



COMPARATIVE ANALYSIS OF CONSUMER PREFERENCE FOR ORANGE AND WHITE-FLESHED SWEET POTATO IN KWARA STATE, NIGERIA

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ABSTRACT

This study examined the consumer preference for orange-fleshed sweet potatoes (OFSP) compared to white-fleshed sweet potatoes (WFSP) in Kwara State, Nigeria. A multistage sampling procedure was used in selecting 140 respondents from the study area. Data were collected through the administration of questionnaire and analyzed using both descriptive and inferential statistics. Findings show that 66.4% were males while 82.1% were married. The average age was 46.1 years with the standard deviation ± 8.26 , and an average household size of 5 persons. Majority (51.4%) of the respondents had formal education. The findings also reveal that the respondents agreed that 'OFSP is more nutritious than WFSP' ($\bar{x}=3.9\pm 1.40$), 'OFSP is healthier than WFSP' ($\bar{x}=3.9\pm 1.41$) and 'OFSP has more vitamins and minerals than WFSP' ($\bar{x}=3.6\pm 1.21$). Consumers' willingness to purchase and consume OFSP instead of WFSP was high among the respondents with 83.6%. The results also show that nutritional content ($\bar{x}=3.9$), taste ($\bar{x}=3.8$) and health benefits ($\bar{x}=3.7$) were the factors influencing the choice of OFSP's consumption over WFSP. In addition, the results of regression analysis showed that higher education supports preference for OFSP ($\beta=0.233$, $p<0.05$) while age ($\beta=-0.012$, $p<0.05$) had a negative influence on the preference for OFSP over WFSP. The study concluded that consumers preferred OFSP over WFSP due to its nutritional content, taste and health benefits. It is recommended that marketing efforts should be directed at showcasing the nutritional benefits and palatability of OFSP that provide consumers with better taste and good health.

Keywords: Orange fleshed, sweet potatoes, Consumer and Preference

INTRODUCTION

In recent years, a growing interest has been shown in promoting healthier and more sustainable dietary choices to combat malnutrition and address food security challenges. Sweet potato, a versatile and nutritious crop, has garnered significant attention due to its abundant vitamins, minerals, and dietary fibre (Ssali *et al.*, 2020). Notably, sweet potatoes are available in various varieties, with orange-fleshed and white-fleshed being two of the most widely consumed types.

More than 95% of the global sweet potato crop (*Ipomoea batatas* (L.) Lam) is produced in developing countries and it is the fifth most important food crop (Barkessa, 2018). In Kwara State, sweet potato is considered to be the third most important food crop after corn and cassava (Babatunde *et al.*, 2019). The WFSP is widely produced among smallholder farmers, however, the OFSP was recently introduced and is being promoted by stakeholders in the agriculture sector for



providing an inexpensive source of β -carotene, the precursor of Vitamin A (Rosero *et al.*, 2022; Owuor *et al.*, 2023). OFSP was primarily introduced in Mozambique as part of an integrated approach to mitigate Vitamin A deficiency, which affects more than 70% of children under age 5, and 11% of women living in rural areas (Onuegbu *et al.*, 2017; Mbela, 2021).

It is well known that people with severe deficiency of Vitamin A are more susceptible to blindness and infections. OFSP has been used as part of a food-based approach, recommended as an excellent source of Vitamins. Additionally, OFSP has been associated with improving the immune system of individuals living with HIV/AIDS (Jogo *et al.*, 2021). These benefits have prompted both public and private sectors to promote OFSP.

However, it is popularly known that smallholder farmers cultivate and eat more of WFSP as evidenced by the fact that traders predominantly sell WFSP. Therefore, examining the preferences of consumers for orange-fleshed and white-fleshed sweet potatoes is expected to provide valuable information that can guide efforts to promote healthier dietary choices and enhance food security. Thus, this study aims to undertake a comparative assessment of consumer preferences for OFSP and WFSP, including identifying factors for their choice.

The broad objective of this study was to compare consumers' preferences for OFSP and WFSP in Kwara state. The specific objectives were to:

- i. Describe the socioeconomic characteristics of potato consumers
- ii. identify consumers' awareness of the health and nutritional benefits of OFSP and WFSP
- iii. Determine the factors that influence consumers' choice of OFSP and WFSP consumption, and
- iv. Investigate consumers' willingness to pay for OFSP and WFSP.

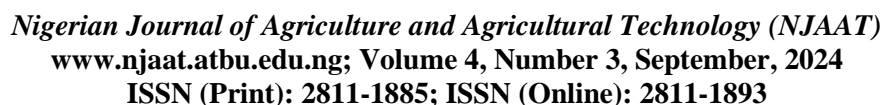
HO: Socioeconomic characteristics do not affect consumers' preference/willingness to pay for OFSP compared to WFSP

MATERIALS AND METHODS

The study was carried out in Kwara State Nigeria, which comprises 16 local government areas (LGAs) with 2021 population estimate of about 3.6 million (Adeyanju, 2021). It has a total land size of 3,682,500 hectares. It is located between latitudes 7° 45'N and 9° 3'N and longitudes 2° 3'0' and 6° 25'E. The topography is mainly plain to slightly gentle. Agriculture is the major occupation in the state with over 70% of the population being farmers.

Sampling Technique and Sample Size

A multistage sampling procedure was used to select the sweet potato farmers for the study. The first stage involved random selection of 30% of LGAs in each agricultural zone gave 6 LGAs selected; viz: *Baruten* from Zone A; *Edu* from zone B, *Ilorin-south* and *Asa* from zone C and lastly, *Ifelodun* and *Oyun* LGAs from zone D. At the second stage, 30% of number of districts were randomly at chosen from the selected LGAs, making 8 districts as listed in Table 1. At next stage, 10 communities were proportionately selected from these districts. Finally, 14 respondents were selected per community, making a total of 140 respondents as the sample of the study.

**Table 1:** Summary of respondents’ selection

Zone	LGAs	District	Communities	Respondents
A	Baruten	Ilesha	Shemga	14
B	Edu	Tsaragi	Saragi & Songa	28
C	Ilorin	Gaa Akanbi	Tanke	14
	South	Owode	Budo Gambari, Bala, Ayegunle,	42
	Asa	Omupo	Ayekale	14
D	Ifelodun	Idofian	Ganmo	14
	Oyun	Okeogun	Ijagbo	14
	6	8	10	140

Source: Field Survey, 2023

Data Collection

Data were collected using structured questionnaires which were distributed to the respondents randomly drawn from the study area. The questionnaire consists of consumers' knowledge of the health and nutritional benefits of OFSP and WFSP was measured on a 5-point Likert-type scale as extremely beneficial = 5, very beneficial = 4, moderately beneficial = 3, slightly beneficial = 2, and not beneficial = 1. Also, important factors influencing the choice of OFSP for consumption instead of WFSP were measured on a 5-point Likert-type scale as extremely important = 5, very important = 4, moderately important = 3, slightly important = 2, not important = 1. Likewise, willingness to pay for OFSP compared to WFSP was also measured on a 5-point Likert-type scale as strongly willing = 5, willing = 4, uncertain = 3, slightly willing = 2, and not willing = 1.

Data Analysis

Data collected were analyzed using both descriptive and inferential statistics. The descriptive statistics used includes frequency, percentages, mean, standard deviation, and rank, while the multiple regression analysis was performed to assess the hypotheses of the study. Multiple linear regression model was adopted. The model was specified implicitly thus: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 + \dots + e_i \dots \dots (1)$

Where:

Y= consumers' preference/willingness to pay for OFSP compared to WFSP

(X) = Independent variables

$X_1 = \text{Age (in years)}$

$X_2 = \text{sex}$ (male = 1, female = 0)

$X_3 =$ Marital status (married =1, otherwise 0)

X_4 = Household size (in numbers)

X_5 = Educational status (in years of schooling)

e = Error term

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Results presented in Table 2 show that 48.6% of the respondents were aged between 41 to 50 years while 26.4% were aged 50 years and above with an average age of 46.1 years. Results



also show that majority (66.4%) of the respondents were males indicating that consumers of sweet potatoes in the study area are male-dominated, meaning that the males consume sweet potatoes more than the female folks in the study area. Also, the majority (82.1%) of the respondents were married with an average household size of 5 persons. In addition, the study revealed that only 12.1% of the respondents had no formal education while a host of others had one form of formal education or the other ranging from primary education (51.4%) and secondary education (36.4%). This indicates that a significant percentage of the consumers had formal education. This finding is consistent with the report by Wangithi *et al.*, (2023) who found that sweet potato consumers are literate.

Table 2. Socio-economic characteristics of the respondents

Variables	Frequency (140)	Percentage (100%)	Mean±SD
Age (years)			
≤ 30	6	4.3	46.1±8.26
31 – 40	29	20.7	
41 – 50	68	48.6	
Above 50	37	26.4	
Sex			
Male	83	66.4	
Female	47	33.6	
Marital Status			
Single	9	6.4	
Married	115	82.1	
Divorced	8	5.7	
Widow/widower	8	5.7	
Household size (persons)			
≤ 3	45	32.1	4.46±1.633
4 – 6	73	52.1	
7 and above	22	15.7	
Level of education			
No formal education	17	12.1	
Primary education	72	51.4	
Secondary education	51	36.4	
College and above	0	0.0	

Source: Field survey, 2023

Consumers' awareness of the health and nutritional benefits of Orange-Fleshed Sweet Potatoes (OFSP) and White-Fleshed Sweet Potatoes (WFSP)

Results presented in Table 3 indicate consumers' knowledge of the health and nutritional benefits of orange-fleshed sweet potatoes (OFSP) in comparison to white-fleshed sweet potatoes (WFSP). Findings show that consumers were aware that OFSP with (mean=3.9) is more nutritious than WFSP (mean=2.4). Regarding health benefits, OFSP (mean=3.9) is healthier than WFSP (mean=2.3). While on vitamins and mineral compositions, OFSP ranked higher having more



vitamins and minerals (mean=3.6) than WFSP (mean=2.3). The results indicate that consumers of sweet potatoes in Kwara State are well aware of the nutritional and health benefits of OFSP compared to WFSP. This aligns with findings by Rosero et al. (2022) and Bocher et al. (2019), who reported that OFSP offers superior nutritional value, including higher levels of vitamins and minerals. The consumers' knowledge is expected to positively influence their preference for OFSP. Additionally, the improved taste and health benefits of OFSP were significant factors for consumers, as noted in a similar study by Owuor et al. (2023) in Rwanda, where consumer preferences and willingness to pay for OFSP juice were largely driven by its taste and nutritional information. This underscores the need for producers to enhance marketing strategies for OFSP, given that nutritional content and health benefits are key factors influencing consumer choice, as also highlighted by Chumo et al. (2023).

Table 3. Consumers' knowledge of health and nutritional benefits of orange-fleshed sweet potatoes (OFSP) in comparison to white-fleshed sweet potatoes (WFSP)

Benefits	Mean±SD	Rank	Level
Nutrition			
OFSP is more nutritious than WFSP	3.9±1.40	1 st	High
WFSP is more nutritious than OFSP	2.4±1.60	2 nd	Low
Health benefits			
OFSP is healthier than WFSP	3.9±1.41	1 st	High
WFSP is healthier than OFSP	2.3±1.29	2 nd	Low
Vitamins and minerals content			
OFSP has more vitamins and minerals than WFSP	3.6±1.21	1 st	High
WFSP has more vitamins and minerals than OFSP	2.3±1.37	2 nd	Low

Source: Field Survey, 2023

**Mean above 3.0 considered high knowledge

Factors Influencing the Choice of OFSP for Consumption instead of WFSP

Table 4 presents the factors that influence consumers' choice of consumption of OFSP above WFSP. The results revealed that nutritional content, taste, health benefits, value-added product influence the choice of OFSP over WFSP with a mean of 3.9, 3.8, 3.7 and 3.6 which were ranked 1st, 2nd, 3rd and 4th respectively. In addition, the results showed that appearance (e.g., colour, texture), ranked 10th with a mean of 2.9, thus, ultimately the least important factor consumers consider to choose OFSP over WFSP variety. The results corroborate the findings of Mbela (2021) and Owuor *et al.*, (2023) who concluded that consumers' preference for OFSP variety was owed to its nutritional content and health benefits

Table 4. Importance of factors influencing the choice of OFSP for consumption instead of WFSP

Factors	Mean±SD	Rank
Nutritional content	3.9 ±.85	1 st
Taste	3.8 ±.77	2 nd
Health benefits	3.7 ±.99	3 rd
Value added product	3.6 ±.84	4 th
Ease of availability of the product	3.4 ±.75	5 th
Shelf life/Perishability	3.2±1.00	6 th
Price	3.1 ±.64	7 th
Familiarity with the product	3.1 ±.94	8 th
Period of supply	3.0 ±.72	9 th
Appearance (e.g. colour, texture)	2.9 ±.87	10 th

Source: Field Survey, 2023

Consumers' willingness to pay for OFSP compared to WFSP

The results in Table 5 showed the consumers' willingness to pay for OFSP compared to WFSP and the ranking was done accordingly. The findings revealed that consumers 'Were more likely to purchase OFSP if it is marketed as a healthier option' with a mean of 3.91 which was ranked 1st and 'the price difference between OFSP and WFSP affected my purchase decision' with a mean of 3.88 was ranked 2nd. The findings also revealed that 'the taste of the sweet potato is more important than the price to me', 'Consumers were willing to pay more for OFSP than WFSP; 'were more likely to purchase OFSP if it is readily available in my local market' with a mean of 3.87, 3.85 and 3.81 which were ranked 3rd, 4th and 5th, respectively. The results further revealed that consumers were more likely pay more for healthier product, were more likely purchase OFSP if it is available at the same price, they considered OFSR to worth the extra cost compared to WFSP and thinking that OFSP is more visually appealing than WFSP with a mean of 3.76, 3.69, 3.64, 3.61 and 3.19 which were ranked 6th, 7th, 8th, 9th and 10th, respectively. This shows that consumers' willingness to pay for OFSP is premise upon their opinion on OFSP as a healthier option of sweet potato, lower price and better taste when compared with WFSP.

Table 5. Willingness to pay for OFSP compared to WFSP among respondents

Statement and opinion	Mean±SD	Rank
I am more likely to purchase OFSP if it is marketed as a healthier option.	3.91 ±0.96	1 st
The price difference between OFSP and WFSP affected my purchase decision.	3.88 ±0.92	2 nd
The taste of the sweet potato is more important than the price to me.	3.87 ±0.94	3 rd
I am willing to pay more for OFSP than WFSP.	3.85 ±0.85	4 th
I am more likely to purchase OFSP if it is readily available in my local market.	3.81 ±0.84	5 th
I am willing to pay more for healthier products	3.76 ±1.12	6 th
I would be more likely to purchase OFSP if it is available at the same price as WFSP.	3.69 ±0.94	7 th
I consider OFSP to be worth the extra cost compared to WFSP.	3.64 ±1.02	8 th
I believe that OFSP is healthier than WFSP.	3.61 ±1.06	9 th
I think OFSP is more visually appealing than WFSP.	3.19 ±1.02	10 th

Source: Field Survey, 2023



Consumers' Willingness to Purchase and Consume OFSP instead of WFSP

Consumers' willingness to purchase and consume OFSP instead of WFSP in different categories as presented in Table 6. The result showed that 5.7% of the respondents' low willingness to purchase and consume OFSP instead of WFSP, 10.7% of the respondents were indifferent and 83.6% had a high willingness to purchase and consume OFSP instead of WFSP.

Table 6. Consumers' willingness to purchase and consume OFSP instead of WFSP

State (Obtained score range)	Frequency	Percentage
Low (10 -29)	8	5.7
Neutral/undecided (30)	15	10.7
High (31 - 50)	117	83.6

Source: Field Survey, 2023

Relationship between socioeconomic characteristics and consumers' preference for OFSP

Table 7 shows the results of regression analysis which indicates that level of education was positive and significant ($P < 0.05$) influencing consumers preference to pay for OFSP compared to WFSP. This implies that as the level of education of consumers increases, the preference and willingness to pay for OFSP compared to WFSP increases and vice-versa. The results also shows that age of the consumers was negative and significant ($P < 0.05$) in influencing consumers preference to pay for OFSP compared to WFSP and vice-versa. This implies that younger individuals had higher preference for OFSP over WFSP. The finding implies that an increased level of education will increase their willingness and preference for OFSP instead of WFSP while older people tend to be less willing to pay for OFSP instead of WFSP. This conforms to a-priori expectation; given that an increase in consumers' educational qualification will enhance their knowledge of the importance of OFSP consumption while this will make them to better appreciate the benefits for healthy living. The finding is consistent with Owuor et al., (2023) who found that consumers' knowledge of nutritional benefits and level of education positively influence preference and willingness to pay for OFSP food products.

Table 7. Linear multiple regression showing the influence of socioeconomic characteristics on consumers' preference to pay for OFSP compared to WFSP.

Willingness	Coefficient (β)	Std. Error	t	Sig.
Age	-.012*	.007	-1.811	.027
Sex	.007	.074	.094	.925
Marital status	.080	.081	.990	.324
Household size	-.027	.032	-.833	.406
Level of Education	.233*	.102	2.273	.025
(Constant)	2.467	.339	7.268	.000

R=.781; Rsquare=.610; Adjusted Rsquare=.580; Std Error =.348; F-stat=20.206

CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, it can be concluded that level of education and age were the factors that influences consumers' willingness to purchase and consume OFSP instead of WFSP in the study area. The following recommendations were thus proffered:



1. Marketers of OFSP variety should put more effort into the advertisement strategies. Marketing efforts specifically should be directed at improved nutritional, mineral and palatability benefits of OFSP that provide better taste and good health for consumers.
2. Agricultural extension programmes aimed to promote the consumption of OFSP should prioritize the involvement of consumers/potential consumers who are young with an appreciable level of education.

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REFERENCES

- Adeyanju, A. I. (2021). State-Local Governments Joint Account and Grassroots Development in Nigeria: A Study of Selected Local Governments in Kwara State (2011–2021) (Doctoral dissertation). Kwara State University, Nigeria.
- Babatunde, R. O., Omoniwa, A. E., & Adeniyi, A. E. (2019). Orange fleshed sweet potatoes (OFSP) and productivity: the case of smallholders in Kwara State, Nigeria. *Agricultura Tropica et Subtropica*, *52*(3-4):105-111.
- Barkessa, M. K. (2018). A review on sweet potato (*Ipomoea batatas*) viruses and associated diseases. *International Journal of Research in Agriculture and Forestry* *5*(9):1-10.
- Chumo, C., Mignouna, D., Ogunniyi, A., Akomolafe, J. K., & Ejima, J. (2023). Assessing food security among young farmers in Africa: evidence from Kenya, Nigeria, and Uganda. *Agricultural and Food Economics* *11*(1) doi: 10.1186/s40100-023-00246-x
- Bocher, T., Sindi, K., Muzhingi, T., Nshimiyimana, J. C., Nzamwita, M., & Low J. (2019). Investigating consumer preferences and willingness to pay for Orange-fleshed sweet potato (OFSP) juice in Rwanda. *Open Agriculture* *4*(1):227-36. doi: 10.1515/opag-2019-0021
- Jogo, W., Bocher, T., & Grant, F. (2021). Factors influencing farmers' dis-adoption and retention decisions for biofortified crops: the case of orange-fleshed sweet potato in Mozambique. *Agrekon* *2*:1-15. doi: 10.1080/03031853.2021.1956555
- Mbela, D. E. (2021). Imparting Nutrition Knowledge to School Children and Communities: The Role of Orange Fleshed Sweet Potato in Nutrition. *The Role of Orange Fleshed Sweet Potato in Nutrition Authors. Adv Image Video Process.* 2021 Jun 30;9(3). doi: 10.14738/aivp.93.10320
- Onuegbu, N. C., Ihediohanma, N. C., Eze, C. F., Okafor, D. C., & Ojukwu, M. (2017). Biofortification of local staples in Nigeria: prospects and problems. *Journal of Food Biotechnology Research*. *1*(1) 5.
- Owuor, A. A., Otieno, D. J., Okello, J. J., Oluoch-Kosura, W., & Dufour, D (2023). Assessment of consumers' preference for orange-fleshed sweet potato puree *chapati*: a case of rural and urban consumers in Kenya. *J Sci Food Agric.* 2023 May 24: doi: 10.1002/jsfa.12734
- Rosero, A., Pastrana, I., Martínez, R., Perez, J. L., Espitia, L., Araujo, H., Belalcazar, J., Granda, L., Jaramillo, A., & Gallego-Castillo. S. (2022). Nutritional value and consumer perception of biofortified sweet potato varieties. *Annals of Agricultural Sciences*. *67*(1):79-89. doi: 10.1016/j.aos.2022.05.004



- Ssali, R., Carey, E., Imoro, S., Low, J. W., Dery, E. K., Boakye, A., Oduro, I., Omodamiro, R. M., Yusuf, H. L., Etwire, E., Iyilade, A. O., Adekambi, S., Ali, A., Haliru, M., & Etwire, P. M. (2020). Fried sweet potato user preferences identified in Nigeria and Ghana and implications for trait evaluation. *International Journal of Food Science and Technology*. **56**:1399–1409. doi: 10.1111/ijfs.14764
- Wangithi, C. M., Nyangaresi, A. M., Srinivasulu, R., Moyo, M., Muzhingi, T., & Kawarazuka, N. (2023). Consumer willingness to pay a premium for orange-fleshed sweet potato puree products: gender-responsive evidence from Becker–DeGroot–Marschak experimental auction among low- and middle-income consumers in selected regions of Nairobi, Kenya. *Frontiers in Sustainable Food Systems* 30:7. doi: 10.3389/fsufs.2023.1114468