



EFFECTS OF COVID-19 PANDEMIC ON RICE PRICE VARIATION AMONG CONSUMERS IN KADUNA METROPOLIS, KADUNA STATE, NIGERIA

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ABSTRACT

This study determined the effects of Covid-19 pandemic on rice price variation among Consumers in Kaduna metropolis, Kaduna State, Nigeria. A total of 183 respondents were randomly drawn from the study area. Data for the study were collected through structured questionnaire and information from KADP and RIFAN. The results of the consumption behavior shows that 32.78% consumed rice four times per week while only (4.92%) consumed once per week, whereas 34.97% consumed 7- 9kg of rice per month. Only 34.93% of the respondents spent ₦13000- ₦16000 of their expenditure on rice monthly. Majority (76.5%) preferred imported rice, and 28.5% preferred local rice. Regarding consumer's preference point to purchase rice, 50.27% preferred buying rice at the local market and 5.46% preferred the supermarket. The result of hedonic pricing model on factors affecting rice price variation among the consumers and it is apparent that the relationship between price and attributes varies within zones. However, under physical attributes there are variables as; Impurities which were all positive and significant at 1% except for Kaduna south, this shows that the higher the impurity the higher the rice price variation among consumers. While under cooking attributes, ease of cooking which was positive in all zones and significant at 1% in Kaduna South, 10% in Chikun, and 5% in Igabi but not significant in Kaduna North. Under Eating attributes were taste which was positive and not significant in Kaduna south but negative and significant in the other 3 indicating that the higher the taste the lower the rice price variation. Other attributes where Origin was found positive and significant at 5% in Chikun but positive and significant at 1% in Kaduna south, Kaduna north and Igabi, indicating the consumers care more about the origin (local or imported) of the rice which causes high price variation. Also, the result from regression analysis on factors that causes shock buying among consumers due to covid-19. The study also revealed 86% of the factors that influences shock buying due to covid-19 were caused by the variables in the model. Emanating from the findings, it can be concluded that, there is a direct and positive relationship, between rice price variation and covid-19 pandemic. The study recommends that rice should be prioritized as a core food crop in food security programmes as it was found to be a necessity in households' food basket.

Keywords: Covid-19 pandemic, Consumers, Price, Rice, Attributes.

INTRODUCTION

Covid-19 issues started in late 2019 with reports of a new virus in China. The Chinese authorities informed the World Health Organization (WHO) about several cases of a mysterious lung disease in Wuhan, the capital of central China's Hubei province. Several of the patients worked on a "wet market". A wet market can be compared to a farmers' market, where local farmers sell perishable foods and animals such as rats, crocodiles, snakes, and larval rollers. The term "wet" comes from the fact that vendors wash their fish and vegetables at the market and make the floor wet (Westcott & Wang, 2020). The WHO categorized this new



disease as the coronavirus disease (COVID-19), which comes along with a virus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (WHO, 2020).

A combination of various factors seems to have triggered the structural increase in rice consumption over the years with consumption broadening across all socio-economic classes, including the poor. Rising demand is as a result of increasing population growth and income level (GAIN, 2012) coupled with the ease of its preparation and storage. Rice has changed from being a luxury to a necessity whose consumption will continue to increase with per capita GDP growth, thus implying that its importance in the Nigerian diet as a major food item for food security will increase as economic growth continues (Ojogho and Alufohai, 2010).

According to Shively (1996), increased price variability can have detrimental impacts on both consumers and producers of agricultural commodities. Variability is one of the major attributes that explain the characteristics of most price data. This attribute has important implications for policy and the welfare of food consumers and the nation's economy (Mafimisebi *et al.*, 2014). The variation in prices of agricultural commodities in Nigeria has been attributed to a number of factors including variances in the bargaining power among consumers, cyclical income fluctuations among sellers and consumers, natural shocks such as flood, pests, diseases, and inappropriate response by farmers to price signals. This study looks at the factors that contribute to change in the price of rice over time.

MATERIALS AND METHODS

The Study Area

Study Area The study was conducted in Kaduna state. The location of the State is between latitudes 10° 22' 00'' - 10° 40' 00'' N and longitudes 7° 20' 00'' - 7° 28' 00'' E (Adewuyi, 2008). The State occupies an area of approximately 48,473.2 square kilometers and has a population of 6,066,652 with a growth rate of 2.55% per annum (NPC, 2014). The metropolis occupies an area of about 260 km². It is made up of four Local Government Areas: Kaduna North, Kaduna South, Igabi and Chikun.

Sampling Procedure

A two-stage simple random sampling technique was used for sample selection. The first stage involves a simple random technique to select five wards each from the four (4) zones. The second stage also involved a simple random technique to select 10% of the sample Frame of 1886 of the rice consumers from the list of Rice Farmers Association of Nigeria (RIFAN) Kaduna chapter, a total of 183 consumers were used as sampled size

Method of Data Collection

The data were analyzed through descriptive statistics and inferential statistics which involves the use of frequencies, percentages, means and standard deviation while the inferential statistics were hedonic price analysis and regression analysis. The models are specified as:

Hedonic Price Analysis Model;

$$Pr = \sum_{i=1}^n \beta_{ir} x_{ir} + \varepsilon$$

This equation can be rewritten as:

$$Pr = \beta x_{1r} + \beta x_{2r} + \beta x_{3r} + \dots \beta x_{nr} + \varepsilon \quad \dots(1)$$

where;

Pr is the observed market price of rice

ε is the stochastic error term.

β_{ir} are the coefficient, gives the implicit value of rice grain characteristics.

X_{ir} are the explanatory variables price of rice and the parameter, representing each of the 14 rice attributes evaluated in the study, which are;

X_1 = Impurities (Presence of foreign matter)



- X_2 = Color (Whiteness of rice)
 X_3 = Rate of breakage (Presence of broken grain)
 X_4 = Grain shape (Shape of grain)
 X_5 = Ease of cooking (Cooking time in minutes)
 X_6 = Grain cohesion (Stickiness after cooking)
 X_7 = Grain size (Size of grain after cooking)
 X_8 = Swelling capacity (Capacity to enlarge)
 X_9 = Taste (Flavor palatability)
 X_{10} = Aroma (Smell/perfume)
 X_{11} = Texture (Feel/consistency)
 X_{12} = Parboil (Whether rice is parboiled)
 X_{13} = Origin (Rice origin)
 X_{14} = Income (Average price of rice ₦/kg)

The regression analysis model;

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 \dots + B_nX_n + \varepsilon \quad \dots(2)$$

Y is Covid-19 shock buying, measured by the number of variables involved.

ε is the stochastic error term.

B_0 is the constant

$B_1, B_2, B_3 \dots B_n$ are the regression coefficient

$X_1, X_2, X_3 \dots X_n$ are the explanatory variables price of rice and the parameter, representing each of the 8 variables evaluated in the study are;

X_1 = Panic buying

X_2 = Fluctuation on exchange rate market

X_3 = Rise in the cost of freight

X_4 = Reduction in production

X_5 = Hoarding

X_6 = Profiteering

X_7 = Rise in cost of raw material

X_8 = Restricted labor mobility and resources.

RESULTS AND DISCUSSION

Consumption Behavior for Rice

Table 1 shows that 32.78% consumed rice four times per week while only 4.92% consumed once per week. This result is closely similar to Kilimo Trust (2014) which reported that consumers who have relatively higher incomes were likely to consume rice 2-3 times more than those who have relatively lower incomes. Where 34.97% consumed 11-15kg of rice per week, regarding purchasing rice, more than half, 59.01% purchased rice once per month. Musa *et al.* (2011) examined the determinants of consumer purchasing behavior for rice in Malaysia and found the dominance of the demographic factors. The majority of the consumers surveyed, 56%, had an average household size between 6-8 people while more than half 70%, bought rice every month. 34.93% of the respondents spent ₦13000- ₦16000 of their expenditure on rice monthly. Majority 76.5% preferred imported rice, and 28.5% preferred local rice. Oyinbo *et al.* (2013) examined consumption preferences between imported rice and local produced rice in Kaduna State, Nigeria. The results revealed that 75% of households preferred imported rice to domestic rice. Using a sensory evaluation experiment, Tomlins *et al.* (2005) investigated consumer preferences and acceptability of domestic and imported rice in Ghana and found that consumers preferred imported raw and parboiled rice to domestic rice, and that acceptability



was influenced by location and gender. Relative preference for domestic and imported rice in West Africa was also investigated by Demont *et al.* (2013). Employing vickery second price auctions to compare consumer willingness to pay for Senegalese and Thai rice, they found that consumers were willing to pay more for imported rice than local rice. They concluded that bids were influenced by taste whereas socio-demographic factors were not important. Regarding consumer's preference point to purchase rice, 50.27% preferred buying rice at the local market and 5.46% preferred the supermarket. The proportion differentials may be due to the price of rice varying from one location to another. Nzomoi and Ian (2013) found that the preference point of purchase is influenced by distance, reasonable prices, and the availability of a variety of products, which give more options and choices.

Table 1: Distribution of respondents according to consumption behavior for rice (n = 183)

Variables	Frequency	Percentage
Frequency of rice consumption		
Once per week	9	4.92
Twice per week	38	20.76
Thrice per week	40	21.85
Four times per week	60	32.78
More than five times per week	36	19.67
Mean	1.20	
SD	0.92	
Rate of Purchasing Rice		
Once per month	108	59.01
Twice per month	28	15.30
Once per week	20	10.92
Twice per week	15	8.90
Others	12	6.56
Mean	1.67	
SD	0.98	
Which rice do you prefer?		
Local	43	23.49
Imported	140	76.50
Mean	0.96	
SD	0.46	
Location of Buying Rice		
Retail shop	70	38.25
Local market	92	50.27
Supermarket	10	5.46
Milling machine	13	7.10
Other places	5	2.73
Mean	0.94	
SD	0.09	

Source: Field Survey (2021).



Table 1: Distribution of respondents according to consumption behavior for rice (n = 183) **Cont'd.**

Variables	Frequency	Percentage
Quantity of rice consumed per month (kg)		
<5	32	17.49
5- 10	45	24.59
11- 15	64	34.97
16- 20	18	9.83
21- 25	11	6.01
26- 50	10	5.46
>50	3	1.64
Min	3kg	
Max	50kg	
Mean	1.78	
SD	1.67	
Monthly Expenditure on rice per month (₦)		
<5000	28	15.30
5000 – 8000	40	21.86
9000 – 12000	25	13.66
13000 – 16000	64	34.93
17000 – 20000	15	8.19
20000 – 25000	8	4.37
>25000	3	1.64
Min	3000	
Max	32000	
Mean	159.87	
SD	43.52	

Source: Field Survey (2021).

Factors Affecting Rice Price Variation among Consumers

Table 2 shows the result of the hedonic pricing model presented in this section. On average, consumers paid a premium for parboiled rice compared to raw rice. Consumers also paid higher premiums for imported rice compared to local rice. In other words, the results indicate that imported rice is preferred to locally produced rice because of its higher quality, especially in its physical attributes such as color and absence of impurities. A study by Adegbola and Singbo (2008) also found that traders and middlemen preferred to sell imported rice over domestic rice because of its higher preference by consumers and higher profits.

Oyinbo *et al* (2013) examined consumption preferences between imported rice and domestically produced rice in Kaduna State, Nigeria. The results revealed that 75% of households preferred imported rice to domestic rice. The findings revealed that the quality of rice had a significant effect on consumption preference for the household. Also, Tomlins *et al*, (2005) examined urban consumer preferences and sensory evaluation of domestically produced and imported rice in West Africa. The authors reported that domestic parboiled rice had poor quality and thus, was less preferred relative to imported rice. They also reported that 86% of the consumers preferred the imported rice (non-parboiled) compared to the domestically produced rice because the latter was regarded as having poor quality. Imported rice was characterized with long grain, brightness, uniform appearance, and whole-grain shape, while domestically produced rice was associated with slender, brown, unshelled paddy, and black specks. Anang *et al*. (2011) reported income as one of the factors influencing consumer preferences for quality characteristics of rice. Hara (2002) is one of the few to have used



hedonic analysis to value country of origin attribute but did so in the context of estimating the premiums paid by consumers for domestic and organically certified rice.

Table 2: Hedonic price analysis of the factors affecting rice price variation among consumers based on location

Variable	Kaduna South	Location Chikun	Kaduna North	Igabi
Physical attributes				
Impurities	0.66 (0.375)	2.91*** (0.006)	3.92*** (0.000)	2.15*** (0.003)
Mean	1.9			
SD	1.00			
Color	2.18** (0.015)	3.19*** (0.000)	2.13*** (0.001)	1.53** (0.016)
Mean	1.9			
SD	0.88			
Rate of breakage	2.19*** (0.002)	2.15** (0.038)	2.08*** (0.001)	2.37*** (0.003)
Mean	2.0			
SD	0.96			
Grain shape	-4.14*** (0.000)	-3.91*** (0.002)	-1.81*** (0.007)	-4.09*** (0.000)
Mean	1.7			
SD	1.01			
Cooking attributes				
Ease of cooking	2.71*** (0.018)	1.98* (0.094)	0.15 (0.836)	1.22** (0.029)
Mean	2.0			
SD	0.79			
Grain cohesion	-0.29 (0.684)	-1.88** (0.013)	-0.66 (0.227)	-0.91* (0.070)
Mean	2.8			
SD	1.19			
Grain size	1.87** (0.025)	-0.12 (0.860)	-1.42*** (0.010)	-0.26 (0.631)
Mean	2.6			
SD	1.02			
Swelling capacity	0.39 (0.678)	-0.82 (0.360)	-2.78*** (0.000)	-1.90*** (0.003)
Mean	1.9			
SD	0.89			

T-statics in parentheses. Level of significance are ***1%, **5%, *10%
 Source: Field Survey (2021).



Table 2: Hedonic price analysis of the factors affecting rice price variation among consumers based on location **Cont'd.**

Variable	Location			
	Kaduna South	Chikun	Kaduna North	Igabi
Eating attributes				
Taste	0.26 (0.808)	-2.09* (0.097)	-1.79** (0.042)	-1.92*** (0.007)
Mean	1.8			
SD	0.75			
Aroma	0.39** (0.682)	1.01* (0.146)	0.49*** (0.377)	0.13** (0.805)
Mean	2.5			
SD	1.13			
Texture	-1.11 (0.166)	-0.12 (0.892)	1.43** (0.014)	0.034 (0.950)
Mean	2.1			
SD	0.83			
Other attributes				
Parboil	5.18 (0.35)	39.39*** (3.77)	33.85*** (3.16)	36.03*** (2.31)
Mean	0.68			
SD	0.45			
Origin	41.86*** (0.675)	20.75** (0.691)	33.09*** (0.028)	35.91*** (0.963)
Mean	0.6			
SD	0.49			
Income	7.95* (0.07)	0.00*** (2.86)	5.17* (0.99)	0.00** (1.44)
Mean	327.37			
SD	68.70			
Constant	-10.96*** (0.000)	-6.94** (0.028)	-5.97*** (0.002)	-0.89 (0.600)
R ²	61 %	54 %	65 %	50 %
F-Value	79.1			

T-statics in parentheses. Level of significance are ***1%, **5%, *10%

Source: Field Survey (2021).

Factors That Cause Shock Buying Among Consumers Due to Covid-19

Table 3 shows the result from regression analysis on factors that causes shock buying among consumers due to covid-19 in the study area. This result revealed 86% of the factors that influences shock buying due to covid-19 were caused by the variables in the model. Emanating from the findings, it can be concluded that, there is a direct and positive relationship, between rice price variation and covid-19 pandemic.



Table 3: Regression analysis of the factors that causes shock buying among consumers due to covid-19

Variables Significance		Coefficient	Standard error
Panic buying	0.033 ***	0.009	0.001
Fluctuation on exchange rate market	0.642 ***	0.211	0.003
Rise in the cost of freight	0.009*	0.011	0.413
Reduction in production	0.064 ***	0.016	0.000
Hoarding	0.013**	0.014	0.375
Profiteering	0.182**	0.186	0.329
Rise in cost of raw material	0.256***	0.097	0.578
Restricted labor mobility and resources	0.467*	0.705	0.743
Constant = 86.35 $R^2 = 0.861$ F – Value = 87.5			

Level of significance are ***1%, **5%, *10%
 Sources: Field Survey, (2021).

CONCLUSION AND RECOMMENDATIONS

In general, the results suggest that purchasing decisions based on product attributes vary across the four zones, although consumers do appear to pay premiums for certain qualities of rice, in particular physical attributes. Imported rice was believed to exhibit superior characteristics in terms of aroma, grain size, color, taste, texture and swelling capacity. In addition, the study assessed and analyzed the possible causes of the movement in prices by taking into consideration the impact of Covid-19, this study finds that the longer-term consequences of previous disruptions continue to affect the availability, accessibility and affordability of rice for individual households. Based on the result from this study, the following recommendations are necessary:

1. More effort should be given to production of rice considering its relevance to food security and the rising population of the country and efforts should be placed to counter the excessive rise in price.
2. Since increase in price brings about an increase in production, In line with the theory of Supply which states that the higher the price, the higher the quantity supplied: government should implement policies that will subsidize the price of rice to consumers and increase the level of food security in the country.
3. The marketers should form cooperatives or association that can assist them in provision of physical facilities and better dissemination of market intelligence and information.

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