Household demand for basic foodstuffs in a recessed economy: a case study of Southwest Nigeria

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Abstract

Purpose – The economic recession that Nigeria recently passed through caused distortions in economic and well-being of Nigerians. The purpose of this paper is to examine the effects of the economic recession on households' demand for basic foodstuffs in Southwest Nigeria.
Design/methodology/approach – Data were collected from 380 respondents drawn from urban areas of Lagos, Osun and Oyo states using multistage sampling technique. Descriptive statistics and Quadratic Almost Ideal Demand System were employed to analyze data collected.
Findings – The study showed sharp increase in the prices of basic foodstuffs during recession. Households were compelled to spend higher percentage of their monthly income on basic foodstuffs. Also, 51.1 percent of the respondents were government workers who experienced inconsistent or modulated monthly salary during the period. The percentage of households that were food insecure was 36.4 percent. Osun State had the highest monthly per capita expenditure (₦5,147.13) on foodstuffs, followed by Lagos and Oyo states while rice had the highest expenditure share (0.26), followed by yam (0.18), beans (0.106), vegetable oil (0.104) and garri (0.101).The breakdown also showed that 11.7, 18.1 and 17.7 percent of the total household monthly expenditures in Lagos, Osun and Oyo states, respectively, were spent on basic foodstuffs.
Research limitations/implications – There purchasing power of naira reduced significantly during recession, thus compelled households to spend more on basic foodstuffs compared to similar purchases before economic recession.
Practical implications – The reduction in purchasing power of naira affected the formal and informal sector. Irregular salary for civil servants reduced their expenditure on goods and services.
Originality/value – The study is original and topical, serving as literature of accounts that transpired among the households as far as demand for basic foodstuffs is concerned during the economic recession.

Keywords Economics, Economy, Food security, Agricultural management, Food price inflation
Paper type Research paper

1. Introduction

The economic recession structurally heralded significant decline in investments, trade, employment and real earnings. Hence, the end results were increase in food prices, food insecurity and levels of inequalities (NBS, 2016; Eaton *et al.*, 2016; Trading Economics, 2016). Prior to 2016, there was growth in the Nigeria economy although not steady. However, in the second quarter of 2016, the nation's gross domestic product (GDP) declined by −2.06 percent (year-on-year) in real terms. This was lower by 1.70 percent points from the growth rate of −0.36 percent recorded in the preceding quarter, and also lower by 4.41 percent points from the growth rate of 2.35 percent recorded in the corresponding quarter of 2015 (NBS, 2016). The two consecutive quarters of declining growth signaled the commencement of economic recession. According to National Bureau of Economic Research (2003), economic recession is defined as "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in a real gross domestic product (GDP), real income, employment, industrial production and wholesale-retail sales." The sharp drop in the price of crude oil in the international market coupled with restiveness of youths in the Niger Delta was among the factors that lead to the economic recession. Crude oil accounts

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for 95 percent of the foreign exchange earnings. The price of crude oil dropped from $112 per barrel in 2014 to less than $50 per barrel in 2016 (EIA, 2015).

Despite the diverse and rich vegetation that can support crop and livestock production (Chauvin *et al.*, 2012; Lipton, 2012), Nigeria's trade imports were dominated by foods and raw materials. According to Abubakar (2016), Nigeria spends over ₦1 trillion on the top 4 food imports (rice, wheat, fish and sugar) annually. The disaggregation revealed that Nigeria was the largest importer of US hard red and white wheat worth ₦635bn annually; world's number 2 importer of rice at ₦356bn; ₦217bn on sugar and ₦97bn on fish while rice alone accounted for substantial percentage of the food import bills. The neglect of the agricultural sector aggravated the negative effect of recession on households since the available foreign exchange cannot sustain massive importation of foods.

Food security and insecurity dynamics have been a global issue and generated widespread concerns over the years especially in the developing countries like Nigeria. Human body needs energy to be able to carry out its normal physiological and productive activities and, hence, basic food needs top the hierarchy of needs for individuals in the household. It is, therefore, a major area of policy concern for governments around the world, Nigeria inclusive. Aromolaran (2004) found a strong link between food intake, human health and productivity.

However, despite the importance and undoubted relevant role of food security to an individual, the household and the nation as whole, it is under a structural and technical threat in Nigeria owing to the economic recession. Specifically, in Southwest Nigeria where this study was carried out, more than 60 percent of the states owed civil servants at least four to eight months unpaid salaries (*Vanguard*, 2016). Without doubt, the purchasing power and capability of the workers was under unquestionable attack as stagnant and unsteady earning were the norms in the southwestern states in Nigeria. Against this backdrop, the mechanism and dynamics of demand for foodstuffs in the region (Southwest) requires prompt appraisal which necessitated this study to be carried out at the recession period. Basic foodstuffs are crops used as food or used to make food. Each region in Nigeria has its basic foodstuffs which are obtained from crops grown within the agro-ecology zone. The basic foodstuffs in Southwest Nigeria are garri, rice, yam, palm oil and beans among others:

RQ1. Therefore, the questions in the minds of the authors are that: what was the response of the residents of Southwest Nigeria to foodstuffs demand considering highlighted situations above?

RQ2. What was the extent of reduction in the purchasing power of naira of the households compared to periods before recession?

RQ3. What was the average equivalent amount that the household would have spent on the same quantity of basic foodstuffs before recession?

RQ4. What was the structure of the price elasticity mechanism in the region during this period?

RQ5. What are the factors influencing households' expenditure on foodstuffs during economic recession?

Various studies (Akinyele, 2009; Aromolaran, 2010; Ojoghoand Alufohai, 2010; Jayasuriya *et al.*, 2012; Akerele *et al.*, 2013; Udoh, 2013; Abdoulaye *et al.*, 2015; Mkhawani *et al.*, 2016; Syazwani *et al.*, 2017) on food demand, food price increasing volatility, behavior of consumption expenditure of households, consumer price index (CPI) and food security and effects of rising food prices on household food security among others have been conducted. Specifically, most studies in Nigeria on food were in state, regional or zonal levels and undertaken when there was no shock attributed to recession in the economy. However, there has been a dearth of studies on the effect of economic recession on households demand for

basic foodstuffs; specifically, in Southwest Nigeria. It is pertinent to understand that the findings of this research may, therefore, be important to buttress the point made by Devereux *et al.* (2008) that efforts at ensuring food security should not only be focused on the supply side but also look at the demand side. Therefore, this study seeks to compare the expenditure share on foodstuffs with the existing literature; and also, to isolate and compare own and cross-elasticities in recessed economy with the booming economy.

2. Theoretical framework and literature review

The theory of consumer behavior supports this study. According to Reynolds (2005), utility is the capacity of a good (or service) to satisfy a want. Concept of utility is one approach that explains the phenomenon of value. Factors that affect consumer behavior include marketing personnel, psychological, situational, social and cultural factors. For instance, consumer behavior in terms of demand for a basic foodstuff such as semolina would require factors such as the price, education, income level of the consumer, packaging among other factors.

Among the several analytical tools that have been used in demand analysis are Almost Ideal Demand System (Iwang, 2014; Motallebi and Pendell, 2013), Linear Approximate Almost Ideal Demand System (Green and Alston, 1991; Alston *et al.*, 1994; Buse, 1994) and Double Hurdle Model (Blundell and Meghir, 1987; Newman *et al.*, 2003; Akinbode and Dipeolu, 2012). Two analytical tools (AIDS and Quadratic Almost Ideal Demand System (QUAIDS)) have been intensively utilized in studies assessing the demand mechanism for food. Studies that used AIDS include Abdulai *et al.* (1999), Akinleye (2007) and Muhammad-Lawal *et al.* (2011), while Obayelu *et al.* (2009) and Olorunfemi (2013) used QUAIDS to analyze food demand in Nigeria. Banks *et al.* (1997) opined that QUAIDS model is preferred to AIDS model in that it has the property of non-linear Engel function which is more appropriate to household data we considered in this study.

Using CPI as a measure of inflation, several studies have examined the effect of inflation on the prices of food crops. Zhu and Lu (2011) used Granger causality, impulse response analysis and variance decomposition method to determine the relationship between prices of agricultural products and CPI after seasonal adjustment. They concluded that the response of cereal prices to CPI was weaker, while the variance contribution degree of CPI to cereal prices was lower. Feng and Peng (2002) used error correction model to analyze the relationship of co-integration between grain prices and inflation. They found long-term relationships between grain prices and inflation; and a unidirectional causality from inflation to grain prices rather than from grain prices to inflation. In a related study, Apergis and Rezitis (2011) revealed that higher food prices translate to higher inflation and price shocks which later passed on to consumer prices. Abdoulaye *et al.* (2015) found out that food price inflation has increased in many Sub-Saharan African countries, pushing up CPIs with ripple effects on households and on the macro economy. This has a direct consequence on the already weakened household purchasing power thus exposing these households to food insecurity. This study utilized difference of means to compare food expenditure during economic recession and the equivalent food expenditure before economic recession.

Schnepf (2013) posited that continued sluggish/negative economic growth, stagnant wages and persistently high unemployment (the indicators of economic recession) are factors responsible for increase in food price inflation which combined to weaken consumer purchasing power. Specifically, Osei-Asare and Eghan (2013) found that food price inflation between 2005 and 2011 eroded real household food purchasing power in Ghana by 47.18 percent. Mkhawani *et al.* (2016) revealed that rising food prices made high-quality food scarce for poorer households, forcing them to resort to cheaper or less nutritious foods and that half (50 percent) of the respondents claimed that almost 50 percent of their monthly income was spent on food. This impeded their ability to access other important commodities required in the household.

2.1 Analytical framework

The QUAIDS is derived from the generalization of the PIGLOG preferences starts from an indirect utility function of the form:

$$\ln V\left\{\left(\frac{\ln m - \ln a(p)}{b(p)}\right)^{-1}\right\} + \lambda(p)^{-1}, \tag{1}$$

where $[\ln m - \ln a(p)]$ = indirect utility function of the PIGLOG demand system (i.e. a system with budget shares linear in the log total expenditure); m = total expenditure; and $a(p)$, $b(p)$ and $\lambda(p)$ are homogenous of degree zero in prices.

The $\ln a(p)$ given in Equation (1) has the translog form:

$$\ln a(a) = \alpha_0 + \sum_{i=1}^{j} \alpha_1 \ln p_i + \frac{1}{2}\sum_{i=1}^{j}\sum_{i=1}^{j} \gamma_{ij} \ln p_j, \tag{2}$$

and $b(p)$ is the simple Cobb–Douglas price aggregator defined as follows:

$$b(p) = \prod_{i}^{j} p_i^{\beta^i}, \tag{3}$$

$$\lambda(p) = \sum_{i=1}^{k} \lambda_i \ln p_i, \tag{4}$$

where:

$$\sum_{i=1}^{k} \lambda_i = 0, \tag{5}$$

where $i = 1, \ldots, k$ denotes the number of goods entering the demand model.

Application of Roy's identity or Shepherd lemma to the indirect utility function gives the QUAIDS model budget shares as follows:

$$\omega^i = \alpha_1 + \sum_{j=1}^{k} \gamma_{ij} \ln p_j + \beta_i \ln\left[\frac{m}{a(p)}\right] + \frac{\lambda_i}{b(p)}\left\{\ln\left[\frac{m}{a(p)}\right]\right\}^2. \tag{6}$$

To control for varying preference structures and heterogeneity across households, demographic variables (z) are incorporated into the QUAIDS model through the linear demographic translating method (Pollak and Wales, 1981).

2.2 Estimation of expenditure, compensated and uncompensated price elasticities

The formulae for elasticities in the QUAIDS are given by Banks *et al.* (1997). Elasticity is an important measure in demand analysis. The elasticities were obtained by first differentiating the budget share equation with respect to $\ln m$ and $\ln p_j$, respectively, to obtain:

$$\mu_{ij} = \frac{\partial_{w_i}}{\partial \ln x} = \beta_i + \frac{2\lambda_i}{b(p)}\left\{\ln\left(\frac{m}{a(p)}\right)\right\}, \tag{7}$$

$$\mu_i = \frac{\partial_{w_i}}{\partial \ln p_j} = \gamma_{ij} - \mu_i\left(\alpha_j + \sum_k \gamma_{jk} \ln p_k\right) - \frac{\lambda_i \beta_j}{b(p)}\left\{\ln\left(\frac{m}{a(p)}\right)\right\}^2. \tag{8}$$

The expenditure elasticity was derived as follows:

$$e_i = \frac{\mu_i}{\omega_i} + 1. \tag{9}$$

The uncompensated or Marshallian price elasticities are given by the following equation:

$$e_i = \frac{\mu_i}{\omega_i} - \delta_{ij}, \tag{10}$$

where δ_{ij} is the Kronecker δ which is equal to 1when $i = j$, otherwise $\delta_{ij} = 0$.

Using the Slutsky equation, the compensated or Hicksian price elasticities are as follows:

$$e_{ij}^{c} = e_{ij}^{u} + w_i e_i. \tag{11}$$

Equation (11) is calculated and used to assess the symmetry and negativity conditions by examining the matrix with elements $w_i \left[e_{ij}^{c} \right]$ which should be symmetric and negative semi definite in the usual way.

3. Methodology

3.1 Description of the study area

The study was conducted in the Southwest Nigeria. Southwest Nigeria comprises of six states, namely, Lagos, Oyo, Osun, Ondo, Ekiti and Ogun. The southwest geopolitical zone falls within the latitude 6° to the north and latitude 4° to the south. It is marked by the 4° to the west and 6° to the east. The mean annual rainfall is 1,480 mm with a mean monthly temperature range of 18°C to 24°C during the rainy season and 30°C to 35°C during the dry season. The zone has a land area of about 114,271 km^2 with a total population of 27,581,992 in 2006 (NPC, 2006). Most residents of the rural areas of Southwest Nigeria are predominantly farmers, while trading, commerce, manufacturing and banking and administration are common occupations in the urban area. The agro-ecological zones are suitable for the cultivation of tree crops (cocoa, palm tree, cashew and rubber) and arable crops (rice, yam, cassava, vegetables and maize among others).

3.2 Sample selection and data collection

A multistage sampling technique was employed. The first stage was the random selection of three states (Ogun, Osun and Lagos) out of the six states that constitute Southwest Nigeria. The second stage was the purposive random selection of two local government areas from each of the states (urban). The choice of urban local government areas (capital of the state) was because of the diverse income of residents and presence of indigenes from other states that make up Southwest Nigeria. Also, most households in the urban areas buy their basic foodstuffs from the market which makes data collection easy unlike the rural households that produce the food they eat (e.g. garri, yam, beans, palm oil, cassava flour and yam flour). In the third stage, 70 households were randomly selected from each local government area to give a total of 140 households per state and 420 households from the three states (six local government areas). Data were collected using questionnaires. The data collected included socioeconomic characteristics (age, sex, marital status, household size, educational status, weekly/monthly income and occupation of the household head), the basic foodstuffs for the household, the unit price, the quantity of each of the basic foodstuff consumed per week/month and amount spent on each foodstuff per week/month. Out of 420 questionnaires administered, 380 were returned on time, while 360 were suitable for the analysis. In total, 20 questionnaires were not properly completed.

3.3 Data collected and utilized

Primary and secondary data were used for the study. The primary data collected included socioeconomic characteristics (age, sex, marital status, household size, educational status, weekly/monthly income and occupation of the household head), the basic foodstuffs for the household, the unit price, the quantity of each of the basic foodstuff consumed per week/month and amount spent on each foodstuff per week/month. Secondary data on urban CPI (food) with 2009 as the base year for before (2010–2011 and 2013–2014) and during (2016–2017) economic recession were sourced from National Bureau of Statistics. The years before the economic recession were chosen because prices of foodstuffs were relatively stable with marginal increases.

3.4 Data analysis

Data were analyzed using descriptive statistics to explain the characteristics of CPI (food) before and during economic recession, as well as to profile the socioeconomic characteristics of the respondents in the study area. The descriptive analysis included measure of central tendency (mean and mode), measure of dispersion (standard deviation, variance and skewness) and frequency distribution. Equality test was used to explain whether there were significant differences in the average urban consumer price indices, average consumer expenditure on food before and during economic recession or not. The equivalent amount that the household would have spent on the same quantity of food was extrapolated from the average consumer price indices before and during economic recession. Bearing in mind the time value of money and comparing food expenditure before and during recession, it is expected that households would have spent less to obtain the same quantity of foodstuffs before economic recession sets in. Thus, this confirms the fact that money loses its value during recession. Average per capita food expenditure approach was used to determine the extent of food insecurity in the study area during economic recession.

QUAIDS model was employed to examine the determinants of basic foodstuff demand, and also to estimate expenditure and price, income and cross-elasticities. Budget share equations were specified as a quadratic extension of AIDS (QUAIDS) model. Application of Roy's identity or Shepherd lemma to the indirect utility function gives the QUAIDS model budget shares as follows:

$$\omega_i = \alpha_i + \sum_{j=1}^{k} \gamma_{ij} \ln p_j + \beta_i \ln\left[\frac{m}{a(p)}\right] + \frac{\lambda_i}{b(p)}\left\{\ln\left[\frac{m}{a(p)}\right]\right\}^2 + \sum_{s=1}^{L} \delta_{is} z_s + u_i, \tag{12}$$

where α_i, λ, β and γ are parameters to be estimated; α_i represents average value of budget share of garri, yam, beans, rice, vegetable oil, palm oil, cassava flour, yam flour and semolina; β represents parameter that determines whether food items considered are luxurious or necessities; γ_{ij} represents effects on budget of item i of 1 percent change in the prices of foodstuffs under consideration (garri, yam, beans, rice, vegetable oil, palm oil, cassava flour yam flour and semolina); m represents per capita expenditures on all food items (garri, yam, beans, rice, vegetable oil, palm oil, cassava flour yam flour and semolina); δ_j represents vector of socioeconomic and demographic variables of respondents in the study area; u_i represents error term; ω_i represents the household's expenditure share of ith food item, for $i = 1, 2, 3, \ldots, 9$; ω_1 represents share of garri; ω_2 represents share of yam; ω_3 represents share of beans; ω_4 represents share of rice; ω_5 represents share of vegetable oil; ω_6 represents share of palm oil; ω_7 represents share of cassava flour; ω_8 represents share of yam flour; ω_9 represents share of semolina; p_i represents price of ith food item, for $i = 1, 2, 3, \ldots, 9$; p_1 represents price of garri; p_2 represents price of yam; p_3 represents price (₦) of beans; p_4 represents price (₦) of rice; p_5

represents price (₦) of vegetable oil; p_6 represents price (₦) of palm oil; p_7 represents price (₦) of cassava flour; p_8 represents price (₦) of yam flour; p_9 represents price (₦) of semolina; z_i represents socioeconomic variables; z_1 represents age of household head(years); z_2 represents sex of household head (1 = male, 0 = female); z_3 represents household's size (head count); and z_4 represents years of education head (years).

Also, the demand theory requires that the above system to be estimated under restrictions of adding up, homogeneity and symmetry. The adding up is satisfied if:

$$\sum_{i=1}^{n} w_i = 1, \tag{13}$$

for all x and p which requires:

$$\sum_{i=1}^{k} \alpha_1 = 1; \sum_{i=1}^{k} \beta_i = 0; \sum_{i=1}^{k} \lambda_i = 0; \sum_{i=1}^{k} \gamma_{ij} = 0 \text{ (add up)},$$

$$\sum_{i=1}^{k} \gamma_{ij} = 0 \text{ (homogenity)}, \tag{14}$$

$$\gamma_{ij=}\gamma_{ij} \text{ (Slutsky symmetry)}. \tag{15}$$

4. Results and discussion

4.1 Characteristics of respondents

In total, 35 percent of the respondents had their ages within the bracket 28–37 years and the average age of the respondents was 42.2 years. Most of the respondents had their ages below the average age (positive skewness). Also, 66.1 percent of the respondents were married and the average household size was 3.9. The literacy level was high in the study area with 93.6 percent had tertiary education, while only 1.4 percent had no formal education. Moreover, 51.1 percent of the respondents were government workers; 3.6 percent were artisan, while 1.7 percent were retirees. The average monthly income of respondents in the study area was ₦82,090.6 with most respondents (62.8 percent) earning at most ₦50,000 per month. The averages of monthly income and expenditure on basic foodstuffs of respondents were ₦82,090.6 and ₦25,582.8, respectively. Also, 82.5 percent of the respondents spent at most ₦40,000 per month on basic foodstuffs.

4.2 Disaggregation of food expenditure among states

The breakdown of the average household monthly expenditure on foodstuffs reveals that ₦15,240.19, ₦17,242.25 and ₦15,990.46 were spent by households in Lagos, Osun and Oyo states, respectively. These amounts were expected to have been higher if public servants who constituted 51.1 percent of the respondents received their monthly salaries regularly. Rice had the highest expenditure share (0.26), followed by yam (0.18), beans (0.11), vegetable oil (0.104) and garri (0.10) in Southwest Nigeria (see Table I). The expenditure share of rice and yam followed the same pattern (first and second) in the three states considered for the study. The breakdown shows that 11.7, 18.1 and 17.7 percent of the total household expenditures in Lagos, Osun and Oyo states, respectively, were spent on foodstuffs per month. Rice, yam, beans and garri were important staple food in Southwest Nigeria; their high expenditure share may be attributed to the general increase in prices of food which according to Ngolina (2016) have gone up by more than 100 percent compared to previous years. This assertion was affirmed by Odili (2017) who said that the drop in the value of the naira and the ban placed on some imported food items have been identified as some of the reasons for the increase in prices

of goods in the market. The low expenditure share of cornflakes, yam flour, wheat, semovita and the likes may be attributed to their low consumption among the residents in the study area. Unlike the major foodstuffs (garri, yam, rice and beans), consumers exercise a high degree of choice over whether to buy or not to buy these foodstuffs. They are broadly considered to be luxury purchases (Gittins and Luke, 2012).

In addition, displacement of farming households from their abode in the Northeast by Boko Haram and other civil unrests in the northern part of the country may be a strong factor for the increase in the prices of beans, yam and grains generally. Moreover, Osun state had the highest monthly per capita expenditure (₦5,147.13) on foodstuffs, followed by Lagos (₦4,472.97) and Oyo states (₦4,455.65). This may be attributed to general increase in the prices of food and cost of transportation. Among the four major foodstuffs consumed in the states that make up the study area, rice has the highest per capita expenditure followed by yam across states (see Table III).

According to Gittins and Luke (2012), consumers have little or no choice but to continue to buy these commodities regardless of their prices and income pressures. However, consumers can vary quantity purchased to reflect their shrink budget during recession. Expenditure on this commodity is regarded as non-discretionary spending. Although yam and beans are not imported commodities, the unrest in most of the producing states as well as increase in the farm inputs used in their production might have led to the prices increase (Table II).

Rice consumption in Nigeria was 5.2 metric tons in 2010 and is expected to reach 36 metric tons by 2050 with 5.1 percent annual growth. The annual domestic output of rice in Nigeria still hovers around 3.0m metric tons, leaving the huge gap of about 2.2m metric tons annually, a situation, which has continued to encourage dependence on importation (Daramola, 2005; FMARD, 2011). According to Abubakar (2016), before the ban on rice importation, $2bn was being spent annually on rice importation which translates to $6m daily (Table III).

4.3 Determination of purchasing power of naira before economic recession

Figure 1 shows that the CPI had a gentle rise from January to December of 2010 and 2011. The average urban CPI for food was 113.3 percent. This indicates 13.3 percent increase over

Table I.
Expenditure share of foodstuffs in the states that make up the study area

Foodstuffs	Total respondents	Disaggregation of study area into states		
		Lagos	Osun	Oyo
Garri	0.101	0.106	0.090	0.088
Yam	0.178	0.197	0.169	0.173
Beans	0.106	0.095	0.102	0.108
Palm oil	0.087	0.084	0.084	0.084
Vegetable oil	0.104	0.102	0.106	0.104
Rice	0.264	0.227	0.298	0.262
Wheat	0.047	0.077	0.030	0.048
Corn flakes	0.020	0.023	0.023	0.020
Yam flour	0.088	0.083	0.092	0.105
Semovita and the likes	0.006	0.007	0.006	0.008

Table II.
Expenditure shares of the total expenditure per state

State	Total monthly household expenditure (₦)	Monthly household food expenditure (₦)	Food expenditure share
Lagos	15,600,000	1,828,810	0.117
Osun	11,427,500	2,069,070	0.181
Oyo	10,832,500	1,918,855	0.177

the period. During the economic recession, the CPI for food rose abnormally to an average of 222.7 percent. This means that the prices of food increased by 122.7 percent. The purchasing powers of naira in relation to the recession period are given in Table IV. The table shows that the farther the period from the economic recession periods (2016 and 2017), the higher the purchasing power of naira. The purchasing power of naira before the recession was computed using Leonard's (2019) approach.

Given the average monthly expenditure (₦25,582.75) on basic foodstuffs by households in the study area during recession (see Table IV), the same quantity of basic foodstuffs would have cost the households ₦13,585.77 and ₦18,261.41 per month in 2011 and 2014, respectively. The drastic reduction in the naira value (astronomic increase in urban CPI) is attributed to economic recession. With the average monthly income of ₦82,090.60 among the respondents, 31.16 percent of the monthly income was spent on basic foodstuffs during economic recession. This was unlike the finding of Mkhawani *et al.* (2016) that found that almost 50 percent of the respondent's monthly income was spent on food (Figure 2).

Foodstuff	Lagos	Osun	Oyo
Garri	495.79	472.66	375.60
Yam	858.06	833.91	745.39
Beans	419.79	522.38	485.60
Rice	984.76	1,548.88	1,182.33

Table III.
Per capita monthly expenditure (₦) of major foodstuffs consumed in the study area

Source: Google maps (2016)

Figure 1.
Map of the Southwest Nigeria

Given the same monthly income, households would have spent 15.16 and 20.23 percent per month on the same quantity of basic foodstuffs in 2010 and 2013, respectively. This indicates a low cost of living and better standard of living among households before the recession. The average food expenditure by the households during recession was compared to the average of the amount households would have spent for the same quantity of foodstuffs before economic recession started (2015, 2014, 2013, 2012, 2011 and 2010). Table V shows that there were significant differences ($p < 0.01$) in all the years compared with recession period. The result reveals that the households would have spent lesser amount to buy the same quantity of basic foodstuffs.

The farther the period from the recession, the smaller the amount households would have spent on basic foodstuffs. Also, using average per capita annual food expenditure of ₦37,534.95; 36.4 percent of the households were food insecure during economic recession. Given the purchasing value of naira before the economic recession, it is expected that the percentage of food insecure households will be less. This is in agreement with Abdoulaye *et al.* (2015) that food price inflation has a direct consequence on the already weakened household purchasing power thus exposing these households to food insecurity.

Table IV.
Purchasing power of naira and equivalent average expenditure on basic foodstuffs

Year	Average urban consumer price index (food)	Purchasing power compared to recession UCPI	Equivalent amount (₦) to ₦100 during recession	Equivalent of average monthly food expenditure (₦)	Percentage (%) of monthly income spent on basic foodstuffs
2010	108.31	0.486	48.64	12,442.71	15.16
2011	118.26	0.531	53.11	13,585.77	16.55
2012	131.68	0.591	59.13	15,127.47	18.43
2013	144.54	0.649	64.91	16,604.83	20.23
2014	158.96	0.714	71.38	18,261.41	22.25
2015	175.39	0.788	78.76	20,148.90	24.54

Note: UCPI, urban consumer price index

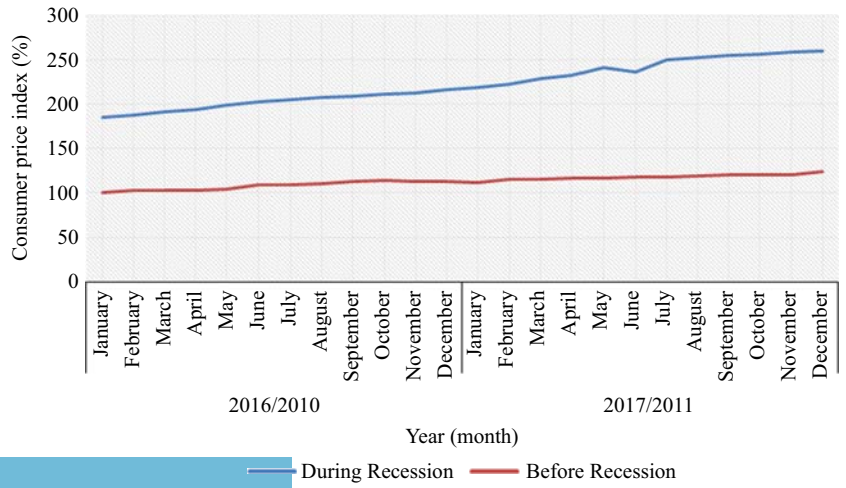

Figure 2.
Urban consumer price index (food) before and during recession

4.4 Determinants of expenditure share on household foodstuffs

The test of endogeneity (Table VI) indicates the superiority of using QUAIDS model in this study compared to AIDS model; therefore, I am inclined to reject the null hypothesis ($p < 0.05$). Also, the Wald test for demographic effect shows that the demographic effect is statistically insignificant on the expenditure shares of basic foodstuffs ($p > 0.05$). The rejection of the null hypothesis in λ Wald test means that the λ coefficients are significant and jointly different from zero.

Table VII shows the estimated coefficients of the expenditure share equations. Specifically, 65 percent (36 out of 55) of the price coefficients of the foodstuffs are statistically different from zero. This indicates that there is quantity response to movement in relative prices. A change in the price of the commodity leads to change in the expenditure share of each of the foodstuffs (garri, yam beans palm oil, vegetable oil, rice, wheat, cornflakes, yam flour, semovita and the likes). Most of the coefficients expectedly have negative relationships with the expenditure shares. This means that for every increase in the price of the commodity, expenditure share reduces. The result shows an improvement over Bopape and Myers (2007) that only 32 percent of the coefficients of prices of the food items were significant. However, the food commodities used in this study are different from what Bopape and Myers considered. The result is the reflection of economic recession in the country with more than 100 percent increase in the prices of basic foodstuffs while household budgets shrink (Odili, 2017). The general increase in the prices of food items was as a result of economic recession that has not only made inflation rate to rise from 9.3 percent in October 2015 to 18.3 percent in October 2016 (Nairametrics, 2017) but also led to reduction in consumers' demand for food. While the quantities of non-discretionary food items were reduced significantly, the discretionary food items were removed from households' menu list. The CPI and food index increased from 8.50 and 9.40 percent, respectively, in March 2015 to 17.80 and 18.53 percent in February 2017 (NBS, 2017). Apart from the increase in prices of goods, there was shortage of money in circulation. The government workers who constituted 51.1 percent of the respondents in this study were seriously affected with the multiplier effects on traders.

Periods	Food expenditure (₦) during recession $n = 298$ Mean	SD	Equivalent food expenditure (₦) before recession $n = 298$ Mean	SD	Z^{cal}	p-value
Recession period – 2010	25,582.75	16,221.34	1,244.71	7,889.59	12.58	0.000***
Recession period – 2011	25,582.75	16,221.34	13,585.77	8,614.38	11.28	0.000***
Recession period – 2012	25,582.75	16,221.34	15,127.47	9,591.93	9.58	0.000***
Recession period – 2013	25,582.75	16,221.34	16,604.84	10,528.68	8.01	0.000***
Recession period – 2014	25,582.75	16,221.34	18,261.41	11,579.07	6.34	0.000***
Recession period – 2015	25,582.75	16,221.34	20,148.90	12,775.88	4.54	0.000***

Note: ***Significant at the 1 percent level

Table V. Equality test results for comparing food expenditure before and during recession

Test	Statistic	df	p-value
QUAIDS specification: LR value	16.51	8	0.036
Demographic effect (χ^2 score)	49.08	36	0.072
Expenditure endogeneity (Wu–Hausman: F-value)	0.49	(8,360)	0.01
λ Wald (χ^2 score)	225.69	9	0.0000

Source: Result of analysis (2016)

Table VI. Results of test for QUAIDS specification, endogeneity and demographic effects

Table VII.
QUAIDS analysis result

Variable	Garri	Yam	Beans	Palm oil	Vegetable oil	Rice	Wheat	Cassava flour	Yam flour	Semolina
Constant	−0.0091	0.1238***	−1.2359***	−0.0895**	0.1383***	0.8845***	0.0892***	0.0565*	0.1187***	0.9236***
	(0.0368)	(0.0355)	(0.0660)	(0.0424)	(0.0316)	(0.0789)	0.0273)	(0.0305)	(0.0239)	(0.0724)
Price coefficients										
ln Price of Garri	0.0202***									
	(0.0021)									
ln Price of Yam	−0.0058***	0.0371***								
	(0.0015)	(0.0026)								
ln Price of Beans	0.0064	−0.0079**	0.1823***							
	(0.0040)	(0.0037)	(0.0122)							
ln Price of Palm oil	−0.0036**	−0.0057***	0.0160***	0.0215***						
	(0.0014)	(0.0013)	(0.0048)	(0.0020)						
ln Price of Vegetable oil	−0.0049***	−0.0046***	−0.0072**	−0.0023*	0.0215***					
	(0.0013)	(0.0014)	(0.0035)	(0.0013)	(0.0017)					
ln Price of Rice	−0.0013	−0.0091**	−0.0967***	−0.0145***	0.0006	0.1365***				
	(0.0038)	(0.0038)	(0.0110)	(0.0039)	(0.0032)	(0.0135)				
ln Price of Wheat	0.0005	−0.0023**	−0.0015	−0.0004	−0.0007	−0.1116***	0.0188***			
	(0.0009)	(0.0010)	(0.0028)	(0.0008)	(0.0008)	(0.0023)	(0.0008)			
ln Price of Cassava flour	−0.0023	−0.0010**	0.0029	0.0009	−0.0012	−0.0098***	−0.0003	0.0159***		
	(0.0009)	(0.0078)	(0.0035)	(0.0009)	(0.0008)	(0.0026)	(0.0005)	(0.0007)		
ln Price of Yam flour	−0.0023**	−0.0041***	−0.0015	−0.0029***	−0.0039***	−0.0049**	−0.0019***	−0.0011**	0.0247***	
	(0.0010)	(0.0011)	(0.0022)	(0.0008)	(0.0009)	(0.0022)	(0.0006)	(0.0005)	(0.0011)	
ln Price of Semolina	−0.0070***	0.0033	−0.0927***	−0.0092***	0.0026	0.0104***	−0.0009	−0.0039**	−0.0021	0.0996***
	(0.0026)	(0.0025)	(0.0078)	(0.0029)	(0.0022)	(0.0041)	(0.0017)	(0.0019)	(0.0016)	(0.0074)
Expenditure and expenditure^2										
lnEXPD	−0.0004	0.0008**	−0.0043***	−0.0003	0.0002	0.0007	0.0000	−0.0003	−0.0001	0.0036***
	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0003)	(0.0006)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
lnEXPD2	−0.0158***	0.0029	−0.1572***	−0.0191***	0.0055	0.0979***	−0.0006	−0.0051	−0.0024	0.0939***
	(0.0055)	(0.0057)	(0.0066)	(0.0060)	(0.0049)	(0.0110)	(0.0040)	(0.0042)	(0.0039)	(0.0085)

(*continued*)

Table VII.

Variable	Garri	Yam	Beans	Palm oil	Vegetable oil	Rice	Wheat	Cassava flour	Yam flour	Semolina
Household characteristics										
Age	0.0000	−0.0000	−0.0000	0.0000	0.0001*	−0.0001*	0.0000	0.0000	0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Gender	0.0003	0.0017*	−0.0006	0.0004	−0.0002	−0.0023*	−0.0001	0.0000	0.0006	0.0003
	(0.0008)	(0.0010)	(0.0007)	(0.0006)	(0.0007)	(0.0014)	(0.0006)	(0.0004)	(0.0007)	(0.0004)
Household size	0.0000	−0.0001	−0.0001	0.0001	0.0001	−0.0003	0.0002*	0.0000	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Years of	0.0001	0.0003*	0.0001	−0.0000	−0.0000	−0.0004	−0.0001	−0.0000	−0.0000	0.0001
education	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)

Notes: Standard errors are in parenthesis. *,**,***Significant at the 10, 5 and 1 percent levels, respectively
Source: Result of analysis (2016)

With the exception of Lagos state, as on May 2016, government workers owed salaries but Osun state paid half salary for workers on grade level 8 and above (BudgIT, 2016).

Moreover, the table shows that just 15 percent (6 out of 40) of the 40 coefficients of household characteristics are significantly different from zero. That is, six of the coefficients significantly influenced ($p < 0.10$) the expenditure shares of the foodstuffs. This may be attributed to economic recession which compels households to spend according to their shrink budgets. This is also confirmed by the significance of the coefficients at 10 percent ($p < 0.10$). The result shows that age of respondents only influenced the expenditure shares of vegetable oil (positively) and rice (negatively), while the coefficient of household size only influenced expenditure share on wheat (positively). Also, the coefficient of sex influenced expenditure shares of yam (positively) and rice (negatively). Unlike Nigeria, the significance of 69 percent of the household characteristics in Bopape and Myers (2007) that were considered non-discretionary food items (grains, meat/fish, fruit/vegetable, dairy products, oil/butter/fat and sugar) may be attributed to normalcy in economic situation in South Africa unlike Nigeria that was in economic recession. Three out of the ten coefficients of total expenditure significantly influenced the expenditure share of the food commodities. Expenditures on yam, beans and semonila influenced their respective expenditure share. The results show that increase in total expenditure leads to increase in expenditure shares of yam ($p < 0.05$) and semolina ($p < 0.01$), and decrease in expenditure share of beans ($p < 0.05$).

4.5 Expenditure elasticities of household basic foodstuffs

The expenditure elasticities of all the foodstuffs except semolina and the likes were positive, indicating that six of the food items were normal goods while one (semolina) was inferior good. For the normal food items, expenditure on them increases as the income increases, while for the inferior good, the reverse is the case. Garri, yam, beans, palm oil, wheat and bournvita showed expenditure elasticities of less than 1, indicating they are necessities (see Table VIII). This means that for every increase in income there is less proportionate increase in expenditure on the commodities. This finding is in agreement with several past studies (Larochelle *et al.*, 2016; Akinbode, 2015; Ojogho and Alufohai, 2010). However, the result disagrees with Akinbode (2015) who found garri and palm oil to be inferior commodities ($Ee < 1$) and Ojogho and Alufohai (2010) suggested yam and beans to be luxurious foods ($Ee > 1$). On the other hand, the expenditure elasticities for vegetable oil, rice, cassava flour and yam flour are greater than 1; hence, they are luxurious goods (see Table VIII). This result agrees with Akinbode (2015). Of special note is the status of rice that changed from a necessity/inferior commodity in several previous studies (Ojogho and Alufohai, 2010) to luxury commodity among households. The sudden change in status of rice may be attributed to almost 100 percent increase in the price of the commodity due to

Household foodstuffs	Expenditure elasticity
Garri	0.9824
Yam	0.9050
Beans	0.6797
Palm oil	0.8931
Vegetable oil	1.0044
Rice	1.2470
Wheat	0.9765
Cassava flour	1.1192
Yam flour	1.0240
Semolina	−0.2535

Source: Field survey (2016)

Table VIII.
Expenditure elasticities of demand for household foodstuff

fall in the value of naira and the ban on its importation. According to Sessou and Kolawole (2016), the price of 50 kg bag of rice rose from ₦9,000 in 2015 to ₦18,000 in 2016 and presently oscillating between ₦17,000 and ₦17,500. The exchange rate of naira to dollar dropped from ₦155 to $1 in November 2014 to ₦197 to $1 in 2015 and 2016, and ₦305 to $1 in later part of 2016 till date (official rate) (CBN, 2017). The prevailing scarcity due to sharp drop in the price of crude oil in the world market and restiveness in the Niger Delta led to the lowest drop in the exchange rate of naira to dollar in the black market in February 16, 2017 with ₦522 exchanging for $1 (Nairametrics, 2017; The cable, 2015).

4.6 Marshallian and Hickian elasticities of household basic foodstuffs

Table IX presents the Marshallian or uncompensated elasticity. The own-price elasticities for all the commodities except semolina were negatives and inelastic in line with *a priori* expectation. This mean that increase in the price of the food items leads to small change in quantity demanded of the foodstuffs. The result shows that beans and cassava flour have magnitudes smaller than the others. Garri (0.80) has the highest absolute own-price elasticity, followed by vegetable oil (0.79) and yam (0.78). The value of semolina (8.97) shows that it is elastic. This may be attributed to its low demand and popularity among most households in Southwest Nigeria. Only few of the commodities' cross-price elasticities of demand are in agreement with *a priori* expectations. Yam and beans, palm oil and yam, vegetable oil and yam, and vegetable oil and beans have negative cross-price elasticities. This indicates that they are complements. Garri and wheat, and yam and semolina have positive cross-price elasticities. Hence, they are substitutes.

The own-price elasticities for Hicksian or the compensated elasticities show that all the commodities have negative own-price elasticities except semolina which agrees with *a priori* expectations. However, the magnitude of the values in compensated elasticities is smaller compared with uncompensated elasticities. Garri (−0.71) has the highest absolute own-price

Household foodstuffs	Garri	Yam	Beans	Palm oil	Vegetable oil	Rice	Wheat	Cassava flour	Yam flour	Semolina
Marshallian/Uncompensated elasticity										
Garri	−0.8045	−0.0520	−0.0239	−0.0449	−0.0424	0.0441	0.0055	−0.0247	−0.0223	−0.0172
Yam	−0.0218	−0.7832	−0.0265	−0.0253	−0.0167	−0.0084	−0.0088	−0.0020	−0.01329	0.0009
Beans	0.0075	−0.0024	−0.3263	0.0411	0.0130	−0.1646	−0.0054	0.0040	0.0061	−0.2529
Palm oil	−0.0430	−0.0493	0.0267	−0.7668	−0.0076	−0.0217	−0.0004	0.0086	−0.0237	−0.0157
Vegetable oil	−0.0435	−0.0464	−0.0211	−0.0161	−0.7951	−0.0230	−0.0074	−0.0100	−0.0375	−0.0042
Rice	−0.0096	−0.0671	−0.1236	−0.0377	−0.0343	−0.7521	−0.0514	−0.0376	−0.0403	−0.0930
Wheat	0.0125	−0.0462	−0.0436	−0.0080	−0.0136	−0.2204	−0.5965	−0.0070	−0.3875	−0.0149
Cassava flour	−0.1358	−0.0552	−0.0235	0.0173	0.0627	−0.4559	−0.0225	−0.2280	−0.0693	−0.0836
Yam flour	−0.0297	−0.0480	−0.0288	−0.3475	−0.0462	−0.6205	−0.0227	−0.0140	−0.7227	−0.0151
Semolina	−0.1750	0.2148	−4.5218	−0.1467	0.5671	−3.7138	−0.0630	−0.2605	−0.1119	8.9747
Hicksian/Compensated elasticity										
Garri	−0.7055	0.1227	0.0798	0.0406	0.0595	0.3036	0.0513	−0.0047	0.0643	−0.0115
Yam	0.0694	−0.6222	0.0690	0.0534	0.0771	0.2306	0.0333	0.0164	0.0665	0.0062
Beans	0.0760	0.1185	−0.2545	0.1003	0.0835	0.0149	0.0263	0.0178	0.0660	−0.2489
Palm oil	0.0469	0.1096	0.1210	−0.6891	0.0850	0.2141	0.0412	0.0267	0.5503	−0.0104
Vegetable oil	0.0578	0.1323	0.0849	0.0770	−0.6909	0.2422	0.0394	0.0105	0.0510	0.0017
Rice	0.1160	0.1547	0.0081	0.7070	0.0950	−0.4229	0.0066	−0.0122	0.0696	−0.0858
Wheat	0.1109	0.1275	0.0595	0.0770	0.0876	0.0375	−0.5510	0.0129	0.0473	−0.0092
Cassava flour	−0.0230	0.1439	0.0947	0.1147	0.0533	−0.1604	0.0296	−0.2052	0.0294	−0.0771
Yam flour	0.0735	0.1341	0.07937	0.0544	0.0600	0.2084	0.0250	0.0068	−0.6325	−0.0091
Semolina	−0.2005	0.1697	−4.5485	−0.1688	0.0304	−3.7807	−0.0748	−0.2656	−0.1343	8.9732

Source: Field Survey (2016)

Table IX. Compensated and uncompensated price elasticities of demand for household foodstuffs

elasticity, followed by vegetable oil (−0.69) and palm oil (−0.68). Also, the compensated cross-price elasticity shows that vegetable oil and palm oil, beans and rice, garri and yam flour, wheat and cassava flour, wheat and garri, and yam and yam flour have positive cross-price elasticities; hence, they are substitutes. The need for households to look for cheaper substitutes of food commodities is one of the coping strategies to survive economic recession. However, semolina and palm oil are complements.

5. Conclusion and recommendations

The study showed that the economic recession brought about reduction in the purchasing power of households as result of significant increase in the prices of basic foodstuffs. The considerable drop in the purchasing power of naira raised the percentage of income households spent on basic foodstuffs at the expense of other needs. This made households to spend more on the smaller quantity of basic foodstuffs consumed during economic recession. Reduction in the number of households' meals per day was used as a coping strategy for the increase in the prices of foodstuffs. As a result of food price inflation, 36.4 percent of the households were food insecure. The significant increase in food price inflation was the aftermath of the drop in foreign exchange earnings from crude oil which made importation of foods not feasible. The need to diversify the economy is imperative. Sustainable efforts in agriculture will prevent the economy from going into recession, thus enhancing households' effective demand for basic foodstuffs. However, the use of disaggregated CPI data to geopolitical regions will help further study to be region specific in terms of reduction in the consumer's purchasing brought about by economic recession rather than generalization.

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