-Driven Theory, Surplus-Extraction Theory and the "Lewis Model"-The Theory of Economic Growth.

2.3.1. Population-Driven Theory. This model is base on the Malthusian work. According to this approach, the cause of food insecurity was a tendency for population to outstrip resources-particularly land—over a long period of time. Population pressure pushed production into more labour-intensive techniques and eroded the surplus that would be needed to fund innovation and growth. Malthus maintained that economic arrangements--particularly the level of the real wage

and the number of positions within the economy--dictate the level of population at a given time. This causal connection is supposed to work through positive and negative checks: positive checks include sources of increased mortality resulting from overpopulation (war, civil strife, famine), while negative checks include culturally specific checks on fertility—delayed nuptiality, birth control, and the like. Thus population change is a dependent variable, conditioned by the economic environment: as a regional economy becomes more productive, population can rise. Malthus posited a mathematical model of population growth. The model, though simple, has become a basis for most future modeling of biological populations. Malthus's model is an example of a model with one *variable* and one *parameter*. In the model the variable is the population and the parameter is the population growth rate. If we let $X(i)$ denote the population size during time period i and let r denote the population growth rate per unit time the Malthusian population model can be written mathematically in the following way:

$$X(i+1) = (1+r)X(i).$$

A model in this form, where the population at the next time period is determined by the population at the previous time period, is said to be a difference equation model. If we have a difference equation model and know the population at the beginning of a time period, we can use the model to determine population sizes at any point in the future by applying the equation repeatedly until we reach the desired point in time.

Malthus also realized that his model implied that real wages determined by the market would always be pinned down to the subsistence level. If real wages were above this level, population would begin to grow, inducing a decline in nominal wages as a result of firms having a larger supply of labour available. Moreover, the larger population would result in an increase in the demand for goods, which would force prices to go up and real wages to decrease to their

subsistence level. This concept was known as the Iron Law of Wages, and, although first conceptually formalized by Ricardo in 1817, it was constantly present in Malthus's work. Thus, the rise in population lowers the man-land or the man-resources ratios. This implies that a static, backward economy without any technological progress, like Nigeria could only experience greater poverty and hunger with growing population pressure on available resources.

While the eco-Malthusian vision has not yet been convincing for the world at large, in recent decades it has emerged as a popular way to understand the particular plight of sub- Saharan Africa. In this region, efforts to expand arable land area to boost food production, so as to keep pace with population growth, have led to serious environmental damage in the form of forest loss and habitat destruction. Damage to cropland productivity has been severe as well because population pressures on the land have led to reduced fallow times, hence a more rapid depletion of soil nutrients. This in turn has constrained production. In some African countries, average crop yields per hectare have actually declined, and for sub-Saharan Africa as a whole over the past several decades, total food production per person has declined. On a per capita basis since 1980, the production of maize (Africa's most important food crop, a staple food to 300 million people) has fallen by 14 percent (Robert, 2008). Hunger simultaneously has increased. The number of Africans who are "food insecure"—those consuming less than the nutritional target of 2,400 calories per day—increased from 300 million in 1992 to roughly 450 million by 2006 (Robert, 2008).

Thus, Africa's problems are tragic and severe; sometimes take the form of a classic Malthusian trap, where population growth outstrips food production potential. This is because food production in Africa today is far less than the known potential for the region. African farmers

today use almost no fertilizer (only one-tenth as much as farmers in Europe use), only 4 percent of their cropland has been irrigated, and most of the cropped area in Africa is not planted with seeds improved through scientific plant breeding (Robert, 2008). As a consequence, average cereal crop yields per hectare in Africa are only about one-fifth as high as in the developed world. Africa is failing to keep up with population growth not because it has exhausted its potential but instead because too little has been invested in developing that potential.

2.3.2. **Surplus-Extraction Theory**. This model attempts to explain economic underdevelopment and technical innovation in terms of local class relations and the particulars of the system of surplus extraction that is in place. The surplus-extraction model holds that the key to understanding the process of economic underdevelopment in a given economy is the system of social relations of production--the property relations and the distribution of political power—through which productive economic activity proceeds. This model postulates that an economy typically embodies a class system dividing the immediate producers (farmers, workers, artisans) from an elite class that confiscates part of the surplus products/resources for its own uses. The direction that economic development takes depends very much on the incentives, opportunities, and powers conferred on the various class parties by the property system; thus the class relations impose logic of development on the system.

An extensive application of this framework to the traditional Nigerian rural economy will be justified. The rural societies are substantially stratified, containing a small elite class and a large class of poor peasants and workers, and the elite managed to appropriate the surplus land resources for its own purposes. And also, the cultural and economic values that governed the consumption behaviour of the elite were such as to discourage them from investing the surplus in

economically productive ways--infrastructure, capital improvements, irrigation, new technologies, etc. If these assumptions are substantiated, then a pattern of economic stagnation follows fairly directly. Producers (peasant farmers) lack the funds necessary to invest in more efficient technologies; while the elite group lacks the incentive to do so. As a result, the spectrum of innovations that would lead to economic development is blocked.

3.3.3. The "Lewis Model"-The Theory of Economic Growth. One of the best-known early theoretical models of development that focused on the structural transformation of a primarily subsistence economy was that formulated by Nobel laureate Lewis in the mid-1950s and later modified, formalized, and extended by John and Gustav. The Lewis two-sector model became the general theory of the development process in surplus-labour Third World nations during most of the 1960s and early 1970s. It still has many adherents today.

In the Lewis model, the underdeveloped economy consists of two sectors: a traditional, overpopulated rural subsistence sector characterized by zero marginal labour productivity-a situation that permits Lewis to classify this as surplus labour in the sense that it can be withdrawn from the traditional agricultural sector without any loss of output-and a high productivity modern urban industrial sector into which labour from the subsistence sector is gradually transferred. The primary focus of the model is on both the process of labour transfer and the growth of output and employment in the modern sector. (The modern sector could include modern agriculture, but we will call the sector “industrial” as shorthand) Both labour transfer and modern-sector employment growth are brought about by output expansion in that sector. The speed with which this expansion occurs is determined by the rate of industrial investment and capital accumulation in the modern sector. Such investment is made possible by

the excess of modern sector profits over wages on the assumption that capitalists reinvest all their profits. Finally, Lewis assumed that the level of wages in the urban industrial sector was constant, determined as a given premium over a fixed average subsistence level of wages in the traditional agricultural sector. At the constant urban wage, the supply curve of rural labour to the modern sector is considered to be perfectly elastic.

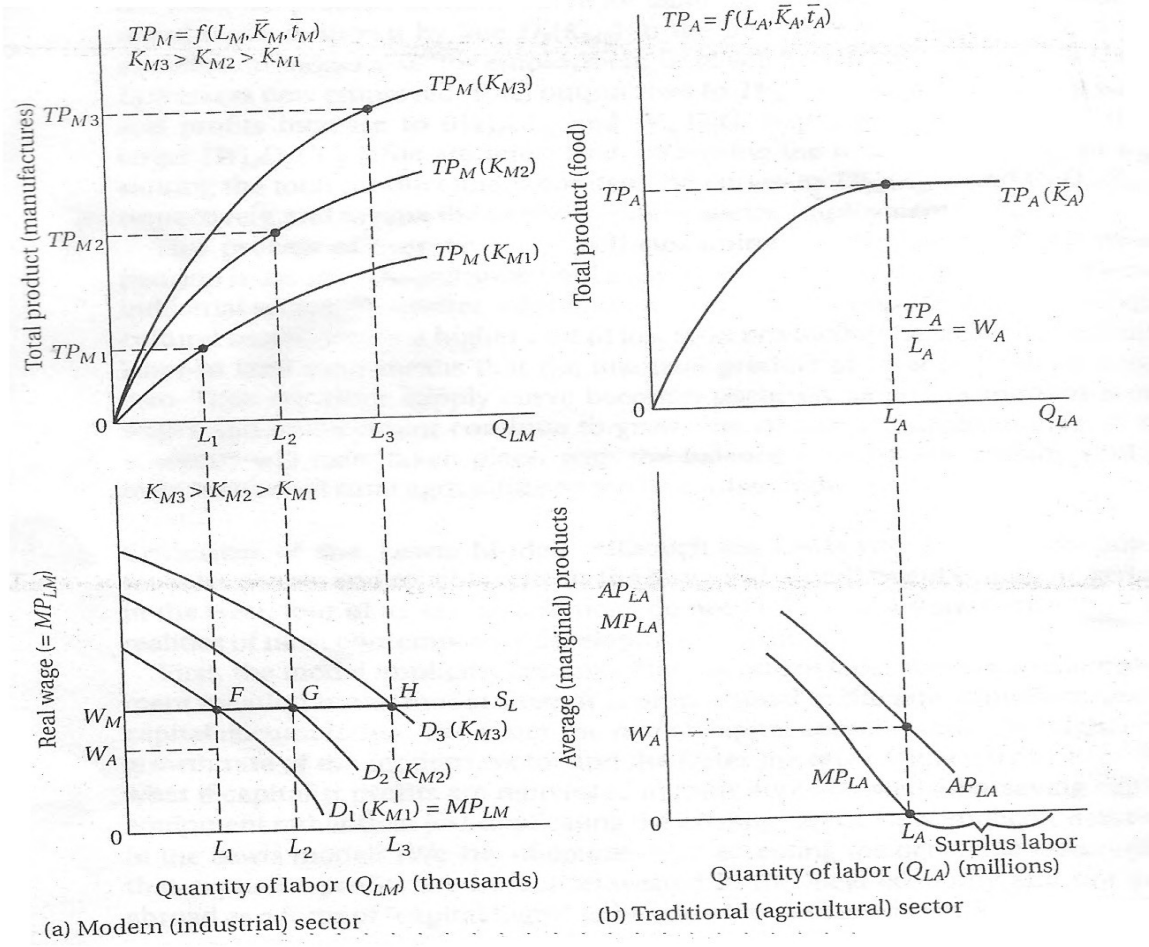


Figure 2: the Lewis Model -The Theory of Economic Growth.
(Source: Todaro, 2007)

Consider first the traditional agricultural sector portrayed in the two side diagrams of the figure 2 above. The upper diagram shows how subsistence food production varies with increases in labour inputs. It is typically agricultural production function where the total products (TP_A) of food is determined by changes in the amount of the only variable input, labour (L_A), given a quantity of capital, ($\square_A$) and unchanging traditional technology, $\square_A$. In the lower-right diagram, we have the average and marginal product of labour curves, AP_{LA} and MP_{LA}, which are derived from the total product curve shown immediately above. The quantity of agricultural labour (Q_{LA}) available is the same on both horizontal axes and is expressed in millions of workers, as Lewis describing an underdeveloped economy where much of the population lives and work in rural areas.

Lewis makes two assumptions about the traditional sector. First, there is surplus labour in the sense that MP_{LA} is zero, and second all rural workers share equally in the output so that the rural real wage is determine by the average and not the marginal product of labour. Assume that that there are L_A agricultural workers producing TP_A food, which is shared equally as W_A food per person (this is the average product, which is equal to TP_A/L_A). The marginal product of these L_A workers is zero, as shown in the bottom diagram of figure 2; hence the surplus-labour assumption applies to all workers in excess of L_A.

The upper-left diagram of figure 2 portrays the total product curves for the modern industrial sector. Once again, output of, say, manufactured goods (TP_M) is a function of a variable labour input, L_M, for a given capital stock $\square_M$ and technology, $\square_M$. On the horizontal axes, the quantity of labour employed to produce an output of, say, TP_{M1} with capital stock $K_{M1,}$ is expressed in thousands of urban workers, L_1. In the Lewis model, the modern-sector capital stock is allowed

to increase from K_{M1} to K_{M2} to K_{M3} as a result of the reinvestment of profits by the industrial capitalists. This will cause the total product curves in figure 2a to shift upward from $TP_M(K_{M1})$ to $TP_M(K_{M2})$ to $TP_M(K_{M3})$.

W_A in the lower diagrams of figure 2 a & b represents the average level of real subsistence income in the traditional rural sector. W_M in figure a, is therefore the real wage in the real modern capitalist sector. At this wage, the supply of rural labour is assumed to be unlimited or perfectively elastic as shown by the horizontal labour supply curve $W_M S_L$.

2.4. Empirical literature review

Several attempts have been made by different scholars in different countries and Nigeria in particular, to provide empirical evidence of food insecurity. Most evidences are on the link between poverty, illiteracy and food insecurity. Clearly, however, they do not offer detailed information on the household food expenditure, which is critical for improving program designs. Babatunde, Omotesho and Sholotan (2007), employed calorie-intake approach; they investigated the socio-economic characteristics and determinants of the food security status of rural farming households in Kwara State of Nigeria. Econometric tools were used to determine factors affecting the food security status of household. A logit regression model made up of eight regressors' was specified. Household income, household size, educational status of household's head and quantity of food obtained from own productions were found to determine the food security status. Using the recommended calorie required approach; the study revealed that 36% and 64% of the households were food secure and food insecure respectively. Another study by Ayantoye, Yusuf, Omonona and Amao (2011) adopted the food Energy Intake used by Greer and Thorbecke (1986). The study examines the dynamics of food insecurity transitions among rural

households in Southwestern Nigeria. Data were analyzed using Marcov Probability Chain (MPC) and Probit regression. Results indicate movements into and out of Food Insecurity during two seasons-planting and harvest seasons. It was found that 86.1% of households would transit to Food Insecurity during Planting Season. Household size, educational status of head, age, asset ownership, remittances, occupational status of head, and access to credit and access to extension services are factors that significantly determine these movements.

Simeon Nanama and Karim Soul (2007) used Africare's measurement, Month of Adequate Household Food Provisioning (MAHFP). The FANTA/Cornell questionnaire consisted of 11 simple questions that assessed if and how households experience food insecurity and the strategies they adopt to combat it. For the entire sample, 12 percent of Production Units (PUs) described no experience with food insecurity and were therefore classified as food secure. Twenty-nine percent of the (PUs) reported uncertainty and worry about having enough food, which classified them as moderately food insecure, 35 percent reduced their consumption and ate less desirable foods, which placed them in the food insecure category, and 24 percent were engaged in action that compromised their dignity and their ability to manage risk, which placed them in the severely food insecure category. Omotesho et al (2006) provides empirical evidence of food insecurity among rural households in Kwara State. The study constructed food security index using Daily per capita calorie consumption. The main tools of analysis for this study include descriptive statistics and logistic regression model. the study revealed that about two-third of the households are food-insecure with an average daily per capita calorie consumption of 1504 kcal which is about 33% less than the minimum daily requirement of 2100 cal. Obayelu, Abiodun Elijah (2010) adopted the Radimer/Cornell hunger scale (Radimeret al., 1992 and Radimer 2002) and the Childhood Hunger Identification Project scale (Wehler 1992)-Rasch

Measurement Model. He found that only 23.7% of the households in the study area were food secure; thus more than 66 percent of the households are food insecure.

A similar study was conducted by Fakayode, Rahji, Oni and Adeyemi (2009). They examined the food security situations of the Nigerian's major farm households using Ekiti State, Nigeria as a case study. The USDA approach for the analysis of farm household food security was used to measure the intensity of food severity among the farm households. They found that only 12.2% of the farm households were food secure, 43.6% were food insecure without Hunger, 35.9% were food insecure with Hunger (moderate) and 8.3% were food insecure with Hunger (severe). Orewa and Iyangbe, (2009), assessed the degree of food insecurity in Nigeria by examining the food insecurity profile among the rural and low-income urban population in the country. Using a 48-hour recall method, each household member was asked about the type and quantity of food he/she consumed the previous day and a day after per meal and per day. The study identified three classes of persons, the pre-scholars (less than 6 years), the male inhabitants and the low-income urban households are more severely affected by food insecurity. Risikat and Dauda, (2010) in their study, provide an analysis of the interrelationship between women's status and provision of food for household members for food security in Lagos metropolis, Southwestern Nigeria using survey methodology. The study population includes all economically active women aged 18-60 years presently living in metropolitan Lagos. The survey results indicate that socio-economic and demographic variables such as marital status, income, education and occupation are significant indicators explaining food security status of households in the study area. Omonona, Titus and Adetokunbo (2007), also analyzed food security situation among urban households in Lagos, Nigeria. The study was conducted in Lagos. The households were classified into food secure and food insecure households using food security index, which was

used to establish the food security status of various households. The food insecurity incidence for the study area was found to be 0.49. Food insecurity incidence increases with increase in age of household heads. It is highest when household heads are within the range of 61 – 70 years at 0.58 and least within range 21 –30 years at 0.30. Food insecurity incidence is higher in female headed households at 0.49 than in male-headed households at 0.38. Food insecurity incidence decreases with increase in level of education.

Omotesho and Muhammad (2010), Employed food Security Index and the Linear Goal Programming (LGP) Model, and developed optimal food consumption plan for the rural households in Kwara State, Nigeria. Food security index with a food security line of 2470 Kcal daily per capita consumption was used to classify the rural households either as the food secure or food insecure. This study reveals that 65.45% of the rural households are food insecure. Also the minimized value for the food plan in the study area was ₦4159.30 per week. With mean adjusted household sizes of eight male adult equivalents, this amount to ₦73.73 per person per day. The food plan has cost implication that is below the poverty line set by the World Bank at One U.S. Dollar per person per day.

2.5: Trend Analysis of Agricultural Productivity and Demographic Population in Nigeria.

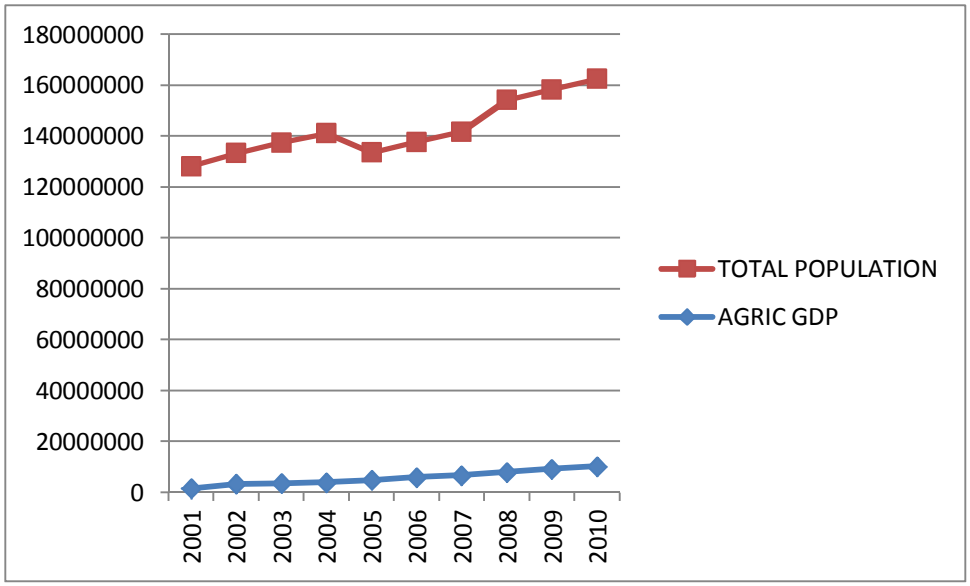
The table below shows the value of agricultural output in millions Naira from the year 2001 to 2010 and the total population of Nigeria from 2001 to 2010.

Table 1: Value of Agricultural Output and Total Population in **Nigeria**

Years	****Total Population**	***Agric GDP(Million□)**
2001	126635600	1598017
2002	129934900	3360090
2003	133881700	3628553
2004	137253100	3908926
2005	128772000	4779429
2006	131859700	5947992
2007	135031200	6776333
2008	146255300	7990329
2009	149229100	9186306
2010	152217300	10273651

***Source:**CBN statistical Bulletin 2011, ** CIA World Fact book 2012.**

Chart 1: line graph of population and value of agricultural output



The data displayed in table 1, shows the annual population growth and agricultural GDP of Nigeria from 2001 to 2010. The trend in population's growth shows and appreciable rise in the figures. For instance from 2002 to 2003 the growth rate was 3 percent, however from 2005 to 2006 it rose by 2.4 percent, while from 2008 to 2009 it was 2 percent. On the other hand, the

values of agricultural commodities changed marginally from 2001 to 2002 by only 7.9 percent; and by 24 percent from 2005 to 2006. However, it recorded a change of 12 percent from 2009 to 2010. Thus there is a mismatch between population growth and growth of agricultural productivity. Given this problem, the extent of food insecurity would be appreciated.

CHAPTER THREE:

METHODOLOGY

3.1. Area of Study;

The selected area of study is Gombe State of Nigeria. The State has the following features;

Chart 2: Map of Gombe State showing the eleven Local Government Areas;



3.1.1. Location and Physical Setting of Gombe State:

The State is located between latitude 9°30' and 12°30'N and longitudes 8°45' and 11 °45'E of the Greenwich Meridian. It lies within the Northeast region of Nigeria and occupies a total land area of about 18,768 Km^2 and a Density 125.4/km2 (324.7/sq mi). Being it located in the north eastern zone, right within the expansive savannah, allows the state to share common borders with the states of Borno, Yobe, Taraba, Adamawa and Bauchi. Gombe has two distinct climates, the dry

season (November-March) and the rainy season (April-October) with an average rainfall of 850mm.

3.1.2. Administrative Feature Gombe State:

The State nicknamed the 'Jewel in the Savannah' was formed in October 1996 from part of the old Bauchi State by the Abacha military government. Gombe is divided into eleven Local Government Areas. They are: Akko, Balanga, Billiri, Dukku, Funakaye, Gombe, Kaltungo, Kwami, Nafada, Shongom and Yamaltu/Deba. The State is headed by Executive Governor and has 24 State House of Assembly members, 3 Senatorial districts and 6 Federal constituencies. It also has 14 Emirates /Chiefdoms.

3.1.3. Socio-Economic Features of Gombe State:

The state had, by 2011, an estimated population of 2,797,692 people. Gombe State is mainly populated by Fulani people. Other tribes include Hausa, Tangale, Waja, Cham, Bolewa, Tera, Kare-Kare and other minor tribes. Farming is the major economic activity of people of Gombe State. They produce both food and cash crops. Among its food crops are Cassava, millet, sweet potatoes, Maize, Rice, etc. the cash crops include Beans, Tomato, Groundnut, cotton, etc. These products provide raw material for agro-based industries like the Tomato Company, cotton ginnery, and groundnut oil mill in the state. By 2007, the state has an estimated total GDP (PPP) of $2.50 billion, and a percapita of $1,036.

3.2. Source of Data, Sample Design, Sampling Technique and Sample Size.

The study used mainly primary data. Thus a cross-sectional data set was generated from the State using questionnaire instrument. Structured questionnaires were used in the collection of primary data with the household being the unit of analysis. Following Israel (2009) samples size will be mathematically calculated using the following formula:

$$n = \frac{N}{1+N(e)^2}$$, where;

n = the sample size

N = the total population

e = the level of precision

Given the population size as 2,353,879 with precision level of 0.05 the sample size is determined as: $n = \frac{2,797,692}{1+2,797,692(0.05)^2} = \frac{2,797,692}{1+2,797,692(0.0025)} = \frac{2,797,692}{1+6995}$

n = 400

Therefore, a total of 400 households were selected through multi-stage sampling procedure from the state. At first stage, three local governments were purposively selected, (one from each of the Senatorial Districts in the State). They are Dukku Local Government Area, Akko Local Government Area and Balanga Local Government Area. This is because of varied cultural, religious and farming practices among the regions. Then 10 out of the 31 geo-political Wards of these Local Government Areas were selected. They include Waziri South, Zange, Jamari Wurotale, Tukulma, Pindiga, Tumu, Kalshingi,Talasse/Gelengu, Bambam and Kindiyo. Thirdly, 40 households from each of the ten wards were randomly selected. Hence, these households were interviewed with the aid of written structural questionnaire.

3.3. The Research Instruments.

The major instrument used in the collection of Data is the Questionnaire. The major themes of the questionnaire are; *The Core Food Security Module and Food Expenditure Module (CFSM) and The Food Expenditure modules.* The (CFSM) was developed by United State Department of Agriculture (USDA). It contains eighteen questions that provide detailed information about the experiences of household members as it pertains to a household's inability to meet basic food needs due to financial constraints. A household's responses to these questions are used to

categorize the household as (a) food secure, (b) food insecure without hunger, or (c) food insecure with hunger. The eighteen questions used in the CFSM are listed below

1. *Worried food would run out*
2. *Food bought did not last*
3. *Respondent not eat balanced meals*
4. *Child fed few, low-cost foods*
5. *Adult cut/skip meals*
6. *Child not fed balanced meals*
7. *Respondent eat less than should*
8. *Adult skips meals, 3+ months*
9. *Child not eating enough*
10. *Respondent hungry but did not eat*
11. *Respondent lost weight*
12. *Child meal size cut*
13. *Adult not eat for whole day*
14. *Child hungry*
15. *Adult not eat for whole day, 3+ months*
16. *Child skipped meal*
17. *Child skipped meal, 3+ months*
18. *Child not eat for whole day*

Each question is designed to capture some aspect of food insecurity and, for some questions, the frequency with which that particular aspect of food insecurity manifests itself. The questions are listed in ascending order of food inadequacy. Examples of questions include 'I worried whether our food would run out before we got money to buy more' (the least severe question); 'Did you or the other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?'; 'Were you ever hungry but did not eat because you couldn't afford enough food'; and 'Did a child in the household ever not eat for a full day because you couldn't afford enough food?' (The most severe question). For many of the questions, the response can be of more than two types. Consider, for example, the following question 'How often did [the adults in this household not eat for a whole day]—almost every month, some

months but not every month, in only one or two months, or never?' There are four different responses to this question. However, for every question, irrespective of whether it admits two or more than two possible responses, the responses are converted into a binary format (0 or 1). A value of 0 indicates the aspect of food deprivation that the question seeks to capture is present in the household (i.e. an 'affirmative response') and 1 indicates the absence of that aspect of food insecurity (i.e. a 'negative response').

The Food Expenditure modules provide data on monthly household expenditure on basic food items that are found in the localities. Such information allowed us to determine whether a household meets minimum daily food consumption requirements or not.

3.4. Model Specification

To examine the relationship across the determinant of food security, the study used multivariate regressions to determine which socioeconomic characteristics are correlated with perceptions of subjective food adequacy. The study modeled the relation as a Probit, thus;

$$P(y = 1|x) = G(\beta_0 + \beta_1 X_1 + \cdots\cdots \beta_x X_k) = G(\beta_0 + X\,\beta) \quad \text{---------- (1)}$$

Where G is a function taking on values strictly between zero and one: $0<G(z)<1$, for all real numbers z. This ensures that the estimated response probabilities are strictly between zero and one. Therefore, food secured household is 1 and 0 for food insecure household.

Y ..... indicates food security status of households and

X..... is a vector of household characteristics such as marital status, education, religion, occupation, number of children, and income, and;

P…….. is the probability distribution function of the standard Normal distribution:

In the model, *G* is the standard normal cumulative distribution function (cdf), which is expressed as an integral:

$$G(z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_0+\beta_1} e^{-z^2/2}\, dz \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

This choice of *G* ensures that (equation 1) is strictly between zero and one for all values of the parameters. Therefore, a positive coefficient of a given explanatory variable can be interpreted as being associated with a higher probability of food adequacy. Thus,

Food security = f(ageh, hhsz, occu, relg, educ, geog, gend, asst, inco)………………………………….(3)

More formally, the full model would be expressed as

$$CAQ = \alpha + \beta_1 ageh + \beta_2 hhsz + \beta_3 occu + \beta_4 relg + \beta_5 educ + \beta_6 geog + \beta_7 gend + \beta_8 asst + \beta_9 inco + \varepsilon$$

……….(4)

Where:

CAQ = food consumption adequacy;

Ageh =refers to the age of the household head

hhsz = refers to the size of the household

occu = refers to occupation of the household head i.e. whether the household head is employed;

relg= refers to the religion of the head of the household;

educ = refers to educational qualification of the household head;

goeg = refers to a geographical location of the household

gend = refers to sex of the household head;

asst = refers to a household asset, including both agricultural and non agricultural assets

inco = refers to the income of the household

and α, β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8 *and* β_9 *are parameters to be estimated.*

CHAPTER FOUR
DATA ANALYSIS, INTERPRETATION AND DISCUSSION OF RESULTS

4.1. Introduction

This chapter deals with analysis of data collected, interpretation and discussion of results, in order to empirically analyze food security. The chapter is divided into four parts including this introduction. The second part is socio-economic analysis of the households, consisting both descriptive and inferential analysis, the third part deals with interpretation, and lastly discussion of results

4.2. Descriptive Analysis of Socio Economic Characteristics of the Household Heads (HH)

The simple descriptive analysis presented in table 1 below, suggests that, a small percentage of households stated that they are headed by females-10 percent, thus large proportion of households are headed by males 90 percent. And these percentages of females are widowed. Also, in all the three local governments the percentages of households living in rural areas is higher than urban areas, with 70 percent and 30 percent respectively and thus lack basic social amenities. In term of their economic activities, farming constitutes the largest workforce with 63 percent, while civil service and trading constitute 27 percent and 10 percent respectively. Also in the case of their ages, it was found that 62 percent are within the working limit, thus only 38 percent are 46 years and above. The decomposition also showed that over 70 percent of the household have large families. The finding of lower income in the households-47 percent, sit well with the finding of farming in rural areas, the middle income earners account for 34 percent, while only 19 percent are fairly high income earners. In terms other income generating assets, farmlands account for 35 percent, shops/housing 15 percent, animals 20 percent and others 20 percent.

Table 2: Socio-Economic Characteristics of the Households Heads (HH)

Variables	Frequencies	Percent	Cumulative Percent
Gender			
Male	358	90	90
Female	42	10	100
Occupation			
Civil servant	109	27	27
Farming	251	63	90
Trading/commerce	40	10	100
Level of Education			
Primary certificate	169	42	42
Senior school certificate	129	32	74
NCE/Diploma	68	17	91
Degree/HND	24	6	97
Msc/PhD	10	3	100
Religion			
Muslim	283	71	71
Christian	92	23	94
Others	25	6	100
Number of Children			-
1 – 7	117	29	29
8 and above	283	71	100
L .G.A.			
Akko	140	35	35
Balanga	120	30	65
Dukku	140	35	100
Location			
Rural	280	70	70
Urban	120	30	100
Age			
18 – 45 years	249	62	62
46 and above	151	38	100
Monthly income			
□20000 - □25000	186	47	47
□25001 - □30000	136	34	81
□30001 and above	78	19	100
Assets			
Farmland	140	35	35
Shops/houses	61	15	50
Animals	119	30	80
Others	80	20	100
Total	**400**		**100**

Source: Field work (August 2012)

The educational status of the respondent follows similar trend. For example, the head count is 42 percent, 32 percent, 17 percent, 6 percent and 3 percent for HH headed by someone with less than a high school education, high school education, college education, graduates and

postgraduate respectively; therefore low income capacity. The table also showed that 71 percent of the HH are Muslims, 23 percent are Christians, while others account for 6 percent.

4.3. Per Kilocalorie Food Security Analysis

The table below shows the food expenditure and intake converted into kilocalories and monetary units

Table 3: Food Expenditure/Intake breakdown

Variables	Freq.	Percent	*c.f.	Mean Food expend./intake
Eaten from own production				
0 - 100kg	186	47	47	200000kcal
101 – 150kg	145	36	83	502500kcal
151kg and above	69	17	100	702000kcal
Money spent if bought it				
□15000 - □20000	94	24	24	□17500
□20001 - □25000	233	58	82	□22500
□25001 and above	73	18	100	□27500
Quantities bought				
0 -5kg	94	23	23	10000kcal
6 – 100kg	255	64	87	212000kcal
101kg and above	5	13	100	502000kcal
Money spent				
□5000 - □10000	122	30	30	□7500
□10001- □15000	199	50	80	□12500
□15001 and above	79	20	100	□17500
Quantities received from other people				
0 – 5kg	174	44	44	12500kcal
6 -10kg	73	18	62	32000kcal
11kg and above	37	9	71	52000kcal
None	116	29	100	-
Total				

Source: Field work (August 2012);own calculations. *cumulative frequency. ***Notes:*** *all quantities were converted into grams and into kilocalories the minimum daily percapita dietary requirement is 2400kcal. The nutritional label for carbohydrates, proteins and vitamins is found to be 4kilocalories/gram (kcal/g).*

Therefore, Base on households' food expenditure and consumption in table 2 above, Food Security (FS) is assigned to each household, (for the sake of simplicity, we used the sample of small household, i.e. n = 7) this assignment is done as follows. In the case of **own production,** 47percent of the households acquire an average of 50kilograms of different foods in a month. This is equivalent to an average of 200000kcal per month. Thus the daily consumption for a household would be obtained as (200000÷30) = 6667kilocalories/household. Thus, the daily

percapita food consumption would be 6667÷7 = 952kcal. For the other 36 percent, the daily percapita food consumption is 2392kcal However, the remaining 17 percent has a daily percapita food consumption of 3342kcal. Similar results would be obtained in the case of **quantities bought**. Thus 23percent of the households have a daily percapita food consumption of 47kcal. Also, 64percent of the households have a daily percapita food consumption of 1010kcal. Then 13 percent of the households have a daily percapita food consumption of 2390kcal. Thus, 87 percent of the households supplement not more than 1010kcal from the market. For the **quantities received from other people**, 44percent of the households have a daily percapita calorie consumption of 60kcal, 8 percent have a daily percapita calorie consumption of 152kcal, 9 percent have a daily percapita calorie consumption of 248kcal and 29 percent do not receive any kind of food from other people or governments. Base on these results, we found that on average less than 50 percent of the households could afford to consume the minimum dietary requirement of 2400kcal. Hence more than50 percent of the households are food insecure in terms of percapita calorie consumption. However, if we relax the assumption of small household size, and carry out the analysis on a large family size the situation of food insecurity has a well established tendency of appreciating.

Extending the analysis to the monetary aspect, we could obtain the following results. 24 percent of the households have a daily percapita expenditure of □83; 58 percent have a daily percapita expenditure of □107; while 18 percent have a daily percapita expenditure of □131. On the other hand, the supplementary expenditure (monetary value of quantities bought) is as follows: 30 percent of the households have a daily percapita expenditure of □36; 50 percent have a daily percapita expenditure of □60; while 20 percent have a daily percapita expenditure of □83. Therefore, the mean percapita expenditure may be aggregated as in table 4 below:

Table 4: Overall Mean Aggregate Expenditure

Aggregate Percapita Expenditure	Percentages
□119	27
□167	54
□214	19
Total	**100**

Source: *own calculations*

The findings showed that at least 27 percent of the household live below one Dollar (1$), 54 Percent are fairy living on a dollar while only 19 percent live above one dollar.

4.4. Perception by Respondents' on Food Security;

Table 5 below contained information on the multiple questions reflecting varying degrees of food insufficiency that were asked, and at least to certain extent the level of food insecurity through individuals' perceptions of their food situation.

Table 5: Respondents' Perception of Food Security

The Core Food Security Modules	Frequencies	Percent	Cumulative Percent
Worried food would run out			
Often true	175	44	44
Sometimes true	170	42	86
Never true	38	10	96
Refused	17	4	100
Food bought did not last			
Often true	118	30	30
Sometimes true	179	45	75
Never true	77	19	94
Refused	26	6	100
Respondent not eat balanced meals			
Often true	170	42	42
Sometimes true	175	44	86
Never true	39	10	96
Refused	16	4	100
Child fed few, low-cost foods			
Often true	176	44	44
Sometimes true	152	38	82
Never true	48	12	94
Refused	24	6	100
Adult cut/skip meals			
Almost every month	163	41	41
Some months but not every month	177	44	85
Or in only 1 or 2 months	36	9	94
none	24	6	100

Child not fed balanced meals			
Almost every month	169	42	42
Some months but not every month	166	42	84
Or in only 1 or 2 months	43	10	94
None	22	6	100
Respondent eat less than should			
Often true	162	40	40
Sometimes true	203	51	91
Never true	24	6	97
Refused	11	3	100
Child not eating enough			
Often true	110	27	27
Sometimes true	196	49	76
Never true	71	17	93
Refused	23	7	100
Respondent lost weight			
Often true	111	28	28
Sometimes true	206	51	79
Never true	78	20	99
Refused	5	1	100
Child meal size cut			
Often true	122	31	31
Sometimes true	206	49	80
Never true	78	16	96
Refused	5	4	100
Adult not eat for whole day			
Almost every month	32	8	8
Some months but not every month	161	40	48
Or in only 1 or 2 months	151	38	86
None	56	14	100
Child hungry			
Often true	134	34	34
Sometimes true	200	50	84
Never true	41	10	94
Refused	25	6	100
Child skipped meal			
Almost every month	160	40	40
Some months but not every month	223	55.8	95.8
Or in only 1 or 2 months	16	4	99.8
None	1	0.2	100
Child not eat for whole day			
Often true	107	27	27
Sometimes true	192	48	75
Never true	78	20	95
Refused	23	5	100

Our interest in the Core Food Security Modules is to classify household either as food secure, food insecure without hunger, or food insecure with hunger. Thus in table 4, the results for **'Worried food would run out'** 44 percent of the household are food insecure with hunger, 42 percent are food insecure without hunger while 10 percent are food secure. Similarly, for **'Food bought did not last**`; 30 percent are food insecure with hunger, 45 percent are food insecure without hunger while 19 percent are food secure. A small percentage of households-10percent could be classified as food secure in the case of **'Respondent not eats balanced meals'.** Hence, 42 percent and 44 percent are food insecure with hunger and food insecure without hunger respectively. Also, for '**Child fed few, low-cost foods**', 44 percent of the household are food insecure with hunger, 38 percent are food insecure without hunger while 12 percent are food secure.

Similar results emerge for **'Child not fed balanced meals'** as 42 percent of the household are food insecure with hunger, 42 percent are food insecure without hunger and 10 percent are food secure. As for **'Adult cut/skip meals'** 41 percent of the household are food insecure with hunger, 44 percent are food insecure without hunger while 9 percent are food secure. Also for **'Respondent eats less than should'** only 6 percent of the households are food secure; 40 percent and 51 percent are food insecure with hunger and food insecure without hunger respectively. For **'Child not eating enough'** approximately 17 per cent of the households is found to be food secure; 49 percent are food insecure without hunger and 27 percent are food insecure with hunger. Extending the analysis to **'Respondent hungry but did not eat'** It was found to be only 13 percent of the households are food secure, and 42 percent and 44 percent of the households are food insecure without hunger and food insecure with hunger respectively.

For **'Respondent lost weight'** the statistics revealed that approximately, 20 percent of the households are food secured, 51 percent are food insecure without hunger and 28 percent are food insecure with hunger. For '**Child meal size cut'** it was also found that the percentages of households that are food secure, food insecure without hunger and food insecure with hunger are 16 percent, 49 percent and 31 percent respectively. The findings for '**Adult not eats for whole' day,** showed that 14 percent of the households are food secure. However, 78 percent of the households are food secure without hunger and only 8 percent are food insecure with hunger. Also in the case of '**Child hungry'** the figures showed that half of the households are food insecure without hunger, 34 percent are food insecure with hunger while only 10 percent are food secure.

The facts for '**Child skipped meal'** indicate that about 60 percent are food insecure without hunger, 40 percent are food insecure with hunger and less than 1 percent is food secure. However, for **'Child not eats for whole day'** the findings are 20 percent, 48 percent and 27 percent for food secure, food insecure without hunger and food insecure with hunger respectively.

Based on households' responses to these questions, subjective food adequacy/inadequacy indicators provide us insight to comment on the overall mean vulnerability and/or relative dimension of food insecurity. This is summarized in table 3 below;

Table 6: Overall Mean Food Insecurity

Dimension of food security	Percentages
Food secure	14
Food insecure without hunger	46
Food insecure with hunger	35
Non responses	5
Total	**100**

Source: own calculations; *Notes*: the percentages are expressed as mean of the corresponding values.

It may seem that the ideal procedure would be to measure the degree of food security/ insecurity of each individual question, aggregate them and then arrive at the overall mean social food insecurity level. Therefore, only 14 percent of the household are food secure. 46 percent of the households are food insecure without hunger and 35 percent may be classified as food insecure with hunger. Though, the major weakness of this method is that the food insecurity index constructed in this way is designed to portray household rather than individual food insecurity.

4.5 Probit analysis

The table 7 below shows the results of the estimate obtained for the Probit model presented in Equation 4;

Table 7: Probit of perception of food adequacy (Calorie Consumption)
Dependent variable (0 = less than food adequate; 1 = more than/just food adequate)

	Calorie Consumption		
	Coefficients	Robust z statistics	Probability values
Constant	**-0.284**	**-0.385**	**(0.6999)**
Gender of the HH	**0.293**	**1.874**	**(0.0609)**
Occupation of the HH	**0.027**	**0.207**	**(0.8362)**
Level of Education	**0.470**	**5.671**	**(0.0000)**
Religion	**-0.289**	**-1.507**	**(0.1319)**
Family size	**0.190**	**1.013**	**(0.3109)**
Location	**0.0145**	**-1.107**	**(0.2681)**
Age of the HH	**-0.641**	**-3-288**	**(0.0010)**
Assets	**0.297**	**-2.255**	**(0.0106)**
Monthly income	**0.607**	**-2.366**	**(0.0180)**

Observations :400
Log Likelihood: −150.70
McFadden-R^2: 0.45

Source: Extracted from Eviews; Note: *significant at 1%; **significant at 5%; ***significant

Once we add the full specification of the model, The McFadden R^2 of 0.45 shows that the independent variables explains a larger part (45 per cent) of the variation in food perception adequacy. An important part of the model is the role of the different types of variables in explaining perceptions of food adequacy. Thus gender of the household Head, occupation, education, size, location asset and income have a positive impact on food security and therefore are highly correlated to food adequacy. This suggests that the higher the level of education, asset and income the more food security a household is in Gombe state. Also, in addition, those in urban area have higher food security than those in the rural area and the fact that income parameter in higher suggest that poverty has a significant impact of household food insecurity. However, age and religion have a negative impact on food security.

Income of the Household Head is statistically significant at 5% and ownership of asset is statistically significant at 1%, gender of the Household Head is statistically significant at 10%, but Occupation of the Household Head, family size and location are not statistically significant. In conclusion, a number of wealth indicators are associated with perceptions of greater food adequacy. These include ownership of assets, gender of the Household Head, and higher wage /skilled occupations. Thus, differences in Religion, Age of Household Head, do not appear to influence Perceptions of food adequacy significantly. However, urban household have higher probability of food adequacy than rural households.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION & RECOMMENDATIONS

5.1 Summary

This study generally aimed at analyzing household food security in Gombe state. The study used household expenditure and consumption surveys containing both objective (quantitative) and subjective (qualitative) information on the same household potentially provides a valuable data for the analysis and determination of the level of food security.

The subjective (qualitative) method contains eighteen questions that provide detailed information about the experiences of household members as it pertains to a household's inability to meet basic food needs due to financial constraints. The objective (quantitative) method provides data on monthly household expenditure on basic food items that are found in the localities. The study also used multivariate regressions (Probit) models to determine which socioeconomic characteristics are associated with perceptions of subjective food adequacy. Thus a positive coefficient of a given explanatory variable can be interpreted as being associated with a higher probability of food adequacy.

For the subjective (qualitative) method, the finding revealed that on average, only 14 percent of the households are foods secure. Hence, 46 percent of the households are food insecure without hunger and 35 percent are food insecure with hunger. Similarly, for objective (quantitative) method, the outcome showed that on average, less than 50 percent of the households could afford to consume the minimum dietary requirement of 2400kcal. The findings also showed that at least 27 percent of the household live below one Dollar (1$), 54 percent are fairy living on a dollar while only 19 percent live above one dollar.

The estimated model indicates that the independent variables explain a larger part (45 per cent) of the variation in food adequacy perception. A number of factors such as assets, income, and occupation level of education, gender, family size indicators are correlated with perceptions of greater food adequacy. However, differences in Religion, Age of Household Head, do not appear to influence Perceptions of food adequacy significantly.

5.2 Recommendations for Policy;

Having found the presence of food insecurity, In the following, we recommend measures for managing threats related to the availability, access, and utilization of food, which constitute the core of food security;

Food Availability: Measures for stabilizing food availability should aim at ensuring the supply of nutritionally adequate food. This stability can be achieved through local production; domestic food stocks changes and concessional food imports (where necessary). Measures for improving domestic production include investments in irrigation, research into drought/pest resistant varieties and encouraging farm level transfer of new technologies. These also include the provision of effective agricultural extension services addressing longer-term food production policies, Promote rural development and farm/non-farm linkages, Empower women and other marginalized groups, Formal/Informal loans, Disease control and Immunization as well as rehabilitating agricultural activities aftershocks affecting production. A range of measures relate to the capacity of the market to respond to supply fluctuations are important. This includes efforts to improve the longer-term performance of input/output markets through infrastructural development aimed at increasing spatial market integration and the development of information systems to increase market transparency and allow a more efficient spread of supply shocks.

Food Access: Measures for managing access to food aim at ensuring that households are able to meet food consumption needs should be put in place. This requires measures that stabilize households' purchasing power/consumption ability through assets management and by stabilizing income flows and/or stabilizing food prices. This is in particular achieved through financial instruments, diversifying income and livelihood activities, increasing the returns to livelihood activities, asset sales, and safety net programmes. Formal and informal insurance, savings and consumption credit are financial instruments used for smoothening consumption. Income diversification can also be used for mitigating risks. Thus Safety net programmes, such as investment in education, special assistance to aged people (the most vulnerable group), public employment programmes, food subsidies and school feeding, transferring payments to households, be it cash, food or other commodities, can be used to maintain a minimum nutritionally adequate food consumption level and at the same time help to avoid households eroding their asset base.

Food Utilization: Risk management measures related to proper food utilization which evolve around protecting health status of individuals should be maintained. The measures are concerned with improving nutrition and healthcare practices, health service delivery, ensuring access to safe water and sanitation, but also with protection of food quality and safety. Promotions of good nutritional practices, including safe food handling and the awareness of balanced diets, together with simple information on how to avoid or treat basic diseases like diarrhea, typhoid etc, all assist in maintaining individual health.

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APPENDIX

Questionnaire

THIS QUESTIONNAIRE SEEKS TO GENERATE DATA FOR THE RESEARCH ON THE TOPIC: AN EMPIRICAL ANALYSIS OF HOUSEHOLD FOOD SECURITY IN OF GOMBE STATE, NIGERIA. ALL INFORMATION PROVIDED WILL BE TREATED CONFIDENTIAL. ANSWER THE QUESTIONS BY TICKING THE APPROPRIATE OPTION PLEASE.

A. BIO DATA

1. Gender: Male { } Female { }

2. Occupation: Civil Servant { } Farming { }Trading/Commerce { }

3. Level of Education: Primary Cert { } SSCE { } Diploma/NCE { }
   HND/BSc { } MSc/PhD { }

4. Religion : Islam { } Christianity { } Others { }

5. Number of Children: 1 – 7 { } 8 and above

6. L. G. A.: Dukku { } Akko: { } Balanga { }

7. Location: Rural { } Urban { }

8. Monthly Income: N20000 - N25000 { } N25001 - N30000 { }
   N30001 and above { }
9. Age: 18 – 45 { } 46 and above { }

10. Assets : Farmland { } Animals { } Shops { } Others { }

B. Food intake questions

11. In the last 12 months, did you or other adults in your household ever ***cut the size of your meals or skip meals*** because there wasn't enough money for food? How often did this happen;
(i) Almost every month { } (ii) Some months but not every month
(iii) Or in only 1 or 2 months? { }

12. In the last 12 months, did you or other adults in your household ever ***not eat for a whole day*** because there wasn't enough money for food? How often did this happen?
(i) Almost every month { } (ii) Some months but not every month { } (iii) Or in only 1 or 2 months { }

13. In the last 12 months, did any of the ***children ever skip a meal*** because there wasn't enough money for food? How often did this happen
(i) Almost every month { } (ii) Some months but not every month { } (iii)Or in only 1 or 2 months { }

14. In the last 12 months, did you ever ***eat less than you felt you should*** because there wasn't enough money to buy food?
(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

15. In the last 12 months, were you ever ***hungry but didn't eat*** because you couldn't afford enough food?
(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

16. Sometimes people lose weight because they don't have enough to eat. In the last 12 months, did you ***lose weight*** because there wasn't enough food?
(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

17. In the last 12 months, did you ever ***cut the size of any of the children's meals*** because there wasn't enough money for food?
(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

18. In the last 12 months, were the ***children ever hungry*** but you just couldn't afford more food?

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

19. In the last 12 months, did any of the ***children ever not eat for a whole day*** because there wasn't enough money for food?

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv)Don't know/ refused { }

20. "I ***worried whether our food would run out*** before we got money to buy more." Was that

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

21. "The ***food that we bought just didn't last***, and we didn't have money to get more." Was that

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

22. "We ***couldn't afford to eat balanced meals."*** **In the last 12 months,**Was that;

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

23. "We ***couldn't feed the children a balanced meal*** because we couldn't afford that." Was that

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv)Don't know/ refused { }

24. "The ***children were not eating enough*** because we just couldn't afford enough food." Was that

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }
(iv) Don't know/ refused { }

25. "***We relied on only a few kinds of low-cost food to feed the children***because we were running out of money to buy food."

Was that

(i) Often true { } (ii) Sometimes true { } (iii) Never true { }

(iv) Don't know/ refused { }

SECTION C. food expenditure questions

I am going to ask you some questions about the food brought into your home in the last month for your family to eat. I want to know about all the foods that you bought with money, ate from your farm or garden, or got from other people, such as friends, someone a family member worked for, or the government.

26. Since last day of the month, did you or others in your household acquire: Rice, Maize, Millet, Yam, Bread, Flour, Oil, Meat or Others

Yes { } No { }

27. How much did you buy?

(i) 0- 100kg { } (ii) 101 – 150kg { }(iii) 151 – and above { }

28. How much money did you spend?

(i)N15000 – N20000 (ii) N20001 - N25000 (iii) N25001 and above.

29. How much did you did you eat from own production?

(i) 0- 5kg (ii) 6 – 100 kg (iii) 101 – and above

30. How much money would you spend if you bought it?

(i)N5000 – N10000 (ii) N10001 – N15000 (iii) N15001 – and above

31. How much did you receive from other people?

(i)0- 5kg (ii) 6 – 10 kg (iii) 11kg – and above

Dependent Variable: Food adequacy
Method: ML - Binary Probit (Quadratic hill climbing)
Date: 10/31/12 Time: 11:35

Sample: 1 400
Included observations: 400
Convergence achieved after 5 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Constant	-0.284346	0.737591	-0.385507	0.6999
Gender	0.293183	0.323931	1.874424	0.0609
Occupation	0.026697	0.129097	0.206798	0.8362
Education	0.470220	0.082920	5.670767	0.0000
Religion	-0.288723	0.191630	-1.506669	0.1319
Size	0.190320	0.187817	1.013325	0.3109
Location	0.014728	0.221006	-1.107340	0.2681
Age	-0.640768	0.194906	-3.287580	0.0010
Assets	0.297791	0.116555	-2.554935	0.0106
Income	0.607170	0.123903	-2.366122	0.0180

Mean dependent var	0.165000	S.D. dependent var	0.371645
S.E. of regression	0.344706	Akaike info criterion	0.803542
Sum squared resid	46.34064	Schwarz criterion	0.903328
Log likelihood	-150.7084	Hannan-Quinn criteria.	0.843059
Restr. log likelihood	-179.1475	Avg. log likelihood	-0.376771
LR statistic (9 df)	56.87832	McFadden R-squared	0.458747
Probability(LR stat)	5.33E-09		

Obs with Dep=0	334	Total obs	400
Obs with Dep=1	66		