WILLINGNESS TO PAY FOR DETACHED MALLOW LEAVES (*Corchorous Olitorius*) AMONG VEGETABLE CONSUMERS IN KWARA STATE, NIGERIA

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ABSTRACT

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This study was carried out to examine vegetable consumer's willingness to pay for detached Mallow leaves (Corchorous Olitorius) in the study area. Primary data was used for the study. Survey instrument used was structured questionnaire, administered to 120 respondents randomly selected in a three-stage sampling procedure. Analytical tools employed include descriptive statistics, Contingent Valuation Method and Binary logistic regression technique. The study revealed that vegetable related purchases are predominated by female, accounting for up to 62% transactions. About 69% of the respondents were willing to pay 60% premium per bundle of detached Mallow leaves. At 5% level, factors that significantly determine consumers' willingness to pay for detached Mallow leaves are consumers' awareness of the health and nutritional benefits and also bid price being premium for detaching the Mallow leaves. It is recommended that innovations targeted at affordable technologies should be put in place to quicken the process of detaching Mallow leaves from the stalks. Likewise, there is need for awareness creation on health and nutritional benefits of Corchorous Olitorius as knowledge on the benefits will help consumers make consumption decision as only 26% of the respondents have substantial knowledge of the health and nutritive benefits.

INTRODUCTION

The issue of micronutrient deficiency is a major concern especially in developing countries like Nigeria. Tulchinsky (2010) stated that micronutrient deficiency conditions are widespread among 2 billion people in developing and in developed countries and there are silent epidemics of vitamin and mineral deficiencies affecting people of all genders and ages, as well as certain risk groups. According to Ajewole (1999), leafy vegetables are regular ingredient in the diet of the average Nigerian and with their level of consumption, they can provide appreciable amounts of nutritive minerals. *Corchorus Olichorius L*, is a leafy vegetable belonging to the family *Tiliaceae*, commonly known as Mallow leaves and locally referred to as *ewedu* in South western Nigeria and having high acceptability in the region. According to Oke and Ojofehintimi (1988), proximate analysis has revealed that *Corchorus Olitorius* contains about 85-87 g H_2O, 0.7 g oil, 5 g carbohydrate, 1.5g fiber, 250-266 mg Ca, 4.8 mg Fe, 1.5 mg vitamin A, 0.1 mg thiamine, 0.3 mg riboflavin, 1.5 mg nicotinamide, and 53-100 mg ascorbic acid per 100 g. There are well documented literature attesting to the efficacy of Mallow leaves in diverse therapeutic uses and as ranking higher in nutritional profiling among vegetables (Dansi *et al*., 2008; Fasinmirin and Olufayo, 2009; Fagbohun and Ibrahim 2011; Adeniyi *et al*., 2012). Evidences therefore abound as to the potentials of Mallow leaves and other leafy vegetables in alleviating micronutrient deficiency in Nigeria.

Unlike most other indigenous vegetables, the Mallow leaves requires some level of expertise in preparation which in most cases serve as a constraint to consumers. A relatively large proportion of time goes into preparation of the Mallow leaves into the slimy sauce which is commonly eaten in south western Nigeria. The process of shredding Mallow leaves from the harvested plants has not been mechanized hence the leaves have to be manually picked off the harvested plant one after another. This processing activity accounts for the bulk of preparation time. Mostly, the processing time discourages consumers who are constrained by time especially in a fast-paced world that we live in. This study was therefore carried out to examine the willingness to pay for detached Mallow leaves amongst vegetable consumers in Kwara State Nigeria. The research objectives were to describe the socio-economic characteristics of vegetable consumers in the study area, evaluate consumers' knowledge on the health and nutritional benefits of Mallow leaves, assess willingness to pay for detached Mallow leaves by consumers and examine the determinants of vegetable consumers' willingness to pay for detached Mallow leaves in the study area.

MATERIALS AND METHODS

Kwara State, Nigeria was the study area. The geographical location of the state is between latitude 7° 20′ and 11° 05′ north of the equator longitude 2° 5′ and 6° 45` East of the prime meridian (Ogunlade *et al*., 2009). There are 16 Local Government Areas in Kwara State with a total population estimate of 3,286,171 and covering a total land mass of 32,500 square kilometers out of which 75.3% is cultivable. Mainly, the area has dry and wet seasons. The dry season runs from the months of November to April. Mallow leaves are usually cultivated throughout the year as a lot of farmers get involved in dry season farming as they have access to irrigation facilities considering

that the farm sizes are usually small and even sometimes at the level of home gardening which makes it easier for farmers to man. The Kwara State Agricultural Development Project identified four main agro-ecological zones based on the ecological characteristics, cultural practices and the administrative convenience of the project. Zone A comprises the Baruten and Kaiama Local Government Areas. Zone B includes Edu and Patigi Local Government Areas. Zone C composes the Asa, Ilorin East, Ilorin South, Ilorin West and Moro Local Government Areas. Zone D consists of Ekiti, Ifelodun, Irepodun, Isin, Offa, Oke-Ero and Oyun Local Government Areas.

This study engaged a three-stage sampling technique with the first stage being the purposive selection of the Kwara State capital which is Ilorin based on the fact that this is a major urban centre and the most populous city in the State with a large number of elites working and residing in the city. These urban dwellers constitute the sample frame for this study. The second stage involved the purposive selection of 6 major market locations within Ilorin metropolis while the third stage was the random selection of 20 vegetable buyers, who were making purchases at the time of data collection, in each of the selected market locations to give a total of 120 respondents for the survey. Primary data used for the study were collected by the use of semi-structured questionnaires which gathered information on socioeconomic characteristics, vegetables consumption, consumer preferences etc. The questionnaire was designed to elicit the consumers' willingness to pay for value added to *Corchorous Olitorius* (Mallow Leaves) which is detachment of the leaves from harvested plants as this semi-processed product is not yet on the market, yet this value addition may be a major motivation to consumers who would rather do without the product as a result of time constraint despite the nutritional benefits and its ability to improve on the micronutrient deficiency in per capita daily diets. After having established starting bid values, an open-ended question was used for the elicitation of the respondents' maximum amount they are willing to pay for detached *Corchorous Olitorius* (Mallow leaves) in the study area.

Data collected were analyzed using descriptive statistics, Contingent Valuation Method and Regression analysis. The descriptive statistics used to describe the socio-economic data includes frequencies and percentages. Contingent Valuation method was used to examine urban dwellers' willingness to pay for detached (semi-processed) Mallow leaves in the study area.According to Teshome and Bogale (2015), willingness to pay is defined as the amount that must be taken away from household's income. The willingness data is collected through contingent valuation method (CVM), this method is also suited to solicit consumers' willingness to pay for a product that is not yet on the market. Basically, CVM is a nonmarket-valuation method that is used to value specific changes from the obtainable norm. The method relies on directly querying individuals about their willingness to pay (WTP) for a specified improvement in the course of an interview. CVM is a stated-preference technique, whereby the individual "states" his or her preference. Specifically, in carrying out this technique, individuals are asked about the status quo versus the alternative being proposed and as such information is elicited about the individual's opinion of the alternative relative to what had always existed and the WTP, if anything, to obtain the proposed alternative. Willingness to pay may specifically be defined as the amount that must be taken away from the person's income while keeping his utility constant. Willingness to pay may be stated as follows:

$V(y - WTP, p, q_1; Z) = V(y, p, q_0; Z)$ …..... (i)

where V denotes the indirect utility function, y is income, p is a vector of prices faced by the individual, and q_0 and q_1 are the alternative levels of the good or quality indexes (with $q_1 > q_0$, indicating that q_1 refers to the improved commodity or value addition). CVM is now increasingly used in developing countries (Alberini and Cooper, 2000). Binary Logistic regression was used to examine the determinants of consumer's willingness to pay for detached Mallow leaves amongst vegetable consumers in the urban area that was studied.

This explicit form of the binary logistic regression is expressed as:

$Y = \beta X_1 + \beta X_2 + \beta X_3 + \beta X_4 + \beta X_5 + \beta X_6 + \beta X_7 + \varepsilon$ …….. (ii)

Where, Y which is a dichotomous response variable (1 for consumers that are willing to pay and 0 otherwise), X_1 =monthly income (₦), X_2 =awareness of nutritional benefits (1 for yes, 0 otherwise), X_3 =amount spent on dietary supplements (₦), X_4=amount spent on other vegetables (₦), X_5=consumer's perception of Mallow leaves processing techniques (index), X_6=cost of Mallow leaves / bundle (₦), and X_7= Bid price (₦).

RESULTS AND DISCUSSION

Socioeconomic characteristics of the study area

Some of the socioeconomic characteristics of the study area considered included gender, age, marital status, educational status, monthly income and household size. Tables 1 presented the distribution of the respondents based on their socioeconomic characteristics. Results revealed that the percentage of vegetable buyers that were female was about 62% while the male buyers of vegetables were 38% which is far lower when compared to the female buyers. This result differed on a study carried out by Adekunle *et al.* (2016) on willingness to pay for organic leafy vegetables where majority of the respondents were male. This may be due to the fact that food commodity shopping is largely a routine task that is traditionally associated with the female folks in the study area. Vegetables purchasing is predominated by female in the study area. This could mean that females are more conscious of the constituents of their diets hence are more likely to make purchases of foods such as to ensure a balance in diets. In the study area, the average age of the respondents was 38.84 years. The modal age of the

vegetable consumers falls within the 21-30 years range which accounts for about 38% of the respondents. This category is followed by older adults in the 41-50years age bracket as they account for 30% of the sampled population. This is consistent with *a priori* expectation as most individuals within those age ranges are mostly concerned about the composition of their diets either due to the health implications (older adults) or as a result of paying attention to body structure which may inform individuals' diets.

The study revealed that majority of the vegetable consumers was those people who were just reaching their active ages and those they were getting older. This may be attributed to the fact that those people were more aware of vegetables benefits in the diet and/or they had more influence from available information and even their peers who were knowledgeable of the benefits. In tandem with the findings of Adekunle *et al*. 2016 on willingness to pay for organic leafy vegetables, majority of the vegetable consumers were married and this may be explained by the fact that married individuals may have food purchases decisions hinged on the other family member's preference hence their decision is dependent on the generally acceptable diets in the homes. This study revealed that about 76% of the respondents had tertiary education. This may be attributed to the fact that the study was carried out in the state capital where majority of the urban populace were civil servants or students, having higher education or in higher learning and these set of people were also willing to respond to the research upon administering questionnaires. It is believed that the level of education an individual is exposed to determines their access to and application of knowledge. Most of the respondents that have higher educational level are more likely to research into the health benefits of food in making consumption decision for themselves and their families where applicable.

Findings from the research revealed that 78% of the respondents earned monthly income below or equal to ₦100,000 (One hundred thousand Naira) which is explainable by the fact that most of the respondents were educated hence probably were gainfully employed. The study revealed the average household size in the study area to be 5.2 individuals. Only about 26% of the respondents have substantial knowledge of the health and nutritive benefits of the Mallow leaves. Majority of the respondents consumed the plant based on the fact that it is traditional to them. The results generated from analysis carried out on the willingness to pay for an hypothetical intervention which involves leaves detachment as a form of value addition to *Coschorus Olitorius* plants by the vegetable consumers in the study area is as shown in Table 2. The result presented in table 2 reveals that about 83% of the respondents were willing to pay 20% in addition to the cost of any given quantity of Mallow leaves they are purchasing. The respondents willing to pay up to 40% in addition to the cost of their good reduced by 5% while up to 69% of the respondents were still willing to pay as high as 60% for detached Mallow leaves, having placed higher premium on their time. Based on the Nigerian currency, 69% of the respondents were willing to pay up to ₦180 for every ₦300 worth of Mallow bundles, given that the plant is mostly in bundles of ₦50, respondents were willing to pay ₦30 for each bundle that has been detached having established that this has drastically reduced their own processing time.

Determinants of willingness to pay for detached mallow leaves by consumers

To identify the determinants of willingness to pay for detached mallow leaves in the study area, the binary logistic regression model was used. Table 3 shows the result of the analysis where it is revealed that the logistic model explains 79.8% of the consumer's willingness to pay for detached Mallow leaves for consumption purpose in the study area. At 5% significance level, the consumer's awareness of the various nutritional benefits and the bid price for detached Mallow leaves is statistically significant while the monthly income, amount spent on dietary supplements, consumer's perception of Mallow leaves processing techniques and the cost of Mallow leaves / bundle were statistically insignificant. Exp (β) statistic implies that the odds in favour of consumer's willingness to pay for detached Mallow leaves increased by a factor of 32.263 in case of consumer's awareness of the nutritional benefits of the Mallow leaves. Hence if the level of awareness the nutritional and health benefits of Mallow leaves increases, people will tend to consume more of the products and this will definitely improve the malnutrition and undernutrition reported to be affecting all age groups in Nigeria. Exploring the nutritional benefits in Mallow leaves (*Corchorous Olitorious)* may be highly impactful in tackling micronutrient deficiency issues not only in Nigeria but globally considering that the plant is well known across the World based on literatures earlier reviewed. Also, the monthly income of individuals, the amount spent on dietary supplements and the amount spent on other vegetables also increased the odds of consumer's willingness to pay for detached Mallow leaves by factors of 1.001, 1.011 and 1.567 respectively. It is of utmost importance that the plant *Corchorous Olitorious* be seen and taken in its potential to alleviate Micro-nutrient deficiency issues in Nigeria. It is also shown that the odds of consumer's willingness to pay for detached Mallow leaves reduced by a factor of 0.641 in the case of consumer's perception of the cumbersome process of preparing the leaves especially in the leaves detachment and making into paste. Increasing the awareness of the health and nutritional values of the Mallow leaves, adding value to the harvested plants to ensure a reduction in drudgery experienced in processing will improve the people's perception and hence raise their willingness to consume the products.

Table 1: Socio-economic characteristics of sampled vegetable consumers

	Category	Frequency	Percentages	Mean
Sex	Male	46	38	
	Female	74	62	
	Total	120	100	
Age (in years)	11-20	12	10	38.84yrs
	21-30	46	38	
	31-40	12	10	
	41-50	36	30	
	>50	14	12	
	Total	120	100	
Marital Status	Single	54	45	
	Married	66	55	
	Divorced	-	-	
	Widow	-	-	
	Total	120	100	
Educ. Status	Primary education	14	12	
	Secondary education	11	9	
	Tertiary education	91	76	
	Adult education	-	-	
	Quaranic education	-	-	
	No formal education	4	3	
	Total	120	100	
Monthly Income	≤ ₦100,000	94	78	₦42,513.06
	₦ 100,001 - ₦200,000	14	12	
	₦ 200,001 – ₦ 300,000	6	5	
	₦ 300,001 – ₦ 400,000	4	3	
	₦ 400,001 – ₦ 500,000	1	1	
	> ₦ 500,000	1	1	
	Total	120	100	
Household Size	1-3	18	15	5.2 individuals
	4-6	70	58	
	7-9	24	20	
	10-12	8	7	
	Total	120	100	

Source: Field survey, 2016

Table 2: Willingness-to-pay for detached mallow leaves in the study area

	Willingness to pay 20% of cost of *Corchurus Olitorius*		Willingness to pay 40% of cost of *Corchurus olitorius*		Willingness to pay 60% of cost of *corchurus olitorius*	
Hypothetical Intervention	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Value addition of Mallow leaves detachment prior to sale	100	83	94	78	83	69
Average amount WTBP for every *$1 worth bundle of Mallow leaves (*Corchorus Olitorius)*	20c		40c		60c	

Source: Field survey data. 2016. Number of observation: 120 *$1: NGN300 as at March 2016 WTBP–Willing to be paid

CONCLUSION AND RECOMMENDATION

The study concluded that given its high nutritional profile and wide acceptability, a lot of individuals will choose Mallow leaves if they had an option of purchasing detached Mallow leaves directly from the market such as to enable them reduce preparation time. The study therefore recommends the need to come up with innovations targeted at affordable technologies that may be put in place to quicken the process of detaching Mallow leaves from the stalks. From the production perspective, such value addition will lead to an increase in market demand for Mallow leaves hence inducing a supply–response by the rural farmers. The resultant effect of this is a rise in their income level, an improvement in the livelihood of small holder vegetable growers and even job creation along the value chain hence positively impacting socially on the Nation. The study also recommends the need for increased consumers' awareness of the nutritional benefits of Mallow leaves considering awareness tends to influence consumption decisions.

Table 3: Parameter estimate for the logistic regression model variables in the equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
X_1 Monthly Income	0.002	0.011	0.016	1	0.894	1.001
X_2 Awareness of Mallow leaves nutritional benefits	3.671	1.026	10.78	1	0.001	33.263
X_3 Amounts spent on dietary Supplements	0.015	0.121	0.013	1	0.904	1.011
X_4 Amounts spent on other vegetables	0.49	0.261	0.024	1	0.558	1.567
X_5 consumer's perception of Mallow leaves processing techniques	-0.187	0.819	0.056	1	0.791	0.641
X_6 Cost of Mallow leaves/bundle	-2.644	3.368	0.641	1	0.398	0.061
X_7 Bid price	-1.97	0.049	0.037	1	0.003	0.449
Constant	-0.409	2.343	0.028	1	0.864	0.624

Variable(s) entered on step 1: X_1, X_2, X_3, X_4, X_5; Overall case correctly predicted 79.8%; Model Chi-square 53.47

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