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## **Consumers' Perception and Willingness to Pay for Organic Leafy Vegetables in Urban Oyo State, Nigeria**

**Oluwakemi Adeola Obayelu<sup>1\*</sup>, Ololade Modupeola Agboyinu<sup>1</sup>  
and Bola Amoke Awotide<sup>2</sup>**

<sup>1</sup>*Department of Agricultural Economics, University of Ibadan, Nigeria.*

<sup>2</sup>*International Institute of Tropical Agriculture, Ibadan, Nigeria.*

### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author OAO designed the study, wrote the protocol and the first draft of the manuscript. Authors OAO and OMA performed the statistical analyses and managed the literature searches and the analyses of the study. Author BAA also managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Recent development of widely reported incidents of dangerous levels of pesticides in food, fertilizer contamination of ground water and the occurrence of livestock diseases attributable to the production methods of large scale agriculture have stimulated the demand for organic food. Food safety is also gaining prominence in developing countries as more and more people desire to consume chemical free foods. This study therefore assessed consumer's perception of food safety standards and willingness to pay (WTP) for organic vegetables in Oyo state, Nigeria. Data were obtained from two hundred respondents through a multistage sampling procedure using the contingent valuation method and were analysed using descriptive statistics, principal component analysis and the logit model. Results showed that majority (87%) were in their economic active age ( $\leq 50$  years) and 73% of the respondents had prior knowledge of organic vegetables. Furthermore, about 58% of the consumers preferred organic fluted pumpkin (Ugwu) to other organic vegetable probably owing to their awareness of the health advantages and nutritional constituent of the vegetable. The results of the principal component analysis showed that 49 percent of the respondents had information (awareness) about organic

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\*Corresponding author: Email: [jkemmyade@yahoo.co.uk](mailto:jkemmyade@yahoo.co.uk)

leafy vegetables. The logistic model showed that employment status, price, health benefit and label had positive relationship with WTP for organic vegetables while gender and household size had a negative relationship with WTP.

*Keywords: Consumers awareness; safety standard; Willingness to pay; Organic vegetables.*

## 1. INTRODUCTION

The use of chemicals in vegetable production has been identified as a major source of health risk such as abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin dermatologic conditions, cancer, depression and eye problems [1,2] as well as a cause of extensive environmental damage. Food safety, is therefore, a major concern as many vegetable farmers inappropriately use toxic pesticides at pre and post-harvest stages and this threatens the health of the farmer and consumers as well as contaminating the environment [3]. Organic production systems are premised on specific and precise standards of production which seeks to attain optimal agro-ecosystems which are socially, ecologically and economically sustainable [4]. It avoids the use of synthetic pesticides, herbicides, chemical fertilizers, growth hormones, antibiotics or gene manipulation. Instead, organic farmers use a range of techniques that help sustain ecosystems and reduce pollution. It dramatically reduces external inputs by refraining from the use of chemo-synthetic fertilizers, pesticides and pharmaceuticals. Instead, it allows the powerful laws of nature to increase both agricultural yields and disease resistance [5].

Consumers' worry over health and environmental degradation has raised their demand for organic food products [6]. The demand for organic products has received a boost in recent years with the increase in the value of the world organic market to 59 billion US\$ in 2010, attributed mainly to the growth in the United States of America (USA) and many European countries [7] which represents 96 percent of global revenues. The high degree of sales concentration highlights the disparity between production and consumption indicating that most organic food production in regions such as Africa and Latin America is export-gearred. In the USA, organic foods being the largest segment of organic grew by 20.5% in 2006 and accounted for \$16.7 billion in consumer sales. Driven by consumer choice, the organic industry grew by 9.5 percent overall in 2011 to attain \$31.5 billion in sales. Of this, the organic food and beverage sector was valued at \$29.22 billion [8,9].

On the other hand, the African market for organic products is under-developed and the general lack of large domestic organic markets in the continent seems to make commercial organic agriculture a high risk, as it strongly relies on export markets. Certified organic products are currently recognized in only a few domestic markets, excluding Nigeria [10]. In Nigeria, The share of organic agricultural land in the nation is less than one percent and is not ranked among the ten African countries with the most organic agricultural land in 2010 [11]. However, organic agriculture has existed by default in the country because of the unavailability and sparse use of chemical inputs by farmers, other adopt the use of animal droppings as manure [12]. Non-certified organic systems (indigenous models that follow organic principles by intent or by default) of several million small farmers may represent at least an equivalent share in subsistence agriculture of developing countries [13] including Nigeria.

Studies abound that show that the organic crops are more expensive than their inorganic counterpart. According to Barkley [14], the production, distribution and marketing of organic

food is more costly than conventional food because of the costs of segregation of organic products. Also, the market of organic products is growing as the number of people willing to eat organic food and pay premium price is increasing. The future agriculture will, to a large extent, also depend on customer demand of organic and their motive for paying extra price for organically grown food. Thus, a customer-oriented approach to understanding the market for organic products is important for pursuing better management of organic farming. However, this is a complex process, which is determined by factors such as quality production, certification, infrastructure and environment and policies [15].

Consumers' awareness of food safety information has been recognized as a germane policy tool in food demand analysis [16]. The knowledge about the effect of food consumption on human health, increasing awareness of food-borne diseases such as bird flu, and increasing concern about the environment, are driving consumer demand for food that are healthier, safer, more palatable and environmentally or animal friendly [17,18,19,20]. Consumers evaluate food alternatives in terms of functional and psychological benefit that the food offers and their choices are influenced by both internal and external factors. Food safety is therefore affected by the decisions of producers, processors, distributors, food service operators and consumers as well as government regulations (Caswell, 2003).

The production, marketing and consumption of vegetables has potential social, economic and health benefits including contribution to food security, as a source of livelihood and a good source of essential nutrients. They are known to be essentially rich in micro nutrients such as vitamins A and C, minerals and certain essential amino acids such as lysine, [21]. Organic vegetables contain more iron, magnesium, phosphorus and vitamin C and less nitrates in organic crops as compared to conventional crops. Furthermore, there were several trends showing less protein but of a better quality, more nutritionally significant minerals, and lower amounts of some heavy metals in organic vegetables when compared to conventional ones [22]. However, micronutrient deficiencies is a major nutritional problem in Nigeria and it is a drain on the nation's human resources and a hindrance to development, with enormous costs in human, social, and economic terms [23]. This problem of acute micro nutrients shortage and the ever increasing population of the country make it necessary to undertake such study that has to do with the consumer's perception of certification of organic vegetables (a rich source of micronutrients) and willingness to pay for organic vegetables. Specifically this study assessed the level of customers' awareness and perception of organic food products and identified the factors affecting customers' willingness to pay for organic leafy vegetables.

## **2. MATERIALS AND METHODS**

The study was carried out in Ibadan, the largest city in the south of Sahara, in 2012. A multistage sampling procedure was adopted to select the respondents. The first stage was the purposeful selection of Ibadan North Local Government Area (LGA). Ibadan North LGA has the largest land area among the urban Local Governments with 145.58km<sup>2</sup> and a population of 306,795 people (NPC, 2006). The second stage was the random selection of three wards in the LGA while the final stage was the randomly selection of two hundred respondents proportionate to population sizes of the wards. The study used structured questionnaires elicited information on consumers' socioeconomic characteristics, level of awareness and past experiences about organic products, purchasing preference for organically produced leafy vegetables and willingness to pay for selected organically vegetables. In addition, the questions were designed to obtain respondent's comments and suggestions to improve the organic product market.

Descriptive statistics were used to profile the perception of organic vegetables, while the principal component analysis was used to generate the awareness index among the respondents. The contingent valuation of consumers' preference and logit analytical models were used to determine the factors affecting consumers' willingness to pay for organically produced leafy vegetables. Consumers' response to willingness to pay for organically produced vegetable was characterized as a dichotomous response. The logit model postulates the probability ( $P_i$ ) that a consumer is either aware/willing to pay or not, by predicting a binary outcome (YES or NO) out of a set of independent variables. In this model, awareness and willingness to pay (the dependent variable) was specified as 1 if willing/aware and 0 otherwise. Assuming that willingness to pay for a product is function of income, price and socio-economic characteristics; the initial model was given as:

$$\text{Logit } (WTP_i) = \log(P_i/1 - P_i) = \alpha + \beta X_i \quad (1)$$

Where:

- $WTP_i$  = Whether consumer  $i$  is willing to pay for organic vegetable or not;
- $\beta_i$  = Coefficients to be estimated;
- $X_i$  = Vector of exogenous variables
- $\alpha$  = Constant

### 3. RESULTS AND DISCUSSION

Table 1 shows the summary statistics of the socio-economic characteristics of respondents in the study area. The mean age of the household head was 45.6±12.4 years while the mean household size was 4.72±1.79. Results also showed that the average years of working experience was 12.4±1.40 with the mean income of ₦78,635.4±₦86,502.2. These suggest that a typical urban household head is in his economic active years and has a moderate family size.

**Table 1. Summary statistics of continuous variables**

	Mean	Standard deviation	Minimum	Maximum
Age of household head (years)	45.6	12.44	28	76
Household size	4.72	1.79	1	12
Years of working experience	12.4	1.40	1	9
Income	78,635.4	86502.2	6,000	500,000

Source: Field survey, 2012.

#### 3.1 Awareness Profile of Consumers

The awareness index for organic leafy vegetables was determined using the Principal Component Analysis (PCA). This index was used to categories the respondents into those that were aware and those that were not aware. The average awareness index for organic leafy vegetables in the study area was 0.344. Thus, any consumer with a less than average awareness index were categorized as not having adequate information about organic vegetables while those higher than the average index were aware of organic vegetables. From the results, 49 percent of the respondents had adequate information (were aware) of organic leafy vegetables as against 51 percent who did not have such information (not aware).

The awareness profile of the respondents is presented in the next sub-sections. It should be noted that the results show the percentages of each category within the awareness index and not of the total. Results in Table 2 showed that awareness of organic vegetable was higher among male-headed households (52 percent) than the female counterparts (48 percent), with the married being more aware of organic leafy vegetables than the single respondents. Also, the highest proportion of professionals had above average knowledge of organic leafy vegetables while a similar distribution on civil servants and a slightly lower proportion of married people but more professionals did not have adequate information on organic leafy vegetables. Further, the disaggregation of awareness by the age of the respondents showed that a largest proportion of youthful household heads 41.8percent of 30-39 years age category is aware of organic leafy vegetables of the proportion of those who reported to be aware. This is followed by 22.4 percent of the age category 40-49 years of those who are aware. This implies that respondents in middle-age years were more aware than younger or older counterparts.

**Table 2. Awareness profile of the consumers**

<b>Category</b>	<b>Aware (%) N=98</b>	<b>Not aware N= 102</b>
<b>Gender</b>		
Male	38.2	52
Female	61.8	48
Total	100	100
<b>Marital Status</b>		
Single	41.2	37.8
Married	52.0	62.2
Widow/Divorced	6.8	0.0
Total	100	100
<b>Occupation of Household head</b>		
Professional	12.7	30.6
Artisan	11.8	0.04
Trader	16.7	12.2
civil servant	41.2	42.9
Student	10.8	0.05
Unemployed	0.03	0.03
Farming	0.04	0.02
Total	100	100
<b>Household Size</b>		
1-3	1.04	5.1
4-6	79.4	77.6
7-9	17.6	15.3
>10	1.96	2.04
Total	100	100
<b>Age of Respondent (years)</b>		
< 30	24.5	26.5
30-39	36.3	41.8
40-49	22.5	22.4
50-59	12.7	5.1
60-69	4.0	2.1
70-79	0.0	2.1
<b>Education attainment</b>		
No formal education	9.2	87.3
Have formal education	90.8	12.7

Respondents in households with seven to nine members were reported to be more aware with 15.3 percent of those who reported to be aware and 5.1 percent of respondents with 1-3 members being aware of organic vegetable. Education plays a huge role in increasing awareness of technology. A larger percentage (90.8 percent) of the respondents with formal education were aware of organic leafy vegetables while a similar proportion of those without any formal education (87.3 percent) did not have adequate knowledge of what organic leafy vegetables are. This corroborates the fact that education increases awareness of technology and consequently the welfare of the people.

### **3.2 Distribution of Respondents by Perception of Organic Vegetables**

The perception of consumers about organic vegetables is presented in Tables 3 and 4. Results revealed that although a good percentage of the respondents (73 percent) had at one time or the other heard of growing leafy vegetables without agrochemicals, some of them did not have adequate information on advantages of organic leafy vegetables and therefore would be indifferent in their choice of vegetables. About a half of the respondents saw for the first time organic leafy vegetables between year 2000 and 2012 probably while about a third of the respondents had never seen any leafy organic vegetable before. Among those who had seen organic vegetables before, only 61.5 percent of them had eaten organic leafy vegetables. Among those who actually purchase organic leafy vegetables, more than two-thirds reported that the freshness of leafy vegetables is a factor that determine whether they will buy the vegetable or not while level of income is a major factor for about 2.5 percent of them. The market is the major place for the purchase of these vegetables which is typical of any Nigerian household. While quality is the major factors that determine the point of purchase by two-fifth of the consumers, it is the proximity to the point of purchase for about a half of them. Almost no respondent bought labeled vegetables. The reason is not far to reach as most respondents purchase vegetables from the local markets without standardization of the products and where there is labeling/standardization, the price per kilogram is high. In addition, about two-fifth of the respondents chose *Cochorus olitorus* as the most preferred vegetable but *Celosia* was the least preferred (13percent).

About two-thirds of the respondents reported that they were aware of the health benefits of organic leafy vegetables (Table 4). While about two-fifth they claimed to know about the environmental benefits of organic farming. In addition, 88.6 percent of the respondents reported that they had no knowledge of any health hazards associated with the consumption of organic leafy vegetables. This could be due to the belief that organic vegetables are natural and contain less of agrochemicals than the inorganic, thus making a high percentage of the respondents reporting no knowledge about the health hazards

### **3.3 Factors Influencing Consumers' Willingness to Pay**

Table 5 presents the results of the factors that affect the willingness to pay of respondents for organic leafy vegetables. The following variables were significant and had a positive relationship with WTP. These are the employment status, smaller household sizes, education, health benefits and bid, while gender had a negative relationship with WTP.

Being a female household head would reduce the willingness to pay of the household for organic vegetable by 0.24 while increasing the bid by one unit would increase the probability of willingness to pay for organic vegetables by approximately 0.20 units. Further, having basic education or tertiary education increases the probability of willingness to pay by 0.4 or

0.5 percent respectively. Having more than six household members would also increase the probability of WTP by 0.35 units relative to those with larger members. In addition, being a government employee (relative to the self-employed) and perceiving health benefits of consuming organic vegetables would increase the willingness to pay of the household for organic vegetable by 0.23 and 0.73 units respectively.

**Table 3. Perception of consumers on Organic Vegetables**

<b>Category</b>	<b>Frequency (N = 200)</b>	<b>Percentage (%)</b>
<b>Are you aware of leafy vegetables production without agrochemicals</b>		
Yes	146	73.0
No	54	27.0
<b>Have you seen organic Leafy vegetables before?</b>		
Yes	146	73.0
No	54	27.0
<b>Year Seen</b>		
<1980	4	2.0
1980-1989	7	3.5
1990-1999	20	10.5
2000-2012	169	84.5
<b>Have you eaten organic vegetables before?</b>		
Yes	123	61.5
No	77	38.5
<b>What do you look out for in purchasing leafy vegetable?</b>		
Price	8	4.0
Income	5	2.5
Taste	42	21.0
Freshness	140	70.0
Others	5	2.5
<b>Point of purchase of organic Vegetables</b>		
Trusted organic Farmer	29	14.5
Hawker	22	11.0
Market	142	71.0
Others	7	3.5
<b>Main factor that determines purchase point</b>		
Quality	79	39.5
Price	14	7.0
Closeness	95	47.5
Others	12	6.0
<b>What determines the type of vegetable to be eaten in the household?</b>		
Affordability	20	10
Nutritional constituent	91	45.5
Availability	78	39.0
Others	11	5.5
<b>Do vegetables purchased in the market come with label?</b>		
Yes	3	1.5
No	197	98.5

**Table 4. Perception of benefits and hazards of organic vegetables**

Category	Frequency (N = 200)	Percentage (%)
<b>Do organic vegetables have health benefits?</b>		
Yes	119	66.5
No	81	33.5
<b>Does organic farming conserve the environment?</b>		
Yes	82	41.0
No	108	59.0
<b>Do you know of any health hazard associated with consumption?</b>		
Yes	20	11.4
No	180	88.6

**Table 5. Determinants of WTP for organic vegetables**

Variables	Coefficients	Standard error	Marginal effects	Standard error
Female	-0.9950**	0.4524	-0.2422**	0.1059
Married	-0.5379	0.4710	-0.1328	0.1154
<b>Employment Status</b>				
Government employee	0.9193**	0.5885	0.2258**	0.1398
Private employee	-0.0884	0.5388	-0.2184	0.1328
<b>Income level</b>				
10001-20000	0.1193	1.9345	0.0295	0.4788
20001-30000	0.8364	1.8087	0.2043	0.4278
30001-40000	0.2917	2.0369	0.0726	0.5079
>40,000	1.9106	1.8373	0.4442	0.3678
<b>Education</b>				
Basic	2.0647*	0.7744	0.4474**	0.1213
secondary	1.1004	1.0999	0.2635	0.2347
Tertiary	2.282***	0.6132	0.5003***	0.1085
<b>Health benefits</b>				
Yes	4.0922***	0.6246	0.7345***	0.0576
Bid	0.8017*	0.4505	0.1965***	0.1075
Land ownership	0.5842	0.4865	0.1440	0.1187
<b>Household Size</b>				
≤ 6	0.6714	0.5222	0.1655	0.1265
7-9	1.7353***	0.8471	0.3463***	0.1176
Constant	-4.9086***	2.0043		
<b>Number of observations = 200</b>				
<b>LR chi2(38) = 119.96</b>				
<b>Log likelihood = -73.774618</b>				
<b>Pseudo R2 = 0.4484</b>				
<b>Prob &gt; chi2 = 0.0000</b>				

Source: Field Survey, 2012. \*\*\* P< 0.01 \*\*P<0.05 \*P<0.1

\*\*\*Denotes statistically significant at 1%

\*\*Denotes statistically significant at 5%

\*Denotes statistically significant at 10%



#### **4. CONCLUSION AND RECOMMENDATION**

The awareness index showed that about half of the respondents do not have adequate knowledge of organic vegetables suggesting the need for intensified awareness of organic vegetables. There is also the need to enhance consumers' knowledge on organic vegetable by incorporating its benefits into the basic educational curriculum. Further, any policy that would enhance nutritional security would intensify campaign on birth-control and ensure a right economic environment for the self-employed.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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