Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.15, No.5, 2024

Analysis of Consumer Preferences for Orange-Fleshed Potatoes in Burundi: Case Study of Consumers of Bujumbura Town

Ndayitwayeko Willy Marcel[*1] IRAKOZE Radegonde[2]
1. Centre Universitaire de Recherche pour le Developpement Social et Economique, University of Burundi, BP 1550 Bujumbura, Burundi, Telephone : +25779470996
2. Department of Rural Economics, Faculty of Economics and Management, University of Burundi, BP 1550 Bujumbura, Burundi
*Corresponding author: willy-marcel.ndayitwayeko@ub.edu.bi

Abstract
The sweet potato is one of the most widely consumed tubers in Burundi. There are several varieties, including the orange-fleshed sweet potato (OFSP), which contains beta-carotene, a precursor of vitamin A. The aim of this study was to analyze the effects of nutritional knowledge on the decision and intensity of purchase of OFSP and to analyze the psychosocial factors influencing preference for OFSP. It focused on consumer food preference, a decision affected by a range of factors, including nutritional knowledge, and was conducted in the commune of Ntahangwa. This study applied a multistage sampling method to identify survey respondents. Three markets in Ntahangwa commune, including Kamenge, Buterere and Kinama were deliberately selected based on their location in the city of Bujumbura. The difference in location allowed the survey to target consumers with different socioeconomic characteristics.Qualitative and quantitative data were collected from 385 respondents. A double-barrier model was used to analyze the effect of nutritional knowledge on sweet-potato purchase preference and intensity. The results indicate that nutritional knowledge has a positive effect on preference and purchase intensity of OFSP. The main characteristics for which respondents chose to buy OFSP were good sensory attributes and the ingredients of the OFSP variety. Consequently, the objectives that motivate the preference and consumption of OFSP include the desire to stay healthy, long life, taste and price. This study recommends that efforts to promote OFSP should emphasize the nutritional benefits, particularly as a source of vitamin A. In addition, markets and sellers of OFSP need to improve product design, particularly sensory attributes to satisfy consumer preferences.
Keywords: orange-fleshed sweet potato, preference, consumption
DOI: 10.7176/JESD/15-5-02
Publication date: April 30th 2024

Introduction

In Burundi, sweet potato is the third most important food crop after banana and cassava (ISABU, 2019). There are many varieties of sweet potato, including yellow-fleshed sweet potato, white-fleshed sweet potato and orange-fleshed sweet potato (Karanja *et al.,* 2006). The orange-fleshed sweet potato (OFSP) is a variety that contains a large amount of beta-carotene, which provides vitamin A (Low *et al.,* 2007). Vitamin A is one of the essential micronutrients for good consumer health. This vitamin helps to improve eyesight, maintain a healthy body, promote general growth and stimulate development in children (Sommer *et al.,* 2012). Among the food crops already bio-fortified with vitamin A, a focus on orange-fleshed sweet potato shows that 90% of these roots are consumed locally in Kenya (KNBS, 2015). Governments, particularly in sub-Saharan Africa, are developing strategies to stimulate the consumption of vitamin A-rich foods. This is a process that makes it possible to obtain crops of increased nutritional value (Msusani, 2014). Government implement interventions associated with development partner programmes (IPC and USAID) influence the consumption of OFSP. Consequently, the end result is an improvement in the quality of consumers' diets by incorporating vitamin A and thus reducing its deficiency.

Vitamin A deficiency remains a major problem in Burundi, with 20% of women and 84.4% of children currently affected (CIP, 2018). In many developing countries, VAD is a common form of malnutrition. VAD is prevalent and widespread (WHO, 2018). Those most affected are women and children. It is estimated that 20% of women, particularly adolescents (20%) and breastfeeding mothers (20%), and 9% of children under the age of five are vitamin A deficient. The problem that the NGOs called PRONIANUT are alleviating in 2019 is that the majority of women and children are not receiving an acceptable minimum diet. Recent statistics disaggregated by different provinces of Burundi show that in Bujumbura, the frequency of consumption of foods rich in micronutrients and in particular those containing vitamin A is low.

In rural areas, the sweet potato is one of the staple foods in Burundi, and is therefore mainly consumed in large quantities. In urban areas such as Bujumbura, however, sweet potatoes are consumed in small quantities. The reason for this under-consumption is twofold: sweet potatoes are in short supply and can be bought when they are on the market. In addition, some consumers perceive the OFSPas a sweet food suitable for children and women, and the crop of the poor, which makes it a product of inferior quality.

If Burundi is to achieve the ambitious goal of putting an end to all forms of malnutrition, including VAD, by 2030, the consumption of bio-fortified food by individuals or households must be promoted as a means of acquiring added micronutrients. To this end, the Burundian government has promoted bio-fortification. The government of Burundi and other NGO-led organizations called the ″ CIP ″ to promote the production and consumption of bio-fortified foods, including OFSPs. Through the ISABU project in 2015, CIP introduced OFSP to the Burundian market. The 4 target provinces were Muyinga, Ruyigi, Cibitoke and Bubanza. In relation to our research field, urban consumers in the above-mentioned provinces are easy to buy. They find the quantity they want, compared with those in Bujumbura, who are obliged to export OFSP within Burundi (ISABU, 2015). However, psychosocial and economic factors influence the level of consumption of OFSP in urban areas compared to rural areas.

Studies on consumer preference have been based on the neoclassical theory of utility maximisation and have not sufficiently captured psychosocial factors (Wambugu *et al.,* 2009*,* Okello *et al.,* 2014). Random utility theory postulates that a choice decision is made by an individual among a set of alternatives (McFadden, 1978). Individuals have a set of consumption choices and whatever alternative they choose maximises their utility. The specific choice made by a consumer is generally a function of a set of influencing factors. Individuals are therefore presumed to choose a product from which they derive the greatest utility (Greene, 2003). Consumers often prefer to buy any category of food that costs less without taking this dimension into account. In this sense, UNICEF (2019) considers that low-income consumers tend to choose poor-quality products because they are more often cheaper. Furthermore, consumers living in urban areas face time constraints when it comes to buying and preparing fresh food (Senauer and Alderman*,* 1986).

Psychosocial" factors combine two concepts of psychological and social factors. Psychosocial factors include the processes and meanings at the individual level that influence mental constructs or states, while social factors include the concerns of human society with the social structure and processes that affect the individual (Stansfeld and Rasul*,* 2007).

Several studies conducted in different parts of the world have helped to understand the acceptability of bio-fortified products by consumers. Bio-fortified foods are widely accepted by people because they taste similar to conventional foods Meenakshi et al (2010). Consumption of vitamin A-rich foods such as bio-fortified sweet potato has been touted as a sustainable remedy for VAD (Jones and Brauw*, 2015;* Low *et al.,* 2017). Consumption of bio-fortified foods can be influenced by both socio-economic and psychosocial factors. However, many studies use neoclassical economic theory to investigate the effects of socio-economic factors on bio-fortified food consumption (Okello *et al.,* 2016), and neglect psychosocial factors.

Researchers have not captured consumers' nutritional knowledge of OFSP, particularly as a source of vitamin A and as a factor that may influence OFSP preference (Lind*,* 2007*,* Laurie *et al.,* 2015). By extension, nutritional knowledge could probably influence OFSP preference. Thus, it is unclear whether nutritional knowledge and psychosocial factors affect the preference and intensity of OFSP purchase in Burundi. Consequently, there is a lack of literature in identifying and documenting the psychosocial factors that influence consumer preference for OFSP. The present study on orange-fleshed sweet potato preferences among consumers in the city of Bujumbura aims to investigate the determinants and psychosocial factors that influence consumer preference for orange-fleshed sweet potato. To carry out this research, the study sought to identify the psychosocial factors influencing consumer preference and consumption of the OFSP, as well as the effect of nutritional knowledge on consumer preference and purchase intensity of the orange-fleshed sweet potato.

Materials and methods

Description of the study area

The commune of Ntahangwa is a commune in Burundi located in the Province of Bujumbura Mairie, to the north of Lake Tanganyika. It lies to the north-east of Burundi's economic capital. Its 6 zones are among the most densely populated (around 10,000 inhabitants/km2). The Kamenge, Kinama, Cibitoke and Buterere areas are the most densely populated. New residential neighbourhoods have sprung up in the 2010s: Carama in Kinama, Kigobe in Gihosha, and Kiyange in Buterere *(en.climate-data.org (consulted on 12 November 2022).* The municipality has a population of 491,786 and is separated from the rest of the capital by the river Ntahangwa, hence its name.

Choice of study area

The commune of Ntahangwa in Bujumbura Mairie was chosen because it is one of many markets where potatoes are widely distributed by suppliers. In addition, the choice of this commune was justified by the fact that it is one of the areas with the greatest potential for sweet potato consumption. The difference in location enabled the survey to target consumers with different socio-economic characteristics.

Sampling techniques and determining sample size

This study applied a multi-stage sampling method to identify survey respondents. Firstly, the city of Bujumbura was chosen and the commune of Ntahangwa was deliberately selected on the basis of their location in the city of

Bujumbura. In the second stage, a systematic random sampling method was used to select sweet potato consumers, including consumers of OFSP and other PD varieties.

The total household sample size was determined using a formula developed by Cochrane (1977):

$$n = \frac{t^2 p(1-p)}{c^2} \quad \ldots\ldots (1)$$

Where: n : Sample size for a very large *(infinite)* parent population; t: Margin coefficient 1.96, e: Margin of error, p: Probability of success or positive probability of occurrence *(p = 0.5)*, q = 1-probability of failure or negative probability of occurrence.

So our sample size becomes :

$$n = \frac{1{,}96^2 * 0{,}5(1-0{,}5)}{0{,}05^2} \quad \ldots\ldots (2)$$

$$n = \mathbf{384}{,}16$$

Using the size-proportional sampling technique, a total sample of 385 households will be surveyed.

Source and type of data

This study used both primary and secondary data. The primary data were both quantitative and qualitative in nature. The secondary data was mainly important for the literature review. Data was obtained from journal articles, published books and national government reports. Other sources included stakeholder reports and information documented by several development partners**.**

Data collection method

A survey was used to collect quantitative and qualitative data respectively. A structured questionnaire was used during the general interviews to collect data from samples of OFSP purchasers. Relevant variables were included in the questionnaire to capture data on socio-economic factors, nutritional knowledge, purchasing practice and product attributes.

Description of variables

Several determinants may influence the preference for orange-fleshed sweet potato varieties. We selected the explanatory variables that might be relevant to our study. The table 1 explains the different variables that were used and their expected signs.

Table 1: Study variables and expected signs

Variable	Level 1	Level 2	
	OFSP preference	OFSP intensity	purchasing
Preference	+		+
Consumers' level of nutritional knowledge (weighted score-number)	+		+
Level of decision-making (weighted score-number)	+		+
OFSP awareness (1=yes 0=no)	+		+
Profession (1=salaried employment 0=if not)	+		+
Pregnant member of household (1=yes 0=no)	+		+
Marital status (1=married 0=not married)	+		+
Relationship with head of household (1=self 0=other)	+		+
Alternative OFSP unit price (number)	+/-		+/-
Sex of consumer (1=male 0=female)	+/-		
Level of consumer education (number)	+		
The respondent considers taste (1=yes 0=no)	+		
The responder considers the colour (1=yes 0=no)	+		
The respondent considers the nutritional information (1=yes 0=no)	+		
The respondent considers the variety of the OFSP (1=yes 0=no	+		
Size of household (count 1=one person, 2=two people, etc.)			+

Data analysis methods and tools

In analyzing the effect of nutritional knowledge on firstly OFSP preference and secondly on consumer purchase intensity, a two-level model was used. This model provided a two-level decision framework. Consumer product purchase decisions are generally characterised as occurring in two stages. First, a consumer makes a preference on the variety of product to purchase, and second, decides how much of the product to purchase and consume (Holloway *et al.,* 2001*,* Makau *et al.,* 2016). The likelihood function for both was a binary probit integration for the first stage and truncated regression for the second stage. This structure is similar to Cragg (1971) when he integrated probit and log normal and Burke (2015) when he integrated ordered probit, probit and log-normal

models.

The first step was used to analyse the effect of nutritional knowledge on preference COOL. The model was specified based on Burke (2009b), Gujarati and Porter (2009) as follows:

$Pr(y = 1|x) = Pr(y = 1|x_1, x_2, x_3, \ldots . x_k$……..……..(3.1)

Where the dependent variable, OFSP preference represented by y, and the determinants represented by x.

The probability of knowing if y is equal to zero, i.e. when a consumer does not prefer the OFSP will be given by:

$P(y_i = 0|x_i) = 1 - \emptyset(x_{i\beta_i})$……...…..(3.3)

Where is the standard normal probability distribution function and are parameter estimates. Similarly, the probability of knowing if y is equal to one, i.e. when a consumer prefers the OFSP will be given by

$P(_{yi} > 0|_{xi}) = \emptyset(\ x_i\beta_i)$…….....(3.4)

Where is the standard normal probability distribution function and are parameter estimates.

The model has been specified as follows :

OFSP preference=β_0i + β_1iconnaissance notionnelles + β_2igenrre + β_3iéducation + β_4iprofession + β_5ienceinte + β_6irelation + β_7ietat matrimonial + β_8iconscient + β_9ipriseprise of decision + β_10iprice per unit + β_11igoût considéré + β_12iodeur considéré + β_13icouleur considéré + β_14inutri info considéré + β_15ivariété de OFSP considéré + ε_ii.....(3.5)

The second step was used to determine the effect of nutritional knowledge on OFSP purchase intensity. Purchase intensity was measured by the number of varieties of OFSP purchased by the respondent in one week. According to Burke (2009b), the expected value of y conditional on y > 0 is given by :

E $(y_t y_t >$ o,$x_t) = x_t\beta_t$…….…...(3.6)

Where is the expected quantity of OFSP purchased by the consumer per week, is the vector of explanatory variables including consumers' nutritional knowledge, socio-economic factors and sensory attributes of the product, and are the parameters of the estimates.

According to Gujarati and Porter (2009) the value can be estimated by a truncated regression specified as follows :

$y_i = \acute{x}_i\beta_i + \varepsilon_i$……..…….…..... (3.7)

Where all we do is observe and for the cases where = 1. This simply implies that consumers who did not make the preference to buy the OFSP have been truncated and not included in the second stage.

The specification of the implicit functional form of the model was as follows:

Quantity of OFSPpurchased =+nutritional knowledge +awareness +decision-making +profession +pregnant +marital status +relationship +alternative OFSP price +height +.....(3.8)

While the values of the coefficients of each explanatory variable in the two stages explain their respective likely influence on OFSP preference and purchase intensity, marginal effects are typically used in probabilistic studies to measure the true effect (Anderson *&* Newell*,* 2003). Therefore, marginal effects were calculated to estimate the true effects of changes in any explanatory variable on the predicted probability of preferring the OFSP as well as purchase intensity while holding the other explanatory variables constant.

Marginal effects that showed the effect of explanatory variables on OFSP preference were calculated based on Burke (2009b) and Stata Corp (2013) as follows:

$\frac{\partial E(y_{i|x_i})}{\partial x_j} = \beta_j$……..……...……..…..(3.9)

Where the change in the dependent variable (OFSP preference) is given by a change in the explanatory variable from probability and is an element of representing the coefficient.

Results

Descriptive Analysis

Descriptive statistics that include means and percentages for the level of nutritional knowledge, a set of socio-economic factors as well as the sensory attributes of the products are presented in Table 2.

Table 2: Description Data Analysis

Variables	Total Sample N=385	Participant OFSP N = 116	Non Participant OFSP N = 219	t-test
	Mean	Mean	Mean	
Knowledge of Nutrition Value	0.41	0.46	0.36	-1.07
Level of Decision Taking	0.42	0.46	0.39	-1.42
Price of Bread	887.53	881.92	891.78	-1.97
Education	0.81	0 .92	0.73	-2.67
Size of Household	3.09	2.90	3.23	1.93*
Age	42.21	41.55	42.71	0.87
Bread quantity purhcase	6,51	6,52	6,50	-0,08
	%	%	%	χ^2
Sex	92.73	41.30	51.43	4.04
Profession	31.69	13.51	18.18	1.00
Pregnant women	42.08	22.60	19.48	12.7*
Matrimonial status	44.16	19.22	24.94	0.02
Taste	64.68	30.39	44.29	28.14*
Odour	61.04	25.19	35.84	0.83
Colour	64.94	26.49	38.44	1.56
Nutritious	78.96	32.21	46.75	5.63*
Vine OFSP	56.88	23.64	33.25	0.5

As shown in the table, a sample size was 385 respondents which included 166 OFSP consumers and 219 non-ODSP consumers participated in the study.

A gender comparison showed that almost of the respondents (92.72%) who participated in the study were women. Furthermore, the proportions of respondents in the OFSP consumer group and the non-OFSP consumer group were not significantly different.

This implies that most female members of the household are involved in the food purchasing decision, in this case the purchase of OFSP. As noted by Pambo *et al.* (2014), female household members typically bear a large share of responsibility for food purchasing decisions. Thus, this probably implies that intervention programs aimed at improving the consumption of new foods such as OFSP should target more women than men.

The overall mean level of nutritional knowledge was 0.41, indicating that most of the respondents knew that OFSP was a rich source of vitamin A. Additionally, they understood the importance of vitamin A for the human body. However, it is important to note that the level of nutritional knowledge was lower among the non-ODSP consumer group (0.36).

Female OFSP consumers were better informed in both OFSP consumer categories. This implies that first, differences exist in OFSP preference decisions based on the level of nutritional knowledge. This further explains the differences observed in the quantity of OFSP purchased between the two groups. Consumers who purchased OFSP had a higher level of nutritional knowledge and therefore purchased larger quantities compared to other OFSP consumers. Second, female consumers who are primarily involved in household food purchasing, especially OFSP, are deprived of essential nutritional knowledge.

The results indicate that the overall average level of decision making on the variety and quantity of OFSP to purchase was 0.42, meaning that most consumers who purchased OFSP possessed power over purchasing decisions. of food. However, the level of decision-making was higher among OFSP consumers. This probably explains their preference for OFSP thus justifying an earlier argument by Amugsi *et al.* (2016) that individuals who had power over decisions about what foods were purchased, were likely to focus on achieving dietary diversity by considering nutritious foods.

Focusing on the age of respondents, an average of 42 years meant that most respondents were middle-aged. It is the most active stage of life where most people work or engage in business. The implication is that these consumer groups face time constraints that limit them to depend on retail outlets to purchase ready-to-eat foods such as OFSP (Senauer *et al*., 1986).

In addition, the results show that respondents had an average of 0.8 years of schooling, which means that the majority of them had some post-secondary education. The implication is that most OFSP consumers are able to gather information if promotional messages are presented through posters or broadcast media.

As shown in Table 1, half of the respondents were full-time employees and earning a salary, implying that they had the purchasing power to consume OFSP as well as other varieties. The average household size was 3 people, indicating that the inhabitants of Ntahangwa commune have relatively small families. Most of the respondents were married (44.16%), implying that they were likely to practice healthier eating habits noted by Haapala *et al.* (2012). Additionally, half of them were household heads, meaning they had power over food purchasing decisions, including OFSP. On the contrary, only a few households reported the presence of a pregnant

woman, or 42.08% of the overall sample.

More than 50% of respondents considered the attributes of OFSP; taste, smell, color, nutritional information and variety of PDCO when shopping. These results are consistent with those found by Naico and Lusk (2010), that OFSP preference depended on attributes that included taste, color and knowledge of health benefits. This implies that OFSP design should focus on improving these attributes in order to meet consumer tastes and preferences.

Effects of nutritional knowledge on preference and intensity of purchase of OFSP

Table 3 presents the results of the outcome equations of the dual-barrier or level model that estimated the effects of consumers' level of nutritional knowledge on the variety of OFSP preferred and the intensity of OFSP purchase.

Table 3: Determinants of preference and purchase intensity for OFSP

	Level 1		Level 2	
	OFSP preference		quantity of OFSP purchased	
Variable	**coef**	**p value**	**coef**	**p value**
level of nutritional knowledge	0.23618	0.000***	0.28969	0.000***
level of decision-making	0.1886	0.003***	0.09917	0.164
Education	0.06553	0.004***		
alternative unit price	0.0002	0.222	0.00023	0.211
Aware of the OFSP	0.28899	0.000***	0.3567	0.000***
household size			-0.0203	0.027**
Gender	0.09081	0.189		
Profession	0.10842	0.036**	0.13453	0.109
having a pregnant wife	0.38675	0.000***	0.5094	0.000***
status_matr	-1.7445	0.000***	-2.3642	0.000***
relationship with head of household	1.11117	0.000***	1.64213	0.000**

Note: *, ** and ***represent statistical significance of 10%, 5% and 1% respectively.

The first level shows the effects of nutritional knowledge as well as other factors on OFSP preference while the second hurdle shows the effects of nutritional knowledge as well as other factors on quantity of OFSP purchased (Table 3).

The level of nutritional knowledge was found to have a positive effect on consumer preference and purchase intensity of OFSP. There was a significant positive relationship between the level of nutritional knowledge and OFSP preference. A similar relationship was observed between the level of nutritional knowledge and the quantity of OFSP purchased. A unit increase in the level of nutritional knowledge possessed by a consumer increased the probability of preferring OFSP by 23.6% and increased the quantity of OFSP purchased by 28.96%.

The results further indicate that several other determinants were significant in either of the two levels of the two-level model. Firstly, the level of decision making had a positive effect on consumers' preference for OFSP. However, the same variable was found not to have an effect on the quantity of OFSP purchased by the consumer contrary to the hypothesis that it had a positive influence. A unit increase in the level of decision making increased the probability of a consumer preferring OFSP by 18.86%. This result implies that consumers who had greater power over decisions within the household were more likely to prefer OFSP.

Secondly, the number of years of formal education had a positive relationship. One more year of formal education increased the probability of preferring OFSP by 6.5%. Presumably, more years of formal education appear to increase choice options among vitamin A-rich foods as consumers acquire more information about the different varieties of these foods. As consumers acquire more knowledge specifically about the importance of vitamin A and the different sources, they are likely to change their diet by buying other varieties of food such as green leafy vegetables or fruit.

In line with the hypothesis of this study, having a pregnant woman in the household had a positive influence on a consumer's preference for OFSP. Similarly, it had a positive effect on the quantity of OFSP purchased. The marginal effect indicates that having a pregnant woman in the household increased the probability of preferring OFSP by 38.6%.

The results also show that household size has a negative influence on the quantity of OFSP purchased by consumers, confirming the hypothesis of the study. One less person in the household reduced the quantity of OFSP purchased by 2.03%. Contrary to the study's expectations, marital status had a negative effect on the quantity of OFSP purchased. This study did not anticipate that consumers who were married were more likely to purchase larger quantities of OFSP. Probably, one explanation for this is that food buying decisions, particularly the variety of OFSP, are strongly influenced by the tastes and preferences of other household members rather than the buyer's decision alone.

Salaried employment had a positive effect on the preference for OFSP. However, there was no effect on the

quantity of OFSP purchased by a consumer, contrary to the hypothesis of this study. Salaried employment means that a consumer earns an income, and therefore has Power. In fact, the study predicted that these consumers would buy more OFSP. Having a job increases a consumer's likelihood of preferring OFSP by 10.8%. These results are consistent with those found by De Groote *et al* (2010) that higher income consumers were likely to purchase nutritionally rich foods if all other factors were taken into account.

Psychosocial factors influencing the preference for and consumption of OFSP

The estimated results of the logit regression model were used to determine the psychosocial factors influencing preference for and consumption of OFSP. Table 4 shows an analysis of the aggregate descriptive statistics representing the entire sample.

Table 4: Estimates of psychosocial factors influencing preference for and consumption of OFSP

			Robust		
Preference	**dy/dx**	**Coef.**	**Std. Err.**	**Z**	**P>z**
alternative unit price	1.12E-06	1.53E-05	0.00145	0.01	0.992
take taste into account	0.0959883	1.310598	0.394919	3.32	0.001
Take the smell into account	0.0406357	0.554829	0.707037	0.78	0.433
take colour into account	-0.0743374	-1.01498	0.734133	-1.38	0.167
take account of information	0.083316	1.137573	0.272272	4.18	0.000
take account of variety	0.332334	4.537594	0.396725	11.44	0.000
_cons		-4.16373	1.283072	-3.25	0.001

The results displayed indicate that respondents were motivated to buy OFSP by 3 attributes which include varieties (sweet potato), good sensory attributes (good taste), taking into account the info and variety of PD. Most respondents considered the good sensory attributes of P D, followed by the varieties of PD.

Taking taste into account had a significant positive effect at the 1% level on preference and consumption of OFSP. Participants rated OFSP as sweet and appealing. Thus, consumers generally enjoy sweet-tasting products. Good sensory implies that the OFSP should be tasty, sweet and attractively coloured. To improve consumption of novel foods such as OFSP, attributes such as taste, sweetness or colour need to be attractive to consumers.

Just as consumers consider taste, they also pay attention to other information and to the attributes and nutritional aspects of OFSP. Thus, the preference and consumption of OFSP is linked to health aspects. The variety of OFSP is a food product that allows individuals to avoid falling ill. OFSP is therefore considered a health food. Furthermore, a healthy and strong individual is perceived as being able to work and earn an income. A similar argument was made by Pambo et al (2017).

This only implies that promotional strategies for new food products such as OFSP must ensure that the sensory attributes of the product, e.g. taste, colour and smell, are good enough to influence consumer preference and food consumption; as well as the health aspects.

Discussions

The preference and intensity of purchasing orange-fleshed sweet potato was determined by the level of knowledge in nutrition, level of decision-making, education, household size, occupation, having a pregnant wife, marital status.

The results showed that having the level of knowledge in nutrition has a positive and significant effect on the preference of OFSP. This would indicate that consumers who are aware of the existence and quality of PDCO are likely to purchase it. These results are consistent with the findings of Muzhingie *et al.* 2018, who reported a positive relationship between nutritional knowledge and consumers' WTP for OFSP juices.

The level of education has a positive effect on the preference of OFSP consumers. This is further empirical evidence for Pambo *et al.* (2018), which showed that the nutritional education intervention could lead to a positive change in consumer behavior towards the consumption of a product. These results are similar to those of Lubungu *et al.* (2012), who found that formal education was an important tool for using market information in Zambia thereby enabling consumers to diversify their food choices.

The level of decision making had a positive effect on consumers' preference of OFSP. This result implies that consumers who had greater power over decisions within the household were more likely to prefer OFSP. A possible explanation for this is that the ability to make decisions reduces the preference reduction that can be made by a consumer. These results confirm those of Amugsi *et al.* (2016) that if individuals have some decision-making power over what foods are purchased, they are likely to focus on achieving dietary diversity, thereby increasing the likelihood of purchasing nutritious foods.

Having a pregnant woman in the household had a positive influence on a consumer's preference for OFSP. Likewise, it had a positive effect on the quantity of OFSP purchased. Vitamin A is an important supplement to the diet of pregnant women and young children (CIDP, 2018). This may be the reason for the observed positive effect.

The results also show that household size has a negative influence on the quantity of OFSP purchased by consumers. This means that smaller households require smaller quantities of food compared to larger households.

This result is similar to that of Etumnu (2016), who concluded that a decrease in household size decreases the quantity of OFSP roots consumed.

Occupation had a positive effect on PDCO preference. This result means that a consumer earns income, and therefore has power. Indeed, the study predicted that these consumers would purchase more OFSP. These results correspond with those found by De Groote *et al.* (2010) that consumers with higher incomes were likely to purchase nutritionally rich foods if all other factors were taken into account constant.

An increase in education level has a positive effect on consumers' preference for OFSP because it is higher level consumers who are likely to be able to understand the nutritional benefits in terms of vitamins from OFSP. This result is consistent with the findings of Nkokelo, 2016, who reported that education level had a positive and significant influence on consumers' WTP for OFSP bread, flour and biscuits.

Conclusion

The results of this study confirm the importance of nutritional knowledge and psychosocial factors on OFSP preference and consumption. Nutritional knowledge has a positive effect on OFSP preference. This study concluded that increasing consumers' nutritional knowledge has a positive influence on the consumption of OFSP. Similarly, nutritional knowledge had a positive effect on the quantity of OFSP purchased. This provided evidence that consumers buy and consume more OFSP if they know it contains vitamin A and understand its importance in the human body. In general, increasing levels of consumer nutritional knowledge will increase consumption rates of OFSP. The fact that consumers who considered both the taste of OFSP and the nutritional information were unlikely to prefer OFSP. It was concluded that the taste of OFSP should be improved while more nutritional information should be provided on this variety.

On psychosocial factors, this study concluded that certain ultimate life goals, including staying healthy, long life, happiness, freedom, being responsible, achieving prosperity and good social status motivate consumers' decision to buy and consume OFSP. The attributes of OFSP which include good sensory attributes (good taste), variety of OFSP are means to achieve life goals.

Recommendations

Based on the results and conclusions of this study, recommendations, possible policies and interventions can be proposed. Promotional efforts are needed for OFSPto emphasise the nutritional benefits, particularly as a source of vitamin A. Commercial producers and sellers of OFSP should develop promotional messages based on the superior attribute of pro-vitamin A, to increase consumption rates.

Information on the OFSP and therefore on the nutritional content must be provided clearly either via promotional campaigns by OFSP vendors such as Foodservice and other retailers.

Acknowledgements

The authors would like to thank the authorities of the Ntahangwa commune of the city of Bujumbura for agreeing to do our research on the preferences and purchasing intensity of orange-fleshed sweet potatoes. We also thank the consumers in this locality who opened their doors to us and took their time to answer questions and the reviewers for their suggestions to improve this article.

References

Amugsi, D.A., Lartey, A., Kimani-Murage, E., & Mberu, B.U. (2016). Participation des femmes dans la prise de décision des ménages et une plus grande diversité alimentaire : résultats données représentatives du Ghana. Journal de la santé, de la population et de la nutrition, 35 (1), 16-30

Bocher, T., Sindi, K., Muzhingi, T., Nshimiyimana, J.C., Nzamwita, M., & Low, J. (2019). Investigating consumer preferences and willingness to pay for an orange flesh candy potato juice (OFSP) in Rwanda. Open Agriculture, 4(1), 227-236.

Burke, W.J. (2009b). Fitting and interpreting Cragg's Tobit alternative using Stata.

Burke, W.J., Myers, R.J. & Jayne, T.S. (2015). A three-barrier production model and participation in the Kenyan dairy market. American Journal of Agriculture Economics, 97(4), 1227-1246.

CIDP- County Integrated Development Plan 2018-2022 working Draft Nairobi City County [Internet]. [cited 2023 Apr 18].

Cragg, J.G. (1971). Some statistical models for limited dependent variables with application to the demand for durable goods. Econometrics, 39(5), 829-844.

De Groote, H., Chege, CK, Tomlins, K. & Gunaratna, N.-É. (2014). Combiner expérimental ventes aux enchères avec un test d'utilisation à domicile modifié pour évaluer l'acceptation de la qualité par les consommateurs ruraux le maïs protéique, une culture biofortifiée. Qualité et préférences alimentaires, 38, 1-1

Etumnu, C.E. (2016). Déterminants comportementaux de l'acceptation des aliments biofortifiés: le cas de Patate douce à chair orange au Ghana. Présenté au Concours Agricole & Appliqué 2016

Greene, W.H. (2003). Econometric analysis. Delhi: Pearson Education Publishers.
Gujarati, D.N. & Porter, D.C. (2009). Basic econometrics. (5th ed.). New York, NY: McGraw Publishers.
Holloway, G., Barrett, C. & Ehui, S. (2001). The double hurdle model in the presence of Fees. Applied Economics and Management Working Paper, Cornell University.
International Potato Centre (CIP). (2017). Facts about biofortification. Retrieved from http://cipotato.org/sweetpotato/facts.
Jones, K.M. & de Brauw, A. (2015). Using agriculture to improve child health: Promoting orange sweet potatoes reduce diarrhoea. World Development, 74, 15-24.
Laurie, S., Faber, M., Adebola, P. & Belete, A. (2015). Biofortification of sweetpotato for food and nutrition security in South Africa. International Food Research, 76, 962-970.
Lind, L.W. (2007). Consumer involvement and perceived differentiation of different types of pork - a medium-fine chain analysis. Food Quality and Preference, 18(4), 690-700.
Low, J., Ball, A., Jaarsveld, P.J., Namutebi, A., Faber, M. & Grant, F.K. (2015). Assessing nutritional value and behavioural change in orange-fleshed sweetpotato use in sub-Saharan Africa.
Low, J.W., R.O. Mwanga, M. Andrade, E. Carey & A.M. Ball (2017). Tackling vitamin A deficiency in biofortified sweetpotato in sub-Saharan Africa. World Food Security, 14,23-30
Lubungu M, Chapoto A & Tembo A, 2012. Participation des petits exploitants agricoles à l'élevage marchés : le cas des agriculteurs zambiens.
McFadden, D. (1978). Modelling residential location choice. Transportation Research.
Muzhingi T, Owade JO, Abong GO, Okoth MW, Heck S, Low J et al., Sen-sory attributes of composite breads from shelf storable orange-fleshed sweetpotato puree. Open Agric 3:459–465 (2018).
Nkokelo U, Consumer Acceptability and Willingness to Pay for Selected Pro-cessed Orange Fleshed Sweet Potato Products in Morogoro Municipality [MS Thesis]. Sokoine University of Agriculture, Tanzania (2016).
Okello, J.J., Lagerkvist, C.J., Muoki-Kingori, P., Heck, S. & Prain, G. (2016). Combining sensory evaluation and mental models in assessing consumer preferences for and choice of healthy products.
Okello, J.J., Sindi, K. & Low, J. (2014). Consumer perceptions and demand for biofortified sweet potato biscuit products: The case of Akarabo golden power biscuit in rwanda.
Pambo, KO, Okello, JJ, Mbeche, RM, Kinyuru, JN & Alemu, MH (2018). Le rôle d'informations produit sur l'évaluation sensorielle, les attentes, les expériences et émotions des petits pains à la farine de cricket.
Sommer, A. & Davidson, F.R. (2002). Assessment and control of vitamin A deficiency.
UNICEF. (2019). The state of the world's children 2019: Children, food and nutrition: Growing up well in a changing world. New York: United Nations Children's Fund.
Wambugu, S.N., Okello, J.J., Nyikal, R.A. & Shiferaw, B. (2009). The effect of social capital on the performance of smallholder farmer organizations: the case of groundnut farmers in western Kenya.
Wanjuu, C., Bocher, T., Low, J., Mbogo, D., Heck, S. & Muzhingi, T. (2019). Consumer knowledge and attitude towards orange-fleshed sweet potato mash bread (OFSP) in kenya.
Worsley, A., Wang, W.C., Yeatman, H., Byrne, S. & Wijayaratne, P. (2016). Does health and home economics education at school influence adults' food knowledge?