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Consumers' willingness to pay for organic beans in southwest Nigeria: towards food safety

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ABSTRACT

Minimizing the health dangers associated with consuming inorganic staple food crops due to residues from pesticide and herbicide usage is a reasonable pathway to ensure nutrition security. Therefore, an extensive knowledge of consumers' interest in organic foods would be a useful complementary strategy to public health interventions. This study examines consumers' willingness to pay for organic beans in southwest Nigeria. Primary data were collected from 180 shoppers of beans. The data were analysed with descriptive statistics and a logistic regression model. Consumers were willing to pay for organic beans if the premium was not more than ₦601.76 (USD 1.58) for 2 kg of organic beans. The significant factors influencing the consumers' willingness to pay for organic beans were gender, access to food safety information, acquaintance with organic products, monthly income, and nutritional knowledge of the food planner. Meanwhile, taste/palatability, freshness, appearance, safety, nutritional value, hygiene, and environmental friendliness were highly ranked when buying beans compared to price and convenience. Therefore, any welfare programme involving the introduction of organic beans in Nigeria should ensure that the premium should not be greater than ₦601.76. Also, policies aimed at improving food safety, and nutritional knowledge should be put in place by the government.

1. Introduction

Organic farming contributes significantly to social well-being through healthy community development. Organic farming avoids harm such as water contamination, pandemics associated with conventional agriculture, biodiversity erosion, food scares, and pesticide poisoning, leading to the death of people (Muhammad et al. 2016). Organic agriculture is based on the sustainability of the agroecosystem, involving farming activities that enhance agroecosystem health, soil biological activity, and sustainable biological cycles (James et al. 2019; Phillip and Dipeolu 2010). It does not use herbicides, chemical fertilizers, synthetic pesticides, gene manipulation, antibiotics, or growth hormones; instead, it employs techniques that aid pollution reduction and ecosystem sustainability (Saleki et al. 2019; Oyawole et al. 2016). It supports the environment by avoiding the use of pesticides, inorganic fertilizers, and other chemically related inputs in agricultural production. Continuous use of pesticides and fertilizers results in the deterioration of the environment, soil health and nutrient imbalance (Vats et al. 2012). Organic farming is currently gaining global recognition in terms of the role it plays in providing safe food and income. Although organic farming is characterised by low yield (Dobbs and Smolik 1996; Pham and Shively 2019), the high premium tag makes up for the low yield recorded among farmers (Delate et al. 2003; Delbridge et al. 2011).

Consumers are showing serious concerns about the safety of the food they consume, which influences them to try to source organic food (Alphonce and Waized 2020; Joya et al. 2022; Kumar et al. 2018; Ortega and Tschirley 2017). They have become more concerned about food quality due to pesticide and fertilizer residuals and contamination of conventional agriculture. Consumers buy organic foods due to the perception that it is healthy, safe, and environmentally friendly (Krissof 1998; Güney and Giraldo 2019). For example, older people may want to purchase organic products because they are cautious about what they eat for health reasons (Falola 2014). Globally, policymakers are more concerned about the production and consumption of organic products due to food safety and environmental quality (Owusu and Anifori 2013). The consumption of organic food could help prevent some health problems, such as cancer and allergic diseases, related to the consumption of conventional food (Owusu and Anifori 2013).

One of the most widely consumed legumes by people and livestock is cowpea (*Vigna unguiculata*), commonly called beans in Nigeria. Beans have many nutrients, which leads to high consumption rates, as well as being a major source of protein in Nigeria, as animal sources of protein such as meat and fish are expensive. They are also rich in zinc, phosphorus, potassium, calcium, folate, iron, B-vitamins and fibre, but low in fat content. Human nutrition studies have revealed that eating beans has both nutritional and health benefits (Curran 2012; Sichilima et al. 2016). For example, it can prevent heart disease, lower blood cholesterol and control constipation, colon cancer, and obesity

(Akibode and Maredia 2012). Thus, beans are very crucial to a wide range of consumers, including both poor and rich households, pregnant women, adults, and infants (Sichilima et al. 2016).

However, the production of beans largely depends on the use of insecticides and other chemical inputs. The use of insecticides, pesticides, fertilizers, and herbicides in the production of beans results in health risks and environmental problems that can be averted by the organic production of beans. Recently reported dangers related to consuming conventional beans due to residues from pesticides and herbicide usage have increased the search for organic beans worldwide. Conventionally produced beans sold in the market pose food safety risks to consumers, such as microbial pathogens, fertilizers, and pesticide residues. This makes the larger global population, especially in developed nations, more concerned about their food safety and an increased desire to consume foods free from any chemical substances.

Minimising health dangers related to consuming inorganic staple food crops due to residues from pesticide and herbicide usage is a reasonable pathway to ensure nutrition security. Therefore, an extensive knowledge of consumers' interest in organic foods would be a useful complementary strategy to public health interventions. In order to formulate relevant policies on the consumption of organic beans, there is a need to assess consumers' willingness to pay (WTP) for such beans. However, studies on WTP for organic food has largely been focused on vegetables with no focus on beans (Ajibade et al. 2017; Bhavsar et al. 2018; Güney and Giraldo 2019; James et al. 2019; Narine et al. 2015; Owusu and Anifori 2013; Oyawole et al. 2016; Phillip and Dipeolu 2010; Saleki et al. 2019). The studies showed that consumers are aware of organic vegetables and are willing to pay for them. Furthermore, education, awareness, income and bid price have been reported to influence consumers' willingness to pay for organic vegetables (Adekunle et al. 2016; Ajibade et al. 2017; Owusu et al. 2013; Oyawole et al. 2016). But awareness and willingness to pay for organic beans has received little or no attention in the literature. This creates a gap in WTP for organic food literature.

This study, therefore, aims to assess consumers' WTP for organic beans in southwest Nigeria. Specifically, the study sought to (i) investigate the quality attributes consumers desire in organic beans; (ii) assess the WTP for organic beans; (iii) estimate the premium consumers are willing to pay, and (iv) determine the factors influencing WTP for organic beans by the consumers. Since there is a huge potential in the local organic industry, this research will be of importance to agricultural marketers who may decide to offer organic foods to the domestic market in the future. The outcome would also be useful to relevant stakeholders, such as farmers, food vendors and retailers, to help build consumer confidence in general. Besides, this study could assist policy-makers with agricultural and public health intervention strategies, especially in the pursuit towards achieving food security in terms of quality and nutrition.

2. Materials and Methods

2.1. Study area

The study was conducted in Ogun State, located in southwest Nigeria. The state is primarily agrarian and lies within longitudes 20°45'E and 3°55'E and latitudes 70°1'N and 7°58'N in the tropics, with a landmass of 16,762 km^2. The mainstay of the state is agriculture. The common food crops produced in the state are rice, beans, maize, yam, and cassava. The state has twenty local government areas (LGAs), among which the populace of Abeokuta South and Odeda LGAs are commonly known for the marketing of food crops. Of prominence among the food crop markets are the Eleweran and Kuto markets, which are renowned for the marketing of beans in large quantities in Abeokuta South and Odeda LGAs, respectively.

2.2. Sampling procedure and data collection

The target population of interest for this study was made up of consumers (shoppers) of beans in the study area. This research employed a three-stage sampling procedure. The first stage was a purposive selection of Abeokuta South and Odeda LGAs as being renowned for the marketing of food crops in the state. In the second stage, the two markets renowned for the marketing of beans in the LGAs—Eleweran and Kuto markets—were purposively selected. Then, systematic random sampling technique was used to select respondents in each market at purchase points. Every fourth buyer was sampled and interviewed. The substitution method was used in the case of rejection by a potential respondent. Ninety (90) respondents were chosen from each of the two markets, making a total of 180 respondents, which were used for the study.

Primary data were sourced from the bean buyers through pre-tested questionnaires. Data collected include the respondent's socioeconomic profile, perception and ranking of quality attributes consumers desire in market beans, willingness-to-pay (WTP) for such beans, and amount willing to pay.

2.3. Data analysis

This study employed the contingent valuation method to examine consumers' WTP for organic beans. Bean shoppers were asked if they are willing to pay a price or not. Those willing to pay were further asked to specify the highest amount they were willing to pay for organic beans.

Descriptive statistics such as frequency, percentage, mean, and bar charts were used to explore the socio-economic characteristics of the bean shoppers, the importance of quality attributes to them and the importance of price on consumers' decision to pay for organic beans. It was also used to determine the average amount they would be willing to pay and major constraints to WTP for organic beans by the unwilling shoppers.

The mean WTP was expressed as:

$$MWTP = \frac{I}{n}\sum_{i=1}^{n} y_i$$

Where n= total number of respondents willing to pay, y_i= willingness to pay for consumer i (amount).

The logistic regression model was used to investigate the driving factors of the buyers' WTP for organic beans. This was used because the decision to pay for organic beans was dichotomous and it has been employed in previous studies (Narine et al. 2015; Oyawole et al. 2016; Xu et al. 2018). The explanatory variables in the model were selected based on previous studies on WTP (Falola 2014; Narine et al. 2015; Owusu and Anifori 2013).

The model is explicitly expressed as follows:

$$Y_i = \beta_0 + \beta_1 G + \beta_2 A + \beta_3 E + \beta_4 HS + \beta_5 I + \beta_6 M + \beta_7 OP + \beta_8 FSI + \beta_9 IP + \beta_{10} NK + e_i$$

Where:

Y_i= WTP for organic beans (yes= 1, no= 0)

G= Gender of the buyer (female= 1, male= 0)

A= Age of the buyer (years)

E= Educational attainment (years of successful schooling)

HS= Household size

I= Average monthly income (amount in naira)

M= Membership of social organization (member= 1, not a member= 0)

OP= Acquaintance with organic products (yes= 1, no= 0)

FSI= Access to food safety information (yes= 1, no= 0)

IP= Importance attached to price (very important= 4, fairly important= 3, less important= 2 and not important= 1)

NK= Nutritional knowledge of food planner (very high= 4, high= 3, low= 2, very low= 1)

β_0= Constant

$\beta_{1\text{-}10}$= Coefficient

e_i= Error term

3. Results and Discussion

3.1. Socio-economic characteristics of the beans shoppers

Table 1 presents the socio-economic profile of the bean shoppers. Most of the respondents were females. This seems to suggest that more females shop for beans than males. The shoppers were, on average, 39 years, showing they are middle-aged where they might have knowledge about food safety (Falola et al. 2022). The majority of the shoppers had one form of formal education or another. A high level of formal education could enable them to have in depth knowledge about organic food and its health benefits. The larger proportion (58.3%) of the respondents were married, while 26.1% were single. Others were either widowed or divorced. About two-thirds of the shoppers had household sizes ranging from one to five people, while about one-third had between six and ten people in their households. Further analysis revealed that the mean household size of the respondents was about five people. The majority of the shoppers were members of social organizations, which could influence their willingness to pay, as cooperative societies disseminate useful information to their members (Mukaila et al. 2022). The majority of the bean shoppers were acquainted with organic

Table 1. Socioeconomic characteristics of the beans shoppers

Variable	Category	Frequency	Percentage
Gender	Male	54	30.0
	Female	126	70.0
Age (years)	≤ 30	69	38.3
	31-40	46	25.6
	41-50	35	19.4
	51-60	25	13.9
	> 60	5	2.8
Educational level	No education	12	6.7
	Primary	8	4.4
	Secondary	17	9.5
	Tertiary	143	79.4
Marital status	Single	47	26.1
	Married	105	58.3
	Divorced	5	2.8
	Widowed	19	10.6
	Separated	4	2.2
Household size	1-5	113	62.8
	6-10	67	37.2
Occupation	Studentship	21	11.7
	Artisanship	72	40.0
	Trading	39	21.6
	Civil service	48	26.7
Employment status	Student	22	12.2
	Full-time employed	89	49.4
	Part-time employed	6	3.3
	Self-employed	57	31.7
	Retired	6	3.3
Social organization	Yes	158	87.8
	No	22	12.2
Acquainted with organic product	Yes	154	85.6
	No	26	14.4
Food safety information	Yes	138	76.7
	No	42	23.3
Monthly income (₦)	≤ 30000	29	16.1
	30000-40000	48	26.7
	40000-50000	54	30
	50000-60000	21	11.6
	≥60000	28	15.6

products and had knowledge about food safety. The finding that consumers, who have access to information on food safety, are more concerned about the quality of beans they consume reveals the importance of providing credible information on food safety to consumers. The distribution of the respondents according to their monthly income shows that the majority of the shoppers earned more than ₦30000 (USD 78.62), which is the minimum monthly salary in the Nigerian civil service.

3.2. Importance of quality attributes to the beans shoppers

Figure 1 shows the ranking of the importance attached to organic beans bought from markets by the shoppers. From Figure 1, it can be deduced that taste and palatability, freshness and good appearance, safety and health, nutritional value, hygiene, and environmental friendliness are highly ranked when buying in markets compared to price and convenience. Investigations during the survey revealed that the majority of consumers use different kinds of signs to indicate food safety during the purchase. Their concern about food safety can influence their willingness to pay for organic food as it is safer than conventional foods produced using chemical inputs. According to Bhavsar et al. (2018), consumers are changing their food consumption patterns due to concerns about their health and food's nutritional value. These results indicate that consumers are aware of the desirable qualities and nutritional value of healthy food products.

3.3. Willingness-to-pay for organic beans by the beans shoppers

This section examines the level of WTP for organic beans by the shoppers. Table 2 shows the consumers' WTP, the amount they were willing to pay and how much more they are willing to pay. It is worthy of note that the bags of beans sold in the various market segments vary in weight and size; however, they use a common measuring pan for the consumers. In most of the markets, a full measuring pan weighing 2 kg of beans (Ife brown-IT-288) sells at ₦450 (USD 1.18). Meanwhile, consumers were willing to pay ₦601.76 (USD 1.58) on average for the same measure (2 kg) of organic beans. The majority (87.6%) of the shoppers were willing to pay for organic beans in the markets. Further analysis of the results revealed that the mean WTP for a 2 kg bag of beans was ₦601.76 (USD 1.58) for the organic beans. The analysis also revealed that 57.1% of the willing shoppers could pay more than the mean WTP. However, only 1.3% of the willing shoppers were willing to pay above ₦1000 (USD 2.62).

Table 2. Consumers' willingness to pay and amount willing to pay

Variables	Category	Frequency	Percentage
Willingness-to-pay	Yes	156	87.6
	No	24	12.4
Amount willing-to-pay (₦)	500-700	113	72.4
	800-1000	41	26.3
	> 1000	2	1.3

3.4. Major constraints to WTP for organic beans by the unwilling shoppers

Table 3 shows the results of the investigations made to understand why some (13.3%) of the shoppers were not willing to pay for organic beans, if available. The major constraint limiting the unwilling shoppers from buying organic beans in the study area was authenticity The shoppers argued that organic foods were credence goods. In other words, they stated that they could not differentiate between organic beans and conventional ones. This was reported by 37.5% of the unwilling respondents, representing 5% of all the shoppers interviewed. Another reason given by the non-willing consumers in the study area was the long distance to purchase points, as given by 33.3% of the unwilling shoppers. Twenty-nine per cent of the unwilling shoppers complained that organic products were usually expensive and that if organic beans were introduced in the study area, they would be difficult to afford.

Table 3. Major constraints to WTP for organic beans by the unwilling shoppers (n= 24)

Factors	Frequency	Percentage
Authenticity	9	37.5
Long-distance to purchase point	8	33.3
High price	7	29.2
Total	24	100

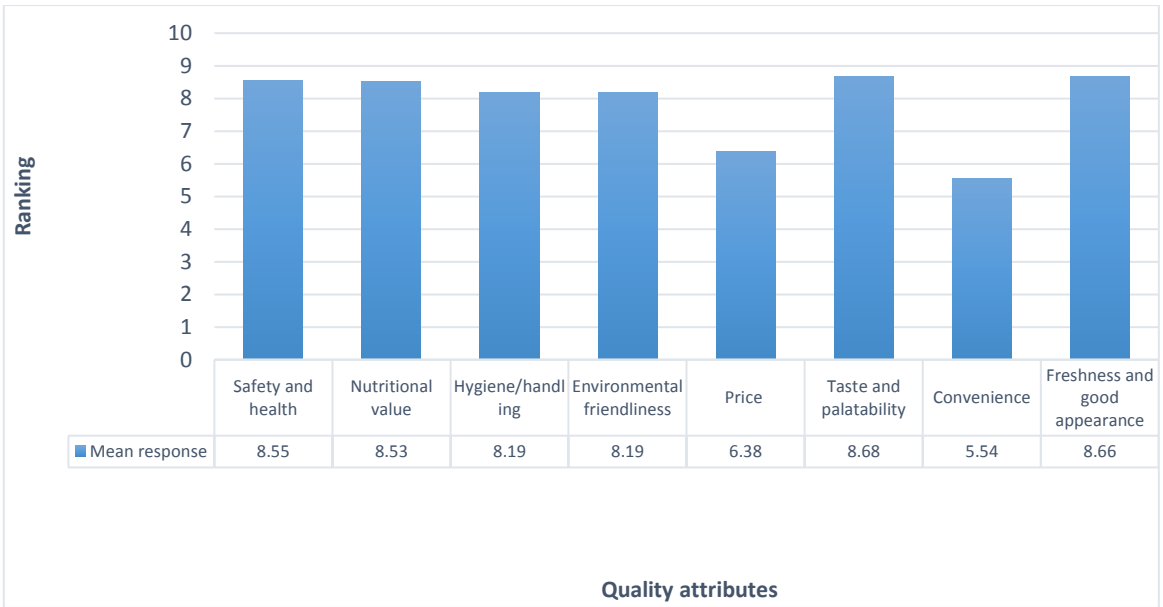

Figure 1. Ranking of desirable attributes of beans.

3.5. Importance of price on consumer's decision to pay for organic beans

The importance attached to price could have an important influence on consumers' interest in organic food. Table 4 shows the distribution of the buyers according to the importance they attached to price in their decision. In evaluating the shoppers' decisions according to price factors, a large proportion (60%) of the consumers did not consider price to be an important factor in their decision to pay for organic beans. They reported that health benefits and food safety mattered to them more than price. Just 5% considered that price was very important in their decision to pay for organic beans. This finding indicates that consumers are becoming more conscious of the health-related dangers associated with the consumption of inorganic foods than the prices of organic ones. This supports Alphonce and Waized (2020), Joya et al. (2022), Kumar et al. (2018), and Ortega and Tschirley (2017), that consumers are concerned about the health implications of the food they eat.

Table 4. Importance of price on consumer's decision to pay for organic beans

Variables	Frequency	Percentage
Very important	9	5.0
Fairly important	20	11.1
Less important	43	23.9
Not important	108	60.0
Total	180	100

3.6. Determinants of consumers' willingness to pay for organic beans

Table 5 presents the results of the logistic regression employed to investigate the factors influencing buyers' WTP for organic beans. The chi-square of 149.91 (with $P<0.0000$) obtained in this study indicates that the variables included in the model were significant. The likelihood function of the model was negative and close to zero (-16.76916); all of these suggest that the model has a good fit. The results in the table show that six of the ten hypothesized independent variables influenced the probability of paying for organic beans by consumers. The independent variables that influenced the respondents' WTP for organic beans were gender, age, monthly income, acquaintance with organic products, access to food safety information, and nutritional knowledge of the food planner.

The coefficient of the respondents' gender is positive and significant. This probably means that being of the female gender increases the probability of WTP for organic beans. This could be because women are more knowledgeable about food safety and are in charge of food and nutrition in the household, especially in developing countries. This supports the findings of Narine et al. (2015), that being a female enhances WTP for organic food.

The age of the shoppers positively influenced their WTP for organic beans. This suggests that older shoppers are willing to pay for organic beans. This is in tandem with the findings of Falola (2014), who reported that older people are willing to pay for organic food. Older people are more concerned about their safety, probably due to the reduction in their immune system as they advance in age (Falola 2014).

Average monthly income was also significant and directly influenced WTP for organic beans in the study area. All things being equal, buyers with higher incomes are more likely to have a greater capacity to pay a higher price for safe foods than their counterparts. Adekunle et al. (2016) and Narine et al. (2015) reported a similar finding that consumers' WTP for organic food increases parallel to income.

Also, acquaintance with organic products had a positive effect on consumers' WTP for organic beans. The result implies that respondents who are acquainted with organic products were willing to pay for organic beans in the markets. Consumers that are acquainted with organic products would know the importance and benefits related to consuming organic food products.

Access to food safety information also had a positive relationship with WTP for organic beans. This implies that an individual that has access to food safety information and is concerned about their safety in terms of food consumption is likely to pay for organic beans. This could be because such consumers are likely to be aware of the health hazards related to unwholesome conventional foods. This conforms with the findings of Owusu and Anifori (2013) who reported that concern about food safety and awareness influenced the consumers' WTP for organic food.

Table 5. Determinants of willingness to pay for organic beans by the respondents

Variables	Coeff	Std. error	t-value	p-value
Gender	0.3428**	0.1678	2.04	0.043
Age	0.0253*	0.0134	1.89	0.057
Educational level attained	0.0130	0.0219	0.59	0.554
Household size	-0.0704	0.0987	-0.71	0.476
Monthly income	3.95e06**	1.69e-06	2.34	0.020
Membership in social organization	-0.1697	0.2004	-0.85	0.398
Acquaintance with organic products	1.4772***	0.2129	6.94	0.000
Access to food safety information	0.9365***	0.3225	2.90	0.004
The importance attached to the price	-0.0884	0.0765	-1.16	0.249
Nutritional knowledge of food planner	0.0276**	0.0139	1.99	0.048
Constant	-2.4986	1.0282	-2.09	0.038
Chi^2 (10)= 149.91				
Prob>chi2= 0.0000				
Log-likelihood= -16.76916				
Pseudo R^2= 0.817				

*** ($P<0.01$), ** ($P<0.05$) and * ($P<0.1$)

Nutritional knowledge of the food planner of a household also positively and significantly influences WTP for organic beans in the markets. The result suggests that households whose food planners have a high level of nutritional knowledge will be more willing to buy organic beans because of their nutritional value than those whose food planners have a low level of knowledge. The knowledge of the health benefits of organic foods influenced consumers' WTP (Narine et al. 2015).

4. Conclusions

Minimising health dangers related to consuming inorganic food crops due to residues from chemical fertilizers, pesticides, and herbicide usage is a reasonable pathway to ensure food safety. Therefore, understanding consumers' interest in organic foods would be a useful complementary strategy to public health interventions. This study examined the willingness of consumers to pay for organic beans in southwest Nigeria. From the findings, it can be concluded that the bean shoppers were aware of the potential nutritional safety of organic products, and the majority of the consumers would be willing to pay for organic beans if available. Thus, organic food products are safe for consumption and their production would improve consumers' health. The study further revealed that gender, age, monthly income, acquaintance with organic products, access to information on food safety and nutritional knowledge of food planners were the major factors affecting consumers' WTP for organic beans. This study also showed that taste and palatability, freshness and good appearance, safety and health, nutritional value, hygiene, and environmental friendliness are highly ranked when buying beans in the markets compared to price and convenience. The major constraint to WTP for organic beans was the authenticity of the produce.

From the findings, it is recommended that any food safety and welfare programme involving sales of organic beans in the Nigerian markets, especially in the study area, should ensure that the premium should not be greater than ₦601.76 (USD 1.58). A designated special shopping mall or market where only organic foods are sold would help to curb the problem of distinguishing organic products from conventional foods. It is also recommended that policies aimed at improving households' access to food safety information and nutritional knowledge of the household's food planner should be put in place by the government and other relevant nutrition security agencies. This may involve educating people on food safety through enlightenment programmes. Besides, people should be informed about the importance of, and create awareness about, organic products. In the same vein, universities and other training institutes could also include food safety and nutrition security in their programmes.

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