Full Length Research Paper

Consumer demand and preference of local and imported rice among households in Sokoto metropolis, Nigeria

A. N. Abdullahi[1*], J. Musa[2], M. Usman[1], F.B. Alhassan[1] and S. Nahantsi[3]

[1]Department of Agricultural Economics, Usmanu Danfodiyo University, Sokoto Nigeria.
[2]Department of Agricultural Economics, Federal University Dutsimma, Nigeria.
[3]Department of Agric. Technology, College of Agriculture and Animal Science Bakura, Nigeria.
*Corresponding Author E-mail: angaski1@gmail.com

The study was to assess consumer demand and preference of local and imported rice among households in Sokoto metropolis, Nigeria. A two-stage sampling technique was employed, where in the first stage; Sokoto-North, Sokoto-South and some part of Wamakko Local Government Areas (LGAs) were purposively selected on the predominant different households' income groups in the areas. In the second stage, systematic sampling was employed and twenty households from each area were selected making a total of one hundred and eighty households. Data were collected using structured questionnaire while descriptive statistics and regression were employed to analyze the data collected. The households' characteristics reveal that 41.1% of the respondents were 29-39 years old. The mean household size was about 8 persons, 82% were married, and 58.9% were civil servants and high-income earners and 63.3% of the attained tertiary education. The study further revealed that more quantity of locally processed rice is demanded as compared to that of imported rice. Own price, income of the consumer, educational level, household size and willingness-to-pay affected the demand of both locally processed rice and imported rice positively, while the price of substitutes and preference for another good affect the demand of both locally processed and imported rice negatively. The preference of locally processed rice as against imported rice was because it is cheaper in price and has better taste. It is recommended that local processors of rice should ensure the upgrading the locally processed rice as clean as the imported rice to compete favourably in domestic and potential international markets.

Keywords: Consumer demand, preference, rice, households, Sokoto, Nigeria

INTRODUCTION

Rice is one of the world's most important food crops (Zhou *et al.*, 2002) and has become a staple food in Nigeria such that every household, both rich and poor consumed considerable quantities of it. Although, Nigeria is an agricultural country, over the years it has depended on importation of rice to meet the demand in respect to short supply for local rice as the local farmers could not meet the country's demand as a result of small scale nature and under development of the sector (Godwin, 2012).

Rice can be found in almost all households ranging from low to higher income households as opposed to being a festive or luxury food in the past. However, consumers have different taste and preferences, some consumers particularly the high income classes prefer foreign brands mainly for status associated with consuming foreign brands and factors such as peculiar taste and fine grains. Yet, others love the local rice and preferred it to imported rice because of nutritional value and other factors (Nkwazema, 2016).

Nigerians as of 2013 consume about 5.5 million tons of rice annually; the country's production has been estimated to be 3 million metric tons per annum creating a consumption gap of 2.5 million metric tons per annum

catered for by importation and even though the amount of rice imported is less than the amount locally produced, it is still enough to put Nigeria as one the highest importers of rice in the world, placing the country among the top five importers at a cost of $6 million daily (Obih and Baiyegunhi, 2017).

Government interventions on rice production and ban on importation of rice towards the development of the agricultural sector and boosting economy have led to an increase in the country's rice production to 15 million metric tons in 2017 (Ehikioya, 2017). However, during the last two years, with government ban on importation of rice and increased in production of local rice Nigerians have discovered that locally produced rice is better than rice from Thailand and Vietnam, which are the largest producers of rice in the world. There has been an increase in the demand for local rice which consequently has led to an increase in its production. The increased demand has led to an increased production which in turn made available more locally processed rice in the market. It against this development this study seeks to empirically measure the consumer demand and preferences of the locally processed rice in comparison with the imported rice among households in Sokoto Metropolis, Nigeria.

MATERIALS AND METHODS

The study area

This study was carried out in Sokoto metropolis of Sokoto state. Sokoto is located in the extreme northwest of Nigeria near to the confluence of the Sokoto River and Rima River. Sokoto metropolis comprises majorly two LGAs, Sokoto-North and Sokoto-South and some part of Wamakko. The state is in the semi-arid climatic environment, having annual rainfall between 500 and 700 mm with highest being in August (Bandiya *et al.,* 2013). The mean monthly temperature varies between 13°C in December/January and 42°C in April with the average annual temperature being 34°C (Bandiya *et al.,* 2013). The area is dominated by Hausa and Fulani and the major occupation of the people is agriculture including crop farming such as the cultivation of sorghum, millet, rice, sweet potato, onion etc, fishing and leather work (Ministry of Information, 2008).

Sampling procedure and data collection

A two stage sampling technique was employed to sample the study respondents. At the 1st stage, the metropolis was divided into Sokoto-North, Sokoto-South and some part of Wamakko, and three areas each were purposively selected on the predominant income groups - low, middle and high income. At the 2nd stage a systematic sampling was employed to sample the study households, twenty

households from each area were sampled and one hundred and eighty household constitute the sample size for the study. Table 1 presented the sample plan distribution. Data for this study were collected through the use of questionnaire supplemented with an interview. Information collected features: socio-economic characteristics, consumer taste and preference for local rice and imported rice and factors such as price of the rice, price of substitute, household size, household education level that are assumed to determine the consumer choice of rice.

Model specification

Regression model specification

Regression model was used to measure the effect of factors affecting demand on the demand of a product. The Cobb-Douglas regression model was chosen as the best fit model due to its high R^2 value and high number of significant variables.

The Cobb-Douglas regression model for the demand of locally processed rice can be explicitly expressed as:

$$lnY = \beta_0 - \beta_1 lnX_1 + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + \beta_7 lnX_7 + \mu \quad (1)$$

Where:

Y= quantity demand for locally processed rice (kg)
β_0= intercept
$\beta_1 - \beta_7$= Parameters to be estimated
X_1= price of locally processed rice (₦)
X_2= price of substitute (other foods) (₦)
X_3= income of the consumer (₦)
X_4= education level (years)
X_5= household size (number of people in the household)
X_6= taste and preference of the consumer
X_7= consumer willingness to pay for locally processed rice
μ = error term

The Cobb-Douglas regression model for the demand of imported rice can be explicitly expressed as:

$$lnY = \beta_0 - \beta_1 lnX_1 + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + \beta_7 lnX_7 + \mu \quad (2)$$

Where:

Y= quantity demand for imported rice (kg)
β_0= intercept

Table 1. Sample plan distribution

LGAs	Income class	Areas	No. of respondents
Sokoto north	Low	Gidan dare	20
	Middle	Sokoto cinema	20
	High	Runjin sambo	20
Sokoto south	Low	Rijiyar Shehu	20
	Middle	Mabera	20
	High	Minanata	20
Wamakkko	Low	Kalambaina	20
	Middle	Arkilla	20
	High	Bado	20
Total			180

Field Survey, 2018

$\beta_1 - \beta_7$ = Parameters to be estimated

X_1 = price of imported rice (₦)

X_2 = price of substitute (other foods) (₦)

X_3 = income of the consumer (₦)

X_4 = education level (years)

X_5 = household size (number of people in the household)

X_6 = taste and preference of the consumer

X_7 = consumer willingness-to-pay for imported rice

μ = error term

RESULTS AND DISCUSSION

Socioeconomic characteristics of rice consumers

The socio-economic characteristics of rice consumers in the study area are summarized in (Table 2). It revealed that 41.1% of the consumers fall within the age class of 29-39 years. This could be corroborated with the explanation of Simsek and Karkacur, (1996) that age of the household head can influence consumption decision of the household. The study further revealed a higher percentage of male respondents over female respondent because most men in the study area make most of the purchasing decisions. Majority of respondent (82%) were married which is one of the important factors that determine the level of consumption, because it determined the family size of the consumers and subsequently determined the number of people expected to participate in consumption and hence the decision on the brand of rice to be consumed putting into consideration the level of income of the family. The mean household size was about 8 persons indicating that household size was relatively large and by implication consume higher than household with smaller sizes. Household size was found to be an important factor that influenced quantity of food consumption among households (Ojogho and Erhabor, 2011).

Majority of the respondents were civil servants and salary earners (58.9%) indicating a possibility for higher rice demand irrespective of price. The higher the level of education, the higher the rate of awareness and this allowed for best choice of rice brands on basis of desired attributes (Ojogho and Erhabor, 2011). About 63 % of the respondents attained tertiary education. This implies that most of the respondents are aware of the consequences of the choices they made. Income is a very important determinant of demand, although there may be preference of a commodity over the other, the actual demand could be determined by the consumer's income, as demand increases with increases in income for normal goods. This corroborated with the findings of Alfred and Adekayode, (2013) who asserted that respondents can be able to afford their preferred brand of rice when their income permits.

Households demands for locally processed and imported rice

Consumer quantity demand is the quantity of rice (locally processed or imported) that a consumer is willing and able to buy at a particular time at a given price. Table 3 presented the quantities of locally processed and imported rice demanded by respondents. The result revealed that 21.1% has no demand for locally processed rice, 32.2%(1-27 kg), 43.3% (28-55 kg), 1.1% (56-83 kg), 1.1%(84-110 kg) and 1.1% (111-138 kg). Conversely, the quantities demand for imported rice among respondents, the result revealed that 40% had no demand for imported rice, 48.9% (1-28 kg), 8.9% (29-56 kg), and 1.1% (57-83 kg) and 1.1% (112-139 kg). This implies that there is a high demand for locally processed rice and lower demand for imported rice when compared to locally processed rice among respondents. Thus, quantity demanded could be dependent on the household size of the respondent. This finding is similar to the findings of Olumide, (2015) who found that majority of the respondents consume locally processed rice and it is therefore served as a major staple food consumed in the

Table 2. Socio-economic characteristics of respondents in Sokoto metropolis, Nigeria.

Variables	Frequency	Percentage
Age		
18-28	52	28.9
29-39	74	41.1
40-50	42	23.3
51-61	8	4.4
62-72	4	2.2
Gender		
Male	120	66.7
Female	60	33.3
Marital status		
Single	32	17.8
Married	148	82.2
Occupation		
Farming	6	3.3
Civil service	106	58.9
Trade	44	24.4
Artisan	24	13.3
Educational attainment		
Primary	4	2.2
Secondary	44	24.4
Tertiary	114	63.3
Qur'anic	12	6.7
Adult education	4	2.2
None	2	1.1
Income		
Low income	66	36.7
Middle income	62	34.4
High income	52	28.9

Source: Data Analysis, 2018

Table 3. Distribution of quantity demanded of locally processed and imported rice.

Locally processed rice			Imported rice		
Qty (kg)	Frequency	Percentage	Qty (kg)	Frequency	Percentage
0	38	21.1	0	72	40
1.0-27	58	32.2	1.0-28	88	48.9
28-55	78	43.3	29-56	16	8.9
56-83	2	1.1	57-83	2	1.1
84-110	2	1.1	84-111	0	0
111-138	2	1.1	112-139	2	1.1

Source: Data Analysis, 2018

locality.

Distribution of prices for locally processed rice

Table 4 presented the distribution of different prices of locally processed and imported rice per *tiya* (2.5 kg equivalent). The result revealed that prices of locally processed and imported rice varied on the basis of quality and from one location to another. However, the most accepted prices for the locally processed and imported rice were ₦700 per *tiya* and ₦800 per *tiya* by about 43% and 31% of the households, respectively.

Regression analysis: the determinants of rice demands

Table 5 presented the regression analysis results estimating factors influencing demand and quantities demanded for both locally processed and imported rice. The coefficient of multiple determination (R^2) for locally processed rice was 0.995 showing that 99.5% the variation in the quantity demanded of locally processed rice was explained by the variation in predictor variables

Table 4. Prices per *tiya*) that households can offer for locally processed and imported rice.

Locally Processed Rice			Imported Rice		
Price (Naira)	Frequency	Percentage	Price(Naira)	Frequency	Percentage
0	38	20.9	0	74	40.7
620	6	3.3	800	56	30.8
630	2	1.1	820	2	1.1
650	22	12.1	830	4	2.2
700	78	42.9	850	24	13.2
720	16	8.8	870	2	1.1
740	2	1.1	900	16	8.8
750	16	8.8	950	2	1.1

Source*:* Data Analysis, 2018

Table 5. Regression estimate for determinant of demand for local and imported rice.

Variables	Locally processed rice			Imported rice		
	β	Std. Error	t-values	β	Std. Error	t-values
Constant	-0.151	0.538	-0.281	-3.030	1.916	-1.581
Own price	0.509	0.012	41.687***	0.399	0.094	4.231***
Sub.Price	-0.206	0.041	-4.996***	-0.041	0.095	-0.428
Income	0.104	0.047	2.227**	0.081	0.136	0.591
Edu.Level	0.095	0.173	0.551	1.154	0.532	2.170**
H/Size	0.014	0.057	0.253	0.580	0.172	3.371***
Preference	-0.018	0.027	-0.668	-0.124	0.152	-0.816
WTP	0.094	0.077	1.231	0.270	0.725	0.373
R^2		0.995			0.714	
Adj. R^2		0.993			0.658	
F Value		519.352***			12.835***	

Source*:* Data Analysis, 2018

included in the model. Similarly the R^2 value for imported rice was 0.714 showing that 71.4% the variation in the quantity demanded of imported rice was explained by the variation in predictor variables included in the model. The F values for local and imported rice models were all statistically significant. These imply the goodness of the models to estimate what they intend to measure.

The estimated coefficient for price of locally processed rice has a positive relationship (0.509) with the quantity demanded statistically significant (P<0.001). The estimated coefficient for price of imported rice is also positive (0.399) and equally significant (P<0.001). These implying that a unit increase in the prices of rice will lead to an increase in quantity demanded for both local and imported rice. However, the local rice is more price elastic relative to imported rice. The positive relationship conformed to the *a priori* expectation of the necessity goods whose demand do not fall with rise in price, and this is because rice as a staple food is no longer considered as a festive food rather it has become a necessity that every household rich or poor demand for it irrespective of change in prices.

The coefficients for price of substitute for both locally processed and imported rice show a negative relationship with quantity demand (-0.206) significant (P<0.001) for locally processed and imported rice (-0.041) though not significant. These implied that lower prices of substitute

do not affect quantity demanded of both brands of rice, as rice is a major staple food consumed in the metropolis. Income has a positive relationship with quantity demanded for both local rice (0.104) and imported rice (0.081) though both not significant. These implied rice in Sokoto metropolis is income elastic, the higher the income of a consumer the higher the quantity of rice demanded.

Educational status depicted positive relationship with quantity demanded for local rice (0.095) and imported rice (1.154) though not significant in case of local rice but significant (P<0.01) for the imported rice. This denotes that individuals irrespective of their educational qualification demand locally processed rice and can be corroborated with the findings that people with higher educational qualification demand more of imported than local rice (Ojogho and Erhabor, 2011).

The results revealed a positive relationship between household size and quantity demanded for both local rice (0.580)   and imported rice (0.014) though not statistically significant for locally processed rice but significant (P<0.001)) for imported rice, implying that that the higher the household size the higher the quantity demanded of both locally processed and imported rice (Ojogho and Erhabor, 2011).

The coefficients for taste and preference (dummy variable) on both local and imported rice models all

Table 6. Respondents distribution according to rice preference.

Preference of rice	Frequency	Percentage
Locally processed	74	41.1
Imported	40	22.2
Both	66	36.7
Total	180	100.0

Source: Data Analysis, 2018

Table 7. Attributes of preference for locally processed rice.

Attribute	Frequency	Percentage
Price	76	54.3
Short Grain size	28	20
Taste	88	62,9
Nutrient	16	11.4
Availability	4	2.9

Table 8. Attributes of preference for imported rice.

Attributes	Frequency	Percentage
Price	8	7.5
Taste	24	22.6
Cleanliness	64	60.3

Source: Data Analysis, 2018

depicted a negative signs and not statistically significant relationship. Similarly the coefficient of willingness to pay for local as well as for imported rice were all positive but not statistically significant.

Consumer preference of rice

Preference referred to likeness of one item over another. Result in (Table 6) showed that respondents' distribution on the brand of rice preferred. The result indicated that 41.1% of the respondents prefer locally processed rice, 22.2% prefer imported rice and 36.7% showed preference for both local and imported rice brands. This further showed that there is a higher preference for locally processed rice over imported rice which is attributed to taste of the locally processed rice as revealed by some of the respondents. The respondents that prefer both brands, prefer imported mainly because of its cleanliness and eased of preparation, while they prefer the locally processed rice for its taste and cooking for certain local dishes. This implies, on the aggregate the locally processed rice has a higher preference over imported rice in the study area, agreeing with finding of Alfred and Adekayode, (2013) in their study in Ondo

State, Nigeria.

Attributes of preference for locally processed rice

Table 7 presented the distribution of factors influencing preference for locally processed rice. It indicated that 54.3% of the respondents prefer it because of its price, 20% prefer it because of the grain size and especially because it is easier to cook certain local dishes, 62.9% prefer it for its taste, 11. 4% prefer for its nutritional value, while 2.9% for it is most commonly available and thus they patronize it. This implies that taste is one of the major driving factors for preference of locally processed rice (Olumide, 2015).

Attributes of preference for imported rice

Table 8 showed that the attributes influencing the preference of imported rice. The result revealed that 7.5% of the respondents that expressed preference for imported rice attributed that to its price, 22.6% prefer it for the taste, while 64% prefer it for its cleanliness. The result indicate that cleanliness is one of the major driving force for preference in imported rice.

Conclusion

Consumers in the Sokoto metropolis demand more of locally processed rice than imported rice. The rice brand own price, income of the consumer, educational level, household size and willingness to pay positively affected demand for both locally processed and imported rice. Conversely, the price of substitutes and preference for other brand caused a decrease in the demands for both locally processed and imported rice. Cheaper prices and better taste of locally processed rice are the major attributes prefer by the consumers while,   some consumers prefer the imported rice is its cleanliness and free from stones and other debris that is commonly in locally processed rice in the study area. Upgrading the local rice value chain produced rice that is as clean as the imported rice to compete favourably in domestic and potential international market.

Authors' declaration

We declared that this study is an original research by our research team and we agree to publish it in the journal.

REFERENCES

Alfred SDY, Adekayode AB (2013). Consumers' attitude towards local rice production and consumption in Ondo state, Nigeria. *Journal of Agricultural Extension and Rural Development*, 6(7): 242-248.

Bandiya HM, Majeed Q, Ibrahim ND, Yahaya MM, Yahaya MA (2013). Intra-colonial population of *Macrotermes bellicosus* (Smeath man) [Isoptera: Termitidae] in Sokoto, semi- Arid Zone of Northwestern Nigeria. *Nigerian Journal of Basic and Applied Science,* 21(1): 55-59

Ehikioya A (2017). Achieving rice self-sufficiency in 2018. Retrieved from http://*thenationonlineng.net/achieving-rice-self-sufficiency* Accessed27[th] April, 2018 at 2:00 pm

Godwin U (2012). *Rice farm, milling plant: Sure money spinner*. Retrieved from http://nationalmirroronline.net Accessed 28th April, 2018 at 11:00 PM

Ministry of Information (MOI) (2008). *Diary*. Ministry of Information, Sokoto, Nigeria. P. 12.

Nkwazema S (2016). Rice debate: Why Nigeria can't meet local Rice Production Demand. Retrieved from *www.thisdaylive.com/index.php/2016/11/05thericedebate* Accessed 10th August, 2018 at 5:00 PM

Obih U, Baiyegunhi SL (2017). Willingness to pay and preference for imported rice in Nigeria: Do Price-quality differentials explains consumers' Inertia? *South African Journal of Economic and Management Sciences,* 20(1): 10-17.

Ojogho O, Erhabor PO (2011). Rice demand pattern and its intervening factors in Nigeria. *International Journal of Agricultural Research,* 6: 769-799.

Olumide OJ (2015). Comparative analysis of household consumption pattern of local and imported rice in Ekiti State, Nigeria. *Journal of Life Sciences,* 9: 181-187.

Simsek D, Karkacur O (1996). A Study on Socio-economic Factors Affecting the Adoption of Agricultural Innovations in Rural Regions. Paper presented at the 15th International Congress of Mediterranean Federation for Health and Production of Ruminants.15th -16th May, 1996.

Zhou Z, Robards K, Helliwell S, Blanchard C (2002). Composition and functional properties of rice. *International Journal of Food Science and Technology,* 37: 847-868.