Professional Agricultural Workers Journal

Volume 6 | Number 1 Article 7

8-10-2018

Determinants of Consumer Preference for and Expenditure on Rice in the Kilimanjaro Region, Tanzania

Japhet S. Laizer
Tuskegee University, japhetstephan@gmail.com

Ntam R. Baharanyi
Tuskegee University, nbaharanyi@tuskegee.edu

Robert Zabawa
Tuskegee University, rzabawa@tuskegee.edu

Reuben M.J. Kadigi
Sokoine University of Agriculture

DETERMINANTS OF CONSUMER PREFERENCES FOR AND EXPENDITURE ON RICE IN THE KILIMANJARO REGION, TANZANIA

***Japhet S. Laizer[1,2], **Ntam R. Baharanyi[1], Robert Zabawa[1], and Reuben M.J. Kadigi[2]**
[1]Tuskegee University, Tuskegee, AL
[2]Sokoine University of Agriculture, Morogoro, Tanzania
***Email of lead author: japhetstephan@gmail.com**
****Email of corresponding author: nbaharanyi@tuskegee.edu**

Abstract

The primary objective of the study was to examine determinants of consumer preferences for and expenditure on rice in the Kilimanjaro Region, Tanzania. Data were collected from a random sample of 230 participants, and analyzed using descriptive statistics and regression analyses. The descriptive statistics revealed that domestic rice was preferred by a majority of the participants over imported rice. The most important attribute for consumers was aroma, followed by taste, cleanness, and price. The logistic regression analysis showed that price of a substitute, quality, and household size had significant effects on preference for rice, domestic or imported. The OLS analysis revealed that the price of rice, income, frequency of consumption, and household size had significant effects on expenditure on rice. It is suggested that domestic rice should be promoted, and influential factors should be considered in any consumption and policy changes in the rice industry.

Keywords: Consumer Preferences, Consumption, Domestic and Imported Rice, Quality Characteristic of Rice

Introduction

Rice is among one of the most important staple foods consumed worldwide. It is a significant food crop with ever-increasing global demand for high-quality characteristics for both producers and consumers (Calingacion et al., 2014). Global rice consumption has been exceeding production causing rising prices in the global market. The available statistics illustrate that global consumption of rice per year will exceed 550 million tons by the year 2035 (Kilimo Trust, 2014). In East Africa, Tanzania is the second largest producer and consumer of rice after Madagascar, with annual consumption standing at approximately 1.18 million tons, almost 65% of the total production in East African Countries (EAC). The demand for rice in EAC exceeds supply and the deficit is covered mainly with imports from Asian countries, such as Pakistan, Vietnam, and Thailand. Over the period 2002–2012, the consumption of rice in EAC grew at an average rate of 4% per annum (European Cooperative for Rural Development [EUCORD], 2012; Kilimo Trust, 2014; Rural Livelihood Development Company, 2009).

Among the EAC, Tanzania has the highest per capita rice consumption at 25kg. The per capita rice consumption for Kenya and Uganda are 10kg and 8kg, respectively, while those of Rwanda and Burundi are 4kg each. The rice consumption in Tanzania has risen in line with national per capita income. The growth in consumption is also driven by increasing population growth, urbanization, and diversified cooking characteristics for rice as a result of tastes and preferences (Kilimo Trust, 2017; Kilimo Trust, 2014). The demand for rice is expected to triple over the next decade as the population grows and becomes more affluent and urbanized. This change is expected to diversify the use of rice-based products. The government, therefore, has targeted the rice sector as a high

priority area and as a means to address food security and boost economic growth in both rural and urban areas (Philemon, 2013; United Republic of Tanzania [URT], 2009).

Opoku and Patrick (2009) mentioned that there are relatively few studies that have investigated consumers' attitudes toward domestic and imported products in developing countries, and thus, very little is known about consumer behavior. Similarly, Calingacion et al. (2014) indicated that most of the studies conducted on consumer preferences for rice have focused on the requirements of a particular country, but currently, rice marketing is now a global business. Furthermore, Suwansri et al. (2002) argued that since the consumers can distinguish the quality of the rice they consume, there is a need to examine preferred attributes and characteristics of domestically produced and imported rice. Therefore, the objectives of this study were to (1) identify and describe attributes that characterize consumer preferences for rice, (2) examine factors that influence the preference for rice, domestic or imported, and (3) evaluate socioeconomic factors that influence expenditure on rice.

Literature Review

Definitions and Explanations

Kassali et al. (2010) defined demand for a commodity as the quantity which consumers are willing and able to buy at different prices in a particular period. The most important determinants of demand for a product include its price, consumers' income, prices of related products, consumers' tastes and preferences, and the size of population. Levin and Milgrom (2004) stated that consumer theory is concerned with how a rational consumer would make consumption decisions that allow making an economic judgment. The consumer's choice sets are assumed to be defined by price and income. The authors concluded that consumers choose a set of goods to maximize utility subject to the budget constraints that cannot exceed total income.

Catoiu and Teodeorescu (2004) explained consumer preference as to how a rational consumer would rank or compare the desirability of any two baskets assuming that the baskets were available at no cost. The consumer's objective is to choose the bundle of goods that provide the highest level of satisfaction. However, the consumer's actual choices are constrained by income and the prices of the goods. The preferences are independent of income and prices because the ability to purchase goods does not determine consumers' likes or dislikes. Consumers make decisions by allocating scarce income across all possible goods to obtain the highest level of satisfaction subject to budget constraints. Consumer preferences are measured by the utility (satisfaction) that consumers derive from consumption of a good. The authors argued preferences allow the consumer to rank bundles of goods according to the levels of utility derived from the consumption of goods.

Voicu (2007) also mentioned that consumer preferences are positive incentives expressed through acceptance of goods or services. Preference is the result of a long-term relationship between the brand and the consumer. Studying consumer behavior is not an easy task; consumers may express their needs and desires and still act in opposite ways. The author also emphasized that knowledge of consumer preferences is necessary for the survival of firms dealing with fast moving consumer goods.

Rutsaert et al. (2013) summarized consumer attributes for rice based on the rapid increase in its consumption. Attributes are product characteristics that are either intrinsic, like taste, flavor,

texture or color, or extrinsic, like packaging, brand or label. The author noted three types of attributes, namely, search attributes, experience attributes, and credence attributes. Search attributes, which consist of the evaluation of the product before purchase include type, price, appearance, brand, packaging, and cleanliness. Experience attributes can only be evaluated after the product has been used or consumed such as taste and texture. Credence attributes are characteristics that the consumer depends on third-party or external sources to ascertain. They include individuals, institutions, industry, and government.

Previous Studies

Attributes and Quality Characteristics for Rice

Anang et al. (2011) investigated influential factors on consumer preferences for various rice brands in the city of Tamale, Ghana. The sample contained 100 randomly selected respondents. The authors found that the quality attributes that were of most importance to the respondents were aroma, taste, cooking quality, the source of rice, impurities (presence of foreign matter), cooking time, and price. Hence, consumers were willing to pay premium prices for desirable qualities, especially aroma, taste, and source of rice.

Suwannaporn and Linnemann (2008) surveyed consumers of the target nationalities (Americans, Japanese, and Thai) to identify a market strategy for Thailand Jasmine rice export. The results showed that American consumers highly preferred Jasmine rice with specific cooking types and characteristics; Japanese consumers preferred well-milled Japonica rice with short grains, and Thai consumers preferred the well-milled long grain Indica rice. The results mentioned essential quality characteristics that influenced consumer preferences for rice; these were color, taste, aroma, stickiness, and hardness. The study concluded that consumer buying decisions were comprised of four factors market activities, quality, price, and country of origin.

The Bill and Melinda Gates Foundation [BMGF] (2012) conducted a rice assessment in Tanzania and described rice as a premium staple food that consumers in Tanzania aspire to consume when income increases. According to the Foundation, consumer preference for rice has grown in line with disposable income and urbanization. It observed that urban consumers preferred domestic rice because of characteristics such as aroma, freshness, and appearance with fewer broken rice grains. The assessment concluded that some consumers were willing to pay a 21% premium price for domestic rice for its flavor, aroma, and cleanness.

Nzomoi and Ian (2013) asserted that consumers in Tanzania purchase rice from a variety of sources, including open markets, retail shops, milling centers, mini-supermarkets, and wholesale shops. The reasons given for the variety of sources include distance, reasonable prices, and availability of a variety of other products.

Consumption and Preferences for Domestic and Imported Rice

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 factors that influenced consumption preferences for rice included quality, ease of preparation, the price of rice, the frequency of consumption, household size, and income. The findings revealed that the quality of rice had a significant effect on consumption preference for the household.

Futakuchi et al. (2013) investigated the need to improve the quality of domestically produced rice in Africa. They stated that improving the quality of domestically produced rice would entail improving standards to those preferred by the consumer. Improving the quality of domestically produced rice will lead to higher prices, and consumers would be motivated to purchase more of it than imported rice.

Suwansri et al. (2002) examined preference mapping of domestic versus imported Jasmine rice for U.S. Asian consumers in Arkansas, U.S. The results revealed that U.S. Asian consumers preferred imported Jasmine rice more than domestically produced rice. The most important factors determining acceptance of Jasmine rice included color, flavor, aroma, stickiness, and hardness in descending order. They concluded that these characteristics were very useful in understanding the drivers of imported rice across different consumer groups.

Ismail et al. (2012) assessed factors affecting consumer preferences of international brands over domestic brands of rice in Karachi, Pakistan. They found that consumers evaluated products based on intrinsic and extrinsic factors. The most important factors that influenced consumers' final decisions were the price and quality of the product. They also found that consumers had the notion that high-priced products have high quality and low-priced products have low quality.

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.

Socioeconomic Factors and Consumption and Expenditure for Rice

Kassali et al. (2010) observed that socioeconomic factors such as household income, the price of rice, the price of substitutes, and household size had significant effects on household consumption and demand for rice. They found that food expenditure increases as the household size increases. Overall, the study revealed that the demand for rice was elastic and income being inelastic, price rather than income was the most significant source of increased demand.

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 4-6 people while almost 70%, bought rice every month. The authors found that urban residence, income, education, age, gender, marital status, and working status had significant effects on purchasing rice.

Galawat and Mitsuyasu (2010) used choice modeling to assess consumer preferences for local rice. Consumer preferences for quality rice were associated with the standard of living, which reflected the ability to pay. The higher the standard of living and the lower the per capita consumption, the wider the range of prices that consumers pay for the different qualities of rice. The lower the

standard of living and the higher the per capita consumption, the smaller the range of prices that consumers pay for the different qualities of rice. Therefore, consumers with limited incomes would prefer large volumes at lower prices and pay little attention to quality differences.

Anang et al. (2011) reported income as one of the factors influencing consumer preferences for quality characteristics of rice. As income levels rose, consumers demanded delicious foods, which reflects preference and quality. The cooking quality of rice is affected by the type of dish preferred by the consumer. With rising incomes, consumers prefer rice with desirable cooking qualities. Imported rice with good aroma influenced consumer preferences compared to non-aromatic local rice varieties which take long time to cook.

Barreiro-Hurle (2012) mentioned that rice is preferred in the diets of high- and middle-income consumers in both urban and rural areas in Tanzania for daily calories. The study found that the price of rice was more expensive than maize (corn) and other staple crops. It is also the preferred dish by many households during festival seasons and social gatherings, because it is convenient to prepare. Changes in consumer preferences from conventional foods to rice, increasing per capita incomes, and rapid urbanization have resulted in a substantial increase in annual per capita rice consumption to about 25-30 kg/year.

Farah et al. (2011) studied the influence of socio-demographic factors, product attributes, and attitudes toward purchasing special rice (Basmati) among Malaysian consumers. The findings showed that household size, marital status, number of children, household income, and gender significantly influenced household choices and consumption of rice (Basmati). They found that consumers with higher incomes tend to increase the frequency of the purchase of Basmati rice compared to those with lower incomes. Moreover, Kilimo Trust (2014) reported that consumers with relatively higher incomes were likely to consume rice two to four times more than those with relatively lower incomes.

Methodology

Conceptual Framework

Studying consumer preferences is very important because the consumer has more power than ever before. Consumer behaviour focuses on how individuals make decisions to spend their available resources (time, money, and effort) on consumption related items. That includes what, why, when and where they buy it; also, how often they buy and use it, and how is it evaluated after the purchase and the impact of such evaluations on future purchases, and how they dispose of it (Schiffman and Kanuk, 1997). The conceptual framework of this study was developed from the basis of demand theory as summarized in Figure 1.

The Framework shows that factors affecting consumer preferences for and expenditure on rice are the function of demographic factors and quality characteristics of rice. The quality characteristics of rice impinge on both extrinsic and intrinsic factors. These two sets of categories also influence the preferences for and expenditure on rice.

Theoretical and Empirical Models

The theoretical and empirical models are based on logistic regression and ordinary least squares regression. A logistic regression model is a type of probabilistic statistical classification model used to predict the outcome of a categorical dependent variable. For binary dependent variables, P = 1 if an event occurs, and P = 0 if an event does not occur (Maddala and Lahiri, 2009). The dependent variable is regressed on a set of independent variables. In this case, the logistic regression model is generally expressed as $P_i = \frac{1}{1+e^{zi}}$ if one event occurs, or $1 - P_i = \frac{1}{1+e^{zi}}$ if the event does not occur. Combining both, it can be written as a linear function as:

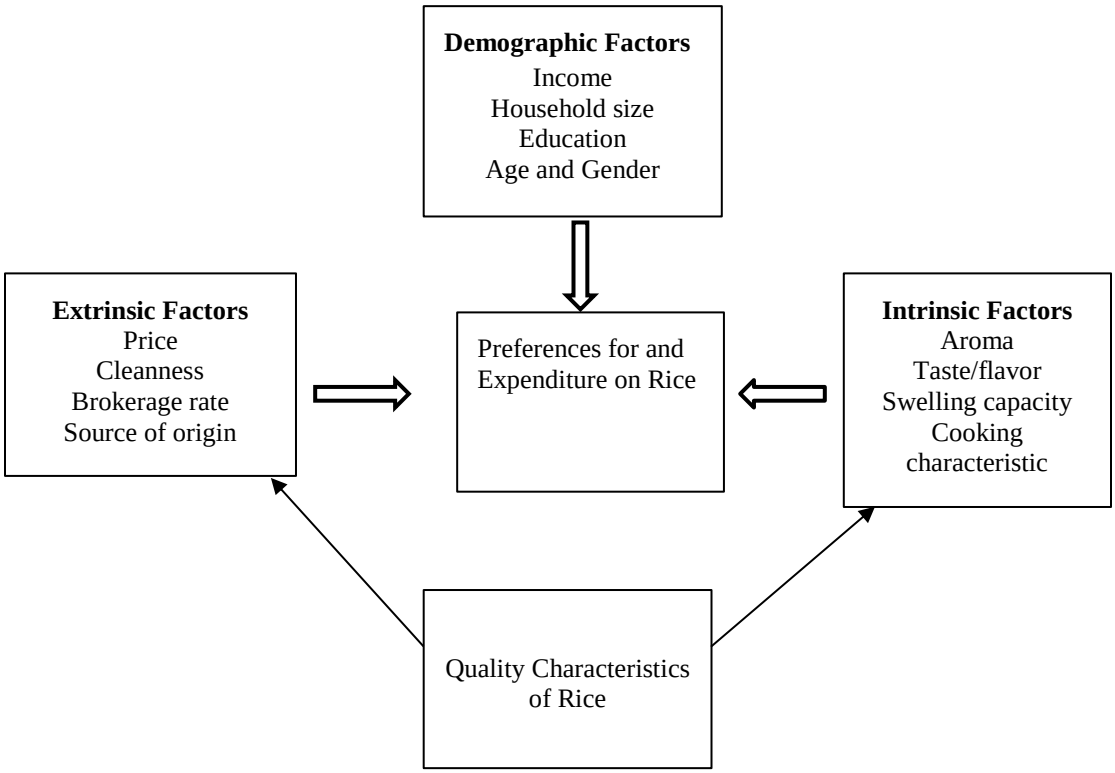

Figure 1. Conceptual Framework of the Study

$$\text{Log}\frac{P_i}{1-P_i}(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \varepsilon \quad (1)$$

Where:

$\text{Log}\frac{P_i}{1-P_i}(Y)$ = dependent variable

X_i = independent variables

β_i = coefficients
ε = error term

In ordinary least squares regression, the idea is to minimize the deviations, stated broadly as:

$$Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \cdots + \beta n Xn + \varepsilon_0 \quad (2)$$

Where:
Y = dependent variable
X_i = independent variables
β_i = coefficients
ε = error term

There were two estimation models. The first one was a binary logistic model expressed as:

$$\text{Log}\frac{P_i}{1-P_i}(PF) = \beta_0 + \beta_1 PR + \beta_2 PM + \beta_3 IC + \beta_4 QR + \beta_5 AG + \beta_6 GD + \beta_7 ED + \beta_8 HS + \varepsilon_0 \quad (3)$$

Where:
PF = Preference for rice, a dichotomous variable (1 = prefer domestic rice and 0 = otherwise)
PR = Price of rice per kilogram
PM = Price of substitute (maize flour) per kilogram
IC = Total monthly income in TZS
QR = Quality of rice (total number of attributes consumer considers when buying rice)
AG = Age of respondent in years
GD = Gender of respondent as a dummy variable (1 = male and 0 = female)
ED = Education level of respondent, completed years of schooling
HS = Household size (total number of family members)
β_i = coefficients
ε = error term

The first model hypothesized that the preference for rice depends on the price of rice, the price of substitute, income, quality, age, gender, education, and household size.

The second model was an ordinary least squares regression model expressed as:

$$ER = \beta_0 + \beta_1 PR + \beta_2 IC + \beta_3 QR + \beta_4 FC + \beta_5 ED + \beta_6 GD + \beta_7 HS + \varepsilon_0 \quad (4)$$

Where:
ER = Expenditure on rice in TZS
PR = Price of rice per kilogram
IC = Total monthly income in TZS
QR = Quality of rice (total number of attributes consumer considers when buying rice)
FC = Frequency of consumption, number of times per week
ED = Education level of respondent, completed years of schooling
GD = Gender of respondent as a dummy variable (1 = male and 0 = female)
HS = Household size (total number of family members)
β_i = coefficients
ε = error term

The second model hypothesized that the expenditure on rice depends on the price of rice, income, quality of rice, the frequency of rice consumption, education, gender, and household size. Table 1 presents the hypothesized signs for the two models.

Table 1. Hypothesized Signs for Models 1 and 2

Variable	Definition	Hypothesized Sign
PR	Price of rice	(-)
PM	Price of substitute	(-)
IC	Income	(+)
QR	Quality of rice	(-)
AG	Age	(+/-)
GD	Gender	(+/-)
ED	Education	(-)
HS	Household size	(-)
PR	Price of rice	(-)
IC	Income	(+)
QR	Quality of rice	(+)
FC	Frequency of consumption	(+)
ED	Education	(+)
GD	Gender	(+/-)
HS	Household size	(+)

Data Collection

The study was conducted in the Moshi District of the Kilimanjaro Region, which is one of the thirty administrative regions in Tanzania. The District has a rice irrigation scheme which covers a total of 1,100 hectares of rice farming. The common rice varieties grown include IR64 and SARO5 (TXD 306). The latter has characteristics of short grain and semi-aromatic while the former has long grain, non-aromatic and high level of swelling capacity when cooked.

The data were collected using a questionnaire. However, before the questionnaire was administered, it was submitted to the Human Subjects Committee of the Institutional Review Board of Tuskegee University for approval. It was administered to household representatives who had an idea of food purchases and the consumption of rice. The data collection occurred from November to December 2015 with the support of data enumerators who were university students. This study applied both random and non-random sampling techniques in the process of selecting areas and participants. A total of 22 wards were purposively selected, and from each ward ten households were randomly selected from the village register, which was used as a sampling frame. The final sample size was 230 participants. The extra ten people were randomly selected from wards with higher populations.

Results and Discussion

Descriptive Results

Table 2 depicts the socioeconomic factors of the respondents. About 54% of the respondents were women; 35% were 21-35 years of age, while 26% were 36-45 years of age. The distribution of household size shows that 57% had household sizes of four-six people. The results on household size were consistent with those reported by Musa et al. (2011) who found that majority of the consumers, about 56%, had an average household size of between 4 and 6 people. The educational level of participants shows that 57% had primary school education; 36% had secondary or vocational education, and only 8% had university degrees. The results are not surprising as statistics for URT (2003) show that primary education is the dominant educational level among people who are employed in the informal sector in Tanzania. Furthermore, regarding economic activities, 43% were self-employed as entrepreneurs compared to 20% who were engaged in agriculture.

Table 2. Socioeconomic Factors (N=230)

Variable	Frequency	Percent
Gender		
Male	105	45.7
Female	125	54.3
Age Distribution		
Less than 20 years	7	3.0
21-35 years	81	35.2
36-45 years	60	26.1
46-55 years	46	20.0
56 years and above	36	15.7
Household Size		
1-3 people	56	24.3
4-6 people	131	57.0
7-9 people	37	16.1
10 people and above	6	2.6
Educational Level		
None	0	0.0
Primary school	130	56.5
Secondary school	52	22.6
Vocational	30	13.0
College Degree	18	7.8
Economic Activities		
Self-employed (entrepreneur)	98	42.6
Agriculture	46	20.0
Employed private sector	33	14.3
Civil servant	25	10.9
Unemployed	16	7.0
Livestock keeping	7	3.0
Others	5	2.2

Table 3 illustrates consumer behavior for rice and expenditure on food. The results show that 34% consumed rice twice per week, while another 34% consumed rice thrice per week. In effect, 68%, a majority, consumed rice two to three times per week. Only 9% consumed rice more than five times 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 two to four times more

than those who have relatively lower incomes. Regarding purchasing rice, 40% purchased rice once per month; 27% purchased rice twice per week, and 19% purchased rice once per week, and 9% purchased rice at other rates, depending on the circumstances. The circumstances were situation dependent, such as, availability of money or exhaustion of stock. Musa et al. (2011) also found that a majority, 70%, of consumers purchased rice every month.

Table 3. Consumer Behavior for Rice and Expenditure on Food (N=230)

Variable	Frequency	Percent
Consumption of Rice		
Once per week	25	10.9
Twice per week	77	33.5
Thrice per week	78	33.9
Four times per week	30	13.0
More than five times per week	20	8.7
Rate of Purchasing Rice		
Once per month	92	40.0
Twice per month	11	4.8
Once per week	43	18.7
Twice per week	63	27.4
Others	21	9.1
Monthly Expenditure on Food		
TZS50,000 or less	13	5.7
TZS50,000-100,000	36	15.7
TZS100,000-200,000	86	37.4
TZS200,000-300,000	62	27.0
TZS300,000-400,000	22	9.6
TZS400,000 -500,000	8	3.5
TZS500,000 and above	3	1.3
Responsibility of Food Purchase		
Father	62	27.0
Mother	150	65.2
House maid	3	1.3
Children	15	6.5
Which rice do you prefer		
Domestically Produced	187	81.3
Imported	43	18.7
Location of Buying Rice		
Retail shop	146	63.5
Local market	54	23.5
Supermarket	8	3.5
Milling machine	18	7.8
Other places	4	1.7

Note: $1(US) =TZS 2,100

Approximately 37% of the respondents spent between Tanzanian Shillings (TZS) 100,000-200,000 on food per month; 27% spent TZS 200,000-300,000 on food per month, and 16% spent 50,000-100,000 on food per month. Also, 65% of the respondents indicated that there the responsibility of food purchase is borne by the mother, while 27% indicated that the responsibility is borne by the father. About 81% preferred domestic rice, and 19% preferred imported rice. The BMGF (2012) also found that Tanzanians preferred domestic rice to imported rice. Futakuchi et

al. (2013) mentioned that improving the quality of domestically produced rice would lead to higher prices compared to current prices.

Regarding consumer's preference point to purchase rice, 64% preferred buying rice at the retail shop; 24% preferred the local market, and 4% preferred the supermarket. The proportion differentials may be due to the price of rice varying from one location to another. For instance, the price of rice at the retail shop and the local market ranges between TZS 1,600 and TZS 2,400 per kilogram, while at the supermarket, which has branded rice, the price ranges from TZS 2,500 to TZS 3,500 per kilogram. 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 4 gives the cross tabulation results for the association between quality attributes of rice and consumer preference. The coefficients for Chi-square ($\chi 2$) for quality characteristics for rice were all significant at the 1% level, p = 0.00. Similar results were found by Anang et al. (2011), Suwannaporn and Linnemann (2008), and BMGF (2012). They reported that aroma, taste, origin, quality, price, flavor, and cleanness were important attributes for consumers. The results also corroborate those obtained by Musa et al. (2011) who found that attributes such as flavor, taste, and price significantly affected choices of rice brands available in the market.

Table 4. Chi-square Results between Quality Attributes of Rice and Consumer Preference (N=230)

Quality attribute	Observation	Levels of importance				χ^2	df	*p value*
		1	2	3	4			
Price	Observed	22	15	78	115			
	Expected	57.5	57.5	57.5	57.5	118.14	3	0.00***
Aroma	Observed	1	3	78	148			
	Expected	57.5	57.5	57.5	57.5	256.92	3	0.00***
Origin	Observed	24	44	86	76			
	Expected	57.5	57.5	57.5	57.5	42.77	3	0.00***
Taste	Observed	4	14	36	136			
	Expected	57.5	57.5	57.5	57.5	195.81	3	0.00***
Cleanness	Observed	3	20	107	100			
	Expected	57.5	57.5	57.5	57.5	150.14	3	0.00***
Swelling	Observed	97	48	62	25			
Capacity	Expected	57.5	57.5	57.5	57.5	47.46	3	0.00***
Percentage of	Observed	9	27	112	82			
broken rice	Expected	57.5	57.5	57.5	57.5	119.18	3	0.00***

***Significant at 1%

Table 5 shows the ranking of rice attributes by consumer preference. The results reveal that aroma is the most important attribute, with a mean rank of 3.6; followed by taste, with a mean rank of 3.5; cleanness, with a mean rank of 3.3; price, with a mean rank of 3.2; percentage of brokerage, with a mean rank of 3.2; origin, with a mean rank of 2.9, and swelling capacity, with a mean rank of 2.1. The results are consistent with Diako et al. (2010) who found that aroma and taste were the highest ranked attributes by consumers in Ghana for cooked rice with mean ranks of 4.5 and 5.0,

respectively. Also, consumers demand sweet-smelling and tastier foods and this could explain the high rankings of aroma and taste.

Table 5. Ranking of Rice Attributes

Attributes	Mean	Rank
Aroma	3.6	1
Taste	3.5	2
Cleanness	3.3	3
Price	3.2	4
Percentage of Broken Rate	3.2	4
Origin	2.9	5
Swelling Capacity	2.1	6

Regression Results

Table 6 presents the results from the logistic regression analysis on factors that influence preference for rice, domestic or imported. The overall model was significant at the 1% level, p = 0.001. The price of the substitute, quality, and household size had statistically significant effects on the preference for rice (with expected signs), respectively, p = 0.083, p = 0.070, and p = 0.037.

Table 6. Regression Results on Factors that Influence the Preference for Rice, Domestic or Imported

Variable	Coefficient	*p-value*	Odds ratio
Intercept	3.504	0.433	2.749
Price of rice	-0.001	0.432	-0.001
Price of substitute	-0.002*	0.083	0.003
Monthly income	6.23e-07	0.171	8.64e-07
Quality	-0.186*	0.070	0.337
Age	-0.017	0.979	-0.000
Gender	0.413	0.720	0.148
Education	-0.066	0.590	-0.035
Household size	-0.004**	0.037	-0.008
Log Likelihood	82.370		
P = 0.001			

**Significant at 5%; *Significant at 10%

For the odds ratio for the price of the substitute, for example, the value of 0.003 means that for every one unit increase in the price of the substitute, the preference for rice increases by 0.003 units, holding other factors constant. For the quality of rice, the odds ratio value of 0.337, means that for every unit change in the quality of rice, the preference for rice increases by 0.34 units, holding other variables constant. Similarly, for household size, for every one unit increase in household size, the preference for rice decreases by 0.008 units, holding other factors constant. This result implies that as the number of family members increases, it negatively affects the consumption of food, especially for low-income earners. The findings on household size are in agreement with Oyinbo et al. (2013) who pointed out that household size has an effect preference for rice. Although the price of rice, monthly income, age, gender, and education were statistically insignificant, income and gender had positive relations with preference for rice, as expected, and price of rice, age and education had negative relationships with preference for rice, as expected.

Table 7 depicts the of the ordinary least squares analysis on the effects of socioeconomic factors on expenditure on rice. Price was negative and significant meaning that if the price of rice increased by TZS 1, the expenditure on rice decreased by TZS 319. The price of rice may be related to the type of rice a household could purchase. If the price is high a household will tend toward lower quality variety, and if the price is low, a household will tend toward a higher quality variety. The results are in agreement with Tomlins et al. (2005) who found that consumers pay attention to grain quality and favorable pricing for the choice of rice types.

Monthly income was found to be positive and statistically significant, which implies that an increased income by TZS 1 will increase spending on rice by TZS 14,889. The frequency of consumption of rice was positive and significant. This result means that if the frequency of rice consumption by household increased by one time per week, it will result in an increase in expenditure of TZS 1,414. Also, household size was positive and significant. This result means that if household size increase by one, it will cause the expenditure on rice to increase by TZS 1,008. An increase in the size of the household will result in additional costs, and the expenditure on rice will increase. Identical results were found by Kassali et al. (2010), Musa et al. (2011), and Oyinbo et al. (2013), who found that household size significantly and negatively affected the demand and consumption of rice. Although the quality of rice, education, and gender had statistically insignificant effects on expenditure on rice, quality and gender had positive effects on expenditure as expected. However, education had a negative effect on expenditure on rice. This result was unexpected as one would expect the expenditure on rice to increase as education increased.

The F value, which represents the overall significance of the model, was statistically significant (p = 0.000). This result implies that the socioeconomic factors, together, had a significant effect on expenditure on rice. The R^2 was 0.288, which suggests that the socioeconomic factors explained 29% of the variation in rice expenditure.

Table 7. Regression Results on the Effects of Socioeconomic Factors on Expenditure on Rice

Variable	Coefficient	t-statistics	*p*-value
Intercept	143940.960	-3.200	0.002
Price of rice	-319.029***	-4.21	0.000
Income	14889.000*	2.48	0.070
Quality of rice	-14503.770	1.25	0.213
Frequency consumption	1413.530***	6.35	0.000
Education	-4652.240	-1.11	0.267
Gender	-22074.780	-0.81	0.420
Household size	1008.000***	3.98	0.000
F(7, 222)	12.820***		0.000
R^2	0.288		

***Significant at 1%; *Significant at 10%

Conclusion

The main objective of the study was to examine determinants of consumer preferences for and expenditure on rice in the Kilimanjaro Region, Tanzania. The specific objectives were to identify and describe attributes that characterize consumer preferences for rice; examine factors that influence the preferences for rice, domestic or imported, and evaluate socioeconomic factors that influence expenditure on rice. The study used a questionnaire to collect data from 230 randomly

selected participants. Both descriptive statistics and regression analysis were used in analyzing the data. The descriptive statistics showed that women comprise 54% of the participants compared to 46% of men; 61% were 21-45 years old; 57% belonged to a household size of 4-6 people; 56% had primary school education, 63% were other self-employed or worked in agriculture. Domestically produced rice was highly preferred by 81% of the participants compared to 19% who preferred imported rice; 65% of consumers preferred buying rice in a retail shop compared to 24% who preferred the local market.

Additionally, the average price of rice in these markets were TZS 2,000 and 3,000, respectively. A majority of respondents (40%) purchased rice once per month; 27% purchased rice twice per week, and 19% purchased rice once per week. Approximately 11% consumed rice once per week, and a majority, 68% consumed rice either twice or thrice per week. The most important attribute for consumers was aroma, followed by taste, cleanness, price, the percentage of brokerage, origin, and swelling. The binary logistic regression analysis showed that three factors, price of the substitute, quality, and household size had statistically significant effects on preference for rice, domestic or imported. The OLS analysis revealed that four socioeconomic factors, price of rice, income, frequency of consumption, and household size had statistically significant effects on expenditure on rice.

Based on the results five major observations were made. First, that a majority preferred domestically produced rice over imported rice means that the domestic rice should be promoted; it may be a case of developed tastes and preferences. Second, Since an overwhelming majority preferred going to the retail shops and/or local markets that reinforces the notion that most of the participants preferred domestic rice, because the domestic rice is mostly found at these outlets. Third, that 40% purchased rice once per month and 46% purchased rice once or twice per week indicate that rice is a favored food. The players in the market need to take advantage of this and provide more rice at an improved quality for consumers. Fourth, on the attribute scale, price ranks fourth. This finding means that if other attributes such as aroma, taste, and cleanness are improved, consumers will even purchase more rice. However, it is up to all of those involved in the industry to make sure this happens before the rice "hits" the shelves. Fifth, considering that, the price of substitute, quality of rice, and household size played a key role in the preference for rice, and the price of rice, income, the frequency of consumption, and household size played a key role in the expenditure on rice; these factors should be considered in any consumption and policy changes in the rice industry. The findings of this research were limited by the coverage and data used, and thus, further research may be needed on other issues such as production and marketing, in order to get a broader sense of other aspects of the industry.

Acknowledgement

The authors acknowledge the support of the iAGRI-USAID Project and the College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, AL, for funding the study; Kilimanjaro Agricultural Training Centre (KATC), which provided resourceful information, and consumers who participated in the study in the Moshi District of the Kilimanjaro Region.

References

Anang, B. T., N. A. Sidney, and A. A. Stanislaus. (2011). "Consumer Preferences for Rice Quality Characteristics and the Effects on Price in the Tamale Metropolis, Northern Region, Ghana." *International Journal of AgriScience* 1 (2): 67-74. http://www.inacj.com [Retrieved June 18, 2016].

Barreiro, H. J. (2012). Analysis of Incentives and Disincentives for Rice in the United Republic of Tanzania. Technical Notes Series, MAFAP, FAO, Rome, Italy.

BMGF. (2012). Developing the Rice Industry in Africa. Tanzania Assessment, Cornell University, Ithaca, NY.

Calingacion, M., A. Laborte, A. Nelson, A. Resurreccion, J. C. Concepcion, V. D. Daygon, and J. Manful. (2014). "Diversity of Global Rice Markets and the Science Required for Consumer-Targeted Rice Breeding." *PloS one* 9 (1): e85106.

Catoiu, I., and N. Teodeorescu, N. (2004). *Consumer Behavior*, 2nd ed., Bucharest, Romania: Uranus Publishing House.

Diako, C., E. Sakyi-Dawson, B. Bediako-Amoa, F. K. Saalia, and J. T.Manful (2010). "Consumer Perceptions, Knowledge and Preferences for Aromatic Rice Types in Ghana." *Nature and Science*. http://www.sciencepub.net/nature [Retrieved April 10, 2016].

European Cooperative for Rural Development [EUCORD] (2012). "Rice Sector Development in East Africa." A Desk Study Prepared for the Common Fund for Commodities. http://eucord.org/wp-content/uploads/2018/01/CFC__Rice_Sector_Development_in_East_Africa_2012.pdf [Retrieved April 22, 2016].

Farah, A. A., M. Zainalabidin, and A. L. Ismail. (2011). "The Influence of Socio-demographic Factors and Product Attributes on Attitudes toward Purchasing Special Rice among Malaysian Consumers." *International Food Research Journal* 18 (3): 1135-1142.

Futakuchi, K., M. John, and S. Takesh. (2013). "Improving Grain Quality of Locally Produced Rice in Africa." In M.C.S. Wopereis, D. E. Johnson, E. Tollens, and A. Jalloh (eds), *Realizing Africa's Rice Promise*. Cotonou, Benin: CAB International.

Galawat, F., and Y. Mitsuyasu. (2010). Assessing Consumer's Preference for Local Rice in Brunei: An Application of Choice Model. *International Society for Southeast Asian Agricultural Sciences* 16 (2): 104 -115.

Ismail, Z., M. Sarah, and M. T. Zainab. (2012). "Factors Affecting Consumer Preference of International Brands over Local Brands." 2nd International Conference on Social Science and Humanity *IPEDR* 31: 54-59.

Kassali, R., R. O. Kareem, O. Oluwasola, and O. M. Ohaegbulam. (2010). "Analysis of Demand for Rice in Ile Ife, Osun State, Nigeria." *Journal of Sustainable Development in Africa*. 12 (2): 63-78.

Kilimo Trust. (2017). Characteristics of Rice Markets in the EAC: Regional East Africa Community Trade in Staples (REACTS), Kampala, Uganda.

Kilimo Trust, (2014). Expanding Markets for Rice in the East African Community (EAC) Region: Great Opportunity for Actors in Locally Produced Rice, Kampala, Uganda.

Levin, J., and P. Milgrom. (2004). "Consumer Theory." https://web.stanford.edu/~jdlevin/Econ%20202/Consumer%20Theory.pdf [Retrieved March 15, 2016].

Maddala, G.S., and K. Lahiri. (2009). *Introduction to Econometrics*, 9th ed. Chichester, West Susex, United Kingdom. John Wiley and Sons Ltd.

Mhlanga, S. (2010). "Economic Analysis of Consumer based Attributes for Rice in Benin." M.S Thesis, Department of Agricultural Economics, McGill University, McGill, Canada.

Musa, M., O. Nasuddin, and A. F. Fazleen. (2011). Determinants of Consumers Purchasing Behavior for Rice in Malaysia. *American Journal of Contemporary Research* 1 (3): 159-167. http://www.aijcrnet.com [Retrieved February 29, 2016].

Nzomoi, J., and A. Ian. (2013). *The Rice Market in East Africa*, Sector Report. Invited Paper Presented at the 4th International Conference of the African Association of Agricultural Economists, Hammamet, Tunisia, September 22-25.

Opoku, R. A., and A. K. Patrick. (2009). "The Preference Gap: Ghanaian Consumers' Attitudes toward Local and Imported Products." *African Journal of Business Management* 3 (8): 350-357 http://www.academicjournals.org/AJBM [Retrieved March 8, 2016].

Oyinbo O., R. A. Oyinbo, and Z. Abdulsalam. (2013). "Household Consumption Preference for Imported and Domestic Rice in Kaduna State, Nigeria: Implication for Rice Quality Improvement." http://www.patnsukjournal.net/currentissue [Retrieved March 15, 2016].

Philemon, K. (2013). Rice Sector, ASA-RLDC Collaboration in Improving Rice in the Central Corridor. NMDF, Morogoro, Tanzania.

Rural Livelihood Development Company, (2009). "Rice Sector Strategy: Improving Rice Profitability through Increased Productivity and Better Marketing Focusing on Tanzania's Central Corridor." http://www.rldp.org/downloads/rice_strategy.pdf [Retrieved January 9, 2016].

Rutsaert, P., M. Demont, and W. Verbeke. (2013). "Consumer Preference for Rice in Africa" (pp. 293-301) In M.C.S. Wopereis, D. E. Johnson, N. Ahmadi, E. Tollens, and A. Jalloh (eds.), *Realizing Africa's Rice Promise*. Cotonou, Benin: CAB International.

Schiffman, L. G., and L. L. Kanuk. (1997). Consumer Behavior, 6th ed. Upper Saddle River, NJ. Prentice Hall.

Suwannaporn, P., and A. Linnemann. (2008). "Consumer Preferences and Buying Criteria in Rice: A Study to Identify Market Strategy for Thailand Jasmine Rice Export." *Journal of Food Products Marketing* 14 (4): 33–53.

Suwansri, S., J.F. Meullenet, J. A. Hankins, and K. Griffin. (2002). "Preference Mapping of Domestic/Imported Jasmine Rice for U.S. Asian Consumers. Sensory and Nutritive Qualities of Food." *Journal of Food Science* 67 (6): 2420-2431.

Tomlins, K. I., J. T. Manful, P. Larwer, and L. Hammond. (2005). "Urban Consumer Preferences and Sensory Evaluation of Locally Produced and Imported Rice in West Africa." *Food Quality and Preference* 16:79-89. http://www.elsevier.com/locate/foodqual [Retrieved March 22, 2016].

URT (2003). *Population and Housing Census General Report.* National Bureau of Statistics, Presidents Office, Dar-es-Salaam, Tanzania.

URT (2009). National Rice Development Strategy Final Draft. Ministry of Agriculture Food Security and Cooperatives, Dar-es-Salaam, Tanzania.

Voicu, M. C., (2007). "Aspects Related to Researching Consumer Preferences." *Theoretical and Applied Economics* 9: 514. http://store.ectap.ro/articole/250.pdf [Retrieved April 14, 2016].