

Demand Structure and the Consumption of Garri in Owerri North Local Government Area of Imo State, Nigeria.

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Abstract: This study analyzed empirically the demand structure and the consumption of garri in Owerri North L.G.A. of Imo state, Nigeria. Simple random and judgmental sampling techniques were used to select communities and their markets and 80 respondents. A set of pretested and structured questionnaire was used in data collection. The result of the multiple regression analysis with semi log, as lead equation showed that the critical and significant determinants of monthly budget share for garri among low income consumers were household size, price of garri and monthly incomes at given levels. The combined effect of all the variables explained 77.8% of the variation in the monthly budget share for garri at 1.0% risk level. The result of the multiple regression analysis with exponential functional form as the lead equation showed the critical and significant determinants of monthly budget share for garri among the middle income consumers were number of years spent in school, household size and monthly incomes. All the variables explained 81.8% of the variation in the monthly budget share for garri among the middle income consumers. The result also showed that the own price elasticity of demand for garri was 0.03 while cross elasticity of demand for garri and fufu, samovita, yam floor and cassava floor were 2.3, 1.8, 1.4 and 1.4 respectively. The income elasticity of demand for garri was 0.3. The logistic regression estimation showed that the determinants for preference of garri include price, colour perception, age and education which were statistically significant at 1.0% risk level. All consumers in different income are advised to patronize garri of all colours in order to act as impetus to farmers to produce more.

Key Words: Demand, Structure, Consumption, Income and Elasticities

Introduction

Cassava (*Manihot spp*) is an important crop widely cultivated in Sub-Saharan Africa. Although, the crop is grown virtually in all parts of the sub-continent, production is specific in the humid tropics (Okereke *et al*, 2001). Cassava plays a major role in efforts to alleviate Nigeria's food crisis because of its efficient production of food energy, all year round availability, tolerance to extreme stress conditions and suitability to various farming and food systems (Awa and Tumanteh, 2001). Cassava is capable of providing food energy much more than maize, sorghum and rice (Achinihu and Owuamanam, 2001). Garri, a product from cassava, constitutes more than 70% of total cassava consumption in Nigeria (Dorosh, 1989). Thus, garri is one of the staple food items consumed in Nigeria. It therefore implies that garri is eaten by every family irrespective of their socio-economic status and religious background. Thus, garri commands much interest and hence gets a considerable preference on the household daily budget. This means that there will be across the board high demand for the product.

Evidence had shown that food production in Nigeria has not kept pace with the increasing population. The annual growth rate of the food sub-sector is 2.0 percent while the annual population growth rate is 3.3 percent (NBS, 2001). This presupposes that a wide gap existed

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between food supply and the demand for food by the nation's populace. The seasonality of agricultural products causes price instability. Evidence has shown that periods of surpluses are usually supplanted by periods of scarcity. These vagaries in the price variable cause unpredictable fluctuations in the demand and supply factors. In addition, there are other factors that influence the purchase decision of consumers such as organoleptic features as colour, taste, aroma, texture, physio-chemical and hydrogen cyanide (HCN) residues.

Ezedinma and Oti, (2001) stated that the traditional methods of cassava processing into garri are often contaminated with undesirable extraneous matters that make them unhygienic thereby affecting demand and consumption. There is therefore the dire need to know the demand structure for garri at a micro setting such as Owerri North Local Government area of Imo State, so as to build a bridge between, processing, availability, affordability and consumption. The significance of this study will to a large extent contribute to good farm policy formulation and market strategies that will enhance the growth of the food sector. This research is anchored on the following specific objectives

- i to determine the factors that influence the monthly budget share for garri at low, medium and high income levels in the study area.
- ii to estimate own price, cross price and income elasticities of demand for garri in the study area.
- iii to determine factors that influence preference for a particular garri brand in the study area.

The following hypothesis were tested:

Ho₁ Monthly budget share for garri among low, medium and high income groups is positively related to literacy level, age, household size, price and monthly income.

Ho₂ Own price, cross price and income elasticities of demand for garri is zero.

Ho₃ Preference to a particular garri type is positively influenced by price, colour, taste, texture, age of consumer and educational level of consumers.

Materials and Method

The study was carried out in Owerri North Local Government Area of Imo State, Nigeria. The choice was purposive. This was informed by the predominance of civil servants and existence of a large daily market in the area. The L.G.A was created in 1996 and had a population of 289,721 (NBS, 2000). It lies between latitudes 4° 5' and 6° 5' North of Equator and Longitudes 6° 30' and 8° 9' east of Greenwich meridian. Owerri North LGA is bounded in the North by Mbaitoli and Ikeduru LGAs and west by Owerri West and Owerri Municipal LGAs of Imo State, Nigeria (IMSG, 1997).

Random sampling technique was used to select eight markets from eight communities. The eight communities and their markets selected were Emekuku, Awaka, Orji, Naze, Uratta Egbu and Obube. Judgmental sampling technique was used to select garri buyers from various daily markets in the area. Data was obtained with the use of structured and pretested questionnaire administered on the respondents. Objective one was achieved using multiple regression analysis

while objective two was analyzed with demand elasticity indicators. Objective three was realized with Logit regression model.

The implicit model of the ordinary least square (OLS) multiple regression is stated thus;

$$Q = F(X_1, X_2, X_3, X_4, X_5, e_i) \dots \dots \dots (1)$$

Where

Q = Monthly Budget share of garri (₳)

X₁ = Years spent in school

X₂ = Age of the consumer (years)

X₃ = Household size

X₄ = price of garri (₳)

X₅ = Income per month (₳)

The demand function was regressed using four different functional forms namely linear, exponential, double log and semi-log and the one with the best fit in terms of a priori expectation, statistical and econometric criteria was used as the lead equation.

The own price elasticity is stated thus:

$$ep = \frac{\partial Q}{\partial p} \cdot \frac{p}{Q} \dots \dots \dots (2)$$

Where: ep = price elasticity

- $\frac{\partial Q}{\partial y}$ = slope of the linear demand curve
- Q = quantity demanded
- P = price of commodity.

The cross price elasticity is stated thus:

$$Exy = \frac{\partial Qx}{\partial py} \cdot \frac{Py}{Qx} \dots \dots \dots (3)$$

Where:

- Exy = cross elasticity of commodity X with regard to commodity Y
- Qx = Quantity demanded of commodity X
- Py = price of commodity Y

The income elasticity is specified as

$$\frac{\partial Q}{\partial y} \cdot \frac{y}{Q} \dots \dots \dots (4)$$

Where

- Q = quantity of the goods demanded
- Y = Consumers income

The Logit model is generally implicitly specified thus

$$Z_i = b_0 + b_1X_{1i} + b_2X_{2i} + \dots + b_p X_{ij} \dots \dots \dots (5)$$

Where

Z_i = unobserved continuous variable for the i th case.

X_{ij} = the j th coefficient (independent variables)

P = number of predictors.

This model is explicitly explained as:

$$Z_i = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6$$

Z_i = preference to the garri type

X_1 = price of garri (₦)

X_2 = Colour of garri (Dummy: white = 1; Yellow = 0)

X_3 = Taste (Dummy: sweet taste = 1; sour = 0)

X_4 = Texture (Dummy: fine = 1; Gritty = 0)

X_5 = Age (years)

X_6 = Number of years spent in school.

Result and Discussion

Monthly Budget Share of Garri by different Income Consumers

The factors that influenced the monthly budget share of garri by the different income groups are shown in Tables 1 and 2. The income groups under study were low, medium and high income groups. The bench mark for the stratification was according to Okorji (1999) and Ezeh (2007) that categorized monthly income levels of ₦50, 000.00 and below (\$333.33 and below) as low income, ₦50, 001 – ₦100, 000.00 (\$333.33 – \$666.66) as medium income and above ₦100, 000.00 (above \$666.66) was high income group. In the study area, only the low and medium income groups were identified and presented based on the above bench mark.

The result in Table 1 shows the factors that influenced the budget share for garri among the Low income households in Owerri North LGA of Imo state Nigeria. It shows that all the estimated functions are significant. ($P < 0.01$). This implies that the functional forms are adequate in explaining the variations in the dependent variables. However, among the four functional forms (Linear Exponential, Double and Semi-Log) used for estimating the monthly budget share of garri among the low income consumers in the study area, the semi-log functional form was chosen as the lead equation based on econometric and statistical reasons such as the number of regression coefficients that are significant, the value of R^2 (0.778) and the significant level of F-ratio ($P < 0.01$).

Specifically, household size is directly related to the monthly budget share of the low income consumers. The coefficient is 2.526, while the standard error is 0.952 and the variable is statistically significant at 1.0% probability level. Expectedly, consumers with large household size

are likely to spend greater proportion of the monthly budget on garri – the basic staple and other basic household requirement. Although, Christianity restricts the number of wives in the household, many low income household sizes are relatively large. This situation has posed serious problems in recent times, due to the present economic crises and is responsible for the high rate of malnutrition, illiteracy and unemployment, especially in the rural economy (Ryon *et al* 1986; Okorji 1999 and Ezeh, 2007).

The price of garri made marginal contribution to the equation. The coefficient (0.976) is positive and the standard error is 0.149. The variable is statistically significant at 1.0 percent risk level. The sign of the variable is in conformity with a priori expectation in that a higher price would cause the consumer to allocate a larger proportion of the monthly budget to garri purchase. This is because higher prices cause the value of real incomes to fall, thus causing a large share of the budget to be devoted to the purchase of the commodity. But when prices fall, the value of real income rises, greater quantity of the good in question can be bought with reduced amount of the budget (Oji, 2002).

The coefficient of the income per month of the low income consumers (8.612) made positive contributions to the equation and the standard error is 3.768. The variable is statistically significant at 5.0% alpha - level. The sign is in accordance with a priori reasoning. Expectedly, the positive sign implies that the monthly budget share of the low income consumers to garri increases as the monthly income increases.

Table 1: Estimates Of Factors That Affects The Monthly Budget Share For Garri Of Low Income Consumers In Owerri North Local Government Area Of Imo State, Nigeria.

Variables	Functional Forms			
	Linear	Semi-log+	Exponential	Double log
Constant	-80.203 (229.309)	6.070*** (1.044)	5.869*** (0.210)	1.600 (1.183)
Number of years Spent in school (X1)	1.534 (10.286)	0.010 (0.009)	0.010 (0.009)	0.156 (0.250)
Age (X2)	0.249 (3.896)	0.288 (0.361)	0.000 (0.004)	-0.041 (0.154)
Household size (X3)	14.896 (25.410)	2.526*** (0.952)	0.076*** (0.024)	0.080 (0.085)
Price of garri (X4)	3.593 (0.263)	0.976*** (0.149)	0.003*** (0.000)	0.858*** (0.102)
Monthly income (X5)	0.003 (0.004)	8.612*** (3.768)	3.612** (1.768)	0.025 (0.097)
R2	0.784	0.778	0.708	0.758

R Squared Adjusted	0.765	0.693	0.674	0.724
F-ratio	42.721***	25.654***	20.877***	21.936***

Source: computations from field survey data, 2010.

* = Lead equation

***, *: indicate variables are statistically significant at 1.0% and 5% risk levels respectively.

Figures in parentheses are standard errors.

The result of the multiple regression analysis on the factors that influence the monthly budget share for garri of medium income consumers in Owerri North LGA of Imo state, Nigeria is shown in Table 2. Of the four functional forms (Linear, Exponential, Double and Semi-Log) used for estimating the monthly budget share for garri among the middle income consumers, the exponential functional form was chosen as the lead equation based on econometric and statistical reasons, such as the number of regression coefficients that are significant, the value of R^2 (0.818) and the significant level of the F-ratio ($P < 0.01$).

The coefficient of the number of years spent in school (-0.55) is marginal and negative while the standard error is 0.037. The variable is statistically significant at 90.0% confidence level. The sign of the coefficient is in conformity with a priori expectation that the monthly budget share for garri of medium income consumers would reduce as the number of years spent in school increases. Consumers with high level of education are expected to evaluate food product by their prices and specific nutritive quality rather than by popularity before allocating a given share of the monthly budget to the commodity (Henseliet et al, 2007; Maduagwu, 2008).

The coefficient of household size is 0.252 and the standard error is 0.082. The variable is statistically significant at 99.0% confidence level. Accordingly, it is expected that middle income consumers with large household size would likely spend a greater proportion of their monthly budget share on garri, which is the basic staple food available and affordable all year round.

The coefficient of income per month (6.993) is positive with a standard error of 1.029. The variable is statistically significant at 1.0% probability level. The sign of the variable is in consonance with a priori expectation. It implies that as the monthly incomes of the middle income consumers increases, the budget share allocated to garri purchase would also increase.

Table 2: Estimates Of Factors That Affect The Monthly Budget Share For Garri Of Middle Income Consumers In Owerri North L.G.A , Imo State, Nigeria

Variables	Functional Forms			
	Linear	Semi-log	Exponential*	Double log
Constant	973.131 (2576.184)	-12697.09 (41934.622)	7.363*** (1.058)	9.452*** (1.042)
Number of years				

Spent in school (X_1)	-124.782 (93.259)	861.051 (5260.284)	-0.055* (0.037)	0.031 (0.038)
Age of consumers (X_2)	12.821 (17.464)	199.864 (3863.966)	-0.030 (0.013)	0.004 (0.007)
Household size (X_3)	103.579 (184.084)	651.999 (1881.962)	0.252*** (0.082)	0.093 (0.074)
Price of garri (X_4)	1.474 (1.337)	-480.997 (2459.769)	5.21 ^{E-005} (0.001)	-3.71 ^{E-005} (0.001)
Monthly income (X_5)	0.022 (0.025)	3335.760 (3653.827)	6.993*** (1.029)	-278E-006 (0.006)
R2	0.263	0.10	0.818	0.282
R Squared Adjusted	-0.147	-1.401	0.515	-0.116
F-ratio	0.642	0.066	32.698***	0.708

Source: computations from field survey data, 2010.

+ = Lead equation

***, *: indicate variables are statistically significant at 1.0% and 10.0% risk levels respectively.

Figures in parentheses are standard errors.

Estimate of Own Price, Cross Price and Income Elasticities of Demand for garri

The values of the own price, cross price and income elasticities of demand for garri is shown in Table 3. The result shows that the own price elasticity of garri was 0.03. This shows that a percentage change in the price of garri would result in a less than proportionate change in the quantity demanded of it, hence being perfectly inelastic. This result compared favourably with Effiong (2004) that obtained -0.83 as own price elasticity in pork demand in Cross River State of Nigeria. This reinforces the readily availability of garri with very minimal variation in the price level.

The values of cross price elasticities of demand for garri with fufu, samovita, yam flour and cassava flour were 2.3, 1.8, 1.4 and 1.4 respectively. This implies that a one percent increase in price of garri, will increase the consumption of fufu by 2.3, samovita by 1.8, yam flour by 1.4 and cassava flour by 1.4 in the study area. This indicates a strong degree of competitiveness and substitutability of these goods with garri.

The income elasticity of demand for garri is shown in Table 3. The Table shows that the income elasticity of demand for garri was 0.3. This implies that as consumers' income increase, a smaller or declining portion of their income will be spent on the product. This result is consistent with Effiong (2004) result in the consumption of pork. Engel's law in terms of elasticity agrees that food is income elasticity. However, a change in consumer's money income will have a significant influence on consumption of the product either increasing or decreasing consumption.

Table 3: Estimate of Own Price, Cross Price and Income Elasticities of Demand for garri in Owerri North L.G.A, Imo State Nigeria

Category of Demand Elasticity	Commodity	Elasticity Coefficients
Own Price	Garri	0.03
Cross Price	Garri and Fufu	2.3
Cross Price	Garri and Semovita	1.8
Cross Price	Garri Yam flour	1.4
Cross Price	Garri and Cassava flour	1.4
Income	Garri	0.3

Source: Computation from field survey data, 2010

Factors That Influence The Preference Of Garri

The results of the Logistic regression on the factors that influence the preference of garri by consumers in Owerri North LGA of Imo state, Nigeria is shown in table 4. The logistic regression estimation for the variables showed that the effect coefficient Exp (B) for price, colour perception, age and education were statistically significant at 1.0% risk level as shown by the Wald test.

In terms of price, the result revealed that higher prices induced medium income consumers to have the preference and the willingness to consume white garri. Similarly, the perception of colour had a positive relationship with preference. This shows that there exists dominant preference for white garri in the study area, contrary to the widely held scientific opinion that yellow garri contains more nutrients especially vitamin A supplied by the colour additive than the white garri. This result is inconsistent with the Umberger *et al*, (2003) assertion that quality and health peculiarities are important factors for preference and willingness to consume food.

With odds ratio of more than one, both the effect coefficient of age and education had positive significant influence on preference for white garri. By implication, increasing age and education impacted positively on preference and willingness to consume white garri in the study area. Older consumers with higher level of education are expected to evaluate food products by their price and specific quality rather than by popularity (Henseliet *et al*, 2007). The Cox-Snell and Nagel Kerke R^2 values are attempting to provide a logistic analogy like the coefficient of multiple determination (R^2) in OLS regression. At 70.4% and 94.3% for Cox-Snell and Nagel Kerke respectively, the regression line fit the data appreciably high and imply the extent of explanation of the variation in the dependent variable. The result consolidates the findings of Nwachukwu *et al*, (2008), who had similar outcome.

Table 4: Estimate Of The Logistic Regression Analysis On Factors That Influence The Preference Of Garri In Owerri North LGA, Imo State, Nigeria

Variable	B	Standard Error	Wald	Exp (B)
Step price (X ₁)	4.213	1.646	6.551	1.237
Colour perception (X ₂)	-40.212	21.332	3.553	0.000
Taste (X ₃)	17.616	16.841	1.094	44.000
Texture (X ₄)	18.374	5071.222	0.000	95.392
Age (X ₅)	0.049	0.24	4.168	1.051
Education (X ₆)	0.065	0.039	2.778	1.015
Constant	0.51	5.578	0.000	1.053
Step 1- 2 log Likelihood		12.320		
Cox and Snell R ²		0.704		
Nagel Kerke R Square		0.943		
Chi – square		97.331		

Source: computations from field survey data, 2010

Conclusion and Recommendations

The research found out that the determinants of the monthly budget share for garri among low income consumers in Owerri North LGA in Imo state, Nigeria with Semi-log as lead equation were household size, price of garri and monthly incomes while the determinants of the monthly budget share for garri among middle income consumers with exponential functional form as the lead equation were number of year spent in school, household size, and monthly increase.

The values of own price elasticity of demand for garri was 0.03 while cross price elasticities between garri and fufu, samovita, yam flour and cassava flour were 2.3, 1.8, 1.4 and 1.4 respectively. The income elasticity of demand for garri was 0.3.

The logistic regression estimation showed that price, colour perception, age and education were the critical determinants of preference for white garri and were statistically significant at 1.0% risk level.

The study recommends the institution of policy that would increase the consumers' incomes which would directly have a compensating effect in enhancing farmers' incomes.

All consumers in different income strata (low, middle and high) are encouraged to consume garri of any colour as this would be added impetus required by farmers to produce more and increase their incomes in so doing.

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