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IMPACT OF RISING FOOD PRICES ON HOUSEHOLDS' FOOD SECURITY IN NIGERIA

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Abstract

In Nigeria, food insecurity remains a pressing issue. One of the main obstacles to access to food is volatile food prices. However, little research has assessed the impact of unanticipated price shifts on household food security outcomes. This study aims to address this knowledge gap using three waves of the Nigerian General Household Survey. The study employed a pooled OLS and fixed effects models to investigate the relationship between various price indices and a Reduced Coping Strategies Index, which measures food security. The price variables included the total food basket price as well as the prices of staples such as rice, maize, and garri. Results show that increases in general food prices and prices of maize and garri are significantly associated with reductions in food security. This relationship persists even when individual heterogeneity is partialled out using fixed effects. However, the impact of changes in rice prices is negligible. No differences were observed between male- and female-headed households. The study suggests that policies are needed to limit inflation and stabilise basic costs, while targeted programmes can help vulnerable groups cope with unexpected price shocks, addressing domestic agricultural productivity and supply chain resilience can also protect poor households from fluctuations in food prices.

Keywords: Food Prices; Food Security; Nigeria

1. Introduction

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (FAO, 2006). Nigeria, like many other developing nations, continues to grapple with issues of food insecurity as large segments of its population struggle to access adequate and nutritious food on a regular basis. One of the major factors that undermine food security in Nigeria is high and volatile food prices.

Prices of food are important determinants of consumption patterns; therefore, high food prices may

have significant negative effects on individual health and nutrition (Green et al, 2013). With the announcement of oil subsidy removal by the current administration in Nigeria, prices of many things were hiked, raising serious concern in food affordability. There is significant increase in the prices of grains and other staple foods in the homes of Nigerians. For instance, the average price of 1kg of local rice increased by 60.59% on a year-on-year basis from N471.42 in September 2022 to N757.06 in September 2023 (National Bureau of Statistics, 2023). On a month-on-month basis, the average price of this item increased by 2.48% from N738.74 in August 2023. Similarly, the average price of 1kg of brown beans surged by 28.76% on a year-on-year basis from

N556.81 in September 2022 to N716.97 in September 2023. On a month-on-month basis, it increased by 3.47% from N692.95 in August. In general, food inflation has been rising in month-on-month basis from 25.25% in June to 31.52% in October, 2023. Accordingly, exchange rate depreciation, growing population, insecurity in major food producing regions, high cost of farm inputs and post-harvest losses are some of the key drivers of rising food prices in Nigeria. This trend may force people, especially poor, to cut down the quality and quantity of their meal.

High prices limit the quantity and quality of foods that even those in employment can procure to meet basic nutritional needs. Food now accounts for over 60% of average household budgets, reducing spending on healthcare, education and other necessities (CBN, 2023). In northern parts of Nigeria where poverty rates are higher, rising costs have pushed families into hunger and vulnerability. Recent food price shocks have had the most severe impacts on the urban poor who depend on markets for food.

Families affected by rising prices often resort to cheaper, less nutritious substitutes and develop negative coping strategies like skipping meals or reducing portion sizes. Malnutrition rates among Nigerian children under five years remain alarmingly high at over 32% (UNICEF, 2019). Severe acute malnutrition also continues rising in some states due to poor dietary intake caused by unaffordable food prices. Food price hikes negatively impact the nutritional status of vulnerable groups and weaken the immunity of people against diseases.

Food security exists when all people have physical, economic and social access to safe, sufficient and nutritious food which meets their dietary needs and food preferences for an active and healthy life, at all times (FAO, 2003).

The importance of food security in an economy can never be overemphasized. For, it not only embodies essential benefits for people's health, but also serves as the cornerstone to achieving sustained economic

growth (Manap & Ismail, 2019). In the same vein, according to UNICEF (2023), high rate of malnutrition can lead to 4 to 5 percent loss of productivity. Also, Walls et al (2021) found that taking nutritional food reduces mortality rate and increases life expectancy.

The essence of understanding the impacts of food price changes on household food security in sub-Saharan Africa (SSA) is still important for policy making in the context of numerous existing and emerging challenges (Kaminski et al., 2014). Economic research has predominantly focused on studying seasonal variations in food prices, which are linked to agricultural production cycles, with prices typically rising during the lean season and falling during the harvest season (Kaminski et al., 2014; Sahn, 1989). Consequently, policy measures often aim to mitigate the effects of seasonal food price fluctuations. However, in addition to these expected changes, households in SSA encounter unexpected shifts in food prices stemming from various factors, including climate change (Kalkuhl et al., 2016), market failures (Timmer, 2017), political instability (Minot, 2014), and emerging challenges such as the COVID-19 pandemic (Devereux et al., 2020). The consequences of food price changes on household food security remain relatively unexplored, leading to renewed research interest in the subject. Unanticipated price increases may affect household food security differently depending on factors such as household wealth and livelihood activities.

The questions this study intends to address are three-fold: (i) How have rising food prices impacted on household food security in Nigeria? (ii) How has this effect change after controlling for the household fixed effect? (iii) Is the effect different between the male-headed and female-headed household?

2. Literature Review

Numerous studies have explored the effect of insecurity and high food prices on food security, bringing to fore, the connection between these factors in Nigeria. For instance (Babatunde et al., 2007; Ahmed et al., 2015), analysed factors influencing food

security and its coping strategies. Agbawodikeizu et al. (2021) evaluated household food security and its determinants, while Egwue et al. (2020) investigated food insecurity of rural households during COVID-19 and the impact of the COVID-19 Pandemic on the economic activities and well-being of older adults in Southeast Nigeria.

These studies have found that high levels of insecurity, whether caused by political instability, violent conflicts, or climatic changes, can severely disrupt food production and distribution systems, leading to food shortages and reduced access to nutritious food (Sandra, 2023).

Rising food prices can limit the ability of households and individuals to afford an adequate amount of food, especially for those already experiencing socio-economic vulnerabilities. Furthermore, the literature emphasizes that the combination of high insecurity and high food prices intensifies the challenges faced by farming households. These households are not only more likely to be food insecure or on the brink of food security, but they also face additional obstacles such as irregular food supply and poor food quality (Papoola & Yusuf, 2021). Again, a study carried out by Amolegbe, Upton, Bageant & Blom, (2021) examines the relationship between food price volatility and household food security in Nigeria. The paper uses panel data and historical price data to estimate the impact of non-seasonal food price volatility on household food security. The authors find that unexpected price volatility has a larger impact on food security than seasonal price fluctuations. They suggest that limiting price hikes for imported rice and other goods purchased by local consumers can improve food security. However, one major drawback of this study is that it examines the impact of food price volatility on household food security, and does not consider other factors that may contribute to food insecurity, such as insecurity and education. Nevertheless, the study agrees with findings of Johnson & Masias, (2017); Gyimah-Brempong, Johnson & Takeshima (2016) and Haggblade, Me-Nsope & Staatz, (2017).

Our paper differs from others' because we constructed an indicator of prices of food and non-food items in the basket of an average Nigerian. We also used individual price indicator of some staple foods in Nigeria; rice, maize and garri. We also control for regions in account for insecurity situations that mostly bedevilled northern states.

Concept of Food Security

The concepts and definitions surrounding food security and insecurity have been extensively discussed and debated in academic literature for an extended period of time. International organizations and researchers have defined food security in various ways since its inception as a key policy concern.

Siamwalla and Valdes (1984) defined food security as the ability of countries, regions, or households to consistently meet target levels of food consumption annually. The 1992 International Conference on Nutrition endorsed a definition of food security as a state in which all people have access to safe and nutritious food to maintain a healthy and active lifestyle (Gurkan, 1995). Similarly, the Committee on World Food Security characterized food security as physical and economic access to adequate food for all household members without undue risk of losing that access.

The 1974 World Food Conference defined food security more broadly as the "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" (United Nations, 1974). This highlights that national-level adequacy does not necessarily ensure food security at the household or individual level.

As a result, the conceptualization of food security evolved during the 1980s to emphasize access to food at the individual and household level, in addition to the supply-side focus (FAO, 1983). In the 1990s, the definition was further refined to incorporate livelihood considerations and subjective factors influencing individual behaviour in the face of uncertainty,

irreversibility, and binding constraints (Osmanis, 2001; Maxwell, 1996).

The most widely used contemporary definition, as forwarded by the 1996 World Food Summit, states that "food security exists 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" (FAO, 1996). This definition integrates the key dimensions of stability, access, availability of nutritionally adequate food, and biological utilization of that food.

3. Methodology

3.1 Data and Sources

The data utilized in this study were obtained from panel data collected by the General Household Surveys (GHS) in Nigeria, which is part of the World Bank's Living Standards Measurement Study–Integrated Surveys on Agriculture (LSMS-ISA). The data cover three periods: 2010/2011 (wave 1), 2012/2013 (wave 2), and 2015/2016 (wave 3).

The GHS data provide a nationally representative sample that includes both rural and urban households in Nigeria.

Data collection occurred during the post-planting period between August and October and between February and April of the following year. The initial sample for the first wave consisted of 4,916 households (3,347 in rural areas and 1,569 in urban areas). The second wave included 4,716 households (3,251 in rural areas and 1,465 in urban areas), while the third wave included 4,581 households (3,132 in rural areas and 1,449 in urban areas).

Attrition across the waves was due to various factors, including households refusing to participate, some households not being located in the follow-up survey, participant deaths, household migration, and violent crises in certain regions. For this study, post-harvest data were utilized to gather comprehensive information about household food availability and the prices of food.

3.2 Model Specification and Method of Data Analysis

Before exploiting the panel dimension of the data, pooled Ordinary Least Square was employed to conduct a cross-sectional analysis for the entire data rounds to estimate the correlation in terms of levels between the food security scale and the price measures to investigate the relationship between food price volatility and household food security status. It provides a snapshot of the correlation between these measures at a given time. Therefore, we model household food security in the following way:

$$FSI_{ht} = \alpha + \beta \text{food_price}_{ht} + \gamma X_{ht} + \varepsilon_{ht} \quad (1)$$

Here, FSI_{ht} is the score for the h household food security index at time t . Higher values indicate higher food security. *Food_prices* is a variable that measures food prices based on the aggregate price of a typical household's food basket as well as the individual prices of local rice, foreign rice, maize and garri. Other household characteristics are captured in X , a vector of control variables that are believed to affect food security e.g age of the household head, number of children in the household, gender of the household head, educational background of the household head, etc. (Efobi et al., 2020). The term ε is the idiosyncratic errors term.

Using equation (1) we estimated five models using the different food price variables to see how each affects food security individually.

We further added a twist to equation (1) by estimating the household fixed effect. That is, using the panel structure of the data by controlling for time in-varying household characteristics, the analysis explores the effect of changes in the various food price indicators on food security. Thus, the following equation turns to:

$$FSI_{ht} = \alpha + \beta \text{food_price}_{ht} + \gamma X_{ht} + \delta_h + \mu_h + \varepsilon_{ht} \quad (2)$$

Whereby, the additional terms of δ and μ are the household and individual fixed effects respectively. Our coefficient of interest is β , which indicates the

relationship between the food price changes and household food security status.

3.3 Variables and Measurement

3.3.1 Food security variable

Following Maxwell, Vaitla, Tesfay and Abadi (2013), the Reduced Coping Strategies Index (RCSI) is constructed to reflect dimensions of food security, such as economic and social access to food. The RCSI provides information on household behaviour or coping strategies in the event of food shortages. It is based on self-reported practices, such as the use of less preferred foods, the reduction of portions and the number of meals eaten, and the reduction of meals in order to give priority to children. All questions are answered on the basis of the number of days in the past seven days in which the household has experienced a certain condition. For each question, the possible values ranged from 0 (the condition never occurred) to 7 (the condition occurred every day). The total scale score was obtained by summing up all positive responses. The higher the score is, the less food secure the household. However, we standardized and reversed the score to indicate that a higher score corresponds to higher food security (see Olivia B. 2019).

3.3.2 Price variables

For this empirical analysis, we created two sets of price variables. The first set represents the price of a food basket typically consumed by Nigerian households. The dataset includes information on the

monthly purchases of food items by households, which we aggregate to calculate the price index for this basket. The second set comprises individual prices of staple items commonly found in Nigerian households. These items include foreign rice, local rice, maize, and garri. We obtained the prices of these items in Nigerian Naira from GHS data. Household members were asked about the prices of the items in their area. We take these prices and use directly to reflect variations of their prices in different regions of the country.

4. Results and Discussions

4.1 Summary Statistics

The summary statistics of the variables used in this study is presented in table. We used only wave 1, wave 2 and wave 3 of the GHS because they are the only waves containing the individual prices data. We used the summary of the waves to see how these variables change across waves. Starting with the gender, the statistics shows that, on average, about 48% of the study sample is males while only about 35% of them are married. From the data also, the mean age of the household head is about 53 years across the waves.

We created the dummies for the educational attainment of the respondents. Higher proportions of the respondents (about 30%) have finished secondary school. About 25% have attended primary school followed by those who have not attended any school with about 22% across waves. Those that reported obtaining up to tertiary education from the sample are about 11% while the about 4% reported to have other qualifications in the sample.

Table 1: Summary Statistics of the variables

Variable	Wave 1		Wave 2		Wave 3	
	Mean/Prop	SD	Mean/Prop	SD	Mean/Prop	SD
Gender (Male)	0.48		0.48		0.49	
Marital status	0.36		0.32		0.34	
Age of the household head	51	17.40	54	17.06	54	15.96
Highest qual. (hh members)						
No qualification	0.23		0.22		0.22	
FSLs	0.24		0.27		0.25	
Secondary	0.32		0.27		0.30	

Tertiary	0.12		0.11		0.10	
Other	0.05		0.03		0.04	
Father's qualification						
No qualification	0.41		0.26		0.37	
FSLS	0.24		0.36		0.28	
Secondary	0.16		0.27		0.18	
Middle Schl	0.03		0.02		0.05	
Tertiary	0.05		0.03		0.08	
Other	0.11		0.10		0.04	
No of dependents	6.33	3.55	5.90	2.78	5.43	2.81
Female headed household	0.23		0.25		0.26	
Farming	0.95		0.94		0.94	
General prices	24054	3542	23720	3646	23397	3391
Staple Food prices (₦)						
Foreign Rice (per kg)	388	73.3	434	117.6	363	288.7
Local Rice (per kg)	322	48.8	282	122.5	329	76.4
Maize (per kg)	213	180.2	172	89.8	190	37.6
Garri (per kg)	238	140.7	285	192.3	238	185.4
Reduced Coping Strategy Index (RCSI)	3.62	5.92	3.69	6.02	3.81	6.03

Source: Authors' computation

With regards to household head educational qualification, the summary shows different pattern whereby those with no qualification at all have the largest percentage (about 35%) followed by those with only primary school certificate with taking 29% of the sample. There is also about 20% secondary school leaver across the waves. Those who reported having *other* (Qur'anic/Vocational education) category of education are 8% of the sample while those with up to tertiary education attainment are just about 5% across the waves.

The data also shows that most of the households (94%) reported that they engage in farming aside of their regular employment. In the same vein, the table reports the average price of food basket to be, on the average N23000 across the waves. Again, the individual prices of foreign rice, local rice, maize and

garri are reported to be, on average, ₦370, ₦311, ₦191 and ₦253 respectively, per kilogram across the waves.

With respect to our food security variable, the summary statistics shows that, on average, the coping strategy score is 3.71 across waves, showing that there is reasonable food security, with no much change as we move from one wave to another.

4.2 Pooled OLS Regression result

To check the sensitivity of our result, we present five sets of results in this section; one is the pooled cross-section estimates using our first price data, while others are result using the second price variable. Thus, we estimate the same equation with different food price at a point in time. The result is presented in table 2 below:

Table 2: Pooled OLS Regression

Variables	(1)	(2)	(3)	(4)	(5)
	RCSI	RCSI	RCSI	RCSI	RCSI
General Prices	-0.216*** (0.065)				
Price of foreign rice		-0.0011*** (0.0003)			
Price of local rice			-0.0004** (0.0002)		
Price of maize				-0.0001 (0.0003)	
Price of garri					-0.00013 (0.0003)
Male	-0.468*** (0.165)	-0.222 (0.247)	-1.676*** (0.310)	0.183 (0.447)	0.716** (0.294)
Age of head	0.007* (0.004)	0.022*** (0.007)	-0.039*** (0.009)	0.034*** (0.009)	0.032*** (0.007)
Primary education	2.228*** (0.154)	0.841*** (0.245)	0.611** (0.295)	3.299** (0.339)	3.677*** (0.269)
Secondary education	-0.541*** (0.159)	0.841*** (0.269)	-0.136 (0.282)	-0.254 (0.392)	-0.647** (0.259)
Tertiary education	0.129 (0.213)	-0.814** (0.322)	3.411*** (0.448)	-1.658*** (0.437)	-0.378 (0.334)
Other (education)	-1.047 (1.440)	-1.348 (4.691)	1.985*** (5.266)	1.013 (3.965)	-0.602 (2.527)
Household Size	-0.317*** (0.146)	1.032*** (0.254)	0.532** (0.259)	-1.384*** (0.330)	-0.511** (0.248)
Farmer	0.413 (0.285)	0.142 (0.435)	0.876 (0.634)	1.984 (0.814)	-1.302 (0.525)
Regional dummy (North=1)	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes
Constant	5.655*** (0.765)	0.889 (0.669)	6.248 (0.945)	1.022** (1.012)	2.765*** (0.760)
R-squared	0.105	0.162	0.127	0.182	0.161
Observation	9196	2389	2400	2682	3898

Source: Authors' computation**Note:** Standard error in parenthesis with ***p<0.01, **p<.05, *p<0.1

The table above presents the regression results of the effect of food price changes on food security. We present the effect of the price change in the food

general price in column (1) while price changes in foreign rice, local rice, maize and garri are presented in columns (2) – (5) respectively.

As expected, the result shows that, after controlling for other demographic characteristics, increase in general food prices is negatively and significantly related with food insecurity. Specifically, once general food price goes up by 1%, the food security decreases by 21%. This is in line with the findings of Amolegbe, Upton, Bageant and Blom (2021) as well as Han and Foltz (2015).

Except the prices of maize and garri that have no statistically significant relationship with food security, according to the result, the prices of rice both foreign and local, exhibited similar relationship with that of general food prices. This means that there is statistically significant negative relationship between them; increase in their individual prices causes a decrease in food security. Although, the magnitudes are really marginal, it suffices to say that the result affirms the findings of Arndt et al. (2008).

Other household characteristics show various relationship patterns with food insecurity. For instance, being male in the household is negatively related with food security in the models with the general food prices and local rice price. These are statistically significant at even 1%. On the other hand, it is positively related with the price of garri and it is statistically significant at 5% level of significance. In the same vein, the age of the household head also exhibited mixed relationship. However, in general the higher the age of the household the lower the possibility of the household being more food secure. This is not surprising, as people tend to be more responsible as they age and also people earn more as their age increase, may be because they gain more experience in life.

To our surprise only those household head that reported having only primary level education have a consistent and statistically significant positive relationship with food security in all the models. Other levels of education exhibit various and mixed relationship based on the price variable used. It is worthy of note, however, that the analysis indicates that education is an important determinant of food security.

Household size shows statistically significant negative relationship in models (1), (4) and (5) as envisaged, while the relationship is positive in models (2) and (3). Ordinarily, we believe that the relationship should be negative all through, because higher number of household members would naturally burden the breadwinner, which may worsen their food security situation in the household. However, given that the relation is positive in models with foreign and local rice prices, signifies that those households that are better off still buy rice even when the prices increase and therefore are not food insecure.

Again, the result suggested that engaging in farming has no statistically significant relationship. This is also another disappointment. We a-priori envisaged that engaging in farming would make one more food secure, but at it is all the models consistently show that there is no relationship.

4.3 Fixed Effect Regression

In the following table, we present the result of estimates from fixed effects regression where we attempt to control of individual and household unobservable characteristics. In this stage, analysis makes use of the panel dimension of the data to investigate whether changes in the food price variables are correlated with changes in the food security index when unobservable characteristics are controlled for.

In table 3, the result shows that increase in the general prices is associated with food security index negatively. Specifically, the result implies that, controlling for other control variables and unobservable effects, any 1% change in general food prices is associated with about 40% reduction in food security. This is closely associated with the result in the cross-session analysis above. Also, the prices of maize and garri showed similar trend, although is relatively lower magnitude whereby increase in the price of maize by 1% cause reduction of food security by 0.06 percentage point while increase in the price of garri cause reduction in food security by 0.0012. These results also followed similar trend what was obtained in the table 2 above. However, we found no

statistically significant relationship between prices of foreign rice and that of local rice. Although, the

direction is consistent with our expectation, that is, negative relationship.

Table 3: Fixed effect regression result

Variables	(1) RCSI	(2) RCSI	(3) RCSI	(4) RCSI	(5) RCSI
General Prices	-0.400*** (0.153)				
Price of foreign rice		-0.0002 (0.0004)			
Price of local rice			-0.00018 (0.0003)		
Price of maize				-0.062** (0.394)	
Price of garri					-0.0012* (0.0008)
Other controls	Yes	Yes	Yes	Yes	Yes
Regional dummy (North=1)	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes
Constant	8.686*** (1.603)	5.416*** (1.509)	5.729*** (1.511)	5.011*** (1.200)	4.509*** (1.138)
R-squared	0.110	0.083	0.063	0.106	0.068
Observation	9196	2389	2400	2682	3898

Source: Authors' computation

Note: Standard error in parenthesis with *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In the same vein, we investigated, using fixed effect strategy, whether there is any difference in food security situation between male-headed households and female-headed households. The result shows no statistically significant pattern. We therefore conclude that there is no difference in the effect of high food prices on food security on whoever headed the household.

5. Conclusion and Recommendations

This study uses panel data from the GHS for three waves to examine the impact of rising food prices on household food security in Nigeria.

A pooled OLS and fixed effects regression model were employed to investigate the relationship between

various food price variables and a household food security index. After controlling for demographic characteristics, an increase in the general price level of food as well as the individual prices of rice, maize, and garri was negatively associated with household food security.

In particular, a 1% increase in general food prices reduces food security by around 0.4%, whereas price increases in maize and garri also have a negative impact, albeit less. This indicates that higher food costs limit households' ability to access nutritious food. Using fixed effects, the relationship between food prices and security was found to hold even after controlling for unobserved time-invariant household heterogeneity. However, the impact of changes in foreign and local rice prices became negligible, which

suggests that other household-level factors may also have an impact. No significant difference was observed between male-headed and female-headed households either.

Overall, the study establishes that rising consumer food prices pose a serious threat to household food security in Nigeria. The increase in prices undermines dietary quality and intake, potentially increasing malnutrition risks.

These results suggest that policy attention is needed to limit inflationary pressures and stabilise basic food costs. Subsidies or targeted social safety nets could

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- help vulnerable households cope with unanticipated price surges. At the production level, efforts to boost domestic agricultural productivity through investments, infrastructure and security in key croplands may reduce import dependence and cushion external price shocks. Diversification of livelihoods can also increase resilience to food price volatility.
- While the paper provides useful insights, further research incorporating non-price factors such as conflict, drought, and pandemic impacts would present a more subtle understanding of the food security challenges facing Nigerian households.

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