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TIGERNUT CONSUMPTION IN OGUN STATE, NIGERIA: SOCIOECONOMIC DRIVERS AND IMPLICATIONS FOR CONSUMER MARKETING

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Abstract

This study examined the potential influence of consumer income, education, health claim awareness and sources of the awareness (information) on purchase decision and consumption-expenditure on tigernut in Ogun State, Nigeria. Multistage sampling technique was used to select 300 respondents and the data collected were analysed using descriptive statistics and double-hurdle regression. Approximately 68% of the respondents had tertiary education and 33% indicated they were aware of the health benefits of tigernut. Of those who indicated health benefit awareness, words of mouth (family and friends) (38.78%), and social media (26.43%) were reported as the two main sources of awareness. Consumers preferred tigernut in its fresh, dried and juiced/powdered forms. Whereas income ($p \leq 0.01$) had non-increasing effect on purchase decision and/or consumption-expenditure of tiger nut, education ($p \leq 0.01$) and health benefit awareness ($p \leq 0.01$), especially through social media ($p \leq 0.01$), among others exerted positive influence. Access to higher formal education, and awareness creation through the social media are advocated, among others, to advance consumption and expansion of tigernut products' market. Of relevance also are opportunities for prospective investors to invest in its value/supply chain, and for farmers to diversify into production in response to consumer preference.

Keywords: Tigernut, Health benefit awareness, Food choice, Consumer marketing, Nigeria

Introduction

Consumers worldwide are increasingly accepting foods beyond the customary notion of hunger satisfaction or correction of nutritional meagreness to a broader context of minimizing risk of diseases for optimal health promotion (Heasman and Mellentin, 2001; Green, 2014; Samoggia *et al.*, 2014; FAO, 2017). Internal Food Information Council Foundation (2011) noted the growing consumers' interests towards the health benefits of some and food ingredients. Health benefits may result from increasing the consumption of substances which are already part of an individual's diet or from adding new substances to an individual's diet (Ashwell, 2002).

Tigernut is one of the crops with some vital nutritional and health benefits. Tigernut (*Cyperus esculentus*), was reported to be high in dietary fibre content, which could be effective in the treatment and prevention of a number of diseases including colon cancer, coronary heart diseases, obesity, diabetics and gastro intestinal disorders, among others (Anderson *et al.*, 1994; Mason, 2005). It is a rich source of quality oil and contains moderate amount of protein. It is also an excellent source of some useful minerals such as iron and calcium which are essential for body growth and development (Oladele

and Aina, 2007). Tigernut is a perennial tuber or nut which is commonly cultivated or found wild in Northern Nigeria (Nata'ala, *et al.*, 2018). It is known as "Aya" among the Hausas; "Ofio" among the Yorubas, and "Akiausa" among the Igbo (Umerie *et al.*, 1997). It is a spherical tuber with sweet nutty flavour and can be eaten raw (fresh), baked, roasted, dried, or processed into non-alcoholic (tigernut milk) or a fermented alcoholic drink (Oladele and Aina, 2007; Bamishaiye and Bamishaiye, 2011). The fermented drink is widely consumed in Northern Nigeria, with some spices such as ginger, black pepper, or rosemary commonly included as additives (Kayode *et al.*, 2017). The waste products obtained after processing tigernuts are used as a supplement in animal feeds, and for making bioethanol (Nata'ala *et al.*, 2018).

The primary role of diet is to provide sufficient nutrients to meet metabolic requirements of an individual and to give a consumer a feeling of satisfaction (and well-being) through hedonistic attributes such as taste. In fact, diet cannot only help to achieve optimal health and development, but it might also play an important role in reducing the risk of disease (Pravst *et al.*, 2010). A number of researches have been carried out on the nutritional contents (Adejuyitan, 2011) and health benefits/claims (Oladele and Aina, 2007; Oguwike *et al.*, 2018) of tigernuts. However, less is known empirically about the factors influencing consumers' behaviour towards consumption of tigernuts or food products known with certain health claims in Nigeria. It has been noted that different sources of awareness (Siddique and Hossain, 2018) can induce different behavioural response towards product consumption. Some of the sources of awareness that have been reported as important factors for product consumption include family and friends, electronic and print media, social media and internets (Akerele *et al.*, 2017; Siddique and Hossain, 2018). Little is known empirically about the contributory role of sources of awareness on consumption of foods with some health functions in Nigeria. Hence, exploring their potential roles in influencing consumption of foods is very crucial from marketing standpoint, particularly in terms of strategies for market expansion and satisfaction of consumers' needs.

The current study seeks, among others, to assess consumers' awareness about the health benefits of tigernuts, the sources of information, and how these and other factors combine to shape purchase decision and consumption-expenditure on tiger-nuts in Ogun State Nigeria. Such information is critical for designing actions that can substantially stimulate consumers towards consumption of some foods with special health functions, thereby contributing to public health optimisation in the country. Besides, such information may provide useful insights for the transformation of tigernuts and products marketing space in terms of the options for promotion and advertisement.

Methodology

Study Area:

The study was carried out in Ogun State, Nigeria. The State is located in the South Western part of Nigeria. The geographical location of Ogun State covers about 1,640,076 square kilometres of land mass where over 60 percent are cultivable arable land, with an estimated population of about 3.39 million. The State is heterogeneous comprising the Egba, Yewa, Egun, Awori, Ijebu ethnic groups who speak different dialects. Ogun State is bound in the north by Oyo State, east by Lagos State while the republic of Benin is at the west. The population of Ogun State based on 2006 Census was 3,751,140 (NPC, 2006) and the projected population as at 2017 Census is 5,217,716 (NBS, 2018). Tigernut, onions and garlic are among the foods that are traded in large quantities in the state.

Sampling Techniques:

A multistage sampling technique was employed to select 300 respondents for the study. The first stage was a simple random selection of three Local Government Areas from the twenty Local Government Areas in the State. The second stage also featured a simple random selection of two towns from each of the three selected Local Government Areas. This made a total of six towns. The third stage was systematic random selection of 50 houses (buildings) from each of the selected towns. An adult (person) that was available for interview during survey visit was then selected in each building to make a total of 50 respondents per town. Thus, a total of 300 respondents were selected from all the six towns. Data were collected from the respondents using questionnaire as interview guide. The data collected include

socioeconomic characteristics of the respondents and the respondents' households, respondents self-reported perception of satisfaction (good taste or health improvement) in previous consumption of tigernut, whether or not the respondents purchased tigernut during the survey period and the amount expended, the most preferred forms of consumption, awareness of respondents about the health benefits of tigernut and the sources of awareness, among others.

Analytical Techniques:

Descriptive statistics such as frequency tables and percentages were used to describe the socio-economic characteristics, monthly expenditure on tigernut, self-reported perception of health improvement in previous tigernut consumption, awareness of the health benefits of tigernut and sources of awareness, among others.

Double Hurdle Model: The double-hurdle model introduced by Cragg (1971) was adopted for this study. The double-hurdle model involves two equations: First, is the purchase decision equation and second, the consumption-expenditure equation. The Cragg Model presumes that two hurdles have to be crossed by a consumer in order to record a positive purchase (consumption-expenditure) on a commodity. The purchase decision equation can be stated as follows:

$$P_i^* = D_i\gamma + u_i \dots\dots\dots (1)$$

where P_i^* is the latent variable that defines the rule as to whether a respondent would decide to consume tigernut or not. D_i is a vector of exogenous variables. γ represents the coefficients associated with the repressors (D) including the constant term. u_i is the error term assumed to be normally distribution which zero mean and unit variance. The observed purchase (P) is linked with the latent purchase P^* as follows:

The second (consumption-expenditure) equation is stated as:

$$E_i^* = X_i\beta + \varepsilon_i \dots\dots\dots (2)$$

where E_i^* is the latent consumption on tigernut. X_i is a vector of explanatory variable influencing consumption which may the same as D_i . β represents the coefficients associated with the repressors X including the constant term. Represented by ε_i is error term assumed to be normally distributed with zero mean and constant variance. The relationship between latent purchases (P^*), the latent consumption (E^*) and the observed monthly consumption-expenditure on tigernut (E) are as stated:

The explanatory variables in the both equations of the double-hurdle model are as specified:

- X_1 = Marital status of the respondent (1 if the respondent is married, 0 if otherwise)
- X_2 = Household income (Naira)
- X_3 = Sex of respondent (1 if the respondents is a male, 0 if female)
- X_4 = Age of respondent (years)
- X_5 = Secondary Education (1= if the highest educational attainment of the respondents is secondary school, 0 otherwise)
- X_6 = Tertiary Education (1= if the respondent had tertiary education, 0 otherwise)
- X_7 = Household size (number)
- X_8 = Awareness (1 = if respondents is aware of the health benefit of tigernuts, 0 otherwise)
- X_9 = Radio/Television (1 = if respondent perceived Ratio/Television as the source of information about the health benefit awareness which had the most stimulating influence on purchase of tigernuts, 0 otherwise)
- X_{10} = Family and Friends (1 = if respondent perceived family and friends as the source of information about the health benefit awareness which had the most stimulating influence on purchase of tigernuts, 0 otherwise)
- X_{11} = Hospital/health centres (1 = if respondent perceived health workers/nutritionists as source of information about the health benefit awareness which had the most stimulating influence on

- purchase of tigernut, 0 otherwise)
- X_{12} = Social Media (1 = if respondent perceived social media as source of information about the health benefit awareness which had the most stimulating influence on purchase of tigernut, 0 otherwise)
- X_{13} = Previous satisfaction (1= if respondent reported that perceived health improvement from previous consumption of tigernut stimulates present purchase, 0 otherwise)

In other to check (ascertain) the effects of awareness and sources of awareness on the purchase decision and the consumption-expenditure of tigernut, two strands of the double-hurdle model were estimated. In the first strand, awareness (X_8) was retained along with the other explanatory variables with the exception of the sources of awareness ($X_9, X_{10}, X_{11}, X_{12}$) were excluded. In the second strand, only the awareness variable (X_8) was left out. The double-hurdle model was estimated (in each of the strands) using the *craggit* (STATA code) written by Burke (2009). The heteroskedastic (standard error) robust option-in which sigma is specified as a function of observables (continuous independent variables)-was selected during estimation. Using this option is beneficial because it permits heteroskedasticity in the second hurdle (consumption-expenditure equation) without conceding model misspecification in the first hurdle (purchase equation) (Burke, 2009).

Results and Discussion

Socioeconomic Characteristics of the Respondents and their Households:

The results of descriptive statistics of the socio-demographic characteristics of the respondents are reported in Table 1. Approximately 51% of the respondents were males. This finding is not pole apart from 48.15% reported for males by Akerele *et al.* (2017) in a similar study on ginger consumption in the same state. The mean age of the respondents was approximately 43 years. This suggests that an average person in the study area belongs to an economically active age group, and improvement in their health is critical for higher labour productivity and economic prosperity of the nation. Nevertheless, expert views (WHO, 2018) suggest that the incidence of certain diet-related non-communicable disease and related death cases maybe be more pronounced among people in this age group or above. This may imply increase preference for foods with health claims (including tigernut) by an average consumer in the studied population. Larger percentage (47.3%) of the respondents were married. This is expected to have some stimulating effect on consumption of tiger-nuts. All the respondents had formal education with the largest proportion (45.0%) of them having NCE or National Diploma as the highest level of educational qualification. All else equal, better knowledge of the nutritional and health values of foods are expected to be positively correlated with advances in education. Hence, education is anticipated to enhance consumption of tigernuts. The majority of the respondents (75.0%) had a household size between 4 to 6 persons and only 10.7% of them had above 6 persons in their households. The mean household size was approximately 5 persons. This is higher than an average household size of 3.2 persons reported for Ogun State in 2006 census figures (NBS, 2007). Higher household size is expected to be positively related to consumption of tigernut. Approximately 40.3% of the respondents' households earned monthly income between ₦20,000 and ₦39,999, while 20.0% earned above ₦60,000. The mean monthly income was approximately ₦42,446. Higher income is expected to be positively related to consumption tigernuts, especially if the average intake is still below the consumer's satiation level.

Monthly Expenditure on Tiger-nut, Reasons for Consumption and Most Preferred Forms of Consumption:

Presented in Table 2 are the results of the distribution of the respondents by their monthly expenditure on tiger-nuts. The results show that 43.0% of the respondents expended between below 100 Naira monthly on tiger-nuts, 26.0% of them spent between 101 to 200 Naira, while 13.3% spend above 200 Naira on tiger-nuts consumption. The average monthly expenditure on tiger-nuts (based on positive expenditures) is ₦171.86. The expenditure translates to 0.4% of the average income of the respondents. The percentage share of tiger-nut expenditure (0.4%) is fairly close to the percentage share (0.6%) reported for ginger (Akerele *et al.*, 2017) in Ogun State, Nigeria. Approximately 46% (the largest percentage) of the sampled respondents mostly preferred to consume tigernut in the fresh (recently

harvested raw) form. This is followed by 27.67% and 18% whose most preferred forms of consumption are in the dried/semidried and powered/juiced forms respectively. The majority (72.67%) of the respondents indicated the good tastes/flavour of tigernut as key non-price attributes stimulating consumption. These findings have important implications for the marketing of tigernut products and expansion of the markets.

Awareness and Sources of Awareness about Nutritional and Health Benefits of Tigernut:

Presented in Table 3 are the results of the respondents' awareness and the sources of awareness about the health benefits of tigernut which they perceived to have the most stimulating influence consumption behaviour towards tigernut. The majority (67.33%) of the respondents were not aware about the nutritional and health benefits of tigernut. This may be due to the poor spread of information about the health claims of tigernut in the studied population. While the finding is consistent with Oyebade *et al.* (2013) who established low level of consumer awareness about the health claims of plantain flour, it is contrary to Akerele *et al.* (2016, 2017) who found out relatively high level of health benefit awareness for garlic and ginger. Of the total number of people who indicated they were aware of the health claims of tigernut, the largest percentage (38.78%) reported family and friends as the source of with the most stimulating influence of their consumption behaviour towards tigernuts. This finding is consistent with a conclusion drawn based on a focus group research on functional foods in which family and/or friends were identified as the key sources of information (Lalo *et al.*, 2011). Although information/knowledge sharing (by words of mouth) through friends and family may have its own advantage in terms of the confidence and trust (Bhaskaran *et al.*, 2002; Lalo *et al.*, 2011) that consumers could have in them, this cannot be exclusively relied upon as the most appropriate strategies to diffuse information faster to a very large population as the scope of coverage per time is limited. Next is the social media of which about 26.53% of the consumers perceived it as the source with the most stimulating influence of their consumption/purchase decision. The implications is that the social media is also an important source of information with persuasive effects on consumer behaviour. This is very important from marketing and policy perspective, especially for evolutionary development and structure of tigernut marketing systems, as well as the marketing strategies needed for market expansion and satisfaction of consumers' needs. Approximately 20% of the respondents were aware through the health workers/nutritionist and, even less than this (14.29%) were aware through the radio/television. The very low reporting of awareness through television/radio may be indicative of poor utilization, or low level of information diffusion on tigernut through this avenue.

Determinants of Purchase Decision and Consumption of Tigernuts:

In Table 4 are the results of the estimated double-hurdle models, indicating, among others, the influence of awareness (Model 1) and sources of awareness (Model 2) about the health benefits of tiger-nuts on the purchase decision and monthly consumption-expenditure. The statistical significance of the constant term ($p \leq 0.01$) of the sigma (ρ) function in each of the models indicates that the joint estimation of the first and second hurdle equations is more appropriate for the data analysis. The Wald Chi-square value associated with the likelihood ratio test in each of the models is also statistically significant ($p \leq 0.01$), implying that all the explanatory variables in each of the models jointly influence probability of purchase and consumption of tigernut. Age of respondent, awareness of respondent about the health benefits of tigernut, and social media as source of awareness, among others, had positive and statistical influence on the probability of purchase of tiger-nuts. Advances in age may be associated with some health seeking behaviour (Sääksjärvi *et al.*, 2009; Fon *et al.*, 2014; Kraus *et al.*, 2017) which may increase the chance of spending on certain healthier foods (such as tiger-nuts) especially if the later years of life (old age) come with some health challenges. The positive influence of the health benefit awareness underscores the critical roles of awareness creation and information dissemination on the health claims of tiger-nuts. The positive influence of the health benefit awareness underscores the critical roles of awareness creation and information dissemination on the health claims of tiger-nuts (Sääksjärvi *et al.*, 2009). Although all the main sources of awareness considered in this study are positively related to the probability of purchasing tiger-nuts, friends and family, and social media are those with statistically significant influence on consumer's decision to purchase tiger-nuts.

The implications are that these avenues may have stronger impacts on consumer's choice of tigernut.

This is important from marketing perspective, especially in terms of promotion/advertisement of tiger-nuts' products and expansion of the consumer markets. Ratchford *et al.* (2001) and Lee *et al.* (2006) found positive influence of friends and family (word of mouth) while Hawkins and Mothersbaugh (2010) also reported positive influence of social media on consumption of foods known with some health claims. The coefficient associated with previous satisfaction is positive and statistically significant on tiger-nuts' purchase decision, implying that an average consumer who derived some level of health improvement in previous consumption may have higher probability of re-purchasing tiger-nuts, all else equal. Income was however found to exert negative influence on the probability of tiger-nut purchase. This is against expectations as increased income is anticipated (theoretically) to enhance consumers buying behaviour. Nonetheless, the finding seems to be consistent with Akerele *et al.* (2016), who found a negative and statistically significant influence of income on garlic purchase decision. One might conclude that increases in income is unlikely to be an effective strategy for stimulating consumption of tiger-nuts in the studied population, but rather health seeking behaviour.

Turning to the consumption-expenditure part (second hurdle) of the double-hurdle model. The coefficient of education level of the respondent (at least diploma level) is significant and has a positive influence on tiger-nut consumption, implying that higher level of education increased consumption of tigernut. This is similar to the works of Sääksjärvi *et al.* (2009) and Sharitori and Kinsey (2011) found positive effect of education on the consumption of functional foods. Household size also exerted significant and positive influence on consumption-expenditure on tiger-nuts. Increases in household size may result in higher consumption if the additional member induced greater preference for tiger-nuts among members of the households. This is in line with Akerele *et al.* (2016) who reported positive influence of household size on consumption of a similar product (garlic) in Nigeria. Awareness about the health benefits of tiger-nuts ($p \leq 0.05$) positively affected the extent of tiger-nut consumption. This means that awareness of the health and nutritional benefit of tiger-nut would substantially enhance consumption of tiger-nut. This is line with Akerele *et al.* (2017) who found a positive influence of awareness on consumption of some foods known with certain health claims in Nigeria. Sex (male dummy) of the consumer had statistically significant and positive influence on consumption-expenditure on tigernut, suggesting on the average, greater consumption of tigernut among males than females. Although all the sources of information is positively correlated with consumption of tigernut, friends and family is the only source one with statistically significant coefficient. This projects family and friends as source that can substantially raise consumption-expenditure on tiger-nuts, all else equal.

Conclusion and Recommendations

The study examined, among others, the influence of awareness and sources of awareness about the health benefits of tigernut on purchase decision and consumption-expenditure on tigernut in Ogun State, Nigeria. Findings suggest relatively low level of awareness about the health benefit of tigernut among consumers while, words of mouth spread through friends and family and the social media were the primary source of awareness. Education, age, household size, previous consumption experience and sex of consumer were demographic factors that significantly enhance purchase decision and/or consumption-expenditure on tigernut. Whereas increased income is unlikely to stimulate consumer towards consumption of tigernut, health benefit awareness and sources of awareness, especially friends and family and the social media can substantially enhance consumption behaviour. Access to higher formal education, and awareness creation through the social media are recommended, among others, to enhance consumption of tigernut. Findings of this study holds a number of implications for tigernut and products market expansion particularly through use of social media, among others. Of relevance also are the opportunities for farmers to diversify into tigernut production where production advantage exists, in order to meet demand from consumers and industries as well as opportunities for prospective investors along its value/supply chain in response to consumer preference. Implicitly, and ultimately, the country benefits in terms of improved health status for the people (which constitute her human capital) and reduction of cost (burden) of health care.

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Table 1: Distribution socio-demographic characteristics of respondents and respondents' households

Variable	Frequency	Percentage	
Sex			
Female	147	49.00	
Male	153	51.00	
Age (years)			
age < 31	97	32.33	
age 31 to 45	100	33.33	Mean age
age 46 to 60	39	13.00	43 years
age 60 and above	64	21.33	
Marital Status			
Single	125	41.67	
Married	142	47.33	
Others	33	11.00	
Educational Level			
Secondary education	97	32.33	
NCE and OND	135	45.00	
Tertiary Education	68	22.67	
Household monthly Income (₦)			
< 20000	78	26.00	
20000 to 39999	121	40.33	mean income
40000 to 59999	41	13.67	₦42446.01
60000 and above	60	20.00	
Household Size			
1 to 3 members	43	14.33	
4 to 6 members	225	75.00	Mean household
Above 6 members	32	10.67	Size = 5 persons

Source: Field Survey, 2015

Table 2: Distribution of respondents by monthly expenditure on tigernut, the most preferred forms of consumption and reasons for consumption

Variable	Frequency	Percentage	
Expenditure (Naira)*			
No purchase	53	17.67	
1 to 100 Naira	129	43.00	
101 to 200	78	26.00	Mean expenditure (Naira) 171.86
Above 200	40	13.33	
Most preferred form of consumption			
Fresh	137	45.67	
Dried/Semi dry	83	27.67	
Roasted/Boiled	26	8.67	
Powered/Juiced	54	18.00	
Key non-price attributes stimulating consumption			
Good Taste/Flavour	212	72.67	
Health Improvement	82	27.33	

Source: Field Survey, 2015. *=mean value computed for the positive expenditures only

Table 3: Distribution of respondents by awareness and sources of awareness about nutritional and health benefits of tigernut

Variable	Frequency	Percentage
Aware	98	32.67
Not Aware	202	67.33
Total	300	100.00
**Perceived Main Sources of Awareness		
*Radio/Television	14	14.29
*Friend and Family	38	38.78
*Hospital and Health Centres	20	20.41
*Social media	26	26.53
*Total	98	100.00

Source: Field Survey, 2015. * implies source of awareness perceived by the consumers (respondents) to have the most stimulating influence on tigernut consumption choice. ** indicates that the percentages generated for each of the sources is based on the number of people (98) who reported they were aware of the health benefits of tigernut

Table 4: factors influencing purchase decision and consumption of tigernut

Purchase Decision Equation	Model with Awareness (Model 1)		Model with Sources of Awareness (Model 2)	
Marital Status	-0.19	-0.79	-0.14	-0.60
Income	***-0.55	-4.63	***-0.55	-4.61
Sex	0.11	0.53	0.12	0.56
Age	***1.10	2.74	**1.03	2.54
Secondary Education	-0.55	-1.68	-0.42	-1.22
NCE/ND	-0.26	-0.97	-0.13	-0.47
Household Size	0.43	1.50	0.47	1.57
Awareness	***0.72	2.72	-	-
Television/Radio	-	-	0.49	0.66
Social Media	-	-	***1.25	2.64
Hospital/Health Centres	-	-	0.55	1.23
Family/Friends	-	-	**0.71	2.08
Previous Satisfaction	***1.67	3.79	***1.73	3.86
Constant	1.72	1.05	1.79	1.10
Consumption Equation				
Marital Status	76.05	0.33	228.70	1.38
Income	12.84	0.08	92.21	0.74
Sex	**361.48	2.21	**311.04	2.25
Age	969.60	0.94	-19.19	-0.03
Secondary Education	186.73	0.65	151.21	0.63
NCE/ND	***901.06	2.77	***745.88	3.02
Household Size	**1736.53	2.39	**1000.81	2.19
Awareness	***807.26	2.98	-	-
Television/Radio	-	-	283.44	1.08
Social Media	-	-	373.21	1.09
Hospital/Health Centres	-	-	404.45	1.53
Family/Friends	-	-	***740.52	3.31
Previous Satisfaction	**655.88	2.49	***615.89	2.86
Constant	-8715.29	-1.82	-4176.89	-1.63
Log likelihood	-1579.15		-1575.52	
Wald Chi-square (12)	***41.97		***44.28	
p-value	0.00		0.00	
Sigma (ρ) function				
Income	-20.37	-0.55	-38.87	-1.24
Age	*-330.67	-1.91	-147.57	-1.22
Household Size	-130.63	-1.7	-73.30	-1.18
Constant	***2067.74	3.56	***1421.01	3.50

Source: Field Survey, 2015. Note: **, ***, imply that coefficients are significant at 5% and 1% level of significance respectively