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Factors Influencing the Consumption and Purchasing of Local Maize in South Sudan

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Abstract

Maize is an important cereal crop in South Sudan. This article assesses the determinants of consumers' consumption and purchasing of local maize. A survey of randomly selected sample of 160 consumers was carried out to collect primary data. Logistic regression model was employed to analyze data. Results obtained showed that environmental concern, environmental benefits, marital status, age and education positively and significantly influenced consumers' consumption and purchasing of local maize, whereas, health consciousness, food safety concern, quality and health benefits and food ethical concern had negative effects. On the other hand, income and residency status positively and significantly influenced consumers' consumption and purchasing of local maize on a regular basis, whereas environmental benefits and education had negative effects. Thus, the effective marketing strategies to increase domestic maize market include targeting married consumers, who are educated, middle-aged, reside in the city and with middle household income. To attract new consumers, stakeholders should improve the quality and safety of local maize to meet consumers' expectations of quality standards.

Keywords: Local maize; Consumer behaviour; Logit model; South Sudan

Introduction

Food occupies a central position in human lives. It is the source of nutrition and hedonic experiences, while also serving social and cultural functions [1]. Food products are nondurable products that consumers buy and consume very regularly, accounting for a major share of their expenditure [2]. Thus, food choices are simple choices, which consumers deal with frequently and effectively. In reality, making food choices is more complex than it seems from a superficial observation. There are many interacting factors that influence food choice, for instance the sensory properties of the food and its perceived post-ingestional effects, convenience- and cost-related aspects, the eating situation, the individual's attitude, previous information about and past experience with the food product [3,4]. The complexity of food choice is furthermore influenced by the fact that food preference and liking are dynamic and subject to change. They vary from person to person, from situation to situation, from product to product and even within each individual in the course of a lifetime [5]. Knowingly or unknowingly, the average person makes more than 200 food choice decisions every day [6].

The first consumer behavior model, named after their authors Engel, Kollat and Blackwell (EKB) model was developed in 1968 by Engel, Kollat and Blackwell. In this model, they suggested that consumer decision making is influenced and shaped by individual differences, environmental influences and psychological processes. According to the authors [7,1], the determinants of food choice can be essentially grouped into three main categories: the food, the person engaged in food consumption and the environment. Burnett [8] recognized that while the decision-making process appears quite standardized, no two people make a decision in exactly the same way. As individuals, we have inherited and learned a great many behavioral tendencies: some controllable, some beyond our control. Further, the ways in which all these factors interact with one another ensures uniqueness. Although it is impossible for a marketer to react to the particular profile of a single consumer, it is possible to identify factors that tend to influence most consumers in predictable ways. Situational, external, and internal influences affect consumer behavior. Research showed that taste and freshness were the main determinants of purchasing local food [9,10].

From a different point view, factors influencing consumer food choice can be categorized into intrinsic and extrinsic factors [11]. Intrinsic factors account for characteristics that are product–specific. Taste, appearance, nutritional value, degree of freshness, and amount of residue of preservative and pesticides are a few examples. Intrinsic characteristics of a food consists of the perceivable and the unperceivable. The perceivable attributes include the general sensory perception such as taste, smell, texture and appearance of a food; the unperceivable attributes include nutritional value, and amount of pesticide and/or preservatives residue. The presence of unperceivable attributes often cannot be physically detected or perceived by consumers even after consumption [12]. Extrinsic qualities are defined as factors that are not physically part of, but are closely related to the product [11]. Brand, price, availability, packaging, region of origin, and production method are some of examples of extrinsic qualities. The imperceptible intrinsic and extrinsic qualities include but are not limited to the ideas of environmental-friendly, animal-welfare, benefit to local economy, and social justice. These qualities, or rather, personal values, cannot be delivered simply by looking, tasting or smelling the actual food products, yet they play an increasingly important role in the consumer decision-making process.

Maize accounts for 22-25 percent of starchy staple consumption in Africa, representing the largest single source of calories followed

by cassava [13]. Most maize farmers in South Sudan are small-scale who practice subsistence farming. The potential for expanding maize production in South Sudan is huge. Nevertheless, annual demand for maize exceeds local production and the difference is met through imports mainly from Uganda and Kenya as well as donations from food aid programs. Annual reports of domestic maize produced and imported maize exist in South Sudan, mainly conducted jointly by the government and the development partners such as WFP and FAO. However, most of these reports focused on quantities produced and imported with little or no knowledge of consumer behavior. Consumer behavior concerns not only on why and how consumers buy, but also on why and how they consume [14]. This study thus aims to assess the determinants of consumption and purchasing of local maize. Understanding how consumer behavior influences the consumption and purchasing of local maize has important managerial implications for the local maize producers, marketers and policy makers in the development of maize industry in South Sudan.

Methodology

Data collection methods

Data were collected from consumers using the survey method. During the survey, a standardized questionnaire was used to collect primary data from the purchasers and non-purchaser of local maize on the socio-demographic profiles of the respondents, maize purchasing behavior, attitudes toward health, food safety, ethics and environment, perceptions of local maize, local maize knowledge, preferences and the rationale for respondents purchasing or not purchasing local maize between August - September of 2017. Using a multi-stage sampling technique, two municipalities and two counties were purposively selected. Then two-quarter councils per municipality and two payams per county were randomly selected. Twenty (20) consumers per quarter council and payam were randomly selected respectively, giving a sample size of 160 consumers.

Data analytical methods

Data were analyzed using factor analysis and binary logistic regression (Logit model). An exploratory factor analysis (EFA) more specifically Principal Component Analysis, was used to condense the large number of consumers' general attitudes related to health, food safety, ethics and environment and perceptions about local maize items into the smallest set of factors while maintaining the highest amount of information. In this study, the binary logit model was used to determine the factors that influenced the likelihood of a consumer purchasing local maize.

The logit model was used to assess the determinants of purchasing local maize and factors affecting the regular purchasing of local maize. The model was used to estimate consumers' decision to purchase local maize and consumers' decision to purchase local maize regularly because of its simplicity and best possible probabilistic choice among the discrete choice models. It has a cumulative probability function with the ability to deal with a dependent variable that allows for estimating the probability that an individual makes a choice or not through prediction of a binary dependent outcome from a set of independent variables. Adopting the analytical procedure [15] and following [16,17], the logit model was specified as:

$$Y = \frac{1}{1 + \exp^{-z}}$$

Where

Y is the dichotomous choice, in which Y=1 if the individual purchase local maize; 0 otherwise Z=Summation of explanatory variables multiplied by their coefficients, i.e.,

Z=β0+β1X1+β2X2+…β17X17+εi

Where

β_0=constant

β_1,..., β_{17}=coefficients of explanatory variables Z_1,..., X_{17}. ε_i=error term.

To find out the probability of respondents' purchasing local maize, the parameters from the logit model cannot be used to interpret effects of each of the explanatory variables, as the model is nonlinear. In this case, marginal effects were calculated to find the relative of each of the explanatory variables. The effects of the jth explanatory variable can be summarized below:

$$\frac{1}{n}\sum_{i=1}^{n}\frac{\partial P[Y_i=1]}{\partial X_{ji}} = \beta j \frac{1}{n}\sum_{i=1}^{n}f\left(X_i^1\beta\right), j=2,...,k$$

i.e., the mean marginal effects over the sample of n individuals. The maximum likelihood method was used to estimate the parameters of the multiple logistic response function. The log-likelihood function is as follows:

The explanatory variables used in this study are explained below:

$$\log L\left(\beta\right) = \sum_{i=1}^{n}Y\left(_i X_i^1\beta\right) - \sum_{i=1}^{n}\log\left[1 + \exp\left(X_i^1\beta\right)\right]$$

X1=Health consciousness (summated scale)

X2=Food safety concern (summated scale)

X3=Food ethical concern (summated scale)

X4=Environmental concern (summated scale)

X5=Quality and health benefits (summated scale)

X6=Availability, information and price barriers (summated scale)

X7=Environmental benefits (summated scale)

X8=Knowledge (1=if the respondent is knowledgeable and very knowledgeable about local maize; 0=otherwise)

X9=Gender of the respondent (1=female; 0=male)

X10=Education (1=if a respondent has completed a diploma or higher; 0=otherwise)

X11=Employment (1=if respondent is employed; 0=otherwise)

X12=Marital status (1=if respondent is married; 0=otherwise)

X13=Having Children (1=if household has children aged less than 18; 0=otherwise)

X14=Middle age (1=if respondent is aged between 31 and 50; 0=otherwise)

X15=Elderly (1=if respondent is aged 51 or more; 0=otherwise)

X16=Middle income (1=if monthly household income is between 3,001 and 9,000 SSP; 0=otherwise)

X17=Residency status (1=if respondent resides in the city; 0=otherwise).

Results and Discussion

Purchasing local maize

The purchasers of local maize prioritized price, freshness and availability (56.3 percent, 42.3 percent and 35.6 percent, respectively) as the most important attributes when they purchased local maize (Table 1). Commodities produced in an environmentally friendly way and produced without using GMOs were also rated as relatively important. The purchasers of local maize reported absence of pesticide residue as the least important attribute (12.5 percent) when purchasing local maize (Table 1).

Attitude towards health, food safety, ethics and environment

Principal component analysis was conducted on the consumers' general attitudes (13 related items) related to health, food safety, ethics and environment (Table 2). The four-factor solution was extracted from the 13 items with the eigenvalues (the Kaiser's criterion) greater than 1.00, which is significant and reliable [18] (Table 2). The variance explained by the four factors was 69.63 percent of the total variance, which is considered satisfactory in social sciences research [18]. The set of factors were then used to generate the summated scales for the regression analysis of consumers' purchase decisions of local maize.

The first factor, labeled Environmental concern, had the largest variance explained (41.6 percent). The environmental concern factor was created from four items: "I separate the rubbish that can be re-used and put in recycle bin", "I use reusable bag when I shop", "I like to buy product prepared in an environmentally friendly way", and "I believe that pesticide and herbicide residues on farms would cause negative effect on the environment".

Heath concern was the second extracted factor accounting for 11.6 percent of the total variation. This factor corresponds to the statements "I often eat healthy food", "I well balance work and family/life", "I exercise regularly", "I often read/check quality label before buying a new food product", and "I avoid buying food with artificial additives and preservatives".

The third factor was Food safety, comprising two items, namely "I believe that the use of growth/red meat stimulants in livestock production is harmful to humans", and "I believe that pesticide

Statements	Purchasers of local maize (n=118)
Importance of local maize attributes	
Freshness	42.3
Price	56.3
Absence of pesticide residue	12.5
Produced in an environmentally friendly way	15.6
Produced without using genetically modified organisms(GMOs)	15.6
Availability	35.6
Note: Multiple responses Source: Survey data (August – September 2017).	

Table 1: Respondents view about important local maize attributes when purchasing local maize.

Statements	VARIMAX rotated loading				Communalities
	F1	F2	F3	F4	
Factor 1: Environmental concerns					
I separate the rubbish that can be re-used And put in recycle bin.	0.814				0.724
I use reusable bag when I shop.	0.802				0.7
I like to buy product prepared in an Environmentally friendly way.	0.758				0.689
I believe that pesticide and herbicide residues on farms would cause negative effect on the environment	0.521				0.728
Factor 2: Health consciousness					
I often eat healthy food.		0.729			0.695
I well balance work and family/life.		0.84			0.731
I often read/check quality label before buying new food products.		0.747			0.633
I exercise regularly		0.812			0.714
I avoid buying food with artificial additives and preservatives.		0.7			0.674
Factor 3: Food safety					
I believe that the use of growth/red meat stimulants in livestock production is harmful to humans.			0.748		0.727
I believe those pesticide residues in food Cause cancer and other diseases.			0.73		0.748
Factor 4: Food ethics					
I certainly believe that genetically modified foods are probably not safe for human consumption.				0.56	0.616
I certainly buy 'animal welfare friendly' food products if they are available.				0.781	0.672
Eigenvalues	5.407	1.508	1.09	1.047	
Variance explained (%)	41.59	11.601	8.381	8.056	
Cumulative variance (%)	41.59	53.192	61.573	69.63	
Number of items (N=13)	4	5	2	2	
Note: Extraction method: principal component analysis with an orthogonal rotation (VARIMAX). Source: Survey data (August – September 2017).					

Table 2: Rotated component matrix for the respondents' general attitudes related to health, food safety, ethics and environment.

residues in food cause cancer and other diseases", accounting for 8.4 percent of the variance.

The fourth factor, Food ethics, included two items, "I certainly believe that genetically modified foods are probably not safe for human consumption", and "I certainly buy 'animal welfare friendly' food products if they are available", which explained 8.1 percent (Table 2).

Perception of local maize

The principal component analysis was conducted to examine the underlying factors on the 10 consumers' perception items towards local maize (Table 3). The appropriateness of applying factor analysis with the data matrix was tested. The survey data were suitable for factor analysis. The factor loading structure from the VARIMAX rotation with only three retained factors with eigenvalues greater than 1 was used for interpretation because its solutions are substantially similar to the OBLIMIN rotation. The three factors account for 67.08 percent of the variance explained, which is considered satisfactory in social sciences [18].

The first factor had 39.60 percent of the explained variance. It includes four items comprising "local maize do not have a wide range of choices", "it is lack of availability of information of local maize compared to imported maize", "local maize products are not easily found in grocery stores compared with imported maize", and "local maize products are much more expensive than imported maize". To determine the conceptual meaning of this factor, Availability, Information and Price barrier was labelled. The second factor with an explained variance of 14.31 percent was labelled as Quality and health benefits. This factor comprised four items: "local maize have more nutrients than imported maize", "local maize are tastier than imported maize", "eating local maize is more beneficial to my health than imported maize" and "local maize have less chemical residue than imported maize". The third factor was called Environmental benefits. This factor had an explained variance of 13.17 percent and included "local maize products grown locally are ecologically sound than imported maize" and "local maize are obtained from sustainable resources and reducing polluted discharges into air, water and soil than imported maize" (Table 3).

Factors affecting the purchasing of local maize

Logistic regression was used to estimate consumers' decisions to purchase local maize. The model's goodness-of-fit measures were adequate as shown by the F value of 4.17 (Table 4). Seventeen variables hypothesized to influence consumers' purchasing decision were included in the regression. Nine of these variables statistically and significantly influence consumers' choice of local maize. These were health consciousness, food safety concern, food ethical concern, environmental concern, environmental benefits, quality and health benefits, high education, middle income and marital status.

The coefficient of health consciousness was negative and statistically significant at the 1 percent level (Table 4). The marginal effect indicated that the probability of purchasing local maize decreased by 10 percent the more the households were health conscious about local maize. This may be because health-conscious consumers have a strong desire for good health and prefer a product with higher health benefits.

The food safety concern coefficient was negative and significant at the 10 percent level. The marginal effect showed that the probability of purchasing local maize would decline by 6% the greater the respondents' awareness of food safety issues. Consumers worry about the perceived food safety risk in the use of chemical fertilizers and pesticides and growth hormones in agricultural production. This finding concurs with the empirical studies [19] which revealed that food safety influenced consumers' decisions to purchase organic products.

Respondents' purchase of local maize was negatively related to food ethical concerns at the 1 percent level of significance. The marginal effect implied that the probability of purchasing local maize would decline by 8% the higher the respondents' concern about food ethics. This might be due to poor hygienic practice of sellers of local maize products.

Concern about the environment was positive and significant at the 10 percent level of significance. The marginal effect show that the probability of purchasing local maize increased by 3% the more attitude towards environmental concerns. The possible explanation for this finding may be that consumers who preferred to purchase local

Statements	VARIMAX rotated loading			Communalities
	F1	F2	F3	
Factor 1: Availability, Information and Price barriers				
Local maize products do not have a wide range of choices compared with imported maize.	0.855			0.804
It is lack of availability of local maize information compared with imported maize.	0.824			0.69
Local maize products are not easily found in grocery stores compared with imported maize products.	0.759			0.63
Local maize products are much more expensive than imported maize.	0.444			0.439
Factor 2: Quality and health benefits Local maize products have more nutrients than imported maize.				
Local maize products have more nutrients than imported maize.		0.774		0.719
Local maize products are tastier than imported maize		0.394		0.585
Eating local maize products is more beneficial to my health than imported maize.		0.773		0.678
Local maize products have less chemical residue than imported maize.		0.683		0.577
Factor 3: Environmental benefits				
Maize products grown locally are more ecologically sound than imported maize.			0.859	0.769
Maize products grown locally are obtained from sustainable resources and less polluted discharges into air, water and soil than imported maize.			0.904	0.817
Eigenvalues	3.96	1.431	1.317	
Variance explained (%)	39.599	14.31	13.173	
Cumulative variance (%)	39.599	53.909	67.082	
Number of items (N=13)	4	4	2	

Table 3: Rotated component matrix for the respondents' perceptions of local maize.

Variables	Coefficient	Standard error	t-statistic	Marginal effects
Health consciousness	-1.5897	0.461	3.45***	-0.099
Food safety concern	-0.9564	0.4804	1.99*	-0.0596
Food ethical concern	-1.2085	0.4406	2.74***	-0.0753
Environmental concern	0.5177	0.2097	2.47*	0.0322
Quality concern	-1.5193	0.585	2.60*	-0.0946
Availability barrier	0.0049	0.268	0.02	0.0003
Environmental benefit	1.288	0.3884	3.32***	0.0802
Knowledge	-0.117	1.0689	0.11	-0.0073
Gender	0.4042	1.0808	0.37	0.0252
Education	1.941	1.1105	1.75*	0.1209
Occupation	-0.8304	0.8943	0.93	-0.0517
Marital status	3.8654	1.9822	1.95*	0.2407
Having children	1.397	1.1509	1.21	0.087
Middle age	1.7341	1.362	1.86*	0.108
Elderly	3.2325	1.9822	1.27	0.2013
Middle income	0.2922	0.8871	0.33	0.0182
Residency status	1.039	1.078	0.96	0.0645
Constant	-6.7333	2.7704	2.43*	
No. of observations	160			
F	4.17			
Significance	0.000			

Note: * and *** indicate statistical significance difference at the 10% and 1% levels, respectively.
1 USD=160 SSP during the survey.
Source: Survey data (August – September 2017).

Table 4: Determinants of consumers' purchasing decision of local maize.

maize might be conscious of the environment and they expressed fear regarding chemical residues causing environment problems. This is further supported by the authors [20,21] who stated that green consumers were more likely to purchase environmentally friendly products to protect the environment.

The empirical results show the quality and health benefits coefficient was significant and negative at the 10 percent level of significance. The marginal effect implied that the probability of purchasing local maize would decrease by 9% as respondents' perceptions towards local maize quality and health increased. The possible underlying reason for this phenomenon is that consumers who purchased local maize have had good product experience, better sensory evaluation and some other intrinsic attributes of local maize (i.e., taste, nutritional value and healthy) than consumers who did not purchase purchased local maize. This finding agrees with the findings [22] which found that taste and health of local or organic products influenced respondents' likelihood of being consumers.

The perception of environmental benefits was positive and significant at the 1 percent level of significance. The marginal effect showed that the probability of purchasing local maize rises by 8% the more perceived environmental benefits of local maize. The benefits of local maize corresponding to the environment refer to the local production method with the use of natural resources resulting in reduction in environmental pollution.

With regard to the socio-demographic and economic characteristics of respondents, the results revealed that, marital status, education and age had significant impacts on the decision to purchase local maize at the 10 percent level of significance respectively. The marginal effects confirmed that the probability of purchasing local would rise by 24% if respondents were married, by 20% if respondents were in the middle-aged group and by 12% if respondents had obtained a diploma or higher. These results are consistent with the findings [23] which revealed that younger consumers had the highest propensity to purchase local food,

[24,25] confirmed that having higher education was important in the purchase of local food (Table 4).

Factors affecting the regular purchasing of local maize by consumers

To determine factors affecting regular purchasing of local maize, logistic regression was estimated. The model fitted the data reasonably well as indicated by F value (Table 5). Seventeen variables were hypothesized to affect regular purchasing of local maize. Out of these, four variables statistically and significantly influenced regular purchasing of local maize including: environmental benefits, high education, middle income and residency status.

The coefficient associated with the perception of environmental benefits was negative and significant at 1 percent level of significance. The marginal effect indicated that the probability of regularly purchasing local maize declined by 12% if consumers are interested in the environmental properties of food and local production's method.

High education coefficient was negative and significant at 1 percent level of significance. The marginal effect showed that a unit increase in education, holding other factors constant, led to decrease in maize purchasing by 0.25%. This implies that respondents who had at least a diploma or higher were less likely to purchase local maize regularly than those who had not completed a diploma or higher.

Monthly household income was stratified into low, middle and high-income categories. The result shows that the middle monthly income group had a significant positive influence at the 5 percent level of significance. The marginal effect indicated that households having monthly income between 3,001 and 9,000 South Sudanese Pounds (SSP) had a 25% probability of purchasing local maize on a regular basis.

The coefficient of the residency status coefficient was positive and significant at 1 percent level of significance. The marginal effect revealed

Variables	Coefficient	Standard error	t-statistic	Marginal effects
Health consciousness	0.3612	0.342	1.06	0.0486
Food safety concern	-0.0438	0.2597	0.17	-0.0059
Ethical concern	0.5285	0.3429	1.54	0.0711
Environmental concern	-0.3371	0.3984	0.85	-0.0453
Quality and health	-0.311	0.3454	0.9	-0.0418
Availability barrier	0.2849	0.2209	1.29	0.0383
Environmental benefit	-0.9036	0.294	3.07***	-0.1215
Knowledge	0.265	0.6372	0.42	0.0356
Female	0.3102	0.7438	0.42	0.0417
Education	-1.8562	0.5732	3.24***	-0.2496
Occupation	0.6655	0.5704	1.17	0.0895
Marital status	1.3569	1.5531	0.87	0.1825
Having children	1.4608	1.2885	1.13	0.1964
Elderly	-0.2874	0.6956	0.41	-0.0386
Middle age	-0.1093	1.2083	0.09	-0.0147
Middle income	1.8908	0.9686	1.95**	0.2542
Residency status	1.4729	0.5707	2.58***	0.198
Constant	-4.2158	1.7264	2.44*	
No. of observations	160			
F	2.54			
Probability > F	0.001			

Note: *, **, and *** indicate statistical significance difference at the 10%, 5%, and 1% levels, respectively.
1 USD = 160 SSP during the survey.
Source: Survey data (August – September 2017).

Table 5: Factors affecting consumer' regular purchasing of local maize.

that the probability of purchasing local maize regularly would rise by 19% if consumers resided in the city. This implies that respondents who reside in the city were more likely to be regular purchasers of local maize than those who reside in the suburbs. This may due to the flow of local maize products from different locations targeting the market in the city where there are a significant number of consumers (Table 5).

Conclusion

The market for local maize has grown over the years due to change in the consumption trends of the people of South Sudan. Hence maize has evolved from a purely subsistence crop to a highly commercial crop. However, the demand for local maize exceeds domestic supply. This gap is filled through import mainly from Uganda. To sustain the growth of local maize in the domestic market, a better understanding of consumer consumption and purchasing behavior is necessary. The empirical results show that, environmental concern, environmental benefits, education, age and marital status positively and significantly influenced consumers' consumption and purchasing of local maize. On the other hand, health consciousness, food safety concern, food ethical concern and quality and health benefits negatively and significantly influenced the purchasing of local maize. Similarly, income and residency status positively and significantly affected the regular purchasing of local maize, whereas environmental benefits and education had negative effects.

Following the above conclusions, the following policy implications can be drawn:

The marketing strategies for introducing local maize to the domestic market will be successful if the marketers target married consumers who are educated and middle-aged. Similarly, the purchasing of local maize on a regular basis will be successful if marketers target consumers who reside in the city and have middle household income.

The results indicate that consumers' decisions to purchase local maize are restricted by health consciousness, food safety concern, food ethical concern and quality and health benefits. Policy makers, marketers and producers will be able to persuade more consumers to purchase local maize by providing more information and educational promotional campaigns on local maize. The promotional activities on local maize by government agencies and marketers should focus on the health and food safety attributes of local maize. For instance, the promotional campaign should emphasize that local maize are safe and produced without synthetic chemical inputs, artificial additives and growth stimulants. This is important to most consumers who are concerned about health and food scandals.

Environmental benefits and education are associated with reduction in the regular purchasing of local maize. To attract new purchasers of local maize, marketers should emphasize the environmental benefits of local maize by informing consumers that local agricultural production conserves national resources and prevents hazardous chemicals entering the environment.

Biographical Notes

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