

Analysis of the Factors Influencing Consumers' Preferences for Rice: Locally Produced Versus the Imported in the Ga East Municipality of the Greater Accra Region of Ghana

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ABSTRACT

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Rice is an important staple cereal for many households in Ghana. This study examines the factors that influence consumers' preference for rice. Using questionnaires, 300 rice consumers, who were sampled across the municipality, were interviewed. Descriptive statistics, factor analysis, and multinomial logistic regression model were used to analyze the obtained data. The rice-related attributes that showed marked influence on consumers' preference for rice were packaging quality, swelling capacity, stickiness of grains after cooking, percentage of broken grains, market availability, price, and degree of whiteness. Therefore, the stakeholders should implement strategies to improve these rice-related attributes and enhance the rice post-harvest chain.

Keywords: Consumer preference, Consumer buying behavior, Factor analysis, Multinomial logistic regression, Rice quality attributes

Introduction

Rice is the staple food for more than half of the world's population and is the main food source for seventeen countries in Asia and the Pacific and eight in Africa (FAO, 2005). Rice has become an important staple food in Ghana. It is second staple following maize. The per capita consumption has increased significantly from 12.7 kg/year in 1985 to 32 kg/year in 2015 (SRID, MOFA, 2015). Consequently, the gap between local demand and supply keep increasing. In Ghana both imported and domestic rice are sold on the same market in the urban centers. Domestic rice (parboiled, white and brown) has a peculiar flavor and is perceived to have nutritional qualities, but is considered a low quality substitute for imported rice. The issue of concern is that, the influx of imported brands of rice has led to a shift in consumption of domestic rice to the imported, which has created rather a huge disincentive



effect to domestic rice producers.

Retailers want to provide a range of desirable goods at saleable prices in order to meet consumer demands, and therefore wish to source freely from international markets (Wall and Heslop, 1986). Consumers want the range of choices that their levels of income, lifestyles, and media exposure make them aware and possible. Therefore the need to assess critically the factors that influence consumers' preferences for rice: locally produced versus the imported, and to come up with the requisite strategies and policies that can put the domestic rice production sector in line and in shape.

The main objective of the study is to analyze the factors that influence Consumers' preference for rice: locally produced versus imported in the Ga East Municipality of the Greater Accra Region of Ghana. Specifically to (1) Specifically, we identify the socio-economic characteristics of consumers who purchase rice (2) analyze consumers' knowledge and buying behavior towards rice and (3) estimate the factors which influence Consumers' preference for rice: locally produced versus the imported.

This paper studies factors that influence Consumers' preference for rice. Using the method of Factor Analysis and Multinomial Logistic Regression, and data collected from the Ga East Municipality of the Greater Accra Region of Ghana Well-structured questionnaires were administered to 300 rice consumers within the municipality. And find out, The results of this study will have a positive impact on the chicken industry in the Ohawu area. Using the proportion of chicken feed in this study can reduce the cost of the chicken industry and enhance the competitiveness of the local chicken industry.

Materials and Methods

Data collection and sampling technique

Primary data was obtained from the Ga East Municipality of the Greater Accra Region of Ghana Well-structured questionnaires were administered to 300 rice consumers within the municipality. The Ga East Municipal is one of the 260 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana, and forms part of the 29 MMDAs in the Greater Accra Region.

Model Specification and Definition of Variables

Dependent variable (Y): Consumer preference for rice.

Independent variables (δ_i): socio-economic factors and reduced factors after factor analysis.

Where,

$Y = f(\delta_1, \delta_2, \delta_3, \dots, \delta_{12}, \delta_{13}, \epsilon)$, Y is Consumer Preference for Rice

δ_1 is Gender (Male=1, Female=2),

δ_2 is Age (1= {10 – 29}, 2= {30 – 39}, 3= {40 – 49}, 4= {50 – 59}, 5= {≥60})

δ_3 is Marital Status 1: (Married=1, Single=0)

- δ_4 is Marital Status 2: (Married=1, Divorced=0)
- δ_5 is Marital Status 3: (Married=1, Widowed=0)
- δ_6 is Household Size, δ_7 is Monthly income in Ghana Cedis (GHS)
- δ_8 is Level of Education (in years)
- δ_9 is Employment Status, δ_{10} is Factor score 1
- δ_{11} is Factor score 2, δ_{12} is Factor score 3
- δ_{13} is Factor score 4, ϵ is Stochastic term

Factor Analysis

Principal Component Analysis (PCA) was the approach adopted in this analysis. The aim of PCA is to determine a few linear combinations of the original variables that can be used to summarize the data set without losing much information. The key objective to use this analytical tool is to determine which variables influence consumer preference for rice for objective three: locally produced or the imported or both. In representing each of the variables as linear combinations of the smaller set of factors (which is the objective of factor analysis), the equation is expressed as:

$$\begin{aligned}
 \delta_1 &= \Pi_{11}FS_1 + \Pi_{12}FS_2 + \dots + \Pi_{1m}FS_m + \epsilon_1 \\
 \delta_2 &= \Pi_{21}FS_1 + \Pi_{22}FS_2 + \dots + \Pi_{2m}FS_m + \epsilon_2 \\
 \dots & \quad \dots \quad \quad \quad \dots \quad \quad \dots \\
 \delta_n &= \Pi_{n1}FS_1 + \Pi_{n2}FS_2 + \dots + \Pi_{nm}FS_m + \epsilon_n
 \end{aligned}
 \tag{1}$$

Where: $\delta_1 - \delta_n$ is Standardized scores, $FS_1 - FS_n$ is Standardized factor scores, $\Pi_{11} - \Pi_{nm}$ is Factor loadings, $\epsilon_1 - \epsilon_n$ is Variance of the error term.

Multinomial Logistic Regression

The multinomial logistic regression model was used to evaluate why consumers in the research area prefer one category of rice to the other. The model is used to predict categorical placement on the probability of category membership on a dependent variable based on a number of independent variables. In an attempt to model a preferred choice of rice by a consumer as to whether to buy or not, and in a position where the consumer is faced with more than two alternatives, the selection of a rice type becomes multinomial. Hence, in determining the factors which influence consumer decision to buy a given type of rice in the study area, the multinomial (MNL) logit model is deemed fit to be used in the analysis and this similar to the model developed by McFadden (1986). The formulation of the model equation is presented as below in (2).

$$P_A = \frac{\exp(u_i)}{\sum_{j \in A} \exp(u_j)}
 \tag{2}$$

Where,

A is A set of available alternative indexed $\{1, 2, \dots, N\}$.

P is Probability of an individual consumer choosing alternative when present with set.

u_i is Scale values (strict utilities) which summarizes desirability of alternatives.

McFadden (1986) describes scale values as the function of attributes of the available alternatives which often interact with the characteristics and features of the consumer’s preferred choice wholly.

Several applications show scale values as being assumed to be additive and in separable linear form as demonstrated in equation (3) below.

$$u_i = \delta_{i1}\beta_1 + \delta_{i2}\beta_2 + \dots + \delta_{ik}\beta_k \tag{3}$$

Where,

δ is Measured attributes and characteristics

β is Coefficient of measured attributes and characteristics

In this study, the δ_1 variables range from $\delta_1 - \delta_2$ for the sampled rice consumers.

As can be seen in equation (3), the scale value is the utility which is associated with consumer i choosing outcome k . The equation can be written as a score function which can easily be converted into probability of consumer i choosing outcome k given the measured attribute of the consumer and also the product itself. The score function can be written as in the below equation (4).

$$A_i = f(k, i) = \delta_{i1}\beta_1 + \delta_{i2}\beta_2 + \dots + \delta_{ik}\beta_k \tag{4}$$

As for k possible outcomes, only $k-1$ independent parameter is identified and estimated in which among the outcomes one is chosen as a reference and others are separately regressed against the chosen reference outcome; to reach multinomial regression of k outcomes, the computations can proceed as follows.

$$\begin{aligned} \ln \frac{P(A_i = 1)}{P(A_i = k)} &= \delta_1\beta_i \\ \ln \frac{P(A_i = 2)}{P(A_i = k)} &= \delta_2\beta_i \\ &\dots\dots\dots \\ \ln \frac{P(A_i = k-1)}{P(A_i = k)} &= \delta_{k-1}\beta_i \end{aligned} \tag{5}$$

Now exponent both sides we have,

$$\begin{aligned}
 P(A_i = 1) &= P(A_i = k) e^{\beta_1 \delta_i} \\
 P(A_i = 2) &= P(A_i = k) e^{\beta_2 \delta_i} \\
 &\dots\dots \\
 P(A_i = k-1) &= P(A_i = k) e^{\beta_{k-1} \delta_i}
 \end{aligned}
 \tag{6}$$

Given the rule of thumb that said that the sum of all probabilities must equal to 1, we can write the expression as below.

$$P(A_i = k) = 1 - \sum_{k=1}^{k-1} P(A_i = k) e^{\beta_i \delta_i} = \frac{e^{\beta_i k \delta_i}}{1 + \sum_{k=1}^{k-1} e^{\beta_i k \delta_i}}
 \tag{7}$$

Applying natural logarithm to the above expression, the equation becomes as shown in equation (8) below.

$$Y = \beta_0 + \sum_{k=1}^{k-1} \delta_i \beta_i
 \tag{8}$$

Equation (8) can thus be expanded to include variables that will be used specifically for this study as shown in equation (9) below.

$$Y = \beta_0 + \delta_1 \beta_1 + \delta_2 \beta_2 + \delta_3 \beta_3 + \delta_4 \beta_4 + \dots + \delta_{12} \beta_{12} + \delta_{13} \beta_{13} + \epsilon
 \tag{9}$$

Result and Discussion

Description of Socio-economic characteristics of Consumers

The minimum and maximum ages of consumers were 16 and 82 respectively with an approximate mean age of 42 years. The minimum and maximum household sizes of respondents were 1 and above 5 respectively with mean household size of approximately 4, as shown in <Table 1>.

Table 1. Factors Affecting Agribusiness in Rivers State

Variable	Observation	Min.	Max.	Mean	Std. Deviation
Age of Respondent	300	16	82	42.27	12.89
Household Size	300	1	> 5	3.71	0.85

Source: Survey Data

<Table 2> presents the ratio of socio-economic characteristics.

Table 2. Percentage Description of Socio-economic Characteristics

Socio-Economic Variable	Percentage
Gender	
Male	47.0
Female	53.0
Education	
No	5.3
Primary	5.0
Secondary	45.0
Tertiary	44.7
Other	0.0
Ethnic Background	
Akan	48.0
Ewe	24.0
Ga	15.0
Other	13.0
Religious Background	
Christianity	70.0
Muslim	13.0
Traditionalist	10.0
Other	7.0
Total(Each Variable)	100.0

Source: Survey Data

The study reveals that 37.3% of consumers earn income between GHS800 – GHS1100; those who earn between GHS1100 – GHS1400 followed with 25%. Income earning groups between GHS0 – GHS300 and those between GHS300 – GHS800, each has 12.7% of the distribution. Income earning group above GHS1400 has distribution of 12.3%. This gives an indication that consumers in the study area will have adjustments in their monthly incomes, and most of them will be able to afford some basic needs of life.

Description of Consumers Knowledge and Purchasing Behavior

<Table 3> (shows or displays) the descriptive statistics of consumers' knowledge and purchasing behavior of rice. Of the 300 rice consumers who were surveyed in the study, about 97% of them showed that they were aware of presence of local rice on the market, although 3% responded "NO". With the sources of information where consumers received their information on presence of local rice on the market, the table reveals that about 33% of the 300 consumers said they sourced their information on presence of local rice on the market from family members. It was followed by those who received information from their friends, about 27%. 19% said they got aware via

listening to others. 13% sourced their awareness information from the internet, whereas 7% indicated they got aware via reading newspaper. Only 1% of consumers indicated that they got information on presence of local rice on the market through other ways.

Table 3. Description of Consumer Knowledge and Purchasing Behavior

Features	Frequency	Percentage
Awareness of presence of local rice on the market		
Yes	292	97.3
No	8	2.7
Ability to clearly distinguish between locally produced rice and imported.		
Yes	258	86.0
No	42	14.0
Source of information of awareness of presence of local rice on the market.		
Family	99	33.0
Friends	83	27.7
Radio	56	18.7
Newspaper	21	7.0
Internet	38	12.7
Other	3	1.0
Frequency of eating rice per day		
Once a day	239	79.7
Twice a day	48	16.0
Trice a day	5	1.7
Other	8	2.7
Are you a Member of your household who buys rice for the family's meal?		
Yes	232	77.3
No	68	22.7
Person who takes decision as to the type of rice the family consumes.		
Family Head	101	33.7
The person making the purchase	126	42.0
The person who does the cooking	73	24.3
Segment/Type of rice market where buyer normally buys rice.		
Retailers	167	55.7
Supermarkets	48	16.0
Hypermarkets	17	5.7
Never answered	68	22.7
Total	300	100

Source: Authors Estimation of Field Data (2019), SPSS

Out of the 300 respondents interviewed, 86% said yes, they are able to clearly distinguish between locally produced rice from the imported on the market. 14% said they are not able to clearly distinguish the locally

produced rice from the imported on the market.

Frequency of consumption of rice by consumers in the study area on daily basis is shown that, about 80% out of 300 rice consumers said they eat rice once in a day. 16% said they eat rice twice in a day. About 2% said they eat rice trice in a day whereas 3% indicated other.

The study also showed who in the household buys rice for the family's meal. 230 out of 300 respondents, representing 77%, said, yes, they are the members of household who buys rice for the family's meal. 68 out of 300 respondents, representing 22.7% answered "No", they are not members of household who buy rice for the family's meal.

The study showed the segment of the rice market. 167 respondents out of 300, representing 55.7%, buy their rice from retailing joints. 16% buy their rice from Supermarkets, while 5.7% of consumers buy their rice from hypermarkets. 22.7% of respondents are not persons in the household who buy the family's rice and so are captured as Nil.

The quantity of rice the buyer buys at a time was also revealed that, percentage of those who buy rice between 5 kg – 10 kg at a time was 30.3% and it is the highest. Followed by 20.3% for those who buy between 10 kg – 15 kg, then 18.3% for consumers who buy rice between 15 kg – 25 kg and again 8.3% buy < 5 kg of rice at a time. About 22.7% of the respondents said they are not the persons in the household who buy rice for the family's meal hence captured as Nil.

<Table 4> shows the descriptive analysis of locally produced rice versus the imported under different categories.

Regarding preference of rice by consumers within the municipality, about 67.7% of consumers indicated they prefer imported rice to local rice. About 24.7% indicated that they prefer locally produced rice to the imported, while 7.7% of consumers showed neutral for preferring neither imported rice nor the locally produced.

Out of the 300 respondents, 107 of them representing 35.7% indicated their recent purchase was imported rice and it's the highest. 41 of respondents, representing 13.7% said their recent purchase was locally produced rice. 84 of respondents, representing 28% indicated their recent purchase were both locally produced and imported rice. About 22.7% did not answer this question.

Concerning the number of times respondents look either for locally produced rice or the imported on the market, 29% of consumers surveyed said they look for it once a month and it's the highest. 27% of consumers followed, saying they do not look for it. About 23.7% said they look for it once a week and 4% said they look for it on the market daily, while another 4% said other.

Regarding frequency search of imported rice on the market, about 39.3% of consumers surveyed said they look for imported rice once a month and it's the highest. About 24.3% consumers followed, saying they look for it twice a week. About 24.0% said they look for it once a week. About 7.3% said they do not look for it at all, 2.7% chose other. Those who said they look for it daily were about 2.3%.

Table 4. Descriptive Analysis of Locally Produced Versus Imported Rice

Features	Frequency	Percentage (%)
Type of Rice Preferred		
Locally Produced	74	24.7
Imported	203	67.7
Neutral (Both)	23	7.7
Most Recent Purchase		
Locally produced rice	41	13.7
Imported rice	107	35.7
Both local and imported	84	28.0
Did not Answer	68	22.7
Frequency of Search of Local Rice on the Market		
None	81	27.0
Daily	12	4.0
Once a week	71	23.7
Twice a week	37	12.3
Once a month	87	29.0
Other	12	4.0
Frequency of Search of Imported Rice on the Market		
None	22	7.3
Daily	7	2.3
Once a week	72	24.0
Twice a week	73	24.3
Once a month	118	39.3
Other	8	2.7
Total (Each category)	300	100

Source: Authors Estimation of Field Data (2019), SPSS

Empirical Results

This study estimates the factors that influence consumers' preference for rice. 17 rice attributes and characteristics were foremost subjected to factor analysis using the Principal Component Analysis to reduce the number of attributes by loading them under factor scores for easy and further analysis. The processes and results of the analysis are discussed below.

Factor Analysis

<Table 5> shows the factor analysis results, KMO and Bartlett's test for factor extraction and loading. KMO measures the strength among the variables. It determines whether responses given with the sample are adequate or not. Kaiser (1974) recommends a minimum KMO value of 0.5. Therefore with KMO value of 0.84 shows the sampling for this analysis is adequate.

In Bartlett's test, the null hypothesis is that the correlation matrix is an identity matrix (i.e all of diagonal elements are 1 and all off diagonal elements close to 0). Therefore with significance of ($P < 0.000$) indicates that the correlation matrix is not an identity matrix, hence the null hypothesis is rejected.

From the table it can be seen that Factor 1 [Packaging quality, Swelling capacity, Stickiness of grains] estimated a Cronbach alpha score of 0.691. Factor 2 [% brokenness, Availability of rice in the market, Price, Degree of Whiteness] estimated 0.639. Factor 3 [Texture, Cleanness from foreign material, Taste] estimated a score of 0.644, whereas Factor 4 [Nutritional Value, Aroma, Ease of Cooking] estimated 0.589.

Table 5. Descriptive Analysis of Locally Produced Versus Imported Rice

	Component				KMO	Cronbach α
	1	2	3	4		
Packaging quality	.752					.691
Swelling capacity	.730					
Stickiness of grains after cooking	.663					
% brokenness of grains		.717				.639
Availability on the market		.624				
Price		.603				
Degree of Whiteness		.502			.840	.644
Texture			.798			
Cleanness from foreign materials			.744			
Taste			.502			.589
Nutritional Value				.771		
Aroma				.706		
Ease of Cooking				.527		

Bartlett's Test of Sphericity: Approx. Chi-Square 1264.758, df 136, Sig. .000.

Total Variance Explained: 52.277%

<Table 6> above the four factor were subjected to cluster analysis to ascertain the homogeneity within clusters. The scores were put into four clusters. In cluster one, factors 3 and 4 had the highest homogeneity among the clusters. In cluster two, factors 2 and 4 had the highest homogeneity within the clusters. Factors 1, 2 and 3 showed high in homogeneity in cluster three whereas in cluster 4 all factors had high homogeneity. The tolerance and VIF values of factor scores put in the analysis were all within the range of acceptance and pass the test for multicollinearity.

Table 6. Cluster Analysis

	Cluster				Collinearity Statistics	
	1 (n=61)	2 (n=79)	3 (n=82)	4 (n=78)	Tolerance	VIF
Factor 1	3.55	3.45	4.29	4.47	.770	1.229
Factor 2	3.77	3.94	4.11	4.60	.725	1.379
Factor 3	4.50	3.57	4.11	4.70	.767	1.303
Factor 4	4.17	3.92	3.91	4.60	.800	1.250

Estimated Multinomial Logistic Regression Results

<Table 7> above shows the multinomial regression estimates of the factors that influence consumer's preference for rice. The independent variables are socioeconomic variables as well as factor containing rice characteristics. The dependent variable was preference for rice, which was set in three category levels named imported rice, locally produced rice and neutral (not prefer any type to another but consumes both). Neutral was set as reference in the multinomial regression analysis against imported and locally produced rice in a confidence interval of 95% (5% significant level). Results from the analysis show that socio-economic variables of age, marital status, monthly income and level of education showed statistically significant with preference for rice (dependent variable) which

Table 7. Multinomial Logistic Regression Estimated Results of Factors Influencing Consumers' Preference for Rice

	B	Std. Error	Wald	df	Sig	Exp (B)
Imported						
Intercept	-14.886	1.302	112.622	1	0.000	
Gender	0.322	0.455	0.503	1	0.478	1.380
Age	0.820	0.320	6.576	1	0.010	2.271
Marital Status 1	0.354	0.461	0.590	1	0.442	1.424
Marital Status 2	7.311	0.790	85.624	1	0.000	1496.613
Marital Status 3	-7.016	0.618	128.949	1	0.000	0.001
Household Size	-0.375	1.362	0.077	1	0.783	1.456
Monthly Income	3.125	1.287	5.905	1	0.015	0.044
Level of Education	1.520	0.643	5.582	1	0.018	4.574
Employment Status	0.082	1.253	0.004	1	0.948	1.685
Factor 1	5.076	2.348	4.673	1	0.031	16.206
Factor 2	4.163	2.022	4.239	1	0.040	64.286
Factor 3	6.376	3.077	4.429	1	0.038	0.002
Factor 4	1.458	3.047	0.229	1	0.632	4.296
Locally Produced						
Intercept	-14.621	0.865	223.946	1	0.000	
Gender	-0.121	0.503	0.058	1	0.810	0.886
Age	0.985	0.337	8.561	1	0.003	2.679
Marital Status 1	0.142	0.692	0.042	1	0.837	1.153
Marital Status 2	6.945	0.752	85.245	1	0.000	10.667
Marital Status 3	-7.044	0.563	56.467	1	0.000	11.496
Household size	0.116	0.334	0.120	1	0.729	1.123
Monthly Income	-1.784	0.753	5.611	1	0.018	0.017
Level of education	1.269	0.570	4.980	1	0.027	3.557
Employment Status	0.376	1.362	0.077	1	0.783	1.455
Factor 1	3.932	1.738	5.118	1	0.024	5.992
Factor 2	4.595	2.305	3.974	1	0.046	99.002
Factor 3	-7.726	3.325	3.981	1	0.020	0.004
Factor 4	1.578	2.708	0.340	1	0.560	4.845

contradicts the null hypothesis that socio-economic variables have no statistically significant relationship with preference for rice. On the basis of this, the null hypothesis is rejected and the alternative is desirable. Factor 1, 2 and 3 showed to have statistically significant relationship with preference for rice which again contradicts the null hypothesis that rice attributes or characteristics have no statistically significance with preference for rice, hence the null hypothesis is rejected.

1) Preference for Imported rice relative to keeping Neutral

The coefficient of age was positive and statistically significant at 5% level, meaning age has positive relationship with preference for imported rice relative to being neutral. The mean age was 42.27 indicating that most of the respondents in the study area are youthful and active, hence would require rice (i.e., milled) to meet their carbohydrate and also protein requirements for their bodies. This is in agreement with the work of Emodi et. al (2011) who mentioned that consumers who are active go for energy-given foods such as rice to meet their daily energy needs.

The coefficient of status of a consumer being married or divorced showed to have positive relationship with preference for imported rice relative to being neutral. The meaning is that consumers who fall under this status are more likely to prefer imported rice relative to being neutral by 7.311 units while holding all other factors constant. The economic well-being of married consumers (in terms of support from each couple) may be better than an individual who is divorced. Therefore the tendency for married households to afford buying quality imported rice is higher.

The results showed that the coefficient of status of a consumer being married or widowed had positive relationship with preference for imported rice relative to being neutral. The multinomial parameter estimate (log-odds) for a change in the marital status of a consumer who is married or widowed to prefer imported rice relative to being neutral decreases by 7.016 units holding all other variables constant. The socio-economic status support for an individual (widowed) becomes less in some instances and so such households may have less income to buy and consume preferred choices of rice compared to households with both spouses alive. Therefore a “widowed household” may prefer both imported and local rice depending on how much it can afford, than to prefer high cost quality imported rice. This is supported by Wall and Heslop, (1986) that states that consumers want the range of choices products that their levels of income, lifestyles, and media exposure make them aware and possible.

The coefficient of monthly income showed to have a positive relationship with preference of imported rice by the consumer relative to being neutral. This means that as income increases the consumer is more likely to prefer imported rice relative to being neutral. The higher the monthly income the higher the demand for imported rice in the municipality. This is in consonance with the work of Kassali et al. (2010) in the study of determinants of rice in Osun State of Nigeria, which reported that income of household significantly increases demand for rice.

The results revealed that level of education had positive effect on preference for imported rice relative to the neutral and statistically significant at 5% level. This means that educated people in the study area are more likely to

prefer imported rice relative to being neutral. Usually people who are more educated people tend to be more sensitive to their health concerns and eating lifestyles compared to the less educated or uneducated. This makes them to become selective in their desired attributes for their health and safety needs.

As shown in table 11, after analysis, Factor 1, Factor 2 and Factor 3 showed statistically significant at 5% (P-values stated below) having an influence on preference for particular type of rice (Factor 1 at $P < .031$, Factor 2 at $P < .040$, Factor 3 at $P < .038$).

Factor 1 – [Packaging quality, Swelling capacity and stickiness of grains]: According to the finding, the multinomial log-odds of a one unit increase in preference for imported rice relative to being neutral on the bases of the above three quality attributes increases by 5.076 units while holding all other variables constant. In other words consumers in the study area are more likely to prefer the imported rice relative to being neutral by 5.076 units.

Factor 2 – [% brokenness of grains, Availability on the market, Price and Degree of whiteness]. The results revealed that factor score 2 had positive relationship with preference for imported rice relative to being neutral. The logit for a rice consumer who uses any of these four attributes or characteristics as measure to make decision to purchase rice to prefer imported rice relative to preferring neutral increases by 4.163 units, while holding all other variables in the model constant. This means that consumers who consider any of the four attributes to make their decision to buy are more likely to prefer imported rice relative to being neutral by 4.163 units.

Factor 3 – [Texture, Cleanness from foreign material and Taste]. Factor score 3 showed positive relationship with preference for imported rice. The finding has a reflection with the work of Opeyemi et al. (2015) in the study of the analysis of consumer preference in patronizing locally produced and imported rice in the Niger State which revealed that taste, cleanliness of rice and absence of stones in rice were found to be significant with imported rice.

2) Preference for Locally Produced Rice relative to staying Neutral

From the results the coefficient of age revealed a positive relationship with preference for locally produced rice. This means as age of the consumer increases, he or she is more likely to prefer local rice relative to being neutral. Consumers opt for rice brands with desirable attributes which favor their health safety and growth. This relates to the findings of Henson et al. (2006) who reported that the product with good attributes for safety reasons usually is consumed much for the health of the users.

The multinomial logit (log-odds) for a one unit increase for a consumer who is married or divorced preferring locally produced relative to staying neutral (not consuming imported rice) increases by 6.945 units holding all other variables in the model constant. In other words consumers under this category of status of marriage are more likely to purchase locally produced rice relative to being neutral. The results also showed that the coefficient of status of a consumer being married or widowed had positive relationship with preference for locally produced rice relative to being neutral. The multinomial parameter estimate (log-odds) for a change in the marital status of a consumer who is married or widowed to prefer local rice relative to being neutral decreases by 7.044 units holding all other variables constant. The socio-economic status support for an individual (widowed) becomes less in some instances

and so such households may have less income to buy and consume preferred choices of rice compared to households with both spouses alive.

It is observed from the results that the coefficient of monthly income showed to have a negative relationship with preference of locally produced rice by the consumer relative to being neutral. The 1 logit for a 1 Ghana Cedis increase in monthly income of a consumer to prefer local rice relative to being neutral decreases by 1.784 units while holding all other variables in the model constant. This means that as monthly income of consumers in the study area increases by a Cedi, they become less likely to prefer locally produced rice relative to just being neutral. Again, this is supported by the work of Wall and Heslop, (1986) who mentioned that consumers want the range of choices products that their levels of income make them possible to obtain.

The results showed that level of education had positive effect on preference for local rice relative to the neutral and statistically significant at 5% level. This means that some educated people in the study area are more likely to prefer locally produced rice relative to being neutral. Recent improvements in local rice production in the country have made the consuming public to be aware of the benefits of eating locally produced rice in terms of its nutritive attributes. Educated people tend to be more sensitive to their health concerns the uneducated. This makes them to become selective in their desired attributes for their health and safety needs.

With regards to preference for locally produced rice relative to staying neutral and as shown in table 11, Factor 1, Factor 2 and Factor 3 showed statistically significant at 5% (P-values stated below) having an influence on preference for particular type of rice (Factor 1 at $P < .024$, Factor 2 at $P < .046$, Factor 3 at $P < .020$). The less preference of the locally produced rice by consumers in using the above attributes as bases can be drawn from the fact that the packaging quality nature of locally produced rice in the area may be of inferior status, swelling capacity and stickiness of grains of the locally produced rice when cooked may not meet the satisfaction of rice consumers in the area. It thus suggests that producers and marketers of locally produced rice in the study area must give attention to upgrading quality nature of these three attributes of the locally produced to encourage patronage.

Consumers in the study area will buy local rice to consume even if the percentage of brokenness of grains is minimal or even non-existent. Continuous supply of which means availability of the product on the market is of essence. It allows the consumer to make selection among choices if available. They will also buy local rice if price is high and also will buy base on the whiteness of rice grains. The price factor could be as a result of quality perception of local rice attributes. Again, inference can be made on the percentage brokenness of local rice grains such that, the lower the percentage of the brokenness of rice grains the higher the preference of the particular type of rice and vice versa. The indication is that local rice consumers in the study area also pay attention to the percentage brokenness of the local rice grain before they make decision to buy local rice.

The less preference of the locally produced rice by consumers in using texture, cleanness from foreign material and taste as bases can be drawn from the fact that the afore-mentioned attributes do not meet the preference criteria of rice consumers in the area. This finding has an agreement with a study carried out by Gurung (2013) in a hedonic price model analysis on domestic rice in Bhutan which revealed that Bhutanese rice consumers have less preference

for rice types containing foreign materials and bad taste after cooking. The finding is also in consonance with the work of Anang et al. (2011) which focused on consumer preference for quality characteristics of rice in Accra. The results revealed that taste, absence of foreign matter, aroma and retail price are the quality attributes that most consumers prefer.

Conclusion

This study finding that active youthful aged consumers would go for energy-given food such as rice to meet their daily energy needs. Most consumers prefer to buy rice at retailing joints. Income of household significantly increases demand for rice. Educated people tend to be more sensitive to their health concerns. Packaging quality, swelling capacity and stickiness of rice grains when cooked, brokenness of grains after milling, availability on the market, price and degree of whiteness showed to have statistically significance with the type of rice the consumer preference.

We suggests that producers and marketers of locally produced rice give attention to upgrading quality nature of these three attributes of the locally produced to encourage patronage, and that marketers make available on the market rice types that meet the requirements of the various socio-economic classes or segments of the rice consuming public.

On another hand, the findings revealed that packaging quality was major rice-related attribute upon which majority of consumers based their decisions to purchase rice.

This paper also has the following limitations. Although this method find the factors influenced consumers preference to rice, it can be seen that due to the limitation of the data collection method, the data entered into the model may not be complete. In addition, the research area selected in this study is also very limited, which will affect the generality of the results. Therefore, in the future, we can obtain more data, improve the scale of the database, and propose more generalized results.

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