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OIL DEPENDENCY AND NATIONAL FOOD SECURITY: A CASE FOR NIGERIA

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OIL DEPENDENCY AND NATIONAL FOOD SECURITY: A CASE FOR NIGERIA

By:

Alexandra Akaakar

B.S. Southern Illinois University, 2017

A Thesis

Submitted in Partial Fulfillment of the Requirements for the

Master of Science Degree

Department of Agribusiness Economics

in the Graduate School

Southern Illinois University Carbondale

May 2019

THESIS APPROVAL

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Master of Science

in the field of Agribusiness Economics

Approved by:

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April 4, 2019

AN ABSTRACT OF THE THESIS OF

ALEXANDRA AKAAKAR, for the Master of Science degree in Agribusiness Economics, presented on April 4, 2019 at Southern Illinois University Carbondale.

TITLE: OIL DEPENDENCY AND NATIONAL FOOD SECURITY: A CASE FOR NIGERIA

MAJOR PROFESSOR: DR. WANKI MOON

Food insecurity is a condition of insufficient access to quality nutritious food; it is often rooted in shocks that interrupt the food production/distribution system in an area. Amidst the capabilities of Nigeria's agricultural system, the number of households across Nigeria experiencing food shortages has increased rapidly. The main reason for this increase was food price increase. This incident highlighted a huge vulnerability in Nigeria's food system, the vulnerability to price shocks. Incidences such as poverty and conflicts magnify the frequency of food insecurity. The ability to reduce vulnerabilities while addressing existing issues in food production and supply depends on **a stable economy and innovative policy**. As a major oil exporter, Nigeria's economy is affected by oil price fluctuations. This paper analyses the extent of the effect and how such volatility could increase vulnerability in the food system. The analysis in this treatise examines economic and agricultural factors to identify trends that negatively affect Nigeria's current food system. Oil prices were significant in explaining variation in food price shocks and Gross Domestic Product (GDP). Food price shocks are one of the symptoms of economic downturns. Agricultural innovation, and economic policies need to be formulated to prevent such shocks in the future. Given the dependency of economic performance on oil prices, a major move would be to diversify the Nigerian economy; with adequate attention being paid to agriculture.

This research is presented in five chapters. Chapter one is an Introduction to the food security problem in Nigeria. Chapter Two is a literature review that explores Nigeria's agricultural development and socioeconomic factors that compromise food security. Chapter three renders data analysis using graphs and two econometric models to analyze the relationship between the Nigerian economy, food security and oil prices. Chapter Four is devoted to a critical appraisal of the multidimensional problem of food security. The discourse concludes with Chapter Five summarizing findings, recommendations and conclusion.

DEDICATION

To:

My Mum and Dad, I finally finished it

To my dear Country Nigeria, I believe in you

God Almighty, the source of my strength throughout this program

ACKNOWLEDGMENTS

It is with a lot of gratitude that I thank:

- My Creator and Counsellor-the Almighty God
- My Family
- My Professors
- My academic adviser Dr. Moon
- The Committee Members Professor Altman and Professor Randleman

Their Guidance through this Process was Invaluable

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CHAPTER 1

INTRODUCTION

Background

The Nigerian agriculture industry is dominated by the production/processing of several foodstuffs and agro-allied products. Some of the products Nigeria grows are rice, sorghum, millet; tree crops such as cocoa, cashews and palm fruit; oilseeds, tuber crops, spices, and fiber crops. Nigeria produces the cash crops timber and rubber. The environment can also support various fishing and animal husbandry activities. Most of these produces are consumed in Nigeria while some of them are exported. Before the civil war, Nigeria was a food sufficient country, but food imports increased after 1973.

Agriculture contributes 5% of the economic goods exported out of Nigeria, the other 95% of exports are made up of petroleum and petroleum products (OEC¹, Nigeria). Cocoa is the leading non-petroleum foreign exchange earner even though growth in cocoa production has been slow since the Nigerian Cocoa Board was disbanded in 1986 (Mabbs-Zeno, 1987). Nigeria exported 300,000 tons of cocoa in 2017 but has the ability to produce much more than that. In recent years, the Cocoa Association of Nigeria (CAN) has taken effective steps to improve the cocoa exports and revive Nigeria's agricultural sector. Cocoa production in Nigeria increased by 20% between 2016 and 2017. However, Low yield, aging trees, and lack of proper equipment have inhibited production (Fawole & Ozkan, 2018). Mismanagement has contributed significantly to the decline of agriculture-based industries in Nigeria. Other exported agricultural produce includes tree nuts, animal feeds, herbs, and teas.

¹ Observatory of Economic Complexity: The world's leading visualization engine for international trade data.

The agricultural sector remains the largest employment sector in Nigeria, it comprises of crop cultivation, forestry, fishing, and animal husbandry. Employment in this industry accounts for approximately 40% of the labor force. Subsistence farming which is done with simple tools is the most common type of farming. The farmers mostly practice shifting cultivation and small farm holdings are scattered across Nigeria. These farmsteads produce approximately 80% of the total food from the 30.7 million hectares of arable land currently under cultivation.

Previous research has shown that small and large farms can be profitable in Nigeria, but more extension services and better resource management are needed to realize this (Aihonsu, Shittu, Bamiro, Idowu, & Onajole, 2006; Baiyegunhi & Fraser, 2009; Ojo, 2008). Nigeria's diverse climate ranges from tropical coastal areas to arid and savannah regions. This creates suitable conditions for several agricultural products from the tropics and the subtropics to be cultivated. The economic benefits of this are recognized by the government, and to some extent, the population yet largescale agriculture is not common in Nigeria (Udoh, 2016).

Poverty is a problem to be dealt with in several countries and regions all over the world. Effective strategies for reducing the number of people living in poverty have been the subject of several research studies and policies worldwide. According to the World Bank, there has been clear progress on reducing poverty over the past decades. The world attained the first Millennium Development Goal target—to cut the 1990 poverty rate in half by 2015—five years ahead of schedule in 2010 (worldbank.org). Even though worldwide poverty rates have decreased significantly, the progress is uneven and there is still a long way to go. Nigeria was

ranked 103rd out of 119 countries on the 2018 Global Hunger Index (GHI)² and 157th out of 189 countries on the 2018 UNDP Human Development Index (HDI)³.

Food poverty is the state of being without consistent access to enough, affordable and nutritious foods. It can be triggered by personal circumstances, but it could also be a long-term effect of manmade economic shocks or instability. Relief is often given by humanitarian organizations to areas experiencing famine, drought, and hunger- these are the extreme cases of food poverty. Attention to the vulnerabilities faced by people experiencing food poverty is a relatively new thing. In early 2017 the United Nations (UN) named Nigeria as one of the countries with people at risk of famine. Looking at the trend in previous Global Hunger Index reports, it is clear that Nigeria has gotten more food insecure from 2012 to 2017 (Table 1).

²The GHI measures the Proportion of undernourished people in the population, the Prevalence of wasting in children under five years, Prevalence of stunting in children under five years, and the Under-five mortality rate

³ The HDI measures the life expectancy at birth, education and the standard of living for the population

⁴Table 1 NIGERIA GLOBAL HUNGER INDEX RANKING

year	Ranking	GHI score
2018	103 out of 119 countries	31.1
2017	84 out of 119 countries	25.5
2016	84 out of 118 countries	25.5
	19 th out of 42 African countries	
2015	91 st out of 104 countries	32.8
2014	38 th out of 76 countries	14.7
2013	39 th out of 78 countries	15.0
2012	40 th out of 79 countries	15.7

The food poverty situation is not evenly distributed in the country. The northern part of Nigeria is being hit the hardest because of the internal Boko Haram terrorist group clashes. However, despite the link between food poverty and conflict, it is possible to have conflict without it leading to hunger and food poverty (GHI, 2015).

Goal 1 of the Millennium Development Goals (MDG) which era was concluded in 2015, was to “eradicate extreme poverty and hunger”. Goal 2 of the Millennium Development Goals (MDG) is to end hunger and promote sustainable agriculture; making sure all people especially children- have access to sufficient and nutritious food all year round. Accelerated agricultural growth has been a cornerstone of successful poverty reduction and the MDG aims to implement sustainable agriculture. Food security programs have been one of the targets of organizations like

⁴ *Compiled by this author.

**Source: Global Hunger Index published by Food and Agriculture Organization (FAO) in faostat data.

***10-19.9 (moderate hunger), 20-34.9 (serious hunger).

the World Health Organization (WHO), Food and Agriculture Organization (FAO), and International Food Policy Research Institute (IFPRI). These organizations promote multi-sectoral initiatives to achieve global food and nutrition security. Food security carries significant benefits for human health and serves as the basis to achieve sustained economic growth. A food insecure and malnourished population stunts necessary human capital development.

The General Household Survey (GHS) is a nationally representative survey administered in Nigeria every 2–3 years. It covers a range of topics including education, welfare, agriculture, health and food security of households in Nigeria over time. Between 2011 and 2016 the number of households reporting food shortages increased on average by 50% nationally (Figure 1), the effect was seen comparably in both urban and rural households.

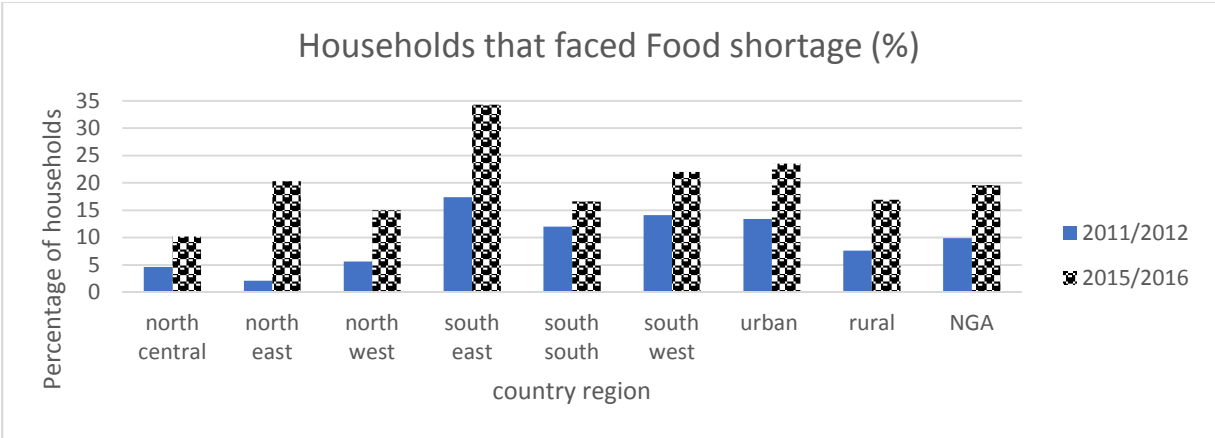


Figure 1 PERCENT OF HOUSEHOLDS REPORTING FOOD SHORTAGES IN 2011 AND 2015

In geographic areas that previously had a low household food shortage, there were increases of as much as 90% in the number of households (HH) reporting food shortages (Table 02). The most reported reason for this food shortage was a food price increase in that time period. The food price shocks were part of a greater economic slump beginning in 2014 that resulted in Nigeria’s economy experiencing a recession by 2016 (Afimia, 2017). The exponential

rise in food prices were ripple effects of dwindling oil revenue amongst other glaring factors, like the neglect of the agriculture sector. Available statistics revealed an 18.3 percent year-on-year basis increase as at October 2016, the highest inflation rate in about 12 years. (National Bureau of Statistics [NBS])

Table 2 PERCENTAGE CHANGE IN NUMBER OF HOUSEHOLDS REPORTING FOOD SHORTAGE

HH faced food shortage in last year	2011/2012	2015/2016	%change
north central	4.6	10.2	55%
northeast	2.1	20.3	90%
northwest	5.6	15	63%
southeast	17.4	34.3	50%
south south	12	16.6	28%
southwest	14.1	22	36%
urban	13.4	23.5	43%
rural	7.6	16.9	55%
NGA	9.9	19.6	50%

Compiled by this author. Source: GHS Panel Survey

The food shortages also highlight an underlying vulnerability in Nigeria’s food production and supply system. This research adds to the existing literature by exploring links to oil dependency in the agriculture sector and its relationship to other socio-economic factors. Acknowledging that a key to food poverty reduction is agricultural development, this study focuses on identifying

agriculture-related factors influencing the extent of vulnerability to food poverty in a developing economy like Nigeria.

The Research Problem:

There is food poverty in Nigeria, and it is exacerbated due to price shocks that cause food price increases. Nigeria has a booming agriculture sector with sizeable capacity for expansion, yet the country is vulnerable to price shocks that lead to food insecurity.

The Research Question:

What factors need to be addressed to ensure better food security in Nigeria with regards to economic growth and agriculture?

The literature review in the next chapter provides a more in-depth look at Nigeria's agriculture sector and discusses previous research on the theoretical benefits of agricultural development. It discusses how oil dependency and social factors can compromise food security vulnerabilities. The empirical analysis briefly describes the data and results of two econometric models. The data were annual statistics obtained from secondary sources. In the discussion, the implications of results on food security in the Nigerian economy, the shortcomings of the analysis are also presented. The conclusion summarizes the paper, presents the closing of these research findings and suggestions for further study.

CHAPTER 2

LITERATURE REVIEW

Economic Growth and Agriculture

The debate around economic growth and agriculture starts from determining if agriculture is important for economic growth. Should a government invest in the agricultural sector or the manufacturing sector as a means of boosting the economy? Evaluating the Pro-poor effects of manufacturing found that investing in the agro-processing industry brought about pro-poor effects. Research from Thailand shows these came from agricultural unit purchases and employment of poor farmers in factories (Watanabe, Jinji, & Kurihara, 2009). Previous research has found that South-East Asia's economic success is based on export-oriented industrialization. Efforts to open up Africa for further development have proposed that African states should imitate south-east Asia export oriented structure. This point of view was undermined by Indonesia where their economic expansion preceded their industrial boom by 15 years. Poverty reduction was used to measure the success of Indonesia's economy. The number of people living in poverty reduced by 50% in the 15 years before industrialization and the rate of reduction was slower under industrialization (Henley, 2012).

This supports the view that industrialization and its pro-poor effects are important to sustain economic growth, but do not necessarily kickstart it. Agricultural growth measurements such as land/labor productivity, yield analysis, and sectoral composition have shown up to 50% reduction in poverty with as much as 10% increase in labor or land productivity (de Janvry &

Sadoulet, 2009). Given the number of Nigerians living in poverty, it is safe to say that the pro-poor benefits of agriculture will be a welcomed relief in both urban and rural Nigeria.

Strategic development in agriculture has directly contributed to achieving five of the Millennium Development Goals (MDGs). Reducing the number of people in extreme poverty by strategizing public spending and growing pro-poor crops (James Wabenga & Jean Blaise Nlemfu, 2016), promoting gender equality and women empowerment (Lenis Saweda O. Liverpool-Tasie; Omotoso, Daud, Adebayo, & Omotayo, 2018) ensuring environmental sustainability and increased market access through innovative agri-food systems (El Bilali, 2018). Previous research strongly supports the view that the pro-poor impact of agricultural growth will be overall improved access to better quality food, increase in farm wages, the creation of employment both on and off the farm, empowering marginalized groups and promotion of sustainable natural resource management.

Agriculture is just one of the major non-oil sectors of the Nigerian economy, the rest are the mining, manufacturing and construction sectors. Nigerian Agriculture can be divided into three distinct phases, namely:

- The pre-1970 phase,
- The 1971-1984 phase, and
- The post-1984 phase (Nwagbo)

During the Pre-1970 period, agriculture was Nigeria's dominant sector and it led to food surpluses. Cash crops were the focus of this boom with agricultural products being exported for foreign exchange. After 1970, Nigeria was feeling the effects of the 1967-1970 civil war and petroleum had become the dominant revenue source being used to support the economy. The Nigerian economy became monolithic and extremely reliant on oil revenue to cover recurring

expenditures such as food, refined petroleum and processed goods. However, Nigeria did not fully harness the potential of the oil windfall due to corruption and mismanagement (Esu, 2017). The non-oil sector including agriculture, took a great hit as its development and contribution to Nigeria's GDP declined.

The first shock to oil prices rocked Nigeria in the '80s. It led to a recession that had Nigeria's leaders struggling to decide how food import bills were to be paid for and threw the population into poverty. In 1980, Nigeria had a rural poverty rate of 28% and an urban poverty rate of 17%. In the post-1984 phase of agriculture, urban poverty had risen to 38% and rural poverty was at 51% by 1985 (NBS). Looking back, this high increase in poverty was not surprising. Rural-to-urban migration increased with the urban development that accompanied oil exploration in Nigeria. Oil export income collapsed, and gross food importation left urban areas facing food price shocks while rural areas dealt with increased hardship. The recession led to several years of policies aimed at poverty reduction, rural development and reviving industries that had declined from overreliance on petroleum. These policies had positive effects on the agricultural sector. The Agricultural policy in this era was aimed at increasing food production. According to the Federal Agriculture Coordinating Unit (FACU, 1993), it performed better in this decade (the 80's) than the previous one (70's) (Nwagbo). The notable policy strides include the:

- National Policy on Food and Security 1988.
- Agriculture in Nigeria: The New Policy Thrust 2001.
- National Food Security Programme (NFSP) 2008.
- Agriculture Transformation Agenda (ATA) 2012.
- Agricultural Promotion Policy (APP) 2016-2020.

Nigeria's agricultural growth strategy in this era centered on increasing the amount of land under cultivation and increasing the productivity of land under cultivation. Moving forward in the 21st century, this approach would not be encouraged as a means of reviving Nigeria's agriculture sector. Factors such as mismanagement of grassland, shrubland & forests, population density, and land use intensity have drastically affected land use patterns in Nigeria. Land use effects vary to differing degrees between the north and south of the country depending on the economic activities and tenure systems (Arowolo & Deng, 2018). The issues of rural-to-urban migration and population increases (Farinmade, Soyinka, & Siu, 2018), conflict (Bunu, Kundili, Mustapha, & Mani, 2014) and climate change (Nwite & Alu, 2017) have altered Nigeria's land use patterns over the past fifteen years. Arowolo & Deng's analysis has shown that with increases of up to 7% in population density, the land expansion for cultivation in urban areas reduces, the rate of reduction increases with proximity to major cities.

The Agriculture sector still suffers from colonial influences that favor cash crop production over food crops. Cultivated grains were more likely to be used for poultry feed and for prepared beverages. Cotton, coffee, and other nonfood crops were also more likely to be grown for export. Foreign exchange and capital were needed to fund and maintain these enterprises and assume the risks brought by monoculture cultivation of crops. The sustenance of this colonial system combined with an over-reliance on petroleum had several negative effects. It introduced disruption into the peasant farmer economy, encouraged increased rural to urban migration, and it left rural and urban agro-industries unable to sustain production (Attah, 2012). Policies that encouraged mechanization and large-scale cultivation benefitted large farms and foreign-owned farms, putting smallholder farmers at risk. These farms were likely to choose

different crops from those common among smallholders, the consequence of this was local food self-sufficiency received less priority (Mabbs-Zeno, 1987).

With an increase in agricultural productivity, came oil-dependent agriculture. Refined petroleum was needed to power agricultural production and oil revenue was needed to import key inputs such as machinery and fertilizer. This made the agricultural sector in Nigeria particularly vulnerable to oil price shocks. There is appreciable literature highlighting how oil prices have direct and indirect effects on economic activity by influencing supply and demand (Moshiri & Bakhshi Moghaddam, 2018). Changes in oil prices have effects on the consumption and investment behavior of firms and individuals; this would reflect negatively in a country's trade. Consumption is affected by a reduction in disposable income and investment is negatively affected by firms facing increasing input costs. Oil price changes also impact foreign exchange markets, volatility can cause stock exchange panics, increased interest rates, inflation and eventually lead to monetary and financial instability (Aliyu). This volatility makes it unwise to have recurrent expenditure such as food, fuel, and fertilizer dependent on exchanges made in the international market.

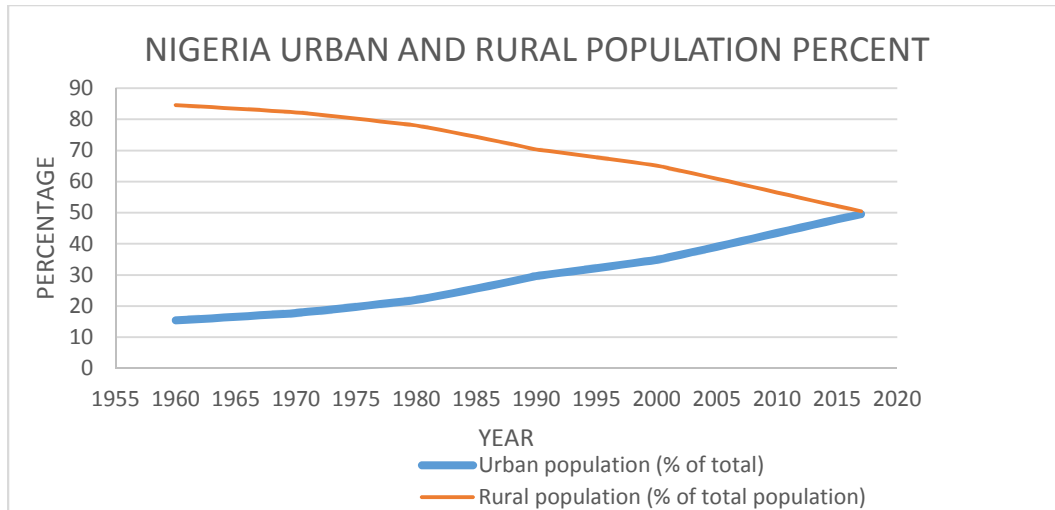


Figure 2 URBAN: RURAL POPULATION COMPOSITION

Consequences of drastic land use changes are felt in the global, regional and local economy. As populations become more “urbanized”, the demands placed on available land changes. Previous research into land use change have linked more intensive land use activities such as farming, animal rearing and tree harvesting with increased risks for natural disasters, increased greenhouse emissions and land degradation (Arowolo & Deng, 2018). Nigeria’s population has become increasingly urban (Figure 2). As the population pressure increased urban areas were more reliant on food grown in rural areas and imports. More land is converted for crop cultivation and animal husbandry in the rural areas than in the urban. As the urban population grew the distance food had to travel between harvesting and consumption increased.

To bridge the gap between food production and food consumption, food importation was increased dramatically at the detriment of local production. Some staples like oil palm went from zero quantities being imported to over 700,000 tons being brought in (Table 03).

Table 3 IMPORT QUANTITY (TONS) FOR STAPLES

Foodstuff	1990	2000	2010
Rice	224,000	785,741	1,882,759
Oil palm	0	102,600	780,000
Flour (Maize)	14	1	7,103

Compiled by this author. Source: National Bureau of statistics

An analysis of Nigeria's food imports revealed that although there was a positive trade balance, the annual food import bill was five times the export (Vaughan, 2014). Nigeria imported an average of ₦1.923 trillion (USD 5.3 billion, at 2019 exchange rate) worth of commodities per annum in the period between 1990 – 2011. Essentially importing ₦1.0 billion (USD 2.7 mil.) worth of food per day. Oil revenue was used to support food import bills but was not adequately invested into smallholder and Rural farming initiatives.

According to the International Fund for Agricultural Development (IFAD) 2007 assessment, improving the competitiveness of smallholder farmers would create employment, increase investment and stimulate economic growth. These benefits would have accrued had steps been taken to better empower small farms. The International Food Policy Research Institute (IFPRI) carried out an International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) analysis in 1995 based on projections of food production and consumption between 2005 to 2020. That analysis predicted pessimistically, that the cumulative effect of reduced economic growth, investment and productivity would be seen in a rise in the price of staple foods. The prices would increase by 13 - 27% and there would be an increase in the number of malnourished children ("Global Food Projections, IFPRI," 1995). However, if agricultural investment and productivity can be maintained, even under reduced economic growth, there would be price stability and fewer dire consequences. The IFPRI has a few recommendations to maintain agricultural productivity. They recommend pro-poor agriculture

growth such as growing pro-poor crops and public investment in rural agriculture. They propose reduction in agricultural market volatility by expanding social safety net programs for farmers.

Food security

Food security means having physical and economic access to enough food to meet dietary requirements and live productively. A nation is food secure when its citizens do not live in hunger or fear of hunger and can adequately engage in non-food consumption without compromising food consumption. If zero hunger, the SDG 2, is to be attained, food security must be on the front burner globally. As a matter of fact, food security is central to the achievement of the eight global SDGs. The centrality of food security is reflected in the elasticity in dimensional and perceptivity scope. This is glaring in the various definitions proffered of food security. For example:

- Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices.

World Food Summit (1974)

- Ensuring that all people at all times have both physical and economic access to the basic food that they need. Food and Agriculture Organization (FAO) (1983).
- Access of all people at all times to enough food for an active, healthy life. World Bank (1986).
- Food security, at the individual, household, national, regional and global levels is achieved when all people, at all times, have physical and economic access, to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. World Food Summit (1996)

- Food security is a situation that exists when all people at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. FAO (2001).

Food insecurity is often rooted in poverty and has long-term effects on overall health and cognitive ability. Access to healthy nutritious food is critical in ensuring the growth of future generations (FAO). According to the World Bank, despite an abundance of urban slums 75% of the poor in developing countries live in rural areas and are employed in agriculture. That is why growth in the agriculture sector has been found, on average, to be at least twice as effective in reducing poverty as growth in other sectors (de Janvry & Sadoulet, 2009). Nigeria's current state of food insecurity is influenced by land use changes, urban migration and lack of development as a result of oil dependency.

Agri-food policy research advocates for a deeper understanding of potential pathways to sustainability through agriculture. It argues for a normative focus on poverty reduction and more concern for the ripple effects of dynamic changes in agri-food systems, rather than the emphasis being laid on aggregates and averages which might not present the full picture (Thompson & Scoones, 2009). However, seeing as the data needed to support research into food security in developing countries can be incomplete, aggregates, averages, and proxies will have to be effectively used until more reliable data collection strategies can be implemented.

CHAPTER 3

EMPIRICAL ANALYSIS

Descriptive Data Analysis

The information presented in this treatise was collected from the Nigerian National Bureau of statistics (NBS) and data collected by international organizations. The database of the world bank and the Food and Agriculture Organization (FAO) are employed extensively for this analysis. The data sets covered the 57-year period from 1960 (Year of Nigeria's independence) to 2017. The data are Nigeria's GDP, the average West-Texas-Intermediate (WTI) oil prices, Consumer Price Index (CPI), Food Production Index (FPI) and the percentage contribution of agriculture to Nigeria's GDP. In studying food security there are several significant indicators that could be considered. A brief example would be smallholder empowerment, land use factors, and levels of agriculture inputs. For this analysis, only variables that quantified oil dependency, food production and economic performance were analyzed. Graphs of the GDP and oil prices are made in order to observe their pattern.

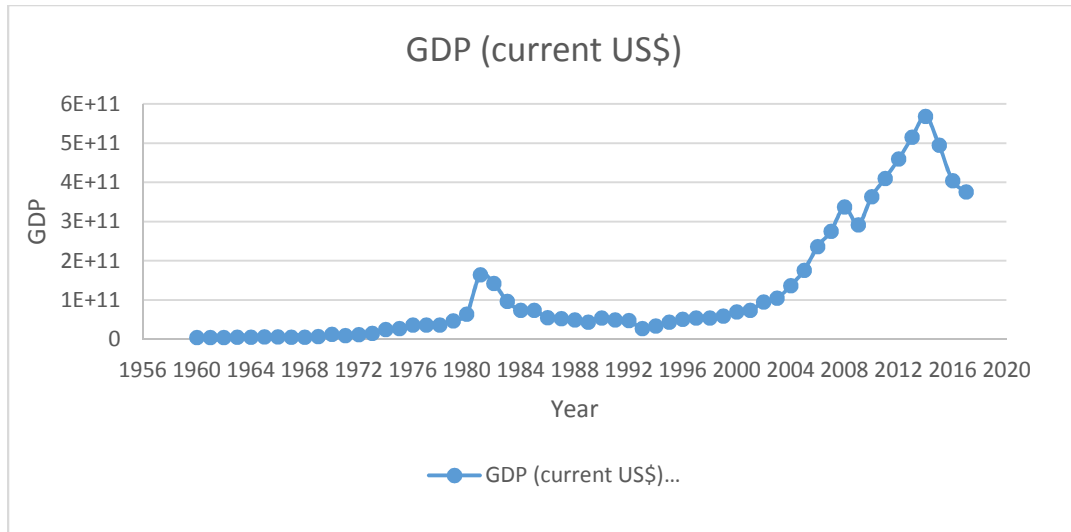


Figure 3 ANNUAL GDP OF NIGERIA,

The GDP is the amount of value added by all producers in the Nigerian economy after subsidies are removed. Value added is the value of the gross output of producers, the intermediate goods and services that go into production are not included in final value of output. The conversion to dollars was done using single year official exchange rates for domestic currencies. Nigeria's GDP value has been generally increasing from 1960 to 2017, Figure 3 depicts short bursts of accelerated increase in the GDP followed by a steep decline and slow recovery.

The rate at which the Economic growth happened has not been constant over the years even in periods with value increases. The years 2010 to 2015 show an increase in the value amount of the GDP (Figure 3) but by graphing the percentage change in it (Figure 4) it is revealed that it was a slow growth period. The decline in the amount of income that happened in 2015 and 2016 was preceded by a slowdown in economic growth in 2014. In 2014 growth slowed from 6.2% to 2.6% in 2015 and -1.6 in 2016.

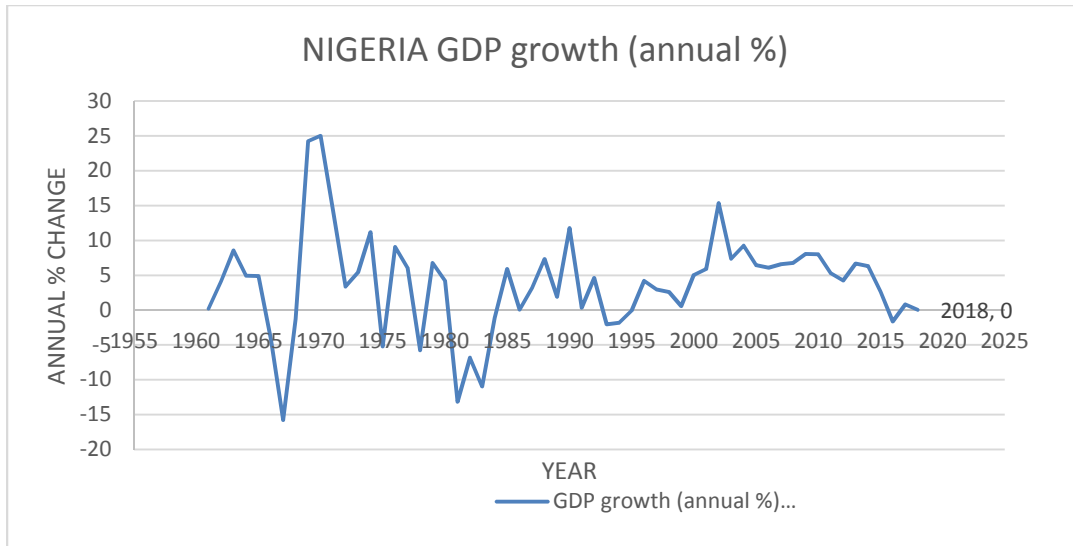


Figure 4 PERCENTAGE CHANGE IN GDP ANNUALLY

The West Texas Intermediate crude oil is a very high-quality crude, it is lightweight and has a low sulfur content making it one of the best crudes for gasoline production. That is why it serves as the major benchmark of crude oil in the Americas, it will be used in this research project to represent global oil prices. The price of crude oil has been on the rise (Figure 5) with positive and negative changes being influenced by the global supply and demand for oil.

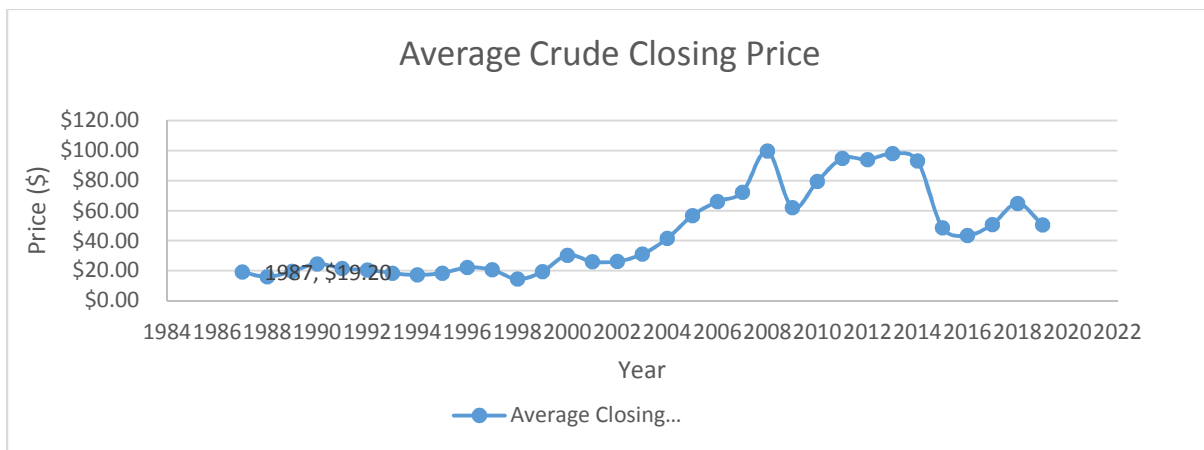


Figure 5 AVERAGE CRUDE CLOSING PRICE

The period between 2011 to 2014 had stable oil prices, between 2014 and 2015 the average closing price of oil went from \$93.17 per barrel to \$48.72 (Figure 6). This corresponds to a period of slow economic growth and recovery Nigeria's economy showed from 2014 to 2016. Shale oil is crude oil that lies between layers of shale rock. The rocks are broken up to allow access to the layers of oil, a recent breakthrough in technology allowed this oil to come to market at a competitive price. As a result, oil prices dropped. This accounts for the shock to oil prices.

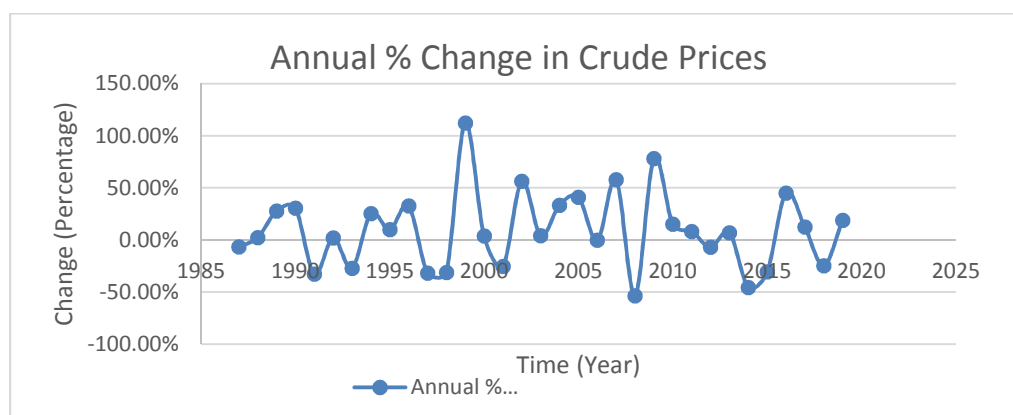


Figure 6 PERCENTAGE CHANGE IN CRUDE PRICES

Regression Analysis

Nigeria's economy is affected negatively by oil price fluctuations. The effects of the previous year oil prices are seen in the current years GDP. The model to test this would be:

$$\log(GDP_t) = \beta_0 + \beta_1 \log(X_{t-1}) + \beta_2 \log(X_{t-2}) + \varepsilon$$

GDP_t = The current value of Nigeria's GDP in USD

X_{t-1} = Average WTI Oil Closing Prices from one year ago

X_{t-2} = Average WTI Oil Closing Prices from two years ago

H_0 : the Nigerian Economy is not affected by previous oil prices

H_1 : the Nigeria economy is positively affected by previous Oil Prices

Table 4 DOUBLE LOG ESTIMATION OF GDP AND OIL PRICES

VARIABLE (LOG GDP)	COEFFICIENT	t-Statistic
CONSTANT	-0.358299	-1.105766
LOG (OIL_CLOSE (-1))	0.782547*	3.260454
LOG (OIL_CLOSE (-2))	0.681245*	2.878152
	R-squared	0.912081
		F-statistic
		134.8639

The oil closing prices of two previous years give significant coefficients when estimated in the log-log model. The oil price of the previous year has a larger elasticity than the oil price of two years before but both effects are significant. The null hypothesis is not supported by the results, so it is rejected.

National food insecurity was reported as a result of price shocks and to account for this at a national level the Consumer Price Index is analyzed. The Consumer Price Index captures changes in the cost of acquiring a basket of goods and services that may be fixed or changed at specified intervals. It compares prices monthly, quarterly and yearly; the yearly figures are used in this case. The index is usually computed as a weighted average of sub-indices for different components of an average consumer's expenditure. The consumer price index is set as a Constant in the model because it captures sharp changes in costs that happen over short periods of time.

The Food Production Index is compiled by the Food and Agriculture Organization of the United Nations (FAO). The index shows the level of the aggregate volume of agricultural production for each year compared with the base period 2004-2006. The commodities covered are all crops and livestock products produced in Nigeria, with the main exception of fodder crops. The produce marked "food production" only includes commodities that are considered edible and contain nutrients. Coffee and tea are excluded along with inedible agricultural products such as flowers and decorative gourds because they have no nutritive value. The Food

Production Index is included in this model because it accounts specifically for how much food is produced in Nigeria.

The contribution of agriculture to the GDP of Nigeria includes value added of forestry, hunting, and fishing, as well as crops and livestock production. The Value added is the net output of each sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for any asset depreciation or accounting for the degradation of natural resources. The determination of “Value Added” is done by the International Standard Industrial Classification (ISIC). The percent contribution of agriculture to the GDP is included in the model as a measure of the importance of agriculture in the Nigerian Economy.

The oil Prices and GDP value of each year are included in the model to capture changes in their value and their relationship to the Consumer Price Index.

Food price increase = f (food productivity, Importance of Agriculture to the Economy, oil price shocks, economic performance)

Food price shocks = Consumer Price Index

How Much Food is being produced in Nigeria = Food Production Index

Importance of Agriculture in Nigeria’s economy = Percentage of GDP derived from Agriculture

Oil Price shocks = Average WTI closing price

Economic Performance= Nigeria GDP (USD Billions)

CPI=f (Food Productivity Index, Percentage of GDP derived from Agriculture, Average WTI closing price of oil, GDP of Nigeria)

Table 5 LINEAR ESTIMATION OF FOOD PRICE SHOCK DETERMINANTS

Variable (Consumer Price Index)	COEFFICIENT	TSTAT
Constant	-58.26052	-5.727729
FOOD_PROD_INDEX	0.293751*	2.436690*
GDP_AG_	-0.237914	-1.013107
OIL_CLOSING_PRICE	-0.335557*	-4.596267*
NIG_GDP_USD_BIL_	4.575366*	13.86305*
	R-squared 0.987154	F-statistic 480.2797

The significant variables returned by this estimation were the food productivity of Nigeria, the closing price of oil and the GDP of the country. The contribution of agriculture to the country's GDP was not significant in explaining variations in the Consumer Price Index.

When interpreting CPI, the shortcomings in the variable are considered. The coverage of the index does exclude some key groups in its calculation. It excludes expenditure made by a country's citizens when abroad and it excludes the expenditure of visitors to the country. It may not capture the consumption of people in rural areas and those that are extremely rich or extremely poor because it focuses on goods and services consumed by the average person.

CHAPTER 4

A DISCUSSION OF NATIONAL FOOD SECURITY

Regression Results

There are two empirical models run in to estimate the relationship between food security, Nigeria's economic performance, and oil prices. Several yearly data sets were downloaded for this analysis, the data was cleaned, and only reasonably consecutive data sets were used in the study.

The oil prices of a previous year and two years before are significant determinants in Nigeria's economic performance (Table 04). The elasticity of oil price from the previous year is 0.78 and the elasticity of oil price from two previous years is 0.68. Oil prices have been shown to significantly affect the global economy and stock market behavior in a country (Jain, Arekar, & Taherah, 2018; Mohalhal, 2015). Previous estimates have forecasted an increase in Nigeria's GDP with Increasing oil prices. The positive coefficients from the estimation (Table 5) are in line with this finding. The previous year oil prices are used because previous year oil revenues are included in the next year budget. The estimate shows the price from the previous year has a larger effect on the GDP than the price of two previous years. However, the effect of oil prices from previous years are still significant in the future.

The oil prices, the food productivity index and the GDP of Nigeria were significant in explaining the variation of the Consumer Price Index. In the linear estimation (Table 5), value added to the GDP from agriculture was not significant in explaining variations in CPI. The FPI and GDP have significant positive linear relationships to the CPI

The closing price of oil has a negative linear relationship with the Consumer Price Index. The response of commodity prices to oil price shocks differ based on the specific commodity and the underlying cause of the shock (Ahmadi, Bashiri Behmiri, & Manera, 2016). The effects of the oil shocks to the CPI become more apparent over time, this may be why the closing price of the current year has a negative relationship with the CPI of the same year. The positive relationship between the FPI and CPI were surprising because increased food productivity should have a negative relationship to food price shocks. This points to an area where more research is needed because the relationship between CPI and FPI could be better explored.

Food Insecurity and Oil dependency In Nigeria

The Consolidated Revenue Account of Nigeria is a fund into which government revenue derived from taxation and economic activity is paid. This account handles the salaries and pensions of government workers and the recurrent expenditure of the country. Export income from oil sales has accounted for an increasing percentage of funds remitted into the account. The contribution to the consolidated revenue fund from oil revenue was 64% in 1981 and steadily increased to 77% by 2001. As at 2017 Oil revenue accounts for 75% to 80% of government expenditure and 90% of export income earned.

The economic performance of Nigeria is strongly tied to her ability to trade oil at a reasonable price in the international market. The oil revenue earnings are shared between government levels, 52% of the earnings go to the federal government while state and local tiers of government receive 27% and 21% respectively. These oil earnings serve as an important part of federal, state and local government project funding. When the amount going to each tier of government is decreased it compromises ongoing economic activities at each level. The sad

effect of having oil dependency is the creation of a 'waxing and waning' cycle in Nigerian currency as oil revenue increases and decreases. This leaves non-oil sectors vulnerable to price shocks and inflation, in sectors like agriculture, transport, and power the consequences are severe and long-term.

Nigeria is proof that oil exporting on its own cannot transform an underdeveloped economy, more innovation is needed to loosen the oil dependency and speed up the growth rate of the economy. Nigeria is now classified as a middle-income, mixed economy with good prospects as an emerging market according to the International Monetary Fund (IMF). The economy is ranked as the 27th-largest in the world in terms of nominal GDP, and the 22nd-largest in terms of purchasing power parity. Expansion in the manufacturing, financial, service, communications, technology, and entertainment sectors has accounted for recent growth.

This trend is expected to continue, and corporate taxes have increased government revenue as part of the ongoing government efforts to reduce its oil dependency. In the midst of these economic strides, 86 million Nigerians were reported as living below the \$1.90 poverty line in 2018. Nigeria has a noticeable paradox, income and poverty levels have continued to rise simultaneously. This shows that the poor in Nigeria do not benefit from her income growth. The implication of this is that growing poverty will continue to pose greater challenges to the Nigerian economic prosperity irrespective of the height she appeared to have attained

Food security remains a major challenge in Nigeria with the proportion of poor and undernourished people increasing every day. Consumer Price Index is a major driver of food insecurity in Sub-Saharan Africa. Previous CPI research has found that incidences of food price inflation have increased in many Sub-Saharan African countries. (Abdoulaye, LanHui, & Beckline, 2015). The effect of this increase is seen as a reduction in the purchasing power of

households thus exposing these households to food insecurity. This played out in Nigeria, the effect of poor trading terms in the international oil market were seen in as an increase in CPI over a short period of time felt mostly by Nigerian households who had to spend a greater percentage of income on food. The Nigerian economy reacts this way because the ties connecting sectors such as agriculture, transportation, and energy to oil revenue are strong.

Crude oil provided many benefits to Nigeria;

- It created employment.
- It increased government revenue
- It Provided a source of energy
- Improved the standard of living in some areas
- Established a lot of oil-related feeder industries upstream and downstream of the supply chain
- It brought in foreign exchange

The presence of oil improved Nigeria's bargaining stance in the international market.

This should be leveraged strategically to heal one of the negative effects of oil dependency, food insecurity. The process of achieving food security should be done in a pro-poor manner.

Attempts to improve the Agriculture sector have to be directed at providing the benefits that Crude oil provided. Achieving food security requires that the availability of physical supplies of food is sufficient, that households have adequate access to those food supplies through their own means, and that utilization of those food supplies appropriately meets the specific dietary needs of individuals.

The two main purposes of the agricultural sector are to feed the population and generate income. To reach this goal an agriculture sector must combine strong economic performance

with sustainable use of human/natural resources. Agriculture is fundamental to development, but the Agriculture sector does not need to become a major supporter of Nigeria's GDP. As countries become more developed agriculture is expected to comprise less of their GDP.

Moving forward with agricultural growth in Nigeria calls for viewing agriculture as a means to trigger economic growth, reduce poverty, narrow income disparity, provide food security and effectively manage the environment. It is possible to transform traditional agriculture in Nigeria into a modern sector by adopting science-based technologies and empowering smallholder farmers. The mostly “peasant farmer, family farmer or commercial farmer” model that characterizes the farm economy needs to be phased out. Emphasis should be placed on Strengthening the links between the agricultural and non-agricultural sector in a sustainable way, taking advantage of the unique markets for agricultural solutions that exist in the rural and urban areas.

Dependency on oil revenue, lack of smallholder empowerment and poor natural resource management were bad for the agri-food system. Despite the labor surplus in Nigeria, good technology is still needed as the image of the smallholder farmer needs to be improved and modernized. Figure 7 is a brief summary of avenues that could be set up to strengthen the farm economy and make it technologically sound. The productivity of smallholders, their contributions to the economy, food security and poverty reduction depend on services provided by well-managed organizations.

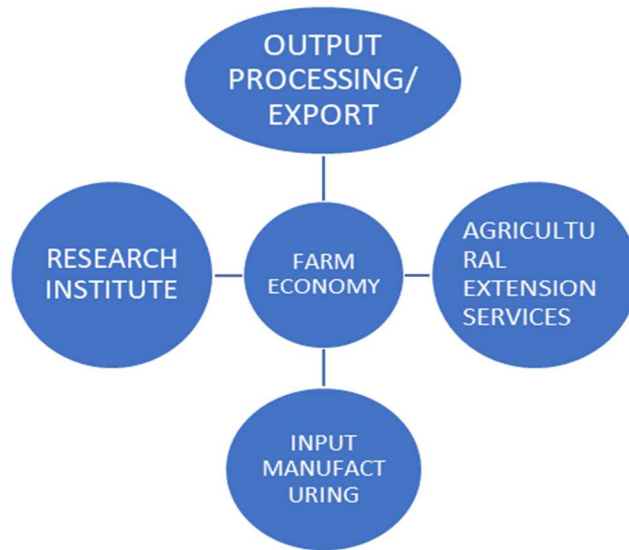


Figure 7 PICTURING THE FARM ECONOMY

Smallholders are an essential part of natural resource management; their farming practices can have significant effects on the rate of degradation of land resources. Agricultural extension services are needed because poverty, lack of knowledge and pressing needs can drive smallholders to put pressure on land and water resources. Better input manufacturing is needed because smallholder access to high quality inputs needs to be improved. Smallholders need access to quality inputs consistently, in re-empowering Nigeria’s smallholder’s conscious effort has to be made to reduce the oil dependency of agricultural inputs.

The data on quantity and quality of inputs such as machinery and fertilizer were mostly incomplete. This suggests that well-developed research institutes would be needed to collect consistent smallholder farmer Data. Graphing the information on yearly fertilizer consumption from 2009 to 2014 shows that Nigeria consumed more fertilizer than was produced in the country. It also shows that fertilizer consumption in relation to fertilizer production is reducing,

more information is needed to see why this is happening. With better data availability, small holder farms can be better managed to maximize efficiency.

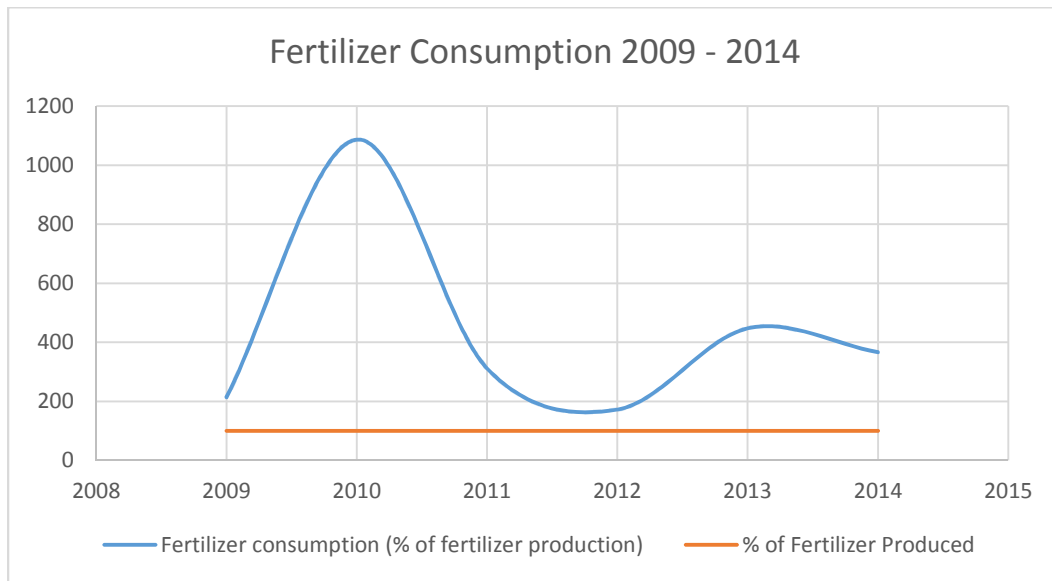


Figure 8 FERTILIZER CONSUMPTION

There should be an investment in implementing proper storage, harvesting and management techniques for all produce. This is to minimize waste and to ensure products are grown and stored properly (Okonkwo et al., 2018). Research by the Nigerian Stored Products Research Institute (NSPRI) calls for more awareness of storage and postharvest handling practices to be facilitated at the small, medium and large farm levels.

The previous approaches to agricultural science and innovation have failed to provide sustainable outcomes in developing countries. By not properly accounting for social effects and long-term effects when developing Nigeria's Agri-systems, vulnerabilities were introduced in food production and food supply. These vulnerabilities were multiplied by new challenges such as overpopulation, conflict and climate change. The main question to now be addressed is how to improve the resiliency and robustness of food production and supply in the face of growing risks

and uncertainties. The IFPRI recognizes that Global and national food security are closely tied to small family farmers. Small family farmers are more likely to experience the trifecta of poverty, food insecurity, and undernutrition. They also play a crucial role in improving food security and nutrition.

Strengthening the farm economy will require significant investment in human capital to ensure new technologies can be properly implemented and managed. Increased productivity among smallholders has been recognized as pro-poor since the 1970s. However, access to smallholder farmers in Nigeria to new technologies is severely limited. A problem identified is that smallholder farmers do not have access to improved seed varieties (Newswire, 2019). This is a global problem because improved seed varieties are currently only accessible to 47 million of the world's almost 500 million smallholders. Seed availability is just one small problem of a larger issue. The effects of globalization, new technologies, new institutions, new demand for higher value products and new markets have drastically changed the surface of agriculture. Steps to reform The Nigerian Agriculture system and achieve food security will have to develop with this in mind.

CHAPTER 5

SUMMARY, CONCLUSION, RECOMMENDATION

Nigeria is a major crude oil producer with an extremely diverse agriculture sector. The country mostly exports oil and the agriculture sector needs improvement. The most common type of farming is small-scale subsistence farming, this produces a large percent of Nigeria's food. In the empirical analysis of this study, a double log regression model was used to analyze the relationship between crude oil prices and the Nigerian economy. The analysis found that an increase in the oil price correlated with increases in the productivity of the Nigerian economy. However, Nigeria's economy is affected negatively by oil price decreases and Nigerian households are vulnerable to food price hikes as a result of this oil dependency. From this model it could be deducted that diversifying the economy would reduce vulnerability to future oil price shocks. The economic activities created by this diversification could present opportunities for further development.

A large number of people live in poverty in Nigeria and households report decreasing food consumption. Food insecurity is a problem across all income levels, and it compounds issues faced by the Nigerians living in poverty. A linear regression model was used to analyze the effect of food productivity, economic performance, oil prices and importance of the agriculture sector on food price shocks. Food productivity, economic performance and oil prices were all significant factors in explaining variation in food and consumer prices. The effects of oil prices on individual consumer goods and services could be negative or positive. The model used for this research returned a negative relationship between consumer prices and oil prices.

Stimulating the economy by encouraging more diverse means of producing goods and services would serve to reduce the harmful effects of low oil prices on consumers.

Agricultural development has been shown to have pro-poor effects. It has led to better food access, increased food quality, and better resource management when carried out strategically. Nigeria's agriculture sector has not provided pro-poor benefits consistently in the past and there are new issues that could prevent these benefits from being realized in the future. The specific issues addressed in this paper were smallholder disruption and land use changes from rural-to-urban migration.

Nigeria suffers from food insecurity as a result of oil dependency. In combating it, empowering small to medium farms has been a proven pro-poor means of improving food security in rural and urban areas. Nigeria's peasant farmer system was disrupted by increased rural-to-urban migration and lack of investment. Even though the smallholder farmers produce over 80% of Nigeria's food, they do so without consistent access to new technologies and poor extension services. As Nigeria's population moves more toward urbanization the gap between food production and food consumption will have to be filled more efficiently. This study proposes future research carried out on urban farming solutions to reduce import dependency and increasing smallholder access to new technologies

Food insecurity is a national issue and the combination of factors influencing it differ from urban to rural areas. Food pricing, production, and supply in Nigeria are linked to the performance of the economy, the effects of oil prices on the Consumer price index and the economy as a whole are significant. The IFPRI has found that if investment and productivity of the agriculture sector can be constant even under economic downturns food prices can remain relatively stable. stable food prices would put Nigerian households a step closer to achieving and

maintaining food security. Reducing the number of people facing food insecurity should have a positive impact on people living in poverty and provide a means to improve the national standard of living.

This study proposes that Nigeria develops a tech-savvy agriculture workforce to address food supply and productivity issues. Significant investment will have to follow this development so that growth in the agriculture sector can be outpaced by growth in other sectors without compromising efficiency. This paper does not state that improving agriculture would solve all of Nigeria's problems, but the social contributions and consumption patterns of a well-fed population would be encouraging to economic growth.

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Oil Dependency and National Food Security: A Case for Nigeria

Major Professor: Prof. Wanki Moon