

Household Food Insecurity in Nigeria Following the 2015 Oil Price Shock and Food Import Restriction Policy

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ABSTRACT

In this paper, the impact on household food security of the exchange rate effects of the 2015 oil price crash, coupled with the government's policy response to restrict the use of foreign exchange for major food imports in the same year, are investigated using panel data from three waves (2012, 2015 and 2018) of the General Household Survey. This survey is a nationally representative sample of approximately 5,000 households that have been surveyed six times across the three waves. It is found that despite the decline in real food prices globally, Nigeria experienced a marked rise in food insecurity, from approximately 26% of households in 2012/2015 to 43.7% in 2018. Nigeria had become more reliant on imported food between 2004 and 2015 as foreign exchange became readily available and the appreciated naira at that time made imported food relatively cheap. The precipitous decline in oil prices in 2015 led to a devaluation of the Nigerian naira, which in turn increased the price of imported goods. Moreover, the rise in food prices, to a large degree, is also tied to the restriction of the use of foreign exchange to import food items. This policy only succeeded in pushing food importers into the parallel market and raised the demand for foreign exchange. This weakened the parallel-market exchange rate and pushed up prices, especially food prices, that had already been rising. Consequently, more families were further pushed into food insecurity. This finding is consistent with the conclusion reached by Sen (1982) that food insecurity is rarely caused by nature, much more likely to be caused by poorly thought-out policy reactions to food market shocks.

Keywords: Food insecurity, GHS-P, Nigeria, Oil price shock, Policy.

JEL Classification: D10, E2, Q17

1. Introduction

Following nearly a decade of steady decline, food insecurity is once again on the rise across the globe (FAO et al. 2020). The number of individuals facing severe food insecurity and in need of immediate assistance in terms of food, nutrition and means of livelihood rose for the fourth year in a row in 2022. In 2022, fifty-eight countries witnessed an upsurge in the number of people suffering from acute food insecurity, which rose to about 258 million. This is a significant increase from about 193 million people previously documented across 53 countries in 2021. According to the FSIN and Global Network Against Food Crises. (2023), over 40% of the global population that fall into the IPC/CH Phase 3 or above—acute food insecurity at crisis or worst levels—are domiciled in only five countries, Nigeria being one of them. Food insecurity is therefore not only a major global problem but also a serious challenge for Nigeria. Moreover, the report also states that food insecurity in Nigeria varies across states and regions. The Global Hunger Index¹ (GHI) rating shows that Nigeria ranked 103rd out of 121 countries in 2022 with a score of 27.3. Food insecurity is more prevalent in Nigeria than in other sub-Saharan African countries such as Senegal, Cote D'Ivoire, Gabon, Namibia, Cameroun, Botswana, Gambia, Malawi, Mauritania, Djibouti, Benin, Togo, Mali, Kenya, Tanzania, Burkina Faso, Angola, Comoros and Rwanda.

Agriculture remains a major economic sector in Nigeria, accounting for about 23% of the gross domestic product and over 51% of employment. Yet, when compared with comparator countries, it becomes quite clear that food insecurity has been on the rise since the 2018 household survey of expenditures (Jung, 2023). Food security has thus remained a major challenge for policymakers in the country (Osabohien et al., 2020). Over the years, various policy interventions have been introduced to drive food security. Examples include; The Green Revolution, the creation of the Lower Niger River Basin Development Authority, Operation Feed the Nation, the creation of the Directorate of Foods, Roads and Rural Infrastructure, and the establishment of the National Agricultural and Land Development Authority. Unfortunately, most of these interventions have so far failed in creating food security. Factors such as weak institutional foundation, corruption and poor implementation have been touted as parts of the reason why these policy interventions failed (Aderinoye-Abdulwahab, 2020).

¹ <https://www.globalhungerindex.org/ranking.html>

In this paper, the exchange rate effects of the 2015 oil price crash coupled are investigated using detailed household-level data from the Nigeria General Household Survey-Panel (GHS-P) where a sample of approximately 5,000 households are surveyed 6 times between 2012 and 2019. The determinants of food insecurity are investigated when food prices are relatively stable (2012 and 2015) and are contrasted with the determinants of food insecurity in 2018 once the full effects of the 2015 oil price crash on the foreign exchange market had been felt. The Nigerian naira depreciated rapidly, and domestic food prices increased sharply as imports became more expensive.

Another important question this study seeks to answer is whether food insecurity in Nigeria was exacerbated by the policy decision to restrict the importation of food. Whether or not Nigeria's food insecurity has root causes that are linked to government policy regarding this aspect of its food policy is a key focus of this paper. It is obvious that several elements combine to determine how well Nigeria fares with regard to food security. Government policies are however crucial. While food availability is collectively dependent on choices made by consumers, producers and intermediaries, the government, through policies and regulations, influence these choices. The Nigerian government over the years has introduced various policies with direct and indirect consequences on food security. For instance, despite the lack of adequate financial reserves, compounded by corruption and inefficient spending affecting the national budget, that limited the government's ability to respond adequately to the 2016 recession (triggered by the drop in oil prices and the lack of diversified foreign exchange earnings), a series of initiatives were still implemented to improve the economy (Ministry of Budget & National Planning, 2017).

The past two administrations in Nigeria (between 2010 and 2019) viewed agriculture as the key to ensuring food security in Nigeria and thus focused on propelling the agricultural sector into development. In 2010, the Nigerian Government initiated the Agriculture Transformation Agenda (ATA) with the aim of overhauling the agriculture sector. The central concept behind this initiative was to view agriculture as a business, with policies geared towards supporting these enterprises. The set objectives included the creation of 3.5 million jobs, boosting foreign exchange revenue, and reducing food imports by 2015 (FMARD, 2016).

However, the ATA fell short of achieving its objectives, failing to make Nigeria food secure and reduce food imports. Consequently, the succeeding administration in 2015 opted to revamp agricultural policies to attain the goal of ensuring food security in the country (FMARD, 2016).

The restructured agricultural policies primarily concentrated on the financial aspects of development. While the government's objectives encompass a range of purposes such as food security, import substitution, job creation, and economic diversification, the policies exhibit a predominant emphasis on import substitution. The concerted efforts to boost domestic production and implement protective measures, including the prohibition of foreign exchange (FX), primarily align with this objective. To this end, agricultural Initiatives such as the Anchor Borrower's Programme, Agriculture Promotion Policy, Strategic Implementation Plan, Government Enterprise and Empowerment Programme, the Zero Reject Initiative, The Nigeria Incentive-Based Risk Sharing System for Agricultural Lending, and foreign exchange bans were introduced in rapid succession. In spite of these ambitious policy initiatives, Nigeria's 33 grain silos with about 1.3 million metric tonnes capacity, built as part of the strategies meant to address food insecurity have remained almost empty, operating below 10 percent capacity while food prices soared in over the same period (see Okojie, 2016; Edema, 2021). Unsurprisingly, the Nigerian government, through the Apex Bank, in October 2023, amongst other policy pronouncements, announced the lifting of the foreign exchange restriction placed on essential agricultural and food items. This came with the realization that the policy was a major source of price instability.²

Sharp increases in food prices have an immediate negative impact on consumers, as households operating near the budget constraint have few or no excess resources to afford unexpected increases in food prices. Generally, there is evidence that food price volatility has long-term consequences for economic growth. Unstable food prices lead to uncertainty for smallholder farmers and lower the potential output of the agricultural sector. Investors also dislike price volatility, and investment in the agricultural sector is generally higher under stable food prices. Overall, long-run economic growth is reduced (Timmer, 2011). Taken together, these facts suggest that the long-term benefits of a stable food price regime are greater than what microeconomic analysis alone would suggest.

As a major oil-exporting nation, the value of the Nigerian currency, the naira, is highly correlated with the price of oil. This is because oil exports bring in foreign exchange (primarily USD) and increase demand for the naira. Four years before 2016, oil prices were above \$100 USD/bbl which led to an increased reliance on imported food due to the strong naira. The World Bank (2021a, b,

² <https://www.cbn.gov.ng/Out/2023/CCD/FAQ%20on%20Removal%20of%20FOREX%20Restriction%20-%2043%20Items.pdf>

c) data shows that food imports increased in real terms from \$1.85 bn USD in 2002 to \$11.34 bn USD in 2012. This led the Nigerian economy to become heavily reliant on cheap imported food—particularly rice, sugar and wheat (Vaughan et al., 2014). This is reflected in the increase in the cereal import dependency ratio which increased from 13.6% in 2000 to 21.7% in 2014 (Onyekwena, 2019). Modernization of the agriculture sector stagnated despite efforts by the Nigerian government to increase domestic production (Salaudeen, 2019).

The price of Bonny Light Crude fell from an annual average of \$113.72 USD/bbl in 2012 to \$52.65 in late 2015 (Table 1). After the oil price crash, the Central Bank of Nigeria (CBN) attempted to keep the naira pegged to the USD. However, this monetary policy was unsustainable in the long term due to insufficient foreign exchange receipts, and in 2015, the CBN allowed the currency to depreciate³ (Onu & Alake, 2021). The nominal exchange rate increased from 158.55 naira per USD in 2014 to 305.79 naira per USD in 2017, with the real exchange rate increasing from 118.06 naira per USD to 160.45 naira per USD over the same period. As Table 2 shows, this depreciation of the currency led to higher domestic prices— particularly for food prices—and a sharp decline in the dollar amount of imported food.

Table 1: Annual Oil Prices and Exchange Rate, Nigeria, 2012 - 2018

Year	Bonny Light Crude (USD/bbl)	Nominal exchange rate (₦/US\$)	Real exchange rate (₦/US\$)	% Change real exchange rate
(1)	(2)	(3)	(4)	(5)
2009	63.90	148.88	166.57	-
2010	80.90	150.30	150.30	-9.8%
2011	113.76	153.86	143.20	-4.7%
2012	113.72	157.50	133.33	-6.9%
2013	110.99	157.31	124.56	-6.6%
2014	100.40	158.55	118.06	-5.2%
2015	52.65	192.44	131.61	11.5%
2016	43.81	253.49	151.76	15.3%
2017	54.09	305.79	160.45	5.7%
2018	72.66	306.08	146.78	-8.5%

Source: Central Bank of Nigeria, World Bank, Author's calculations

³ Nigeria has a robust black market for the exchange of currency between citizens and businesses. As of November 6, 2021, the official exchange rate was 410 naira per USD, while the black market rate was 570 naira per USD.

As the naira weakened, imported goods became relatively more expensive, which increased the price of many goods in the economy. The Nigerian CPI increased from 173 in 2015 to 261 in 2018, an increase of 50.9% over three years, while the food CPI increased by 57.3% over the same period (Table 2). The annual real value of food imports declined from \$11.34 bn USD in 2012 to \$4.21 bn USD in 2018, just 37% of the 2012 value. Over the same six-year period, the real food price index increased by 40.9%, an annual increase of 5.8% in the real food price⁴. This significant rise in food prices, to a large degree, is tied to the restriction of the use of foreign exchange to import food items. This is succinctly summarized in the World Bank's Nigeria Development Update (2023)⁵ where it is stated that stringent trade policies such as the restriction of foreign exchange for import of essential food items is contributing to the escalation of the cost of living. It was established in the report that such a restrictive trade policy adversely affects domestic competitiveness, contributing to heightened inflation and poverty levels while reducing customs revenue. The recommended solution is to remove these essential food items from the list of foreign exchange restrictions and replace import restrictions with tariffs that align with the Economic Community of West African States Common External Tariff.

The impact of this food price shock on food insecurity is immediately clear; as real food prices increased and the amount of imported food declined, the prevalence of undernourishment increased from 7.3% in 2009 to 12.6% in 2018 (FAO et al., 2010, 2019), a 72.6% increase (Table 2). These preliminary findings are indeed supported by findings reported here from the 2018 GHS-P, where a marked increase in household food insecurity is also observed. The increase in food prices has hit lower-income Nigerians particularly hard as expenditures on food comprise a large portion of total expenditures. Clearly, the misguided "high food price policy to stimulate agriculture production" shows a naïve understanding of how investments are made in agriculture to increase - *production. This takes years of consistent agricultural policy. The result of the government policy was to create large rents to existing producers and traders in the areas supporting the President politically, while causing severe food insecurity in the other areas of the country.

⁴ The real food price index is calculated using the Nigerian GDP Deflator, following the methodology in Dorward (2011).

⁵ <https://www.worldbank.org/en/country/nigeria/publication/nigeria-development-update-ndu>

Table 2: CPI, Food Imports and Prevalence of Undernourishment, Nigeria, 2012 - 2018

Year	CPI	Real food price index	Food Imports (2011 USD, bn)	Prevalence of Undernourishment
(1)	(2)	(3)	(4)	(5)
2009	96	135	4.20	7.3%
2010	109	133	4.68	7.4%
2011	121	133	17.12	7.5%
2012	135	135	11.34	7.6%
2013	147	141	9.64	8.6%
2014	159	148	9.43	9.8%
2015	173	158	7.19	11.1%
2016	200	165	4.28	12.0%
2017	233	178	4.68	11.9%
2018	261	185	4.21	12.6%

Source: CPI, Nigeria Bureau of Statistics; Real Food Imports, World Bank Open Data and Author's Calculations; Prevalence of Undernourishment, FAO et al. (2020).

We find that during this period agricultural output failed to increase significantly during the period being considered. At the same time as food imports were rapidly falling, the real growth in domestic agriculture production was very slow. The annual values of agriculture output, when expressed in the nominal producer prices, were growing more slowly than was the prices of food items expressed in domestic consumer prices. Figure 1 shows that the growth rates of the real value of agriculture production are negative for all the years from 2015 onward when estimated by deflating the nominal values of agriculture production (expressed in producer prices) by the domestic consumer price index for food. Hence, the import restriction policy has served to increase the gap between what the consumers are paying for the food items they buy and what the farmers are receiving from the food they produce. This dismal response for the agricultural sector to the quantitative restriction of food imports was no doubt a factor in the government abandoning this policy in October 2023. But they did so only after imposing a tremendous social cost.

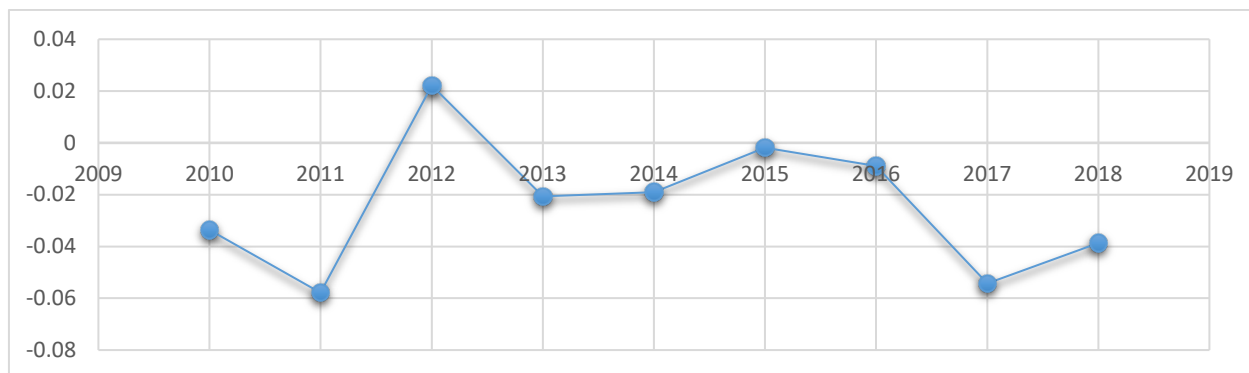


Figure 1. Annual percentage real growth in Nigeria's agriculture production are calculated by deflating the nominal values of agriculture production expressed in producer prices by the domestic consumer price index for food.

Source: Authors' construction based on World Bank and FAO statistics

This study contributes to the literature on food insecurity as novel determinants of household food insecurity related to household composition are discovered. It also contributes to the knowledge of food insecurity as the baseline determinants of food insecurity in Nigeria, as well as the impact of food price shocks caused by oil price shocks are assessed, using nationally representative survey data. This research will help policymakers in Nigeria to better mitigate household food insecurity during these negative oil price shocks and can provide insight around what types of households and regions are most affected by these price shocks. To the best of the authors' knowledge, no other study considers more than a single wave of the GHS-P data for Nigeria to assess household food insecurity. As such, this study is uniquely able to trace the dynamics of adjustment over a six-year period for a panel of households that experienced in this period a food price shock triggered by an oil price crash.

The remaining sections of this paper are structured as follows: section two briefly summarizes the literature on the determinants and causes of food insecurity, section three describes the data and methodology, section four presents the empirical results and section five concludes with a discussion on the policy implications of these findings.

2. Literature Review

Gaining insights into the features and factors that contribute to household food insecurity is essential for formulating effective policies aimed at tackling the issues related to household hunger and inadequate access to food (Ihab et al., 2015). A number of factors have been previously

established in the extant empirical literature as root causes of food insecurity, key among which are prices, household composition and structure, income, education levels and urbanization (see Drammeh et al., 2019). Food price increases significantly impact household food security, national food production and supply (Grace et al., 2014; Ahmed et al., 2017). As an illustration, the sudden surge in food prices in 2008 amplified vulnerability to food insecurity, leaving a large number of individuals without adequate access to proper nutrition (Drammeh et al., 2019). Timmer (2011) shows that food price instability affects consumers and producers differently. Consumers face hardships during price spikes, and elevated food prices can trap low-income households in poverty, as their resources are persistently consumed by food, shelter, healthcare and other basic needs. Farmers experience immediate revenue loss during low food prices, and price volatility creates uncertainty, resulting in reduced investment in the agricultural sector.

The composition, structure, size, gender and age distribution of households are regarded as key factors in shaping their food consumption patterns, resource allocation and nutritional requirements (Abo & Kuma, 2015). For instance, there are findings suggesting that households headed by females tend to have higher rates of food insecurity (Nwaka et al., 2020; Obi et al., 2020). Kassie et al. (2014), using an exogenous treatment switching regression, further reveal that even if the female-headed households were to have the same characteristics as male-headed households, an increased food insecurity risk would still persist. Owoo (2018) finds that polygamous households have better food security outcomes than monogamous households, and that the children of more recently married wives tend to have better health and nutritional outcomes than the children of previously married wives. The literature also shows that the age of the household head is a cause of higher food insecurity (Titus & Adetokunbo, 2007; Arene & Anyaeji, 2010). Household size also displays some correlation with food insecurity; larger households have more mouths to feed and are thus more prone to food insecurity (Deressa et al., 2009; Oluwatayo, 2009).

Poverty is a key underlying obstacle that impedes access to sufficient and nutritious food (Velazco et al., 2016; Muhammad & Sidique, 2019; Fikire & Zegeye, 2022). The disadvantaged socioeconomic status of poor households limits their access to food and hinders its distribution within the household. In Sub-Saharan Africa, income emerges as a critical determinant of food insecurity and hunger within the population (Abo & Kuma, 2015). Poverty plays a pivotal role in

determining the resources available for obtaining food as low-income households allocate smaller portions of their overall expenditure to food (Drammeh et al., 2019).

Household food insecurity is also closely linked to educational status, as it serves as a significant determinant of food production, access and utilization (Workicho et al., 2016; Powell et al., 2017; Muhammad & Sidique, 2019). Education plays a crucial role in improving household income, enhancing access to food and creating employment opportunities. It empowers farmers to adopt modern agricultural technologies, utilize fertilizers effectively and engage in income-generating activities, thereby enhancing household food security (Obadiah, 2014). Furthermore, higher levels of education among household heads, particularly women, promote proper food preparation and nutrition practices, leading to improved feeding habits that help prevent child malnutrition (Titus & Adetokunbo, 2007).

Olomola (2015) discusses policy measures implemented in Nigeria during the 2008 food price crisis. Strategic grain reserves were distributed, agriculture was subsidized, and tariff waivers were implemented in a bid to increase the domestic food supply and lower food prices. These policies were successful as food prices declined within six months. This stands in sharp contrast to the current policy of food import restrictions in a bid to increase domestic food prices and stimulate domestic agriculture (Salaudeen, 2019). Dabalén and Nguyen (2018) find that food import bans in Nigeria increase the price of food and increased poverty rates by as much as 2.6%. Macroeconomic factors also play an important role in food price stability and food security, particularly in an oil-exporting nation such as Nigeria. Nwoko et al. (2016) find a unidirectional causal link running from oil price volatility to food price volatility in Nigeria. Considering global prices, Tadasse et al. (2016) find that food price volatility is amplified by financial speculation in the short term and by oil price volatility in the medium term. Timmer (2000) finds that the macroeconomic consequences of food price instability are reduced economic growth and less redistribution of economic growth to the poor. The net effect on consumers is less clear, as decreases in food prices benefit consumers and increases in food prices negatively affect consumers. The conceptual model of food insecurity is presented in Figure 2.

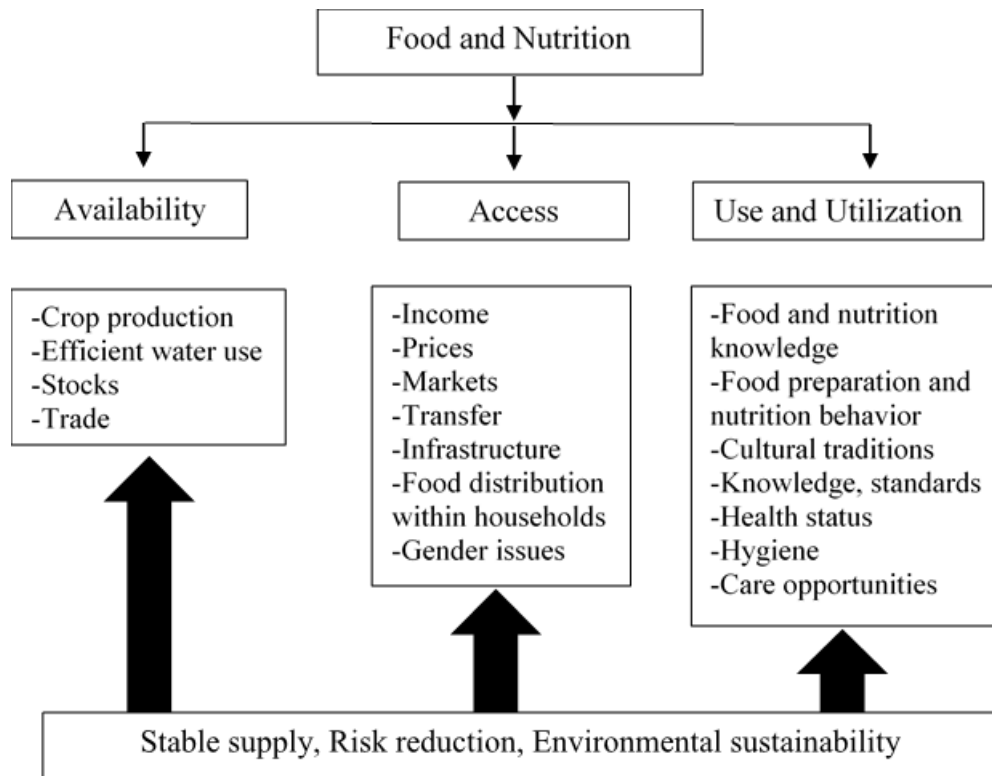


Figure 2. Food Insecurity Dimensions

3. Data and Methodology

3.1 Data

This study uses data from the Nigeria General Household Survey-Panel⁶ (GHS-Panel), which is a nationally representative panel of approximately 5,000 households. As part of the Living Standards Measurement Survey (LSMS), the GHS is enumerated every three years. Within each wave, each household is visited twice—once in the pre-harvest period (February through April) and once in the post-harvest period (September through November). Data from the pre-harvest visit are primarily used as this is when food prices and food insecurity tend to be highest and when people’s memory of their food scarcity situation is freshest. Data at the household level as well as the individual level for the head of household is used in this study. After data cleaning, the analytic

⁶ The Nigerian GHS-panel is a survey of nationally representative of Nigerian households conducted by the Nigerian Bureau of statistics as a part of the living standards measurement study - integrated surveys on agriculture.

sample for this study is 4,384 households in 2012, 4,454 households in 2015, and 4,894 households in 2018, making a total of 13,732 observations.

The main dependent variable of interest in this study is the response to the question, “Has the household been faced with a situation when they did not have enough food within the past year?” The households answering “yes” to this question are coded as food-insecure and are assigned a value of 1. Households answering “no” to this question are coded as not food-insecure and are assigned a value of 0. Explanatory household variables include if the household is involved in agriculture, the proximity to the nearest market, household expenditure, the percentage of household expenditure on food, household size, the proportion of children in the household, if the family owns the home, if the household is polygamous, the geographic zone, and if the household is urban or rural. Explanatory variables relevant to the household head include age, gender, single parent, employment status and level of education. The variables used in the logistic regression are summarized in Table 3 below.

Table 3: Variables of Interest

Variable	Description of Variable	Variable Type	Expected Effect
Dependent variable:			
Food insecurity	Food shortage in the past year = 1 and 0 otherwise	Indicator	
Explanatory variables:			
Year	2012, 2015, 2018	Indicator	-
log(dist_market)	Log of distance in km from point of agricultural production to market for products	Continuous	+
log(age)	Log of age of head of household in years	Continuous	+
hh_agri	Household member(s) involved in agriculture = 1 and 0 otherwise.	Indicator	+
Gender	Male head of household = 1 and female head of household = 0	Indicator	+
single_parent	Lone adult as head of household that is divorced, separated, or widowed and lives with children = 1, 0 otherwise	Indicator	-
Polygamous	Head of the household is in a polygamous marriage = 1 and 0 otherwise	Indicator	+
log(tot_exp)	Annual household expenditure in real (2012) Naira	Continuous	+
food_percentage	Percentage of total expenditure spent on food	Continuous	-
hh_employed	Head of household is employed ⁷ = 1, 0 otherwise	Indicator	+
own_home	Home ownership = 1 and 0 otherwise	Indicator	+
hh_educ	Education attainment of the household head. No education; SSSC or less; Undergraduate, professional, or technical degree; Graduate degree	Indicator	+
urban	Urban household = 1 and rural household = 0	Indicator	+
prop_children	The proportion of household members less than 18 years of age	Continuous	-
HH-Size	Number of household members	Discrete	-
Zone	Indicating which of the six geopolitical zones of Nigeria the household lives in	Indicator	N/A

⁷ In this survey, an individual is considered employed if they are involved in agriculture, working as an employee, or are self-employed.

3.2 Methodology

The panel structure of the data is used to assess the determinants of household food insecurity in Nigeria in 2012, 2015 and 2018. Hence, data from these three waves are pooled together and analyzed via logistic regression to model the likelihood of households become food insecure, following the oil price shock of 2015 logistic regression analysis is particularly useful for investigating linearly separable data sets. Hence, it is valuable for analyzing relationships between binary or ordinal response probability and explanatory variables. A detailed description of the logistic model, associated estimation problems, and applications are provided by Maddala (1986) and Greene (2003). The logistic regression model is specified as follows;

$$P(Y = 1|x_1, x_2, \dots, x_k) = F(\beta_0 + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k) \quad (1)$$

Where P represents probability, Y is the binary dependent variable (Has the household been faced with a situation when they did not have enough food within the past year?), F refers to the cumulative standard logistic distribution function. x_1, x_2, \dots, x_k represent the regressors and $\beta_1, \beta_2, \dots, \beta_k$ are the parameter estimates. The actual functional form of the logistic cumulative distribution, which is defined in exponential function terms, is given as:

$$\frac{1}{1+e^{-(\beta_0+\beta_1x_1+\beta_2x_2+\dots+\beta_kx_k)}} \quad (2)$$

The marginal effects are then calculated thus:

$$\frac{\delta p}{\delta x_j} = F'(X'\beta)\beta_j \quad (3)$$

Where X is the vector of predictor variables (x_1, x_2, \dots, x_k).

Time effects are accounted for by using an indicator variable for each wave of the survey, with 2012 as the base year. Regional differences are captured by using an indicator variable for each of the six geopolitical zones of Nigeria, with all differences relative to the North Central Zone. To account for the repeated observations at the household level, standard errors are clustered by household. Furthermore, to account for unobservable differences at the community level, standard errors are clustered by enumeration zone.

4. Results and Discussion

Findings of interest from the summary statistics for households in the Nigeria GHS-P and their implications for the country's food security are first presented. Food shortage prevalence across the survey waves is reported in Table 4. In 2012, 25.9% of households reported food shortages. This increased to 26.8% of households in 2015. However, in 2018, when the impact of the oil price crash had been fully established, 43.7% of households in Nigeria reported food shortages. It is important to note that in spite of the general decrease in global real food prices between 2012 and 2018 (FAO et al., 2020), food prices increased in real terms in Nigeria over the same period (Figure 3). This is a clear indication that the exchange rate effects of the oil price crash coupled with the foreign exchange restrictions on food imports caused the increase in food insecurity in 2018, rather than global factors affecting food prices. The percentage of food-insecure households by year presents compelling evidence of a growing food insecurity crisis in Nigeria. Overall, the prevalence of food insecurity in Nigeria was relatively unchanged from 2012 to 2015, increasing by only 0.7 percentage points (pp). However, between 2015 and 2018, there was 16.8 pp increase in food insecurity, with 43.7% of Nigerian households experiencing food insecurity in 2018.

Table 4: Percentage of Nigerian Households Experiencing Food Shortages by GHS-P wave

Year	Percentage of households with food shortages
2012	25.9%
2015	26.8%
2018	43.7%

Source: Nigeria GHS-P 2012, 2015 & 2018

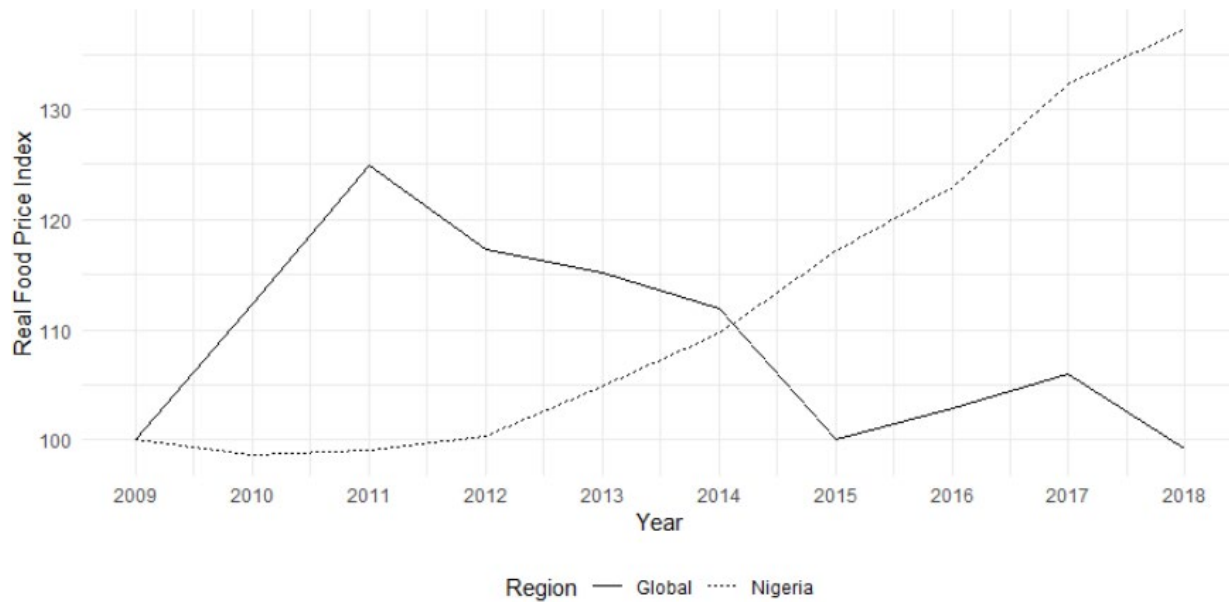


Figure 3: Food Price Index, 2009 - 2019, Nigeria and Global
 Source: FAO Food Price Index

Next, the summary statistics of the regressors across the 2012 and 2015 waves by food security status are reported in Table 5. These two years reflect either a period of high oil prices (2012) or the initial period of falling oil prices (2015) when government finances were not yet in a crisis. Statistically significant differences between the food-secure and food-insecure groups are tested for, using an F-test for binary and continuous variables and a Chi-square test for multinomial variables. As reflected by the results, there are obvious differences in the characteristics of secure and insecure households during 2012 and 2015 waves. Food-insecure households tend to be much closer to the market and are more likely to be urban. This is probably a reflection of the additional handling costs and transportation costs required to get internationally traded food staples from the ports to the hinterlands. Moreover, the GHS-P data shows that 84% of rural households as compared to only 28% of urban households were involved in agriculture in 2012/2015.

Table 5: Descriptive Statistics by Food Insecurity Status, 2012 & 2015, Nigeria

Food security status	Food-secure (N = 6,716) 73.8%		Food-insecure (N = 2,386) 26.2%		Significance Test on Difference of Means
	Mean	SD	Mean	SD	
dist_market	70.43	43.88	58.59	40.86	F=132.739***
age	52.1	14.81	53.2	15.01	F=9.395***
hh_agri	0.67	0.47	0.64	0.48	F=7.859***
gender	0.84	0.36	0.76	0.42	F=78.926***
single_parent	0.1	0.29	0.16	0.36	F=69.806***
polygamous	0.19	0.39	0.14	0.34	F=38.818***
tot_exp	398,166	459,654	346,310	447,455	F=22.727***
tot_exp_capita	87,657	124,318	78,170	92,586	F=11.606***
food_percentage	0.72	0.17	0.70	0.17	F=20.61***
hh_employed	0.91	0.29	0.86	0.34	F=41.153***
own_home	0.75	0.43	0.69	0.46	F=37.175***
urban	0.3	0.46	0.34	0.47	F=15.13***
prop_children	0.43	0.26	0.42	0.26	F=5.749**
hhsz	5.89	3.27	5.59	3.1	F=15.284***
highest_qualification					$\chi^2=62.43$ ***
... None	48%		48%		
... SSSC or lower	37%		43%		
... Undergraduate	14%		8%		
... Graduate Degree	1%		1%		
zone					$\chi^2=494.721$ ***
... North Central	20%		9%		
... North East	16%		12%		
... North West	21%		14%		
... South East	12%		29%		
... South South	15%		18%		
... South West	16%		17%		

Notes: (1) Statistical significance markers: * p<0.1; ** p<0.05; *** p<0.0. (2) SD represents standard deviation.

Source: Nigeria GHS-P 2012 & 2015

Since agriculture in Nigeria is mostly for subsistence, most of the households involved in agriculture supplement their diet with the food they grow. Food-insecure households tend to have slightly older heads of household and are less likely to be involved in agriculture. Female-headed households are more likely to be food-insecure, as are single-parent households—the vast majority of which are also female-headed households. Polygamous households, in which there are multiple

wives, tend to be less food-insecure. Food-insecure households tend to have lower total expenditure⁸ both overall and in per-capita terms, a slightly smaller percentage of expenditures on food, and lower educational expenditures. Food-insecure households are less likely to have heads of household that are employed and are less likely to have an undergraduate degree. Food-insecure households are also less likely to own their own home and tend to have fewer household members.

Considering the differences between the means of food-secure and food-insecure households in 2018, as shown in Table 6, some notable differences appear relative to the pooled 2012 and 2015 data. While many of the differences maintained their significance and direction, there are several variables where the differences became bigger or no longer correlated with food insecurity. The gap in mean expenditure between food-secure and food-insecure households widened in both overall and per-capita terms. The mean distance to the market was significantly higher in 2018, and the difference between food-secure and food-insecure households also became statistically insignificant. The proportion of urban households and the proportion of households involved in agriculture, both of which were significantly different between groups in 2012 and 2015, were also no longer significantly different in 2018.

⁸ Expenditure is calculated as the total amount of real (2012) Naira spent on food and non-food commodities.

Table 6: Descriptive Statistics by Food Insecurity Status, 2018, Nigeria

Food security status	Food-secure (N = 2,816) (56.3%)		Food-insecure (N = 2,158) (43.7%)		Significance Test on Difference of Means
	Mean	SD	Mean	SD	
dist_market	66.66	47.48	65.71	48.38	F=0.484
age	49.47	15.39	50.16	15.53	F=2.431
hh_agri	0.75	0.43	0.74	0.44	F=1.522
gender	0.84	0.37	0.76	0.43	F=50.818***
single_parent	0.1	0.3	0.16	0.37	F=48.797***
polygamous	0.21	0.41	0.15	0.36	F=28.735***
tot_exp	440,248	463,771	334,408	308,821	F=83.901***
tot_exp_capita	114,625	170,236	88,032	98,448	F=41.917***
food_percentage	0.68	0.19	0.67	0.2	F=7.14***
hh_employed	0.93	0.26	0.88	0.33	F=31.283***
own_home	0.67	0.47	0.58	0.49	F=50.719***
urban	0.31	0.46	0.33	0.47	F=1.782
prop_children	0.46	0.34	0.49	0.38	F=6.708***
hhsizes	5.31	3.4	5.01	3.05	F=10.813***
highest_qualification					$\chi^2=56.776^{***}$
... None	37%		38%		
... SSSC or lower	43%		49%		
... Undergraduate	18%		12%		
... Graduate Degree	2%		1%		
zone					$\chi^2=240.372^{***}$
... North Central	21%		11%		
... North East	19%		13%		
... North West	18%		15%		
... South East	14%		20%		
... South South	11%		23%		
... South West	16%		17%		

Notes: (1) Statistical significance markers: * p<0.1; ** p<0.05; *** p<0.0. (2) SD represents standard deviation.

Source: Nigeria GHS-P, 2018

Due to additional handling costs and transportation costs associated with food imports, food staples essentially become non-traded goods for remote villages as their distance from the market increased. When prices in the urban areas are low, the farm-gate price for agriculture crops produced in a village far from its urban market will be above the price that the item can be exported from the village and at the same time below the price of food imported into the village. As the

overall price of food increases, the export price of food also increases so that more regions are now able to trade their agricultural surplus to the urban centers, hence increasing farming activity. The higher food prices in the village will lead to a greater number of land-scarce rural households facing food insecurity. It is expected that some rural households will respond by engaging in more intense subsistence agriculture. This is observed in this study as 65.4% of households were involved in agriculture in 2015, while in 2018, the proportion increased to 74.8%. Some of the decline in food imports will also be due to the increase in agricultural activity that took place between 2015 and 2018.

When the differences between lowest expenditure decile and the highest expenditure decile are considered (Table 7), some striking differences appear. Total household expenditure in the top decile was 1,309,614 naira per year—nearly 27 times the 48,637 naira for the bottom decile. On a per-capita basis, the top decile spent 12.8 times more than the bottom decile, a smaller difference due to the difference in average household size. Somewhat surprisingly, households in the lowest expenditure decile spent 58% of their expenditure on food relative to 71% of the highest expenditure decile. In terms of household characteristics, households in the lowest income decile have fewer members, are significantly older with a lower proportion of children, are more likely to be involved in agriculture, and are much less likely to be urban. All these characteristics, in addition to having less income to address all their basic needs, helps to explain why lower income households in Nigeria spend a smaller proportion of their income than to high income households.

Table 7: Descriptive Statistics by Expenditure Decile, 2018

Expenditure decile	Bottom 10%		Top 10%		Significance Test on Difference of Means
	Mean	SD	Mean	SD	
Food Insecurity Status					$\chi^2=42.40^{***}$
... 0	53%		73%		
... 1	47%		27%		
dist_market	71.03	49.35	63.81	49.21	F=5.33**
Age	54.26	18.14	49.56	12.88	F=22.18***
hh_agri	0.88	0.33	0.55	0.5	F=155.54***
Gender	0.66	0.47	0.91	0.29	F=101.00***
single_parent	0.19	0.39	0.07	0.26	F=30.77***
Polygamous	0.12	0.33	0.24	0.43	F=22.25***
tot_exp	48,637	20,539	1,309,614	614,220	F=2092.36***
tot_exp_capita	21,485	20,586	276,538	322,727	F=309.16***
food_percentage	0.58	0.27	0.71	0.2	F=78.18***
hh_employed	0.87	0.34	0.88	0.32	F=0.56
own_home	0.73	0.44	0.58	0.49	F=25.53***
Urban	0.13	0.34	0.54	0.5	F=229.73***
prop_children	0.41	0.38	0.5	0.28	F=16.96***
Hhsize	4.01	2.82	6.62	3.74	F=154.93***
highest_qualification					$\chi^2=309.22^{***}$
... None	65%		18%		
... SSSC or lower	33%		40%		
... Undergraduate	2%		34%		
... Graduate Degree	0%		8%		
Zone					$\chi^2=27.38^{***}$
... North Central	22%		14%		
... North East	21%		14%		
... North West	17%		22%		
... South East	13%		12%		
... South South	15%		21%		
... South West	12%		17%		

Notes: (1) Statistical significance markers: * p<0.1; ** p<0.05; *** p<0.0. (2) SD represents standard deviation.

Source: Nigeria GHS-P, 2018

While 47% of households in the lowest expenditure decile experienced food insecurity, 27% of households in the highest expenditure decile also experienced food insecurity in 2018. Households in the lowest expenditure decile are more likely to own their own home. This is attributable to the rural/urban split and the fact that older heads of household are more likely to own their own home,

rather than any wealth effect. When considering household head characteristics, those in the lowest decile tend to be much less educated, are much more likely to be female-headed and are more likely to be headed by a single parent.

In Table 8, the percentage of food-insecure households in 2012/2015 and 2018 by expenditure decile are reported. The smallest increases are observed in the ninth and tenth deciles of 9.9 pp and 9.4 pp, respectively. However, even at the two highest expenditure deciles, the rates of household food insecurity are 35.8% and 27.3% in 2018, higher than or close to the highest rates of food insecurity experienced by the lowest two income deciles in 2012/2015. Furthermore, the bottom six deciles all report rates of household food insecurity of nearly 45% or higher, which shows the depth of the food security crisis in Nigeria.

Table 8: Food Insecurity Status by Expenditure Decile, 2012/2015 & 2018

Expenditure Decile	2012/2015	2018	Change
1	31.5%	47.5%	16.0 pp
2	27.1%	46.2%	19.1 pp
3	25.6%	53.3%	27.7 pp
4	27.4%	45.2%	17.8 pp
5	27.4%	47.3%	19.9 pp
6	26.0%	44.8%	18.8 pp
7	27.8%	42.5%	14.7 pp
8	25.7%	44.0%	18.3 pp
9	25.9%	35.8%	9.9 pp
10	17.9%	27.3%	9.4 pp
Total	26.2%	43.7%	17.2 pp

Source: Nigeria GHS-P 2012, 2015 & 2018

Another important group to consider is those that became food-insecure between 2015 and 2018, and how they relate to those that were food-insecure in both periods and those that were never food-insecure (Table 9). The households that were food-insecure in 2018 are more like those that were always food-insecure. Both groups are similar in the proportion of households that are female-headed, active in agriculture, polygamous, head of household employed, and level of education. In fact, the only statistically significant differences between these two groups are on the metrics of single parent, with a higher proportion in the always insecure category, and the geopolitical zone, with a higher proportion of those in the north zones becoming food-insecure in 2018.

Table 9: Household Characteristics by Change in Food Security Status, 2018

Food security status	Always Insecure (N = 200)		Became Insecure (N = 404)		Never Insecure (N = 633)		Significance Test on Difference of Means
	Mean	SD	Mean	SD	Mean	SD	
`dist_market	63.69	51.47	60.85	50.46	58.92	46.07	F=0.771
age	55.75	13.84	54.49	13.87	53.88	13.99	F=1.395
hh_agri	0.75	0.43	0.75	0.43	0.78	0.42	F=0.57
gender	0.7	0.46	0.72	0.45	0.82	0.38	F=10.956***
single_parent	0.25	0.43	0.19	0.39	0.13	0.34	F=8.529***
polygamous	0.16	0.37	0.15	0.35	0.26	0.44	F=11.059***
tot_exp	310,567	264,558	331,379	306,221	473,163	571,122	F=16.486***
tot_exp_capita	75,172	69,261	81,140	80,981	104,476	231,292	F=3.344**
food_percentage	0.66	0.19	0.68	0.19	0.67	0.19	F=0.641
hh_employed	0.82	0.39	0.83	0.37	0.9	0.3	F=6.719***
own_home	0.7	0.46	0.69	0.46	0.76	0.43	F=3.598**
urban	0.34	0.47	0.29	0.46	0.32	0.47	F=0.761
prop_children	0.47	0.44	0.48	0.36	0.46	0.32	F=0.442
hhszise	5.06	2.93	5.34	3.33	5.97	3.42	F=7.77***
highest_qualification							$\chi^2=30.963$ ***
... None	43%		43%		40%		
... SSSC or lower	46%		43%		35%		
... Undergraduate	10%		13%		22%		
... Graduate Degree	1%		1%		2%		
zone							$\chi^2=125.54$ ***
... North Central	4%		15%		25%		
... North East	12%		10%		18%		
... North West	10%		15%		21%		
... South East	26%		22%		10%		
... South South	28%		19%		11%	28%	
... South West	19%		19%		16%	19%	

Notes: (1) Statistical significance markers: * p<0.1; ** p<0.05; *** p<0.0. (2) SD represents standard deviation.

Source: Nigeria GHS-P 2015 & 2018

The households that became food-insecure in 2018 relative to those that were never food-insecure tended to have lower levels of education, fewer are male-headed, fewer were polygamous, fewer were employed or owned their own home. Households that became food-insecure in 2018 also tended to have larger families and were more concentrated in the north geopolitical zones. Total expenditure is slightly higher for those that became food-insecure relative to those that were always food-insecure in both overall and per-capita terms, but not significantly different. Both measures of expenditure are significantly lower for households that became food-insecure in 2018 relative to those that were never food-insecure.

As mentioned above, there was a 16.8 pp increase in food insecurity between 2015 and 2018, with 43.7% of Nigerian households experiencing food insecurity in 2018. The prevalence of household food insecurity in the North Central zone, which has the lowest rates of food insecurity in Nigeria, nearly doubled, going from 14.5% of households in 2015 to 29.5% in 2018 (Table 10). The North East zone experienced an increase of 10 pp between 2012 and 2015, with 26.2% of households being food-insecure, followed by a 7.7 pp increase to reach 33.9% in 2018—nearly double the rate of food insecurity in 2012⁹. The North West zone experienced only 0.8 pp increase to reach 20.2% of households in 2015, and then nearly doubled with 39.1% of households being food-insecure in 2018. The South East zone had 51.4% food-insecure households in 2012 and saw a 9.8 pp reduction to 41.2% in 2015—still the highest of any zone that year. In 2018, 53.4% of households in the South East zone were food-insecure, more than wiping out the gains made in 2015. The South South zone, also known as the Niger Delta region, saw a moderate increase from 27.4% in 2012 to 32.6% in 2015. As of 2018, the South South zone had the highest rate of food insecurity among households at 61.1%, nearly double the 2015 rate and a 28.5 pp increase. Finally, the South West zone experienced a modest decline of 0.8 pp to 26.4% in 2015, followed by a relatively high increase of 17.4 pp to hit 43.8% in 2018.

⁹ North East Nigeria is the area where the Boko Haram terrorist group has been operating and disrupting the lives of the population, particularly in the period between 2012 and 2015.

Table 10: Prevalence of Food Insecure Households by Zone, 2012, 2015, & 2018, Nigeria

Zone	2012	2015	2018
North Central	14.2%	14.5%	29.5%
North East	16.2%	26.2%	33.9%
North West	19.4%	20.2%	39.1%
South East	51.4%	41.2%	53.4%
South South	27.4%	32.6%	61.1%
South West	27.6%	26.4%	43.8%
Overall	25.9%	26.6%	43.7%

Source: Nigeria GHS-P 2012, 2015 & 2018

4.1 Food Insecurity Regression Results

The results of the logistic regression on household food insecurity status are presented in Table 11. Generally, the results are consistent with the descriptive statistics presented in Tables 4 and 5. The time variable for 2015 is positive and insignificant, an indication that food insecurity prevalence in 2015 was not significantly different from 2012, which serves as the base year. The time variable for 2018 is however positive and highly significant, with an average marginal effect of 17.8%. This shows that the chances of households becoming more food-insecure greatly increased between 2012 and 2018. This very closely matches the increase in the descriptive statistics of 16.8%. This very large increase in food insecurity observed in 2018 is tied to a great extent to the foreign exchange restrictions on food imports that reinforced the initial exchange rate impacts of the oil price crash. Although the rise in food prices triggered by the exchange rate effects of the oil price crash would have been largely offset by the fall in global food prices between 2012 to 2016, the foreign exchange policy to restrict imports must have further aggravated food inflation. Thus, the negative consequences of foreign exchange restrictions on the importation of major food items seem to be the key driver of food insecurity over the period being considered. This finding is consistent with the conclusion reached by Sen (1982) that food insecurity is rarely caused by nature, much more likely to be caused by poorly thought-out policy reactions to food market shocks.

Previous studies have found that the gender of the head of household is a key determinant of food insecurity (Nwaka et al., 2020). However, in this study, after accounting for single-parent status and other household composition variables, the indicator variable for gender of the head of

household becomes insignificant. Interestingly, two related variables—single-parent households and polygamous households—exhibit statistical significance. Single parent households are, on average, 5.1% more likely to be food insecure. The data shows that over half of all female-headed households are single-parent households, and from a different perspective, 83.9% of all single-parent households are female-headed households. Furthermore, polygamous households—in which there are multiple wives—have a 2.8% lower probability of being food-insecure.

There are several potential mechanisms for the effects of single-parent and polygamous households. First, there is an increased labour supply in households with more adults, which allows more time for employment, child-rearing, household labour and agricultural activities. Second, there is diversification of risk across labour activities—for example, if the lone adult in a single-parent household becomes sick, the primary source of income and therefore food is gone. However, in a household with multiple adults, there may be multiple types of employment—some for income and some for agriculture—so that in the event of either a recession or a drought, there is an alternative source of food. Finally, there may be financial effects such as wealth effects or better access to credit in a household with multiple adults. These findings warrant further research into the matter. Also accounted for is the household size, which has a relatively weak and positive marginal effect of 0.98%, as well as the proportion of children, which has a significant and positive effect of 4.3%. Taken together, this evidence suggests that it is the composition of the household, rather than the gender of the head of household, that is relevant to food insecurity risk.

Households that are further from the market are less likely to be food insecure. Each 1% increase in the distance to the market reduces the probability of household food insecurity by 1.6%, even when accounting for the effect of living in an urban sector. This likely reflects the greater extent to which rural households that are far from the market rely on subsistence agriculture. Overall, 85.7% of rural households are involved in agriculture as compared to just 33.5% of urban households.

The remaining determinants of household food insecurity are in line with previous research. Heads of households that are unemployed are 9.0% more likely to be food insecure. Education also has the expected effect; relative to no education, heads of household with high school or less are not significantly different, while heads of household with undergraduate, nursing or professional degrees are 8.7% less likely to be food-insecure and those with graduate degrees are 17.3% less likely to be food-insecure. Each 1% increase in total expenditure reduces the probability of food

insecurity by 5.4%, and an additional percentage spent on food reduces the probability of food insecurity by 5.9%. Finally, households that own their homes are 7.8% less likely to experience food insecurity.

The regional variables for each geopolitical zone of Nigeria, relative to the North Central Zone, are all positive and significant. Households in the North East and North West Zones are, on average, 7.1% and 9.2% more likely to have experienced food insecurity in the last 12 months relative to the reference group, the North Central Zone. Zones in the south are much more likely to have experienced food insecurity: 32.5% more likely for households in the South East Zone, the highest of any zone, 23.9% more likely for households in the South South Zone, and 12.6% more likely for households in the South West Zone.

Table 11: Food Insecurity Logistic Regression Results, Average Marginal Effects

	Dependent variable:	
	Food insecurity	
	Coefficient	Standard Error
2015	0.007	(0.012)
2018	0.178***	(0.015)
log_dist_market	-0.016***	(0.006)
log_age	-0.032*	(0.018)
gender	-0.010	(0.016)
single_parent	0.051***	(0.018)
polygamous	-0.028**	(0.014)
log_tot_exp	-0.054***	(0.007)
food_percentage	-0.059**	(0.029)
hh_employed	-0.090***	(0.016)
own_home	-0.078***	(0.014)
SSSC or lower	-0.009	(0.012)
Undergraduate	-0.088***	(0.016)
Graduate Degree	-0.173***	(0.028)
urban	0.041**	(0.017)
prop_children	0.044**	(0.018)
hhsiz	0.010***	(0.002)
North East	0.071***	(0.026)
North West	0.092***	(0.028)
South East	0.325***	(0.029)
South South	0.239***	(0.026)
South West	0.126***	(0.027)
Observations	13,735	
Log Likelihood	-7,899.775	
Akaike Inf. Crit.	15,845.550	

Note: * p < 0.1; ** p < 0.05; *** p < 0.01

5. Conclusion

In this paper, clear evidence that the 2015 oil price crash precipitated a food security crisis in Nigeria is presented using descriptive statistics. The mechanism identified is that after oil prices fell, the naira eventually weakened and imports became more expensive, particularly food imports, which in turn increased the market price of food overall. Nigeria had become reliant on relatively cheap imported food during a period of sustained high oil prices from 2008 to 2014. The food price shock led to a sharp increase in food insecurity as revealed by the GHS-P 2018 data presented here. The prevalence of malnutrition nearly doubled between 2012 and 2017, and household food insecurity increased by 63.2% between 2015 and 2018. In 2015 and subsequent years, the Nigerian

government prohibited the use of foreign exchange for the import of some major food items, effectively blocking food imports in an effort to save foreign exchange (Salaudeen, 2019). This policy pushed food importers into the parallel market and raised the demand for foreign exchange. This weakened the parallel-market exchange rate and pushed up prices, especially food prices that had been rising steadily over time. Consequently, more families were pushed into food insecurity.

Considering rates of household food insecurity between 2015 and 2018 by zone, considerable increases in all zones are observed, with rates of household food insecurity nearly doubling between 2015 and 2018 in the North Central Zone, the North West Zone and the South South Zone. Overall, 43.7% of Nigerian households in this nationally representative sample experienced food insecurity in 2018, a stark difference from 26.6% in 2015. In the descriptive statistics presented, many households are found to have responded to the increase in food prices and food insecurity by engaging in agricultural activity,¹⁰ and more rural households were pushed into food insecurity relative to 2015. Considering rates of household food insecurity across expenditure deciles, it is observed that household food insecurity is relatively flat across the lowest eight deciles, ranging from 42.5% to 53.3% in 2018. However, the incidence of food insecurity falls to 35.8% and 27.4% for the ninth and tenth deciles, respectively. Between 2012/2015 and 2018, all deciles saw an increase in food insecurity, ranging from 9.4 pp in the top decile to 27.7 pp in the third decile. From this, it can be concluded that the food security crisis in Nigeria is affecting households across all levels of household expenditure and declines in the rate of household food insecurity only occur in the top two deciles.

One of the findings in the logistic regression on household food insecurity status is around the gender of the head of household. Previous studies have found that the gender of the head of household is a key determinant of household food insecurity, with female-headed households being much more likely to be food-insecure (Nwaka et al., 2020; Obi et al., 2020). In this model, once the single-parent household indicator variable is included, the indicator variable for gender of the head of household is insignificant. Since over half of female-headed households are also single-parent households, it is found that it is not the gender of the head of household, but rather the

¹⁰ It was investigated whether this may have been attributable to the households in the refresh sample, however, 76.7% of households in both the 2015 and 2018 were involved in agriculture in 2018 and 73.8% of new households in the 2018 wave were involved in agriculture.

composition of the household, that is relevant for food insecurity. Single-parent households, 83.9% of which are female-headed households, are 5.1% more likely to experience food insecurity. This result holds even after accounting for household size and the proportion of household members that are children. In contrast, polygamous households, in which there are multiple wives, are 2.8% less likely to experience food insecurity. It is proposed that the mechanisms behind these findings are related to wealth effects, increased labour supply, economies of scale and risk diversification.

There are multiple policy implications to be drawn from these findings. First, it is clear that support targeting single mothers would reduce food insecurity. However, care must be taken that this support does not create the perverse incentive of discouraging single mothers from marrying or declaring the presence of a common law partner in the household. Given the variation in household food insecurity by zone and year, food aid programmes should be responsive to food crises. The extent to which food aid programmes are accessible to households in need can be assessed using the highly detailed GHS-P data. Timmer (2000, 2011) highlights the importance of managing food price stability; food price instability hurts consumers when prices are high, farmers when prices are low, and instability generally discourages investment from both farmers and investors. Taken together, these facts reduce overall economic growth in the long run and reduce the share of that growth that goes to the lowest-income households. Although Nigeria has had nominal strategic grain reserves that if properly managed could be used to help manage price stability (Timmer, 2011), these have been chronically underfunded and have seen little use outside of buying up some excess crops at the end of the growing season and the distribution of emergency supplies of grains to regions experiencing local food crises (Onyekwena, 2019).

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