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An Empirical Investigation of Food Security Status in Urban Households in Niger-Delta, Nigeria

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Abstract:
The Niger Delta has been faced with the problem of food insecurity which affected the living standard of the people in the region. This study therefore examined the status of food security in urban households in the Niger Delta region. In order to achieve this aim, a survey research was conducted involving the use of questionnaires. A multistage sampling technique wasused to determine the sample size of 240 respondents from 12 communities in 6 local governmentareas spread across Edo and Delta states. Binary Logistic regression model and Household Food Insecurity Access Scale (HFIAS) were used to analyze the data obtained from the questionnaires. The findings reveal that 49.51% of the sampled households are food secure while 50.49% of the households are food insecure. In addition, Household size, Educational Status of the householdhead and Household Income were identified to be the determinant of household food security status in the sampled region. The study therefore recommends that government promotes agricultural education and provide support especially to low income households in the study area,which will in turn encourage households to participate in food gardening/farming activities as a source of generating extra income given that household income was identified to be the most significant determinant of urban food security.

Keywords: Food insecurity, food security, urban household, Niger-Delta

1. Introduction

1.1. Background to the Study

Food is one of the most basic needs for human survival so it is imperative to note that access to it is a basic human right. Food security is a concept that has developed considerably over the years.

It is a complex issue that bedeviled the present world economy (Mohapatra et al., 2010). However, the Food and Agricultural Organization (FAO, 2014) reported that about 805 million people throughout the world and particularly in developing countries within the period of 2012 to 2014 did not have enough food to meet their basic nutritional needs with the highest prevalence of undernourishment been in the Sub-Saharan African (SSA) region where around one in four people in the region proves famished (FAO, 2014). In 2015, it was reported from FAO estimates that about 795 million people of the over 7.3 billion inhabitants in the world or one in every nine, suffered from chronic undernourishment in 2014-2016. The situation is severe in SSA with the percentage prevalence of undernourishment projected to be 23.2 % and the undernourished population been 220 million people (FAO, 2015). The Rome Declaration on World Food Security (World Food Summit-WFS 1996) stated that the art of attaining food security is a complex task to be accomplished by individual governments as the issue of hunger constitutes a threat both to national and international environment. Hence, the issue of food security has continued to attract as well as receive a lot of attention in past decades at the global, regional as well as national levels by major stakeholders. The 1996 World Food Summit brought in the issue of hunger and food insecurity as both the cause and effect of poverty and slow economic growth. In the light of this discovery, reducing hunger and food insecurity also became one of the Millennium Development Goals-MDGs.

The millennium declaration of 2000 which was endorsed by key world leaders (that is the 191 member states) formalized the Millennium Development Goals (MDGs) which spanned from the period of 2001 to 2015 with the specific aim of ameliorating poverty in 2015. One of the MDGs specifically the first goal (MDG 1) was to eradicate extreme poverty and hunger; this goal had a third aim which was to drastically bring down the proportion of people who suffer from hunger from the period of 1990 to 2015 by 50 percent. This goal as well as the other goals was not successful in most nations particularly in the SSA as they were not able to congregate most of the targets set by the MDGs (Mohapatra *et al., 2010)*. As a result of the a foregoing, world leaders came together to enforce a new set of goals called Sustainable Development Goals which comprises 17 goals and 169 targets with a 15 year lifespan (2016-2030) whilst building on the progress made by the MDGs (UN, 2015). The second goal of the SDGs is explicitly stated thus: 'End hunger, achieve food

security and improved food nutrition and also promote sustainable agriculture which emphasizes the importance of attaining worldwide food security' (UN, 2015)

Nigeria was not able to meet target 1c of the MDGs (Evbuomwan, 2016) as majority of the Nigeria populace are food insecure despite the fact that around 80% of the country's total landmass (72m ha) is agricultural land but over 60% that is 42m ha is currently cultivated (PwC, 2015). The increase in populations at a rate considerably higher than the rate of increase in food production has continued to widen the gap between domestic food supply and domestic demand (Helleiner, 1996). Similarly, food insecurity in Nigeria has impelled various regimes of government to include the realization of food security as one. The presence of food insecurity in Nigeria has prompted several regimes of government to include the achievement of food security as one of their objectives at the end of each tenure or regime as the case may be; from the Operation Feed the Nation (OFN 1976) campaign of the Obasanjo led military administration to the current Economic Recovery and Growth Plan (ERGP) which is still ongoing. Nigeria as a country may not be classified as food insecure, but overtime more attention has being focused on household food security as it has discovered that about 67.1% of Nigerian household live below the poverty line (which is a dollar per day) in a report by the National Bureau of Statistics-NBS (2016).

Niger Delta Region which is the oil producing region of the country has in the last decade had to face challenges which are of increasing national and international concerns. However, this region makes available huge oil wealth and serves as the engine base of the Nigeria's economy as a whole, but it also portrays a paradox as the vast revenues barely touch Niger Delta own pervasive poverty, hence giving birth to formidable challenges to sustainable human development in the region (United Nations Development Program- UNDP, 2006).

In the Niger Delta Region of Nigeria, environmental degradation which has manifested in the form of oil spillages, water and air pollution coupled with the security unrest in the region has led to a decline in food production hence resulting in the prevalence of malnutrition as well as under nutrition as there is food scarcity and an abnormal increase in the price of basic food items.

According to official statistics by the Human Right Watch Report (1999), an average of three hundred major oil spillages take place in the Niger Delta every year, spilling approximately 2,300 cubic meters of crude oil into the environment, and causing the destruction of farmlands, economic trees and other economic resources. Delta Petroleum Exploration has exposed the region to oil spillage (which affects fauna and flora of the ecosystem), flooding, the depletion of aquatic lives, and degradation of farmlands, which has led to hunger, starvation and unemployment. However, according to Egbe, 2012), it has equally led most household's inability to afford food to meet their basic nutritional need which is known as food insecurity.

1.2. Statement of the Research Problem

About 854 million people in the world are affected by food insecurity from which the Food and Agriculture Organization of the United Nations (FAO) assessments in the years 2001, 2002 and 2003 with 820 million is in developing countries, 25 million in countries in transition and over 9 million in the advanced countries of the world (FAO, 2006). Food is a part of the foremost need of man. Its importance is evident in the fact that it is a basic means of sustenance and adequate food intake is a key for healthy and productive life (Omonona & Agoi, 2007). Food security is therefore an important source of concern in any country, with more focus on developing countries because it is considered to be an essential element of overall well-being (Kennedy, 2002) and a key issue in development. Furthermore, food security affects more than human health and welfare as it also contributes to the economic and political stability as it is often noticed that most countries of the world where there is political instability are always associated with food insecure territories (Wasiu, Burhan & Eda, 2015).

Nigeria, enriched by oil revenues, is Africa's biggest economy and is also the most populous country in the African continent (PwC, 2015). It has become a prominent emerging market in recent years. In the 1960s, the Nigerian economy was mainly driven by the agricultural sector as Nigeria was a major exporter of several cash crops which shows that the agricultural sector was capable of producing enough to feed the populace and still export to other countries at the time (Gbaiye *et al*, 2013). Maintaining food security at both national and household levels is still a huge challenge for many developing countries. Food insecurity has been increasing recently in SSA countries thereby making the issue a source of growing concern to the respective governments and citizens (FAO, 2003). Again, SSA is the most vulnerable region to food insecurity and Nigeria is one of the food deficit countries in SSA (FAO, 2015).

Although the agricultural sector in Nigeria employs about 70% of the working population, and Nigeria's diverse climate, which ranges from the tropical areas of the coast (enabling the growth of tubers and it's like) to the arid zone of the north (enabling the growth of grains, cereals and the likes), Nigeria is a major importer of food spending over 13 trillion Naira annually on the importation of basic food items including; wheat, rice, sugar and fish (Aku, 2012). As established by the National Population Commission (2012), the population growth rate in Nigeria is greater than the food production rate. Thus, this implies that there is food insecurity as the low rate of food production and the high rate of population growth will most likely generate high rate of food demand, thereby causing food Demand-Supply shortage.

The Nigerian food security problem has been reported to have increased with urbanization (Omonona, et al., 2007). Therefore, the growth of the metropolis has triggered important transformation towards increasing food production to sustain the metropolitan setting because rapid population growth in the metropolis is a major factor influencing food production, food demands and nutritional status of individuals constituting the household. Progressive increase in population from 103.3 million in 1996 to 140.6 million in 2007 without corresponding increases in food output seem to have worsened the food security situation in Nigeria.

The Niger Delta region is richly endowed with natural resources with oil and gas accounting for over 85% of the National Gross Domestic Product (GDP), over 95% of the National budget and over 80% of the entire nation's wealth (Dokubo, 2004). Ironically, the Niger Delta as a region remains the poorest as a result of the land degradation and ecological unfriendly exploitation of oil and even government policies sized the indigenous people of Niger Delta of their rights to these natural resources. However, no doubt, that since the advent of the oil discovery decades ago, it is clear that the region serves as the main source of income to the Nigeria economy, accounting for over 90% of the nation's export earning since 1975 (Ekanem & Nwachukwu , 2015). Additionally, militancy, armed insurgency, couple with oil spillage and environmental degradation has led to instability and the huge influx of numerous people out of the rural communities of the Niger Delta, and into the urban centers of the region. This massive migration has caused the conversion of agricultural lands into other purposes, leading to fears of household food insecurity, especially among the indigenous citizens (Ordinioha & Brisibe, 2013) Although there are existing research works on food security that attempt to analyze the food security position in the Niger Delta axis, however, there is a lack of information on the food security analysis of urban households in the region. Therefore, it is against this background that this study is out to fill the gap acknowledged in the literature.

1.3. Research Questions

The following research questions are identified in the study:
- What is the nature and magnitude of food insecurity in urban households in the Niger Delta Region?
- What are the determinants of food insecurity among urban households in the Niger Delta Region?
- What is the relationship between food security status and income in the Region?

1.4. Objective of the Study

The broader Objective is to critically analyze the food security situation of urban household in the Niger Delta Region of Nigeria, while the specific objectives are to:
- Underscore the nature and magnitude of food insecurity amongst the urban households in the Region.
- Examine the determinants of food insecurity in the urban households of the Region.
- To find out the correlation between food security status and income of urban household in the Niger Delta Region

1.5. Research Hypotheses

In order to achieve the specific objectives stated above, the following hypotheses will be tested in this study:
- H0: there is no significant relationship between the socio-economic as well as the demographic characteristics of the respondents and the food security level of urban household in the Niger Delta Region
- H1: There is no significant relationship between income and food security of urban household in the Niger Delta Region.

1.6. Scope of the Study

This study is a cross-sectional study that focused on urban households in the Niger Delta Region over a period of 30 days using selected Local Government Areas as a sample.

1.7. Significance of the Study

Due to the increasing importance being placed on food security on the global scene, this research is a timely one because the world is dealing with issues of rising food prices, global environmental pollution, a crumbling global economy and a general increase in human insecurity. Also, food security has viewed to be a panacea for ending poverty, hunger, reducing diseases, improving education, ensuring equity, restoring the environment and global collaboration in line with the SDGs particularly the second goal. The determination of food security situation of the household makes available a significant means for planning, evaluation and monitoring food security challenges of a particular population which help in comparing the local food security situation to state and national patterns, assess the local need for food assistance or trail the effect of changing policies or economic conditions and to assess the effectiveness of existing programs (Bickel *et al.* 2000). Furthermore, academics and students particularly those in the field of development economics, agricultural economics and health economics will also benefit from this work 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 malnutrition, poverty and inequality. In summary, this work will contribute to the existing body of knowledge and will spur researches in this field.

1.8. The Study Outline

This study is divided into five chapters. Chapter one is the introductory part which gives a general background to the subject matter. This chapter states the motivation for the study and also states the aim of the work. Chapter two gives a review of previous studies that has been carried out in the past whilst identifying the method of analysis used in those studies and   their relevant theories were discussed in this chapter. Chapter three describes the method employed and the theoretical framework that will be employed in the study. Chapter four deals with the analysis of data gathered as well as the presentation and interpretation of results obtained. Chapter five gives the summary of the work as well as the conclusion, policy recommendations and areas for further study if there is any.

2. Literature Review

2.1. Review of Conceptual Issues

Early notions of 'food security' were intimately connected to the nation-state and to broader notions of national security, as states have long sought to ensure access to food for their populations. These early ideas about food security focused primarily on ensuring sufficient national production and supply of food in order to be prepared for invasion, war, and emergencies,as well as to ensure domestic social and political stability. Due to this reason, support for agriculture and food provisioning have historically been a key component of nation building (Friedmann & McMichael, 1989).

However, the term 'Food Security' was first highlighted formally during the World Food Conference of 1974 where discussions of food security were influenced by events of the early 1970s (Eicher & Staatz, 1985). However, the concept has evolved over the last half century as a lot of definitions have been made to understand the concept of food security.

Food security was first defined in the World Food Conference of 1974 as 'availability at all times of adequate food supplies of necessary foodstuff that would keep up a steady increase of the world food consumption in the world and to offset fluctuations in production and prices' (UN, 1975). It was crop out (definition) of the fact that as at that time, the focus was on the availability and accessibility (in the form of price stability) of food to the people globally. Over the years, after the World Food Conference of 1974, the term food security has gone end to end with different stages of definition and redefinition with the proof of vulnerability and risk in food and nutrition access.In the 1970s, food security was equated to adequate food production (WFS, 1996). Similarly, in the eighties, the food security was measured to refer to the security of food access and availability (FAO,1983). However, in the 1990s the significant of nutrition was fully considered and hence the idea of food security was combined with that of nutrition security (WFS, 1996). And in the 21st Century, the concepts of food and nutrition security were integrated with vulnerability, risk coping and risk management considerations (International Food Policy Research Institute - IFPRI, 2004).

It is important to know that food security can be refined to consider both its long-term and short-term aspects. Long-term food insecurity otherwise known as 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 which is also known as transitory food insecurity is defined as a temporary decline in a household's or region's or nation's access to food (Cathie & Dick, 1987).

2.1.1. Food Security at Global and National Levels

The history of food security is traceable to the time where and when the concern for the availabilityand accessibility of food at the global level became eminent. The term global food security comprises of various concepts such as ecological, social, economicand political aspects that help to recognize the choices and problems that determine whether peoplehave enough resources to consume the food they need and desire (McDonald, 2010). Global food security entails that globally sufficient food is produced to make it possible for national and sub-nationals to have access to sufficient food worldwide (Smith, Pointing & Maxwell, 1992). It focuses on issues which affect the supply and distribution of food both domestically and internationally (Ecker & Breisinger, 2012). According to Africa Leadership Forum ALF, (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. According to Staatz (1990), food security is the ability of a country or a region to assure, that its food system will provide on a long term basis to the total population access to a timely, reliable and nutritional supply of adequate food.

National 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). Similarly, it could mean that a country is able to produce and distribute adequate food that is needed by its citizens (Smith et al., 1992). National food security can be estimated by using the equal balance between food demand and food supply at an acceptable price. The unequal distribution of food demand and supply does not necessarily imply that all households within a country are food insecure; it simply means that a household is food insecure because they have limited entitlement to food due to inadequate resources (Thomson & Metz, 1999). Maxwell (1996) posits that food security has evolved in three stages - beginning as the global andnational concept and moving to an individual and household perspective and also from the production context to a livelihoods stand point and from indicators that were objective in nature to onesthat were more subjective.

2.1.2. The Concept of Household Food Security

This study investigated the household as a unit of analysis. In the 1970s, 'food security' was mostly concerned with national and global food supplies whereas in the 1980s, the focus shifted to questions of access to food at household and individual level (Maxwell & Smith, 1992). A food secure household should be defined as one which has enough food available to ensure a minimum necessary intake by all household members (Alamgir & Arora, 1991). According to Kennedy & Coggill (1988), Household food security can be thought of as the ability to produce directly by household members and/or through the availability of sufficient income to purchase food. National food Security is however a necessary but not a sufficient condition for household foodsecurity (World Bank, 1990).

2.1.3. Dimensions of Food Security

The World Food Security definition of food security given in 1996 points out the fact that there are four important dimension of food security namely: Availability, Access, Utilization and Stability. These four dimensions even though they overlap explain the phenomenon of food security at all levels.

Food availability implies that sufficient quantity of food should be available, and every individual must have access to food (FAO, 2006). Supply of food is to be distributed through domestic and international production. Kannan (2000) argued that food supply is very essential and that the government of any particular country should not depend entirely on food supply in the international markets. Goodall (2009) maintains that the availability of food is interpreted differently across countries; it could simply mean the availability of food to survive or to sustain a healthy life by having enough supplements. Food availability does not guarantee food access; this is because several factors such as institutional structures, government policies, business and the market have an influence on food security at a household level, which in turn is accomplished through empirical analysis (Page & Redclif, 2002). However, on the household level, food could be made available from own production or bought from the local markets. Food access suggests that every individual should have sufficient access to sufficient resources in order to have appropriate food to live a healthy life. Food accessibility by households can be obtained through consumption, production and receiving gifts from other households (FANTA, 2006). The extent to which each member of a household has access to sufficient food depends on several factors such as gender, age and the employment status (Benson, 2004). Access to food is closely associated with poverty because poor people usually do not have sufficient resources to attain access to the right amount of quantities (Labo, 2001). Households that are food insecure lack the necessary resources to pay the price for imports and access sufficient supply of food (Boussard, Francoise & Voituriez, 2006).

Food utilization is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Food utilization implies that the amount of nutritional food intake by an individual should be safe, of the right quality and be sufficient for a diet that provides adequate energy and vital nutrients (WFP, 2007). A person's body must be able to extract and use the nutrients from consuming food; this is according to the meaning of an 'active and health life' in the definition of food security.

Food Stability emphasizes that every individual should have access to sufficient food at all times. Unexpected economic shocks should not be a risk factor to food access when needed (IICA, 2009). Stability also relates to the loss in resources due to income shocks and insufficient reserves. The loss in resources may either be temporal (vulnerability) or permanent (Resilience).

2.1.4. Conceptual Framework of Food Security at the Household Level

As discussed in the previous section above, there are four important components of food security. However, it is essential to note that availability, access and utilization components refers to the food security status and these three components are strongly interlinked whereas the last component stability of the food security status comprises of vulnerability and resilience.
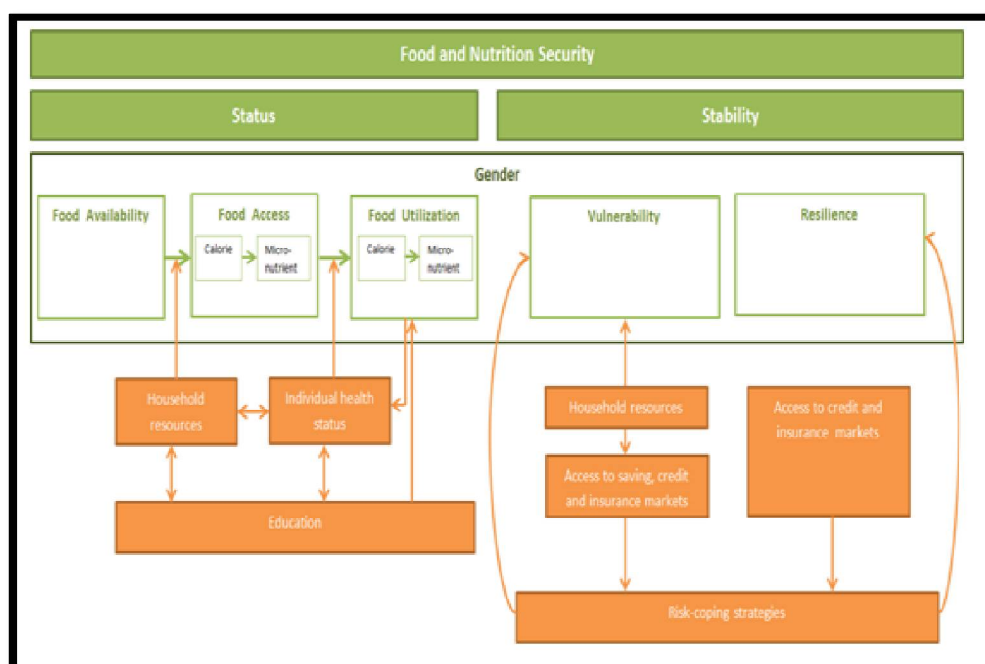

Figure 1: Conceptual Framework of Food Security at the Household Level
Source: Food Secure Working Paper No. 13, September 2013

Figure 1. Above clearly shows that there are strong linkages between the first three dimensions. That is to say the realization of food availability is a necessary but not sufficient condition for the realization of food access. Also, the realization of food access is a necessary but not sufficient condition for the realization of food utilization.

Food availability at the household level can be described as the extent to which food is within reach of households from local and non-local sources, both in terms of sufficient quantity and quality (FAO 2006). Food availability at this level is strongly related to the overall availability offood because it is determined by domestic food production, commercial food imports and food aid(FAO 2006). In sum, the food availability dimension reflects the supply side (Barrett and Lentz 2009) and will therefore be affected by all the drivers and determinants that have an impact on thedomestic supply of food and the ability to finance food imports.

Household-level food access is considered to be achieved when a household has the opportunity to obtain food of sufficient quantity and quality to ensure a safe and nutritious diet (FAO 2006). Important drivers of food access are household resources, food prices, food preferences and socio- demographic factors. Furthermore, Access to income-generating activities is a major determinantof the ability of households to purchase food i.e. food access. The quantity and quality of food thata household can acquire given its resources will depend on domestic food prices, which are generally determined by food availability and aggregate food demand.

Food utilization refers to an individual's dietary intake and his/her ability to absorb nutrients contained in the food that is eaten. Hence, food utilization relates not only to the quantity of foodthat is eaten, but also to the quality of the diet. For this reason, both calories and micronutrients appear in the utilization box of Figure 1. This is because the food consumed by an individual must be of sufficient quantity and quality to satisfy not merely subsistence needs, but also energyneeds for daily activities, notably income generation (United Nations World Food Program 2007).

Food security status stability examines what happens to livelihoods when households are hit by temporary negative shocks (Vulnerability). Vulnerability at the level of food security can be described as the risk that the food security status of the household is undermined by negative shocks. Households generally face multiple negative shocks over time, and each shock may affectthe general welfare and food status of the household. In the context of food security, resilience can be defined as the time needed to achieve or surpass the pre-shock status of well-being. It is important to stress the difference between resilience and vulnerability. However, vulnerability is the chance of a household becoming food and nutrition insecurity after, say, a food price shock. Resilience is the time needed for the household to get back to its food and nutrition status as it was before the shock.

2.1.5. Current Situation of Food Insecurity in Nigeria

Historically, there has been a reported prevalence of food insecurity in Nigeria although there is little or no data to back up this claim (there has been little empirical evidence to quantify the situation). Years ago, most SSA countries, with the inclusion of Nigeria produced most if not all of their domestic food needs. However, this trend changed significantly in the 1980s as food shortage became a recognized problem. In Nigeria the genesis of food crisis has mostly been associated with the collapse of agricultural sector in the mid-1970s. Food crisis set in at the end of the oil boom when the oil price crashed and the petro dollar ran out. (Nwalie, 2017). Kamoru & Babatunde (2007) assessed food security situation in Nigeria by tracing the trends in food supplies since independence and concluded that the problem of food shortages started during the civil war (1967 - 1970) when agricultural inputs and machinery as well as other items were deliberately curtailed to conserve foreign exchange. Agriculture in Nigeria provides the means of livelihood for over 70 percent of the population as it is a major source of raw materials for agro-allied industries and a potent source of the much needed foreign exchange (World Bank, 1998; Okumadewa, 1997).

Although the average agricultural growth rate was 7 percent between 2006 and 2008, this growthlies below the 10% necessary for attaining food security and poverty reduction drastically (Nwajiuba, 2011).Furthermore, despite government programmes and projects towards food self-sufficiency, food production and supply has not been proportionate with demand in Nigeria (Mohammed &Onwurah, 2016).

The Nigerian food security problem has been reported to have increased with urbanization (Omonona, *et al.*, 2007). A progressive boost in population from 103.3 million in 1996 to 140.6 million in 2007 without corresponding increases in food output seem to have worsened the food security situation in Nigeria (Arene & Anyaeji, 2010). There have been several attempts made by the Federal government to create programmes to achieve food security in Nigeria; many of which are developed with the aid and inputs of International Organisations. Some of the programmes that have been implemented include: Agricultural and Co-operative Bank (1973); National Accelerated Food Production Program (1973); Agricultural Development projects (1975); River Basin and Rural Development Authorities (1976); Operation Feed the Nation (1976); Agricultural Credit and Guarantee Scheme Fund (1977); Land Use Decree (1978); the Green Revolution Program (1979/80); and the CassavaMultiplication Program (1985-1999). Several institutions were also set up in order to facilitate these programmes including the Agricultural Credit Guarantee Scheme (ACGS); Rural Banking Scheme (RBS); Nigeria Agricultural Insurance Company (1984); Directorate for Food, Roads and Rural Infrastructure (DFRRI) (1986);Nigerian Agricultural Development Bank (NADB); and the National Agricultural Land Development Authority (NALDA) (1991) (Adewuyi 2002; Okafor, 2004) with the most recent programmes being the Agricultural Transformation Agenda (ATA) ofthe Goodluck Jonathan administration which was launched in the year 2011 and the Agriculture Promotion Policy (APP) 2016-2020- also known as the Green Alternative by the present administration to build on the ATA successes. The Launching in 2011 of the Agriculture Transformation Agenda (ATA), the National Bureau of Statistics has been recording increase in agricultural output and a strong growth rate in the agricultural sector GDP (Nwalie, 2017).

The Central Bank of Nigeria quarterly report (2010) reported that the rate of increase in food production of 2.5 percent per annum does not keep pace with the annual population growth rate of 2.8 percent per annum. Fakiyesi (2001) further posited that Nigeria's domestic food supply has been far short of the need of the population.Over the period 2007–2010 (notably 2008 and 2009), prices were reportedly more volatile than they had been for decades.

According to Agoi et al (2010), the Nigerian food security problem is viewed by a school of thought as the product of Structural Adjustment Programme (SAP) which was implemented in the year 1986, which simultaneously made food exports attractive, while it phenomenally raised the cost of producing food whereas, another school of thought believes that food security problems are the outcome of overdependence on small scale farmers instead of the mechanized huge scale farmers of American counterparts. Many of these initiatives were not successful because they were ad-hoc programmes that lacked focus. They were poorly conceived and implemented and were duplicates of already existing programmes and organisations (Fasoranti 2006). However, the current administration of President Buhari has incorporated the Green Alternative into the Economic Recovery and Growth Plan which is expected to span from 2017 to 2020.

According to the 2010 Millennium Development Goal report, the proportion of the Nigerian population living below the hunger threshold increased from 29% to 33% between 2000 and 2009, and this implied little prospect of achieving the 2015 target of 14.5% of Nigerians living below the hunger threshold and Nigeria as a country was not able to meet the MDGs as well as its targets.

It is important to note that for the past six years domestic food production figures have been up with no reduction in hunger and food insecurity. This is an indication that food insecurity is not to be measured or remedied by food production figures alone (Nwalie, 2017).

2.2. Theoretical Literature Review

Several theories have being used to explain the phenomenon of food security in developing countries such as Nigeria. However, in this study, the theories under consideration will be discussed below.

2.2.1. Malthusian Theory

Thomas Robert Malthus wrote his essay on 'Principle of Population' in 1798 and modified some of his conclusions in the next edition in 1803. The theory propounded by Malthus can be summed up in the following propositions:

- Food is necessary to the life of man and therefore, it exercises a strong check on population. In other words, population is necessarily limited by the means of subsistence (i.e., food). Population increases faster than food production.
- Population increases in geometric progression, food production increases in arithmetic progression and as result the growth of population will out-run the increase in food production.
- Population always increases when the means of subsistence increase, unless prevented by some powerful checks. That is to say, as food supply in a country increases, the people will produce more children and would have larger families.
- There are two types of checks which can keep population on a level with the means of subsistence. They are the preventive and positive checks. Preventive checks are those checks which are applied by man to influence the population growth rate by bringing birth rate down. Positive checks however, are applied by nature and exercise their influence on the growth of population by increasing the death rate.

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.

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:

$$X(i+1) = (1+r) X \quad \text{.....................................(i)}$$

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. A difference equation model can help to ascertain the population at the beginning of a time period, the model can be used to determine population sizes at any point in the future by applying the equation repeatedly until the desired point in time is reached.

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 labor 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.

While the Malthusian theory has not 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. Food production in Africa today is far less than the known potential for the region and as a result population growth outstrips food production potential therefore leading to tragic problems and making most part of Africa take the form of a classic Malthusian trap.

2.2.2. Boserup's Theory of Agricultural Development

Ester Boserup (1910–1999) was a Danish economist who specialized in the economics and development of agriculture. She worked for the United Nations and her experience working in low- and middle-income countries such as India helped to shape her theory of the relationship between human population growth and food production.

Boserup argued in her theory that the threat of starvation and the challenge of feeding more mouths motivates people to improve their farming methods and invent new technologies in order to produce more food. This argument

challenged Malthus's conclusion that the size of the human population is limited by the amount of food it can produce further stating that whenever there is apopulation pressure, population does not go decrease rather it will lead to various technical and other changes which result in agricultural growth and increase in food supply.

Boserup argued that population growth stimulates agricultural development via innovation and productivity improvements. By introducing the frequency of cropping as a measure of agricultural intensity, Boserup was able to distinguish five types of land use: forest-fallow, bush-fallow, short-fallow, annual cropping and multi-cropping.

According to Boserup, the gradual transition from extensive (i.e., forest-fallow) to intensive (i.e.,multi-cropping) land use is roughly characteristic of the sequence of agricultural development through history. As such, this transition is characterised by decreasing fallow periods and increasing levels of agricultural intensity. As fallow periods shorten, new technologies andmethods to improve the productivity of the land must be developed to maintain the land's fertility.At the same time, the introduction of new methods requires additional human labour, and a household must work harder to maintain yields that are comparable to those of the past.

Ultimately, Boserup argued that intensification takes place when population pressure is sufficiently large precisely because the new technologies require an additional investment of labour such that a population increase is necessary. Boserup also identified many secondary effectsof intensification, which may ultimately lead to an overall growth in agriculture.

2.2.3. Engel's Law
Engel's law states that the percentage of income allocated for food purchases decreases ad incomeincreases. He stated further that as the income of a household increases, the percentage of income expended on food reduces as the percentages spent on other goods such as luxury goods increases. The income elasticity as holds for necessities such as food is ≤ 1. The following two versionsof the Engel's law exist:
- The more restrictive edition states that as income goes up, the percentage of total income spent on food tends to decline, and vice versa. I.e. the income elasticity of demand for food is less than unity.
- ii. A less restrictive version states that the income elasticity of demand for necessities tend to below (≤ 1) while those of luxuries tend to be high (>1).

2.3. Empirical Literature Review
Arene and Anyaeji (2009) in their study attempts to investigate the determinants of food security among household in Nsukka metropolis of Nigeria. Data was collected through the use of well- structured questionnaire and was analyzed using food security estimation, logistic regression analysis (Maximum Likelihood Estimation) and descriptive analysis. their findings was that 60%of households were food insecure with the incidence of food insecurity of 0.40 and the main determinants of food security among household in the study area was discovered to be age of thehousehold head and income of household heads. The study further recommended that complementarities such as steady electric power and water supplies, good transportation, information and communication technology network, and housing units that will enhance the business ventures of the metropolitan poor be made available by the government.

Ahmed, Eugene and Abah (2015) in their study analyzed the food security among households in Borno state, Nigeria. Data was collected through multistage sampling technique from 120 farminghouseholds and was analysed using the Cost-of-Calories (C-O-C) method, Logit method, Household Dietary Diversity Score (HDDS) and the 24-hours recall Method. The analysis show that sex, age, level of education, farming experience as well as credit, income, size of the household size and farm size are the determinants of food security in the study area. They further recommended that households be encouraged to intensify combination of enterprises and off-farmactivities that could generate more income for the household and help improve their asset base.

Omonona and Agoi (2007) in their study carried out an analysis of food security situation among urban households using Lagos State as a case study. Primary data used in the study was obtained by using structured questionnaire from 141 respondents and analyzed using analytical tools such as tables, percentages and food insecurity incidence. The major findings of the study show that the food insecurity incidence of the study area is 0.39. This is higher in insecurity incidence (0.49) than in the male which is (0.30)

Seydou, Liu and Baohui (2014) identified the factors influencing food security in West Africa using Southern Niger Republic as a case study. Data was collected through surveys employing theuse of questionnaires which was administered on 500 households and was analysed using Binary logistic model. The major finding of the study was that the major factors influencing food securityin the case area include the gender of the household head, the prevalence of diseases and pests, labour supply, flooding and the access to market. It was further discovered that female headed households are more vulnerable to food insecurity compared to male headed households. The study recommended that market integration through development of local infrastructures and proper trade policies be facilitated in order to ease the food insecurity.

Idrisa, Gwary and Shehu, (2008), analysed food security status among farming households in Jere Local Government Area of Borno State in North-eastern Nigeria. Primary data were collected from 120 households selected through multistage sampling procedure. The data were analyzed using frequency, percentage, the ad count method, food security gap and squared food security gap. Findings revealed that incidence was high among the age bracket of 40-49 years (27.5%).

Jabo et al (2013) examined the incidence, depth and severity of food insecurity in Nigerian rural households. A sample of 3380 rural households was obtained from General Household Survey- Panel data and was analysed using Foster Greer and Thorbecke (FGT) class of decomposable foodpoverty. Major findings of the study show that during post-planting seasons, there is a higher incidence, depth and severity of food insecurity than in post harvesting periods in Nigerian rural

households. The study further recommend that public policy initiative that would target enhance agricultural activities be put in place by the government.

Kuwornu, Suleyman and Amegashie (2011) examined the food security status of Farming Households in the Forest Belt of the Central Region of Ghana. Data was collected through Multi-stage sampling technique and analysed using Binary Logit Model. From the analysis, it was discovered that 60% of households in the study were food insecure and increase in household income, increase to credit access and an increase in the quantity of household farm production cause an improvement in the food security status of farming households. The study recommended that the government broaden the pro-poor policies such as school feeding programme and livelihood empowerment programme.

Similarly, Adeniyi and Ojo, clearly analysed in their study on food status of rural farming households in Iwo, Ayedire and Ayedaade Local Government Areas of Osun state in south-western Nigeria. Questionnaires were administered and 103 respondents were used in the study and data was analysed using a food security index and binary regression model. It was discovered from the analysis of data that 69.90% of households in the study area were food insecure and 30.1% of the households were food secure. It was also revealed that farm size, educational status, monthly income, household size and age of the household head were determinants of food security in the study. It was recommended that food security policy strategies be put in place by the government in order to achieve more than a marginal reduction in the number of food insecure households

Ahmed, Mohammed and Abah (2015) analysed the food security situation among Semi-Urban households using Biu and Bama Local Government Areas in Borno State of Nigeria as a study area. Multi-stage sampling technique was employed for the study and 198 farming households provided data and it was analysed using descriptive statistics, Cost-of-calories (COC) model and Logit model. 44% of the households in the study were found to be food insecure. The study recommended that there should be an improvement in the wage earning capacity, more income diversification opportunities and increased awareness on family planning facilities.

Ibrahim et al (2009) conducted a study which estimated the food security status of urban household using Gwagwalada Area council of the Federal Capital Terriority (FCT) of Nigeria. Primary data was used for the study with 120 respondents and was analysed using the Food Security Scale and frequency counts. Findings revealed 42.5% of the households in the study area were food secure, 27.5% were moderately food secure while 30% were non-food secure. The study recommends that food security and poverty alleviation programmes be extended to cover both rural and urban areas of Nigeria.

Irohibe & Agwu (2014) assessed the food security situation among farming households in rural areas of Kano state, Nigeria. Multi-stage random sampling technique was used to gather data and was analysed using descriptive statistics, food security index and logistic regression. The study revealed that 74% of the respondents were food secure and 26% of the respondents were food insecure. It was further discovered that the educational level, sex of the household head, household size and credit access were significant determinants of food security. The study recommends fast tracking of already established policy measures aimed at reducing food insecurity in the country.

Ayoade and Adetunbi (2013) conducted a study which analysed the level of food insecurity of the farming households in Oyo State. Data (primary) was collected through a well structured interview schedule on farmers in the study area and was analysed using descriptive statistics and Pearson Product Correlation. 64.5% of the respondents were discovered to be food insecure and borrowing food stuff was identified to be the major coping strategy for battling hunger situation. The study recommended that farmers' households improve on their eating habits especially that of children in order to reduce malnutrition.

Abu and Soom (2016) in their study examined the factors affecting household food security in rural and urban areas of Benue State, Nigeria. Data was obtained from primary sources through structured questionnaire and was analysed using descriptive statistics, food security index, Surplus/food insecurity, factor analysis and Probit model. The findings of the study reveal that 53.3% and 62.2% of rural and urban households respectively were food secured. The study recommended that an agricultural policy which aims at promoting farmers' access to land and improving the household productivity be encouraged.

Ahungwa et al (2013) conducted a study that assessed the socio-economic attributes of farming households as they influence food security of Benue State as well as generating food security indices for the farming households in Benue State, Nigeria. The study employed a stage-wise random sampling technique to collect data for 180 households and was analysed using descriptive statistics and food security index. Analysis showed that 38.7% of households were food secure while 63.33% were food insecure.

Birhane et al (2013) in their study investigated the food insecurity situation in urban Ethiopia. Data was collected using questionnaire based interview with the head of the households, the food security status of households was assessed by Household Food Insecurity Access Scale (HFIAS) and data was analysed using SPSS, Univariate and Bivariate analysis. The study found that 75% of the households were food insecure and 23% were food insecure with hunger. The study recommended that Policy maker work on stabilization of the food market as well as creates opportunities that would improve the livelihood and the overall food security situation of urban households. Sanusi, Badejo & Yusuf (2006) investigated in their study the food security position of household in some Local Government Areas in two of Nigeria's largest cities (Lagos and Ibadan). Data was collected using an interviewer administered questionnaire and analysed using descriptive statistics. The results obtained from the study show that the prevalence of food security was 26% in both Lagos and Ibadan; however the food security situation in Lagos was better than of households in Ibadan. In addition, the study showed that three quarter of all the household were found insecure and 30% were food insecure with hunger.

Olagunju et al (2012) assessed specific socio-economic factors influencing the food insecurity situation of households in urban area of Ogbomoso Metropolis in Oyo-state, Nigeria. Primary data was collected from selected

households using a well-structured questionnaire with interview schedule and analysed using the Cost-of-Calories (COC) and Logit model. The results of the analysis revealed that the socio-economic factors influencing the food insecurity in the study area include age of the household head, household size, annual farm income, non-farm annual income and it was discovered from the food insecurity line that 60% of the sample households were food insecure. The study recommended a need for a policy that provides adequately trained and equipped extension workers for disseminating improved agricultural technologies that has the potential of raising efficiency in food crop production which will ensure food security in the long term.

Ntwenya et al (2015) assessed the level of food insecurity and associated factors among households in rural communities of Kilosa District, Morogoro in Tanzania. Data was collected using an interviewer administered questionnaire and the 9 item Household Food Insecurity Access Scale were anylyzed using Bivariate Correlation Analysis. Principal Component Analysis and logistic regression analysis. The findings of the study show that only 20% and 31% of the households surveyed during the rainy and harvest seasons respectively were food secure.

Olaoye & Adewole (2014) in their study examined the incidence of food security among farming households in Ogbomoso agricultural zone in Nigeria. Data was collected through the use of questionnaire and was analysed using descriptive statistics (frequency tables and percentages). It was discovered that 88.3% of the male headed households were food secure and 11.7% of the female headed households were food secure and it was also discovered that food insecurity incidence increased with increase in household size. The study therefore recommended that the government should be should acquire large expanse of land for agricultural purposes.

Fakayode et al (2009) examined the food security in the study district situations of the Nigerian's major farm households using Ekiti State, as a case study. The study collected random sample of 160 farm households selected across 16 villages in the two Agricultural Development Project (ADP) zones of Ekiti State. The USDA approach for analysis of farm household's food security was used to analyze the intensity of food severity among the farm households. Results showed that only 12.2% of the farm households were food secure, 43.6% were food insecure with hunger (moderate) and 8.3% were food insecure with hunger (severe).

Shone et al (2017) in their study aimed to determine the magnitude of household food insecurity and identify associated factors in West Abaya district in the Southern part of Ethiopia. Data was collected using pretested structured questionnaire by trained data collectors and was analysed using HFIAS, Binary and Multivariate logistic regression. It was discovered that the overall prevalence of household food insecurity was 38.1% in the study district and household headed by female are more likely to be food insecure than male headed households. The study therefore recommended that proper attention be given in order to increase food production and productivity of the farmers by improving access to farm land among others.

Mitiku, Fufa and Tedese (2012) examined the status and determinant of rural household food security in Shashemene district of Oromia regional state in Ethiopia. the study was based on a survey of a total of 100 households randomly selected using a three-stage sampling technique and was analysed using descriptive statistics, Foster-Greer-Thorbecke (FGT) and Logit model. The study revealed that 36% and 64% of the households in the study were food insecure and food secure respectively with the Logit model analysis showing that factors such as family size, cultivated farm land size, total farm income, off-farm income and livestock ownership of households were significant determinant of household food security status.

Tefera & Tefera (2014) conducted a study to identify major factors influencing farm household's food security and coping strategies employed to cope with food shortfall in Mareko District, Guraghe Southern part of Ethiopia. Data was collected from a survey of 130 randomly selected households in the study area and analysed using logistic regression, inferential statistics and descriptive statistics. It was discovered that 38% and 62% of the sampled households were food secure and food insecure respectively. The inferential analysis were significantly differ between food secure and insecure household and the significant determinant of food security were age of household head, level of education, household size, size of cultivated land, use of improved seed, number of contact with development agents, size of credit received, size of livestock owned, and off-farm income per adult equivalents.

A study conducted by Sultana & Kiani (2011) aimed to identify the main determinants of food security for Pakistan at household level. The analysis was based on micro data taken from Pakistan Social and Living Standard Measurement Survey (PSLM) 2007-08. The study area was analyzed using Binomial Logit Model and Cost-of-Calorie Approach. The study revealed that place of residence (Urban) has a significant and negative effect on household's food security status. Dependency ratio has a significant impact on food security and has expected sign that is, negative. Educational attainment level of household's head beyond intermediate level has also significant and positive impact on food security status of household. While social capital and employment do not effect household's food security significantly.

Mungai (2014) conducted a research that examined the Determinants of Household Food Security in Lugari and Makueni Sub-Counties in Kenya. The study utilized Secondary household data collected from 2000 randomly selected households in both sub-counties by the Ministry of Agriculture under the NALEP (National Agricultural and Livestock Extension Program) program was used for analysed. Analytical techniques employed include descriptive statistics to analyzed the characteristics of respondent households, and binary regression analysis using Probit model to examine the determinants of food security among the households surveyed. It was discovered that household head age, household head education level, household size, land size per capita and household income (proxied by household expenditure) were found to significantly influence household food security in both Lugari and Makueni Sub-Counties.

Amaza et Al (2006) aimed at identifying and analysing food security measures in Borno State, Nigeria. Data was obtained from a multi-stage sampling technique which was applied on 1,200 households. Cost-of-Calories (COC) method and Logit model were used as analytical techniques for the study. Findings revealed that Over 58% of the sample

households are therefore food insecure. Also, Major determinants of this food insecurity factors were revealed to be household size, gender, educational level, farm size and type of household farm enterprise.

Wahab, Applanaida & Bakar (2015) identified the factors effecting food security in Malaysia by using a Vector Error Correction Model (VECM) approach. Data was collected from World Bank (WB), Food and Agriculture Organization (FOA) and Bureau of Statistic (BOS). The data were analysed using the Vector Error Correction Model (VECM) to determine how much the short rundeviated from the long run. The result shows the value of ECT is negative and significant indicatedthat there are long run causality between food security and its determinants.

Asghar & Muhammed (2013) investigated the determinants of food insecurity for both general and farmer households using the dataset based on Pakistan Social and Living standard Measurement (PSLM) 2007-08 survey conducted by the Federal Bureau of Statistics, Pakistan. The data was analysed using descriptive analysis and Logit model. Findings from the study show that Householdsize, education of household head, annual income and agricultural income are some of the most important factors influencing the household's food insecurity status.

3. Methodology

In this chapter, the theory employed in this study that serves as the analytical framework for thestudy as well as the method of analysis adopted in this study adopted in the study are covered.

3.1. Theoretical Framework

This sub-section would also justify the means through which the objective of the study will be achieved by giving a theoretical underpinning to this study. This study takes its theoretical rootin Engel's law.
The Engels law, named after Ernest Engel, was established following the consumption functionanalysis. The consumption function in its simplest form expresses the quantity of a commodity consumed (qi) as a function of income (y) i. e

$$q_i = f(y) \qquad\qquad\qquad (3.1)$$

However for the purpose of this work, a slight modification will be made in that household food security status, rather than physical quantity of commodity consumed, is expressed as a function of household income. Aside income, other variables are incorporated which influence Household food security such as household size. Furthermore, since income and household food security status are said to be highly correlated, the function will be expressed as:

$$Y= f (INC, SIZE) \qquad\qquad\qquad (3.2)$$

Where Y is the household food security status, INC connotes Household Income and SIZE is the household size. Given the above, socio demographic factors such as size of the family, size of income, levelof education, and more have been found to influence household expenditure patternby similar study (Sekhampu & Ndobo, 2013).

3.2. Description of the Study Area

The study area in this work is the Niger Delta area of Nigeria. The region is Africa's largest delta,and stretches for nearly 242 kilometres (150 miles) from north to south and spreads along the coastfor about 320 km (200 miles) covering an area of approximately 22,600 square kilometres (Encyclopaedia Britannica-Macropaedia 1979). The geographic appellation of the name Niger Delta is derived from being situated at the mouth of the River Niger. The Niger Delta region is situated in the southern part of Nigeria and is bordered to the south by the Atlantic Ocean and to the east by Cameroon (Niger Delta Development Commission 2004).

The Niger Delta region is defined as comprising the area covered by the natural delta of the Niger River and the areas to the east and west, which also produces crude oil. The region occupies a surface area of about 112,110 squares which represents about 12% of the total surface area Nigeria which is projected that by the beginning of 2006, its population will be over 28 million people. The Niger Delta region is Nigeria's largest wetland, and the third largest wetland in the world. It is estimated that the constant increase in population now put at over 40 million inhabitant as of 2006, this accounts for over 23% of 140 millions Nigeria's total population (National Population Commission 2006).
The region lies between latitude 4°2′ and 6°2′ north of the equator and longitude 5°1′ and 7°2′ east of the Greenwich meridian the Niger Delta consists of nine states of the Federal Republic of Nigeria namely Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers whichhave 185 Local Government Areas (LGAs) altogether.

The Niger Delta has a semi-hot, humid equatorial climate with wide variations from one part of the region to another. This is a place of uniformly high temperatures throughout the year, high relative humidity and intense rainfall, which occurs almost year round in the core delta, but becomes markedly seasonal further inland with increasing distance from the ocean.
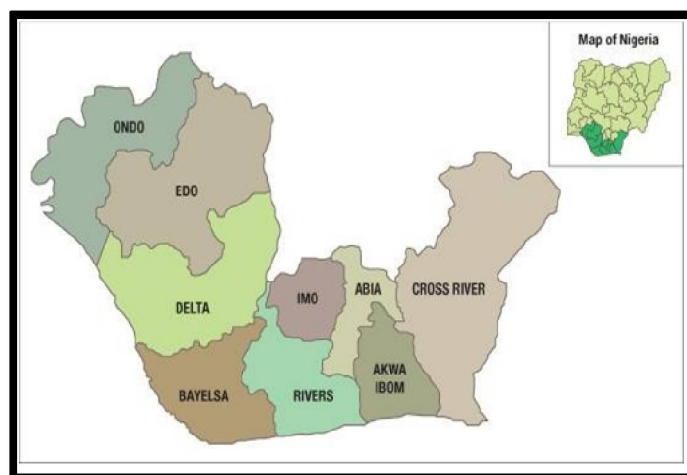
Figure 2: Map of Niger Delta Region
Source: Premium Times (2016)

3.3. Sampling Techniques and Sample Size

The study used cross sectional data obtained from households in the study area. The target population in the study is the household heads or any person(s) that has vital information on the household. The study employed multistage, simple random sampling techniques in selecting the respondents. The first stage involved the purposive selection of two out of the nine Niger Delta States; Delta and Edo States. Secondly, three local government areas are selected from each of the two states namely Egor, Ikpoba-Okha and Oredo LGAs in Edo state and Oshimilli South, Sapele and Uvwie LGAs in Delta State. Thirdly, two communities were selected from each LGA. This choice is made because the selected communities in the given LGAs reflect the feature of the typical urban household in the Niger Delta region. Finally, 20 households are selected at random in each community and a well-structured questionnaire is administered to the household head or any knowledgeable person who is aware of the household details. This means that the sample size totaled 240. However, 36 forms were incompletely or improperly filled therefore the sample size for analysis was 204.

3.4. Method of Data Collected

A structured questionnaire was used to collect the needed data from the household in the study. The questionnaire comprised of two main sections which included variables relating to social, demographic, and economic characteristics of households. The first section of the questionnaire was on social, economic and demographic information of the participants. This section was constructed to include the socio-economic status of households in terms of gender of the household head, age of the household head, household income, and household size, educational status of household head and occupation of the household head. The second part of the questionnaire relates to information needed to calculate the food security status of the sample. The questions were based on the Household Food Insecurity Access Scale developed by United States Agency for International Development USAID (Coates *et al.*, 2007). The HFIAS questionnaire is a standardized international measure used to indicate the incidences of household food security or insecurity as the case may be.

3.5. Model Formulation

The model formulation gives an overview of the econometric technique utilized for the analysis. In this study, the model used is the binary logistic (logit) regression as the logistic cumulative distribution probability function represents a close approximation to the cumulative normal distribution and is easier to work with. Also, the choice of this technique is informed given the fact that the dependent variable in this work is a dichotomous variable.

The generalised form of a logit regression model is given as:

$$Pi = F(Zi) = F[\alpha + (\beta iXi)] \qquad \frac{1}{1+e^{-[\alpha+\beta iXi]}} \qquad (3.3)$$

Where
e represents the base of natural logarithms (2.718) Xi represents the ith explanatory variable Pi is the probability that an event occurs given xi, α and βi are regression parameters to be estimated

However, Interpretation of the coefficients will be understandable if the logistic model is further written in terms of the odds and log of odds (Hosmer & Lemeshow, 1989). The odds ratio is the probability that an event will occur (Pi) to the probability that it will not occur (1 - Pi).

$$(1 - Pi) = \frac{1}{1+e^{zi}} \qquad (3.4)$$

Putting the equation (4.2) in Natural logarithm, it becomes
$$Zi = Ln(Pi) = \alpha + \beta 1X1 + \beta 2X2 + \cdots + \beta nXn \qquad (3.5)$$

Where:
Zi is a function of explanatory variables
α is the intercept or the constant term
β's represents the regression coefficient in the model.

3.6. Technique of Estimation

Two methods were used to analyze household food security. These methods include: the Household Food Insecurity Access Scale (HFIAS) and the logit regression model. The HFIAS examines the food security status of households. The logit regression model establishes the socio- economic and demographic variables that determine household food security.

3.6.1. Household Food Insecurity Access Scale (HFIAS)

The Household Food Insecurity Access Scale (HFIAS) which was developed by the United States Agency for International Development (USAID) was utilized to measure household food security status in this study. However, this technique is based on the plan that the incident of household food insecurity leads to predictable reactions and responses that can be captured and quantified through a survey and summarized in a scale. The HFIAS score was calculated using the answers based on the nine frequency-of-occurrence questions. According to Deitechelr et al. (2011) the HFIAS highlights three broad aspects of household food insecurity access; which involve, worrying about the likelihood of food insecurity, inadequate quality and inadequate supplies of food.

Mohammadi et al. (2011) indicated that the HFIAS method produces accurate results because of its internal consistency, criterion validity and reliability for analyzing household food insecurity. This informs the use of this method to ascertain the household food security status.

From the HFIAS score calculated, the prevalence (that is, the extent and magnitude) of food (in) security is known. Therefore in this study, HFIAS is used to achieve the first objective of this study and it is also used to derive the dependent variable which is used for investigating the second objective of this work.

3.6.2. Logistic Regression

The dependent variable in this study was dichotomous variable, which took a value of zero for the food insecure households and one for the food secure ones. This study followed a logistic regression model. Logistic regression identifies the effect of numerous independent variables which are defined simultaneously for estimating the existence of one of the other two dependent non-continuous variables (Menard, 2010).

In this study a logit regression model was used to establish the impact of socio-economic and demographic variables on the food security status of households. This model was fitted with six variables to help identify factors that have an effect on food security. Therefore food security was analysed using the bid value of 1 (food secure) and 0 (food insecurity) which is obtained from the computation of the HFIAS. So that to address the second objectives of the study, Logit model was employed.

The implicit form for the model in this study is stated as: Y= f (INC, AGE, SIZE, EDU, SEX, OCC)   (3.6)

Where

Y= Household food security status
INC= total monthly household income
AGE= Age of household head
SIZE= Household Size (Number of family members in one household)
EDU= Educational Status of household head
SEX= Gender of household head
OCC= Occupation of household head

The explicit form of Equation (3.4) is defined as follows:

$$Y = \beta_0 + \beta_1 INC + \beta_2 AGE + \beta_3 SIZE + \beta_4 EDU + \beta_5 SEX + \beta_6 OCC + E_t \qquad (3.7)$$

Where

β_0 = Intercept or Constant term
E_t = Error or Stochastic term.

3.7. Sources of Data and Measurement of Variables.

The data set used in this research work is a cross sectional data gotten from the administration of a well-structured questionnaire in selected LGAs of two states in the Niger Delta Area. The dependent variable in this study was household food security status. The independent or explanatory variables include Total monthly household income, Age of household head, Household Size, Educational Status of household head, Occupation of household head and Gender of household head.

3.7.1. Dependent Variable

The dependent variable in this study was household food security status. This value was obtained from the computation of the HFIAS score which ranges from 0 (being food score) to 27 (food insecure). Thus, it was a bivariate taking the value 1 for food secured households and 0 for food insecure households. This variable was used for binary logistic regression

3.7.2. Independent/Explanatory Variables

3.7.2.1. Household Income (INC)
        Monthly income in the study refers to income received by members of a household from all sources within a month. Income is regarded as the most important determinant for food security in a household (Onomona et al., 2007). In this study, total monthly income is expressed in the Naira value and it is expected to positively affect household food security. Monthly income was kept as a continuous variable.

3.7.2.2. Age of Household Head (AGE)
        Age of the household head was used as an indicator for the experience of household food insecurity, and is measured in years since it is a constant variable.

3.7.2.3. Household Size (SIZE)
        The size of the household is a continuous variable and measured by the number of persons in a family or people sharing a common residence and feeding from a common source.

3.7.2.4. Educational Status of Household Head (EDU)
        This is a discrete variable. Education is described as a social capital which has a positive effect on household food security (Babatunde *et al* 2007). The level of education determines whether an individual has better access to job opportunities in the labour market therefore, it was expected that households heads with higher educational qualifications will have a higher chance of being food secure. The analysis on education was based on the household head only.

3.7.2.5. Gender of Household Head (SEX)
        The gender of the household head is a discrete variable. Female headed households have a higher probability of being food insecure (Adugna, 2011). Hence, in this study it is also expected to have relation with the household food security status that male headed households relate positively and negative relation with female headed families. The variable is treated as a dummy variable where:
   GENDER:
    Male = 0
    Female = 1

3.7.2.6. Occupation of Household Head (OCC)
        This refers to the sector in which the household head works or ekes out an income in the event that he/she is working. Otherwise, he/she wouldbe grouped under the category 'Others'.

3.8. A Priori Expectation
        A priori anticipation is used to measure both the size and size of variables as fitted in the model (Hebert & Toporoff, 1989).The reason for it is to examine if the sign and size of variables fitted in the model conforms to the postulations of a theory. A-priori expectations are the given facts which our research findings should follow.
- Household Income: the coefficient is expected to have a direct positive relationship andtherefore, a positive sign, $\beta_1 > 0$.
- Age of Household Head: this coefficient is expected to have a direct positive relationship and therefore $\beta_2 > 0$
- Household Size: Household Size is expected to an inverse relationship with thedependent variable. That is, $\beta_3 < 0$.
- Educational Status of household head: This coefficient is expected to have a positive and direct relationship therefore, $\beta_4 > 0$.
- Gender of the household head: This coefficient can either take a positive or a negativeform but it has to be a direct relationship. That is to say, $\beta_5 > 0$.

MALE	134	65.7	65.7
FEMALE	70	34.3	100
Total	204	100	
OCCUPATION			
Civil Servant	46	22.1	22.1
Farming	17	8.3	30.4
Trading/Commerce	28	13.7	44.1
Self-employed	50	24.5	68.6
Others	64	31.4	100
Total	204	100	
EDUCATION			
Primary Cert	7	3.4	3.4
SSCE	29	14.2	17.6

Diploma/NCE	27	13.2	30.6
HND/B.Sc.	66	32.4	63.2
M.Sc./PhD	65	31.9	95.1
None	10	4.9	100
Total	204	100	
MONTHLY INCOME			
20000-25000	8	3.9	3.9
25001-30000	32	15.7	19.6
30001 and above	164	80.4	100
Total	204	100	
AGE			
18-45	122	59.8	59.8
46 and Above	82	40.2	100
TOTAL	204	100	
HOUSEHOLD SIZE			
1-4	125	61.3	61.3
5-9	74	36.3	97.5
10 And Above	5	2.5	100
	204	100	

Table 1: Social Economic Characteristics of Households Heads (HH)
Source: Survey (January, 2018)

It is also seen from Table 5.1 that 164 respondents reported the total monthly income is above 30,000 Naira whereas 8 Households report that their total monthly income ranges from 20,000 to 25,000 Naira and 32 Households state that the monthly income ranges from 25,001 to 30,000 Naira. 59.8% of the respondents fall within the age range of 18 and 45 years and 40.2% are aged 46 years and above. Finally, 125 household heads (61.3%) have a household size of 1 to 4 members, 74 HHs have a household size of 5 to 9 persons and 5 HHs have a household size that has 10 members and above. Has 10 members and above.

4.2. Demographic Characteristics of the Study Population

4.2.1. Population Distribution by Age and Gender
This subsection looks at the age and gender distribution of the sampled population in the study. The percentage of people who are under the age of 20 years for both females and males is 22.79% and 22.47% respectively. A huge percentages of the females sampled are within the ages of 20 and 35 years (16.62%), whilst the main share of the sampled males are younger than 10 years of age(13.22%). This is shown in Table 5.2 below.

Age Group	Female	Male	Total	% Female	% Male	% Total
0-9	119	120	239	13.10%	13.22%	26.32%
10-19	88	84	172	9.69%	9.25%	18.94%
20-35	151	97	248	16.62%	10.68%	27.30%
36-65	115	107	222	12.68%	11.78%	24.46%
65 And Above	18	9	27	1.98%	1.00%	2.98%
Total	491	417	908	54.07%	45.93%	100.00%

Table 2: Population Distribution by Age and Gender
Source: Author's Computation of Survey Data (2018)

4.3. Food Security Status of Sampled Households
This sub-section sets out to evaluate the food security status of the sampled households in the study area. The results of the study were classified into two categories: the analysis of household food security and the binary logit regression analysis. The Household Food Insecurity Access Scale (HFIAS) measure which was developed by the USAID was used as a measure of household food security in the area. The HFIAS is used to monitor whether households become vulnerable to food access in the past 30 days. The scale comprises of nine questions which ask about changes households made in their diet or food consumption patterns because of lack of sufficient resources to purchase or produce food. It measures the extent of food insecurity in the previous 30 days, as indicated by the participant households. Therefore, it is observed in the study the responses of the participants to the nine basic HFIAS questions.

A binary logit regression model was used to identify the main determinants of household food security. The regression analysis seeks to determine the impact of demographic and socio economic variables (Income, Age of the Household Head, Household Size, Educational status of the household head and Occupation of household head) on Household

4.3.1. Category of Household Food (in) Security

This sub-section looks at the categorization of household food security by using the HFIAP indicator. The Household Food Insecurity Access Prevalence (HFIAP) indicator is used to observe household food insecurity prevalence (Coates *et al.*, 2007). In the study the HFIAP indicator categorized households into four main levels of food security status (food secure, mildly, moderately and severely food insecure) depending on how they respondent to the nine-frequency-of-occurrence questions found in the HFIAS questionnaire.

A food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. Similarly, a kindly food anxious household feel concerns about the not having enough food often or sometimes unable to eat favorites foods. A moderately food insecure household sacrifices quality more frequently, by eating a monotonous diet or undesirablefoods sometimes or often, or slash down the size of the meals and the quality or number of meals, rarely or sometimes. So, the three most severe conditions was not experience. A sternly food insecure household has moved to reduction on meal size or number of meals often or   experiences any of the three most severe conditions (running out offood, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely.

The household food security status was measured and the results are presented in Figure 5.1. TheHFIAS score in this study was found to range from 0 to 24. Based on the HFIAS classification measure of food insecurity, about 49.51% of the sampled households were classified as food secure, 17.61% as mildly food insecure, 25% as moderately food insecure and 8.33% as severely food insecure. This shows the nature and magnitude of the household food security of urban households in the sampled area which is the first specific objective of this work.
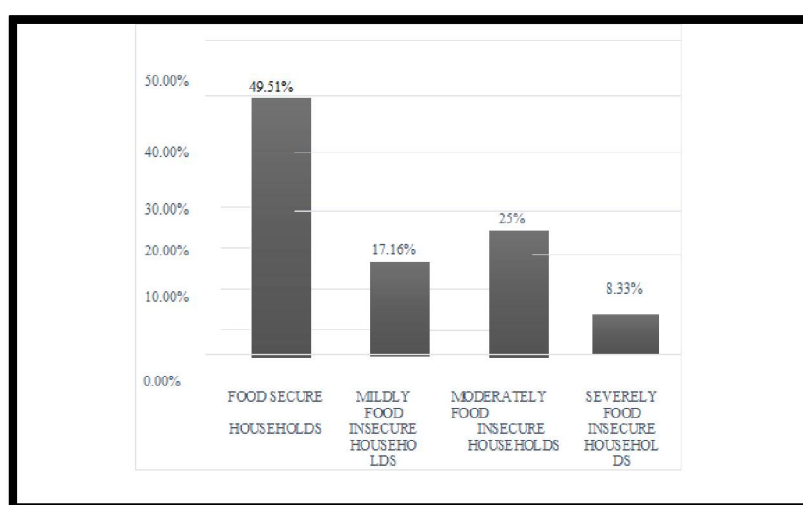

Figure 3: Percentage Distribution of Household Food
Security Level
Source: Survey Data, 2018

Summarily, 49.51% of the sampled households are food secure and 50.49% of the sampled households is food insecure.

4.4. Household Food Security and Demographic Variable

The purpose of this subsection is to examine the socio-economic and demographic variables ofurban households s a m p l e d using the HFIAS categorization measure. These variables include gender, age, household size, education, household income and occupation. However, only two variables will discuss in this manner in this study; gender and age of household heads.

4.4.1. Gender of Household Head

Figure 4 shows the relationship between gender and household food security. The results obtained suggest that the gender of the household head plays a vital role in enhancing household food security, because food security varies substantially between male-headed households (MHH) and female-headed households (FHH). It can be seen that there are MHH (51.49%) were more food secure than FHH (45.71%). Food insecurity is mostly prevalent in FHH with mildly, moderately and severely food insecurity of 18.57%, 25.71% and 10% respectively whereas the corresponding value for MHH are 16.42%, 24.63% and 7.46% respectively.
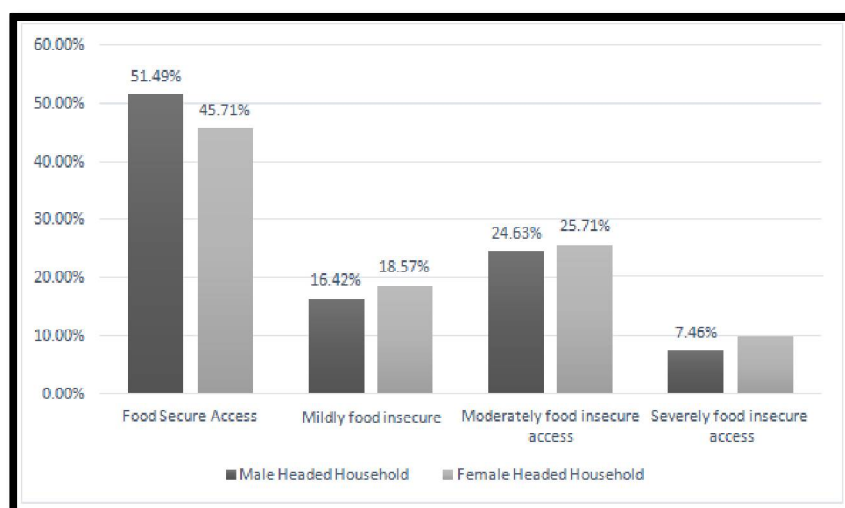
Figure 4: Food Security and Gender
Source: Survey data, 2018

4.4.2. Age of Household Head

This sub-section discusses the relationship between Age of the household head and the category of food access amongst the sampled households. Table 5.3 indicates that half of the household heads within the ages of 18 and 45 are food secure at 50% whereas it is reported that 48.81% of respondents (household heads) who are age 46 years and above are food secure. The mildly food insecurity category showed that the level of food insecurity increases with an increase in age. Themoderately food insecurity category however showed that the level of food insecurity decreases with an increase in age. The incidence of severe food insecurity is shown to be the same rate for both age brackets with both been put at 8.33%.

AGE	Food Secure		Mildly Food Insecure		Moderately Food Insecure		Severely Food Insecure	
	N	%	N	%	N	%	N	%
18-45	60	50%	19	15.83%	31	25.83%	10	8.33%
46+	41	48.81%	16	19.05%	20	23.81%	7	8.33%

Table 3: Age of the Household Head
Source: Survey Data, 2018

4.5. Responses of Sampled Households to the Nine HFIAS Questions

This section discusses the responses to each of the nine HFIAS questions. The share of affirmativeresponses relating to each question is observed in order to assess whether the sequence of severityis attained by the HFIAS questionnaire. The highest share of the sampled population revealed that it is usual to 'worry about food', making the question the lowest determinant for household food security on the scale. The smallest share of the population indicated that they go to sleep hungry'or 'go a whole day and night without eating'. This usually happens when there is no food in the household.

Options								
	No		Rarely		Sometimes		Often	
Hfias Questions	N	%	N	%	N	%	N	%
1.Worry about food	68	33.33	58	28.43	67	32.84	11	5.39
2. Unable to eat preferredfoods	107	52.45	19	9.31	69	33.89	9	4.41
3. Eat just a few kinds offoods	109	53.43	23	11.27	61	29.9	11	5.39
4. Eat foods they really do notwant to eat	115	56.37	19	9.31	65	31.86	5	2.45
5. Eat a smaller meal	128	62.75	9	4.41	56	27.45	11	5.39
6. Eat fewer meals in a day	155	75.98	11	5.39	30	14.71	8	3.92
7. No food of any kind in ahousehold	184	90.19	9	4.41	10	4.9	1	049
8. Go to sleep hungry	190	93.14	9	4.41	4	1.96	1	0.49
9. Go a whole day and nightwithout eating	193	94.61	8	3.92	2	0.98	1	0.49

Table 4: Responses of Sampled Households to the Nine HFIAS Questions
Source: Survey Data, 2018

The most serious case of severe food insecurity is experienced in the last three questions of the HFIAS questionnaire (Coates *et al.*, 2007). This is expressed in percentages and shown in the graphbelow. 90.19% of the sampled households responded that they had no experience of having no

food of any kind in their household. however, 9.81% of the respondents reported in the last 30 days they had no food to eat followed by those who went to bed hungry at 6.59% and then those who went the whole day and night without eating at 5.39%. These three conditions either occurredrarely (once or twice), sometimes (three to ten times) or often (more than 10 times).
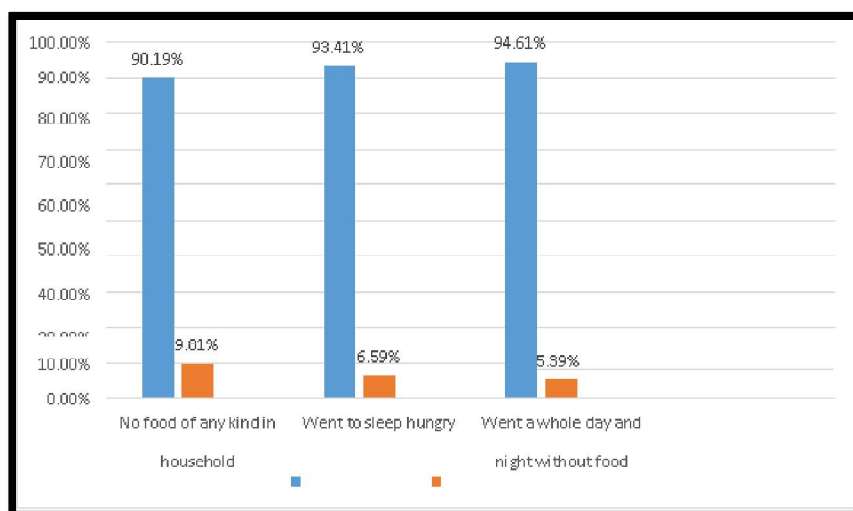

Figure 5: Response to Last Three HFIAS Questions
Source: Survey Data, 2018

4.6. Determinants of Food Security

The aim of this section is to analyse the determinants of food security in the study area; thus looking at the potential for socio-economic and demographic variables to be used as predictors offood security. For this purpose, Table 5.5 observes the correlation analysis while Table 5.6 presents the estimated results of the binary logit mode4.4Correlation analysis.

Table 5.5 observes the correlation analysis while Table 5.6 presents the estimated results of the logit model. Correlation analysis measures the degree to which the dependent variable and the independent variable arelinearly linked (Miles & Shevlin, 2001). The HFAIS score was significantly linked with the explanatory variables which includes; gender, household size, age, household income, level of education and occupation.

From Table 5.5 it is seen that there is a positive and significant relationship was found between the household size and HFIAS score ($r = 0.127$, $p < 0.036$). This implies that there is a significant correlation between the household size and the HFIAS score of households. There is also a negative and significant correlation between household income and the household HFIAS score. This means that an increase in household income corresponds with a decrease in the HFIAS score. The preceding statement applies for the correlation between HFIAS score and the level of education of the household heads. No significant correlation existed between age, gender and occupation of the household heads with the HFAIS score. It important to remember that correlation test for the level of association between variables but it does not imply the effect of one variable to another. Therefore the study used the binary logit regression technique to identify the effects of selected explanatory variables on the food security status of households.

Variables	Hfias Score	Significant
Gender	0.053	0.225
Age	-0.046	0.255
Household Income	-0.407**	.000
Household Size	0.127*	0.036
Level Of Education	-2.90**	.000
Occupation	0.007	0.459

Table 5: Spearman Rank Correlation Analysis
Source: Computed by the Researcher via Stata 13 Software
*   Correlation is Significant at the 0.05 Level
*   Correlation is Significant at the 0.01 Level

4.7. Factors that Determine Household Food Security

In order to know the factors that determine household food security, the study employed binary logit model to show the variables are relevant in explaining the determinants of food security status in urban households in the Niger Delta region using the sampled population of 204 households. Also in the study, the marginal effects of the significant explanatory variables were estimated to highlight their importance for policy implementation and decision making.

The marginal effects are used to analyze the relationship between the dependent variable in relations to a one unit increase in the value of the explanatory variable, with other variables remaining constant (Kleinbaum, 1994).

Six explanatory variables were fitted in the model namely; Household Income (INC), Age of Household Head (AGE), Household Size (SIZE), Educational level of household head (EDU), Gender of household head (SEX) and Occupation of household head (OCC)

Variable	Coefficient	Standard Error	P< |z|	Marginal Effects (dy/dx)
INC	1.250143	0.387648	0.001	0.3119212
AGE	0.3446442	0.1367398	0.303	0.0859916
SIZE	-0.09402864	0.3211675	0.003	-0.2346093
EDU	0.3836864	0.1367398	0.005	0.095733
SEX	-0.2843064	0.3211675	0.403	-0.076442
OCC	0.0483684	0.0997328	0.628	0.0120683
CONSTANT	-4.260374	1.351311	0.002	
	Log likelihood=-123.38242			

Table 6: Result from Binary Logit Regression
Number of observations=204Pseudo R^2=0.1274Prob>chi^2=0.000

4.8. Source: Researcher's Computation Using Stata 13 Software

Taking a cue from table 5.6 above, it can be seen that household income (INC) has a positive relationship with food security status which is significant at 1% level. This implies that households whose income are high are likely to be food secure than households whose income are lower.

The Educational level of Household head (EDU) is positively related with the dependent variable having a significant level of 1 percent. This shows that households whose heads are highly educated are likely to be more food secure than households whose heads are not.

Household Size (SIZE) was found to have a negative significant relationship at level 1% with the dependent variable. Therefore, households with more members are more likely to food insecure.Therefore, Household income (INC), Educational level of Household head (EDU) and HouseholdSize (SIZE) are determinants of household food security in the study area.

The variable of Age of Household Head (AGE) is not significant in explaining household food security. The positive sign of the coefficient indicated that an increase in age leads to an increase in the probability of a household being food secure.

The occupation of the Household Head is positive relationship with food security but it is not significant and the Gender of household head (SEX) bears a negative but insignificant relationshipwith the dependent variable.

5. Summary, Recommendations and Conclusions

5.1. Summary of the Study

No doubt, the food security in Nigeria is a crucial one. In this study, the history of the concept of food securityacross the global, national as well as household levels is discussed. Chapter one gives a backgroundto the problem of food insecurity in Nigeria with particular emphasis given to the oil rich region of Niger Delta. The study engaged the use of a two-part questionnaire: the first part covers the socio-economic as well as demographic details of the house and the second part was the HFIAS questionnaire. The study employed a purposive sampling technique with a sample size of 204 households. Engel's law was the theory that best worked for the formulation of the econometric model used in this study. In carrying out this research, two estimation techniques were used to attain research objectives and test the stated research hypothesis. They are: Household Food Insecurity Access Scale and binary logit regression model. The Household Food Insecurity Access Scale (HFIAS) was used to analyze the food security statusof households. The HFIAS measure captured the household food insecurity levels (access) in termsof anxiety, uncertainty, quality and quantity of food consumed. Also the HFIAS showed the prevalence of food security nature and its magnitude which this study carried out through the sampled population which is equally the first objective of the study. Also, the binary logit regression model was used to establish the socio-economic and demographic factors that have an effect on household food security status that is to know what the determinants of food security are. Food security was a dependent variable and it was estimated by using a bid value of 1(food secure) and 0 (food insecure). The results are shown and discussed in the fifth chapter with the necessary illustrations made.

5.2. Summary of Findings

This sub-section presents the findings which were obtained from the estimation techniques usedin this study and are itemized below:

- From the findings above, 49.51%of the households' sampled were revealed to be food secure and50.49% of the sampled households was discovered to be food insecure.
- Based on the HFIAS classification measure of food insecurity, about 49.51% of the sampled households were classified as food secure, 17.61% as mildly food insecure, 25% as moderately food insecure and 8.33% as severely food insecure thereby achieving the first objective of this work.
- There is a significant correlation between the household size and the HFIAS score of households. There is also a

negative and significant correlation between household income and the household HFIAS score. This means that an increase in household income corresponds with a decrease in the HFIAS score

- There is a negative and significant correlation between HFIAS score and the level of education of the household heads. No significant correlation existed between age, gender and occupation of the household heads with the HFAIS score.
- It can be seen that household income (INC) has a positive relationship with food security status which is significant at 1% level implying that households whose income
- are high and are likely to be food secure than households whose income are lower this conforms to the a priori expectation.
- Also, the Educational level of Household head (EDU) is positively related with the dependent variable having a significant level of 1 percent. This shows that households whose heads are highly educated are likely to be more food secure than households whose heads are not hereby conforming to the a priori expectation.
- Household Size (SIZE) was found to have a negative significant relationship at level 1% with the dependent variable. This means that households with more members are more likely to food insecure. This also conforms to a priori expectation.
- The variable of Age of Household Head (AGE) is not significant in explaining household food security. The positive sign of the coefficient indicated that an increase in age leads to an increase in the probability of a household being food secure.
- The occupation of the Household Head is positive relationship with food security but it is not significant and the Gender of household head (SEX) bears a negative but insignificant relationship with the dependent variable.
- The determinants of household food security status are Household income (INC), Educational level of Household head (EDU) and Household Size (SIZE).

6. Conclusion

The study examined the household food security status of urban households in Niger Delta using sample gotten from selected communities in the region. The study sought to find out the determinant of household food security among the sampled households. The explanatory variables for the study include Household Income (INC), Age of Household Head (AGE), Household Size (SIZE), Educational Status of household head (EDU), Gender of household head (SEX) and Occupation of household head (OCC). The Engel's law formed the theoretical framework of the study as it was adapted to suit to the study. The Household Food Insecurity Access Scale and binary logit regression model were used as estimation techniques. Based on findings in the previous sub-section, both null hypotheses postulated in chapter are rejected and the alternate hypotheses are accepted. This shows there is a large correlation between the socio-economic as well as the demographic attributes of the respondents and the food security status of urban households in the Niger Delta Region and there is a significant relationship between income and food security of urban households in the Niger Delta Region.

7. Recommendations

Based on the findings of this study, the following recommendations are made:
- Given that household size is a significant determinant for household food security; it is therefore important for the Local health inspectors to educate the community about family planning in order to encourage households to plan for smaller household sizes hereby increasing the likelihood of ensuring more food secure households.
- Income was regarded as the most significant determinant for household food security.

It is therefore vital that the government promote agricultural education in the study area, by encouraging households to participate in food gardening/farming activities as a source of generating extra income. Agricultural production in a form of fruits and vegetables as well as legumes is central for securing access to food for low income households.

8. Limitations of the Study and Suggestions for Further Studies

This study looked at the concept of food security from the dimension of access using the HFIAS and also due to the expertise of the researcher it was not possible to include some other variables such as land ownership and household access to credit. However, as a result of limited time and access to fund, this study only covers a small study area. The study suggests that subsequent studies should be carrying out to include all proportions of food security at the household level. Further research can be done on a larger scope with more enumerators to get a more holistic picture.

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Appendix

Questionnaire

This questionnaire seeks to generate data for the research on the topic: An Empirical Analysis of Food Security Situation of Urban Households in the Niger Delta Region of Nigeria.

All information provided will be treated confidential. Answer the questions by ticking the appropriate option. Thank you for your cooperation.

A.   BIO DATA

1.   Gender: Male   { }   Female { }

2.   Occupation: Civil Servant { }   Farming { } Trading/Commerce { } Self-employed { } Others { }

3.   Level of Education: Primary Cert { } SSCE { } Diploma/NCE { } HND/BSc { } MSc/PhD { } None { }

4. Total Monthly Income: N20000 - N25000 { } N25001 - N30000 { } N30001 and above { }

5. Age: 18 – 45 { } 46 and above { }

6.   Number of people in the household: 1-4 {) 5-9 { } 10 and above { }

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

Age Group (In Years)	Number of Males	Number of Females
1-9		
10-19		
20-35		
36-65		
Above 65		

Table 7

B. Household Food Insecurity Access Scale (HFIAS) QUESTIONAIRE

				Household Food Insecurity Access Scale (HFIAS)	
		(rarely: once or twice; sometimes: 3 to 10 times; Often: more than 10 times in the last 4 weeks)			
1	In the past four weeks, did you worry that yourhousehold would not have enough food? (if answer is No, skip to Q2)			yes	0: No
1a	How often did this happen?	1: Rarely	2:Sometimes		3: Often
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferredbecause of a lack of resources? (if answer is No, skip to Q3)			1: Yes	o
2a	How often did this happen?	1: Rarely	2:Sometimes		3: Often
3	In the past four weeks, did you or any householdmember have to eat a limited variety of foods due to a lack of resources? (if answer is No, skip to Q4)			1: Yes	0: No
	How often did this happen?	1: Rarely	2:Sometimes		3: Often
4	In the past four weeks, did you or any householdmember have to eat some foods that you really did not want to eat because of a lack of resources to obtainother types of food (if answer is No, skip to Q5)			1: Yes	0: No
4a	How often did this happen?	1: Rarely	2:Sometimes		3: Often
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food? (if answer is No, skip to Q6)			1: Yes	0: No
5a	How often did this happen?	Rarely	2: Sometimes		3: Often
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because therewas not enough food? (if answer is No, skip to Q7)			1: Yes	0: No
6a	How often did this happen?	1: Rarely	2:Sometimes		3: Often
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resourcesto get food? (if answer is No, skip to Q8)			1: Yes	0: No
7a	How often did this happen?	1: Rarely	2:Sometimes		Often
8	In the past four weeks, did you or any householdmember go to sleep at night hungry because there was not enough food? (if answer is No, skip to Q9)			1: Yes	0: No
8a	How often did this happen?	1: Rarely	2:Sometimes		3: Often
	In the past four weeks, did you or any household member go a whole day and night without eatinganything because there was not enough food?			1: Yes	0: No
9ab	How often did this happen?	1: Rarely	2:Sometimes		3: Often

Table 8