

Consumers' willingness to pay for labelled and certified moringa products in Ogun State, Nigeria

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Abstract

Major resources are being committed to moringa products innovation and value added production, yet considerable uncertainties still exist regarding public perception of moringa products in terms of labelling and certification. Consequently, understanding consumers' behaviour will be important if the impact of moringa products on nutrition is to be realized. This study therefore assessed consumers' perceptions and attitude towards labelled and certified moringa products (tea, spice and oil) and also identified factors influencing their willingness to pay for these products in Ogun State Nigeria. A multistage sampling technique was employed to elicit information from 150 randomly selected respondents within Abeokuta South and Abeokuta North Local Government Areas of Ogun State. Contingent valuation method was used to obtain premiums that consumers are willing to pay for labelled moringa products. Descriptive statistics and the logit regression model were used to analyse the data. Overall, attitude towards moringa products, attitude towards labelling and certification; current purchasing and consumption patterns significantly affected the respondents' willingness to pay a premium for the labelled and certified moringa products.

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Introduction

One-third of the world's population suffers from micronutrient deficiencies, owing primarily to inadequate dietary intake (Fielder and Macdonald, 2009). Micronutrient deficiency is rampant in Nigeria with the country being the third highest with absolute number of children who are stunted (Mitchell, 2010). Globally in 2011, more than one quarter (26 per cent) of children under 5 years of age were stunted, 16 per cent of children under 5 years of age were underweight, and about 8% of children under the age of five were wasted (UNICEF-WHO-World Bank, 2012). Many local foods, fruits, and plants have been reported to be good sources of micronutrients. They are available in abundance and very low-priced. Consumption of varieties of local foodstuffs will help the children have adequate nutrient stores especially during their season when the fruits, vegetables and foodstuffs are usually wasted due to poor storage facilities (Uchendu, 2011). Moringa is now seen as a very simple and readily available solution to the problem of malnutrition and health improvement. It has a local resource and its supply is not seasonal (Fuglie, 2001).

Moringa (*Moringa oleifera*) is a grubby-looking tree of which all its parts are edible. Moringa leaf is a natural antihelmintic, antibiotic, detoxifier and an

outstanding immune builder used in for the treatment of malnutrition and malaria (Thilza et al., 2010). Moringa leaves contain more Vitamin A than carrots; more calcium than milk; more iron than spinach; more vitamin C than oranges; more potassium than bananas; and the protein quality of moringa leaves rivals that of milk and eggs (Fahey, 2005). The leaves can be consumed raw, cooked like spinach or made into a powder that can be added to sauces, soups or chowders. The new leaves have a tendency to appear towards the end of the dry season when few other sources of green leafy vegetables are available. Also, the leaves can be easily dried into powder form for use as a nutritional supplement for sauces or as an addition to infant weaning foods (Fuglie, 2001). The young, green pods can be eaten whole and are comparable in taste to asparagus. The older pods can be used for their seeds, which can be prepared as peas or roasted and eaten like peanuts. Moringa seeds can also be processed in to cooking oil. Absolutely no negative effects to daily consumption of moringa leaves and seeds have ever been reported (Marcu, 2005). The flowers which bloom around eight months after the tree is planted, can be eaten fried and have the taste and texture of mushrooms. In Hawaii, the flowers are used to make a tea that cures colds. In addition to this, the flowers are a year- round source of nectar and can be used by beekeepers (El-Awady,

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2003).

Owing to the increased interest in improving or maintaining health in a proactive and convenient approach (de Jong *et al.*, 2003), consumers have become more concerned about the nutrition, health, and quality of food they eat (Gil *et al.*, 2000). This has made certification and labeling of moringa products a topical issue in the successful marketing of its products. Driven by increasing consumer demand for healthier, safer, and more environmentally friendly food products, the use of food labeling has become increasingly important in recent years (Adesope *et al.*, 2010). The use of credible labels allows firms to signal quality or the presence of specific desirable attributes, and in so doing to create the potential for premiums based on this signal (Mark-Herbert, 2003). Food labels could be a possible answer to the imperfect information dilemma in food safety. This is because quality signaling through product labeling promotes market incentives with relatively limited government involvement (Caswell and Padberg, 1992; Caswell and Mojduszka, 1996). The excess prices paid over and above the “fair” price (premiums) that is justified by the “true” value of the product (Vlosky *et al.*, 1999; Radam, 2010), may be indicators of consumers’ demand for that product (Tse, 2001). Demand for moringa products could therefore be attributed to consumers’ health concerns and food quality/safety consciousness. Thus, Willingness to Pay (WTP) for moringa products can be a good predictor of their demand.

Most existing literature studies on moringa in Nigeria focused on phytochemical and physicochemical analyses (Anjorin *et al.*, 2010; Ogbunugafor *et al.*, 2011; Oluduro, 2012; Nwaiwu and Lingmu, 2012; Ogbe and Affiku, 2012). To the best knowledge of the authors, the only known socioeconomic study on moringa in Nigeria was conducted by Torimiro *et al.* (2009). The study used analysis of variance to examine the gender gaps in the level of awareness and propagation of Moringa oleifera; and to compare their willingness to adopt innovation on moringa. The study concluded that the gender differential gaps could reverse the gains of innovations on moringa by limiting the adoption of innovation and propagation of the plant among the farm families. Owing to a dearth of socioeconomic study on moringa in Nigeria, this study assessed consumers’ perception and attitude toward labelled and certified moringa product as well as analyse the willingness to pay (WTP) for three moringa products (tea, spice/powder and oil), thus enriching literature on the subject matter in Nigeria.

Materials and Methods

Abeokuta is the capital city of Ogun State, Nigeria and occupies a total land area of 879 square kilometers with a population density of 513.77 persons per square kilometer. The city is made up of two Local Government Areas (Abeokuta South and Abeokuta North LGAs). Abeokuta South has a total population of 250,278 while Abeokuta North has a total population of 210,329 (NPC, 2006). A multistage sampling technique was employed to obtain data for the study. The first stage was the purposive selection of Abeokuta South and Abeokuta North Local Government Areas (LGAs) of Ogun State. Both LGAs were selected because they are the most urbanized LGAs in Ogun State and the seat of Government in Ogun State. Based on the National Population Census (2006), respondents were randomly selected proportionate to size. A total of 150 respondents were selected (83 from Abeokuta South and 67 from Abeokuta North). The contingent valuation method (CVM) was used to elicit consumers’ willingness to pay (WTP) for the three commonest moringa products (moringa tea, moringa spice/powder and moringa oil).

The benefit of food safety is a non-market value, and it is difficult to get the information of the revealed preferences of consumers. We adopted the stated preference methods to assess the value, of which the contingent valuation method (CVM) is the most important and also the most popular one (Zhang *et al.*, 2003). Different CV methods have been used to elicit willingness to pay for moringa products. Dichotomous and double-bounded dichotomous choice questions techniques are easily applicable to valuation of the moringa products. In this case, consumers were typically confronted with whether they would be willing to pay a price above the current market price for labelled and certified moringa products (Yes or No). If an individual responded is positive to the first question, a subsequent open-ended question was posed for the price the consumer would be willing to pay for labelled and certified moringa products.

The logit model was used to explain the log-likelihood of willingness to pay because of its comparative mathematical simplicity and asymptotic characteristics which constrained the predicted probabilities to a range of zero to one. Logit model was used to identify the correlates of WTP as specified by Branka and Kelly (2001), Yusuf *et al.* (2005) and Adepoju and Omonona (2009):

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

where P_i = likelihood of WTP; α = intercept parameter; β = vector of slope parameters; and X_i = vector of explanatory variables. Explicitly, the effect of the different factors on consumers' willingness to pay for these foods using a logit regression model is expressed as:

WTP = f(household demographic characteristics (age, sex, maristat, educat, hhsiz, income dist and hhmpcexdist), knownh, awarem, hhistory, percepmor, pattern, attitmor, perceplab, attitudelab).

The composite indices are: Knowledge of nutrition and health (KNOWNH), Awareness of moringa products (AWAREM), Current consumption patterns (PATTERN), attitude towards moringa products (ATTITMOR), attitude towards labelling (ATTITUDELAB), perception of labelling and certification (PERCEPLAB) and perception of moringa products index (PERCEPMOR) were derived by averaging the responses to each of the corresponding items (Moon and Balasubramanian, 2004; House *et al.*, 2004). These scores could be any value between two limits. For example the summated score for ATTITMOR could range between 1 (least positive attitude) and 5 (most positive attitude). The variable HHISTORY captured people's health condition as well as their concern for various nutritional diseases. Different variables were used to measure and represent the effect of one's state of health on WTP for labelled and certified moringa products.

The demographic characteristics variables include age of the respondents (AGE), sex of the respondents (SEX), marital status of the respondents (MARISTAT), education attainment of the respondents (EDUCAT), household size of the respondents (HHSIZE), unit price (PRICE) and per capita monthly expenditure (HHMPCEXDIST). The expected signs of all the variables are presented in the Appendix.

Results

Results showed that majority (86 percent) of the respondents were below 50 years of age, with the mean age of all the interviewed consumers being 38.89 years (Table 1). A higher proportion of the respondents (55.3 percent) were males. Majority of the consumers were married (77.3 percent) and had four to seven members (67.4 percent). The results further show that almost all the consumers had tertiary education (92.7 percent). Tertiary education is the attainment of post-secondary education including National Diploma, National Certificate of Education, Higher National Diploma and University education.

Most of the respondents were gainfully employed (95.3 percent) with 54 percent in the civil service and 24.7 percent were working as professionals in private organisations.

This study also sought to evaluate consumers' current consumption habits and purchasing patterns using seven questions. Question one asked the respondents to rank nutritional content of the food, price of the food, taste or flavour of the food, perceived safety of the food as well as brand name and convenience according to the importance of each factor in influencing purchasing decisions. About 20 percent of the respondents ranked safety as the most important factor influencing their purchasing decisions (Table 2) while only 0.7 percent ranked it as the least important. Nutritional content is the factor that most respondents (62.7 percent) consider most important in influencing their purchasing decisions while only 0.7 percent of the respondents indicated convenience as the most important factor in influencing their purchasing decisions (Figure 1). Respondents' perception of a link between labelling and safety was also measured by a question that required respondents to give a "Yes" or "No" answer to the question of whether they perceive labelled and certified moringa products to be safer than the unlabelled and uncertified. The available choices also included an "I don't know" option to allow for the possibility of lack of an opinion. 74.7 percent of the respondents believed that labelled and certified moringa products are safer than the unlabelled and uncertified (Table 4). The "I don't know" option was transformed to "No" from which the perception of labelling and certification index (PERCEPLAB) was formed where 0 represents negative perception and 1 represents positive perception.



Figure 1. Factors influencing purchasing decision

Results further present the distribution of consumers based on their attitudes towards labelling

Table 1. Distribution of consumers by socioeconomic characteristics

Socioeconomic characteristic		Frequency (N = 150)	Percentage
Age (years)	20-29	33	22.0
	30-39	34	22.7
	40-49	62	41.3
	>50	21	14.0
Sex	Male	83	55.3
	Female	67	44.7
Marital status	Single	31	20.7
	Married	116	77.3
	Widow	1	0.7
	Divorced	2	1.3
Household size	1-3	41	27.3
	4-7	101	67.4
	8-10	8	5.3
Employment status	Unemployed	7	4.7
	Employed	143	95.3
Religion	Christianity	105	70.0
	Islam	44	29.3
	Others	1	0.7
	Primary	1	0.7
Educational attainment	Secondary	10	6.7
	Tertiary	139	92.7
	Yes	108	72.0
Primary household shopper	No	42	28.0
	Professional	37	24.7
Primary occupation	Artisan	5	3.3
	Trader	7	4.7
	Civil service	81	54.0
	Farming	6	4.0
	Transportation	2	1.3
	Others	12	8.0
	< ₦ 10,000	33	22.0
	₦ 10,001 - ₦ 20,000	65	43.3
₦ 20,001 - ₦ 30,000	34	22.7	
₦ 30,001 - ₦ 40,000	12	8.0	
₦ 40,001 - ₦ 50,000	4	2.7	
₦ 50,001 - ₦ 60,000	2	1.3	

and certification (ATTITUDELAB). About 28.7 percent of the respondents always read nutrition while 14.0 percent never read labels and certification. Thus, about 54.7 percent of the consumers care (always or at least most times) about labels and certification. Majority of them preferred labelled and certified moringa products to the unlabelled and uncertified (72.0 percent) and could not consume unlabelled and uncertified moringa products (66.7 percent). Further, 63.3 percent of the respondents claimed that labelling and certification affects their purchase price decisions. About 41.3 percent of the respondents preferred imported moringa products to the local ones. This suggests that the consumers have high level of confidence in the locally made moringa products and this has implication for boosting the local production and market of the products. The reason for the consumers' preference for locally made moringa products is embedded in their trust in local certification agencies, especially National Agency for Food and Drug Administration and Control (NAFDAC), as shown in Table 2. The study further assessed consumers' willingness to pay for three labelled and certified moringa products: moringa tea, moringa spice powder and moringa oil. Results showed that half of the respondents were willing to pay a premium for certified moringa tea and moringa oil respectively while 48.9 percent of them were willing to pay a premium for moringa spice/powder (Table 2). On the average, respondents expressed willingness to pay a premium of ₦ 48.33 (48.33 percent premium) for labelled and certified moringa spice/powder; ₦ 64.80 (9.97 percent premium) for labelled and certified moringa oil and ₦ 58.13 (11.63

percent premium) for labelled and certified moringa tea over the unlabelled and uncertified.

Packaging is an important aspect of marketing and could largely influence the acceptability of any product by its consumers. Results indicated that a higher proportion of the respondents preferred to have their moringa tea and moringa spice/powder packaged in sachets (64.0 percent and 68.7 percent respectively) while 53.4 percent preferred to have their moringa oil packaged in bottles (Table 3).

Determinants of willingness to pay (WTP) for selected labelled and certified moringa products

The results of the logit models are presented in Table 4. The pseudo R² indicates the variation in WTP explained by the independent variables. The chi-square test was used to test the overall goodness-of-fit of the model (that is, to test the null hypothesis that the model did not have greater explanatory power than an "intercept only" model). This hypothesis was rejected in the case of each of the three models estimated, implying that the overall model was significant at 1 percent level. A z-test was used to test the null hypothesis that the associated coefficients are zero. In all the three models, the coefficient associated with attitude towards moringa products (ATTITMOR) is significant for tea (p<0.01), oil (p<0.01) and spice (p<0.05). The coefficients associated with consumption patterns (PATTERN) were significant (with the negative signs) for all the three products [that is, moringa tea (p<0.05), moringa spice (p<0.10) and moringa oil (p<0.05)]. The coefficients associated with attitude towards labelling (ATTITUDELAB)

Table 2. Respondents' ranking of the importance of safety in purchasing and perception of labelled and certified moringa

	Frequency (N=150)	Percentage (%)
A. Ranking of importance of safety in purchasing labelled and certified moringa		
Most important = 1	30	20.0
2	75	50.0
3	30	20.0
4	8	5.3
5	6	4.0
Least important = 6	1	0.7
B. Labelled and certified moringa products are safer than the unlabelled		
No	38	25.3
Yes	112	74.7
C. Certifications/endorsements preferred for Moringa products		
NAFDAC	123	82.0
SON	24	16.0
Others	3	2.0
D. I read nutrition/certification labels when I buy moringa product		
No	21	14
Yes	129	86
E. I consume an unlabelled moringa product		
No	100	66.7
Yes	50	33.3
F. Labels affect my purchase price decision		
No	55	36.7
Yes	95	63.3
G. I prefer imported moringa products		
No	88	58.7
Yes	62	41.3
H. Consumers' WTP for certified Moringa products		
1. Moringa tea	75	50.0
2. Moringa spice/ powder	73	48.7
3. Moringa oil	75	50

NAFDAC = National Agency for Food and Drug Administration and Control; SON = Standard Organisation of Nigeria;

were also significant (with the positive signs) for all the three products [that is, moringa tea ($p < 0.10$), moringa spice ($p < 0.05$) and moringa oil ($p < 0.10$)].

Perception of labelling and certification (PERCEPLAB) was positive and significant for labelled and certified moringa tea ($p < 0.10$) and oil ($p < 0.10$). The estimate on the variable attitude towards moringa products (ATTITMOR) was positive in all the three models. Furthermore, attitude towards labelling and certification (ATTITUDELAB) was positive and significant in the three models (moringa tea ($p < 0.10$); moringa oil ($p < 0.10$) and moringa spice/powder ($p < 0.05$). The coefficient of PATTERN was negative in all the three models and significant for moringa spice/powder ($p < 0.10$), moringa tea ($p < 0.05$) and moringa oil ($p < 0.05$).

Consumers' objective knowledge of nutrition and health index (KNOWNH) variable, was only significant for labelled moringa spice/powder ($p < 0.10$) while subjective knowledge or awareness of moringa products (AWAREM) was significant for moringa oil ($p < 0.01$). Sex was significant for labelled and certified moringa tea ($p < 0.05$) and has effect on WTP. Marital status was negative but significant for moringa tea ($p < 0.05$) and moringa oil ($p < 0.10$). Age was positive and significant for labelled and certified moringa tea ($p < 0.05$) and moringa spice/powder ($p < 0.10$). Household per capita expenditure was positive and significant for labelled and certified moringa spice/powder ($p < 0.05$).

The marginal effect of the logit model which estimated the factors that determines consumers'

willingness to pay for labelled and certified moringa products is presented in Table 10. Only the continuous variables that explain WTP significantly give meaningful explanation of marginal effect after logit. The results shows that a unit increase in age of the respondents will increase their WTP by 0.015 units while a unit change in current consumption habit and purchasing pattern index to a more health conscious one will reduce willingness to pay for labelled and certified moringa tea by 0.2477 units. Also, when consumers change from weak attitude towards moringa product (ATTITMOR), perception of moringa product (PERCEPLAB) and attitudes towards certification and labeling (ATTITUDELAB) to a stronger one, it will increase the respondents' WTP for this product by 0.4036, 0.2298 and 0.5386 units respectively.

For the moringa spice/powder, a naira increase in household per capita monthly expenditure will increase the WTP for this product by 0.1095 unit. A unit change in attitude towards moringa product (ATTITMOR) and attitudes towards certification and labeling (ATTITUDELAB) from a weaker one to a stronger one will increase the respondents' WTP for this product by 0.2472 and 0.5576 units respectively. On the other hand, a unit change in attitude towards moringa product, perception towards labelling and certification and attitudes towards certification and labeling to a stronger one will increase the respondents' WTP for moringa oil by 0.3951, 0.2104 and 0.4619 units respectively.

D

Table 3. Packaging methods preferred for the moringa products

Moringa Tea		Moringa Spice/powder		Moringa Oil	
Package	Percentage %	Package	Percentage %	Package	Percentage %
Bottle	6.0	Bag	0.7	Bottle	53.4
Can	0.7	Bottle	11.3	Can	4.0
Packet	1.3	Can	1.3	Keg	12.0
Plastic container	0.7	Cup	0.7	Plastic container	3.3
Sachet	64.0	Nylon	0.7	Sachet	23.3
Tea bag	22.7	Plastic container	8.7	Tin	4.0
Tin	4.7	Sachet	68.7		
		Tin	8.0		

Discussion

Results show that a good proportion of the sampled respondents were in their economic active age with a higher proportion of the selected households being male-headed. The reason for this could be due to the cultural norms and settings of the study area, which makes males the breadwinners and heads of households. This conforms with the findings of Rahji (2002) and Adepoju and Omonona (2009) which revealed that 71.2 percent and 89.44 percent of the respondents were males respectively. Most of the consumers were literate and gainfully employed which suggests that the consumers were likely to comprehend of the importance of labeling and certification of moringa products and be willing to pay premiums for them.

Furthermore, people's perception of risk associated with food products goes beyond their own personal health and covers wider beliefs about the intrinsic worth or demerits of technological process used to produce them. This explains the no-safe-product attitude of some respondents, implying that they will not buy labelled and certified moringa products despite the health and safety benefits attached to them. Consumers' perceptions and attitudes may influence the decision making process and purchasing behavior of each individual. Perceptions signify the formation of an individual state of mental awareness which is influenced by internal and external environmental stimuli such as economic, social and cultural influences. Conversely, attitudes are internal responses, which are partially affective in nature and considered to be continuing evaluations of objects, issues or persons (Radam *et al.*, 2010). The results showed that the more positive consumers' perception of labelling and certification is, the more likely they would be willing to pay a premium for labelled and certified moringa tea and oil. This supports the findings of Jeddi and Zaiem (2010) that better perception of labelling has positive effect on consumers' purchase

patterns and willingness to pay. Furthermore, *ceteris paribus*, a person with a more favourable attitude towards moringa products will be more willing to pay a premium for labelling and certification of the three products. This corroborates the findings of Bech-Larsen and Grunert (2003) which found that the Finnish respondents were more positive about functional foods and were more willing to pay for the foods than the Danish respondents. It also follows the findings of Munene's (2006) that Americans with more favourable attitude towards functional foods were more willing to pay more for functional foods. Positive consumers' attitude towards labelling and certification is likely to enhance willingness to pay a premium for the labelled and certified moringa products.

Current consumption patterns were measured using a set of six items that sought to determine how health-conscious the respondent is regarding purchasing and consumption of different food items. These items were measured on a scale of 0 (never health-conscious) to 4 (always health-conscious) and were averaged to create a composite index (PATTERN). The a priori expectation is that the effect of current consumption behaviour and purchase patterns on willingness to pay for labelled and certified moringa products may be positive or negative. For instance, a customer who purchases organic products or conventional dietary supplements may have a negative attitude towards moringa products, while a customer that does not buy organic products or conventional dietary supplements but is health-conscious may have a positive attitude and be more willing to pay a premium for moringa products. The result implies that consumers' who are less health conscious and in their purchasing patterns and can go for any other products apart from their regular products are the ones who will likely be willing to pay a premium for labelled and certified moringa products.

The a priori expectation is that the more knowledge an individual has about moringa

Table 4. Results of logit regression analysis of consumers' WTP for labelled and certified moringa products

Variables	Tea		Spice/powder		Oil	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
SEX	-0.7231*	-0.1788*	-0.5229	-0.1297	-0.3624	-0.0903
	(0.4213)	(0.1019)	(0.4075)	(0.0998)	(0.4058)	(0.1006)
MARISTAT	-1.6001**	-0.3645**	-0.7826	-0.1921	-1.3499*	-0.3155**
	(0.7636)	(0.1449)	(0.7146)	(0.1685)	(0.7422)	(0.1517)
AGE	0.0601*	0.0150*	0.0343	0.0086	0.0485	0.0121
	(0.0344)	(0.0086)	(0.0319)	(0.0079)	(0.0331)	(0.0083)
EDUCAT	-0.2719	-0.0676	-0.7943	-0.1925	0.1664	0.0415
	(0.8223)	(0.2025)	(0.7717)	(0.1742)	(0.7685)	(0.1911)
HHSIZE	0.0446	0.0111	-0.0553	-0.0138	0.0593	0.0148
	(0.1619)	(0.0405)	(0.1590)	(0.0397)	(0.1564)	(0.0391)
PRICE	-0.2669	-0.0667	-0.0029	-0.0007	-0.1879	-0.0469
	(0.1936)	(0.0484)	(0.1809)	(0.0452)	(0.1872)	(0.0468)
HHMPCXDIS	0.1414	0.0353	0.4385**	0.1095**	0.1251	0.0313
	(0.2203)	(0.0551)	(0.2217)	(0.0554)	(0.2151)	(0.0538)
KNOWNH	1.2134	0.3034	1.3406	0.3348	0.3496	0.0874
	(0.9536)	(0.2384)	(0.9379)	(0.2343)	(0.9166)	(0.2291)
AWAREM	-0.7161	-0.1790	0.0638	0.0159	-0.7616	-0.1904
	(0.4973)	(0.1243)	(0.4746)	(0.1185)	(0.4853)	(0.1213)
HHISTORY	0.0068	0.0017	-0.3283	-0.0819	0.5761	0.1440
	(0.7778)	(0.1945)	(0.7409)	(0.1850)	(0.7375)	(0.1844)
PERCEPMOR	0.0594	0.0149	-0.3579	-0.0894	-0.2346	-0.0587
	(0.4408)	(0.1102)	(0.4260)	(0.1064)	(0.4343)	(0.1086)
PATTERN	-0.9908**	-0.2477***	-0.7009*	-0.1751*	-0.8997**	-0.2249**
	(0.4209)	(0.1052)	(0.3911)	(0.0976)	(0.3936)	(0.0984)
ATTITMOR	1.6143***	0.4063***	0.9897**	0.2472**	1.5802***	0.3951***
	(0.4407)	(0.1102)	(0.3904)	(0.0975)	(0.4316)	(0.1079)
PERCEPLAB	0.9481*	0.2298**	0.5904	0.1449	0.8639*	0.2104*
	(0.4926)	(0.1122)	(0.4673)	(0.1115)	(0.4752)	(0.1098)
ATTITUDELAB	2.1543*	0.5386***	2.2325**	0.5576**	1.8478*	0.4619*
	(1.1086)	(0.2772)	(1.0628)	(0.2653)	(1.0675)	(0.2669)
CONSTANT	-4.9971*		-4.6934*		-3.6065	
	(2.7084)		(2.5941)		(2.5935)	
N	150		150		150	
Pseudo R-square	0.2255		0.1859		0.1877	
Log likelihood	-80.5279		-84.6054		-84.4613	
LR chi ² (15)	46.89		38.63		39.02	
Prob> chi-square	0.0000		0.0007		0.0006	

*** = significant at 1%; ** = significant at 5%; * = significant at 10%. Figures in parentheses are standard errors.

products, the more accepting and therefore the more willing that individual would be to pay a premium for labelled and certified moringa products. The results, however, showed a negative coefficient associated with this variable regarding willingness to pay for labelled and certified moringa tea and oil. A possible explanation for the unexpected sign is the quality of information that the consumer has about moringa products. Consumer negativity towards the genetic modification of food products is a possible obstruction to acceptance of specific functional foods. Sometimes, seemingly conflicting healthy-eating information to consumers may also be a hindrance (Frewer et al., 2003). For instance an individual who knows that oil is not good for the body finds moringa oil confusing. These arguments agree with the proposition of Wansink (2005) that how much a person knows about functional foods is less important than what a person knows about them.

The influence of the demographic variables on willingness to pay depends on the type of product, which is comparable with the results of De Jong *et al.* (2003) study of demographic and lifestyle characteristics of functional food consumers. The logit results suggest that male consumers, especially the unmarried, were more willing to pay for labelled and certified moringa tea and oil than married ones. Older consumers were also likely to be more willing to pay a premium for labelled and certified moringa tea and powder than the younger ones which might be owing to the nutrition consciousness of the aging consumers and the need to resort to natural sources

of micronutrients; and this conforms to the findings of Millock (2003). Increase in household per capita monthly expenditure would increase the likelihood the willingness to pay a premium for labelled and certified moringa spice

Conclusions

This study assessed consumers' willingness to pay for three labelled and certified moringa products: Moringa tea, Moringa spice powder and Moringa oil. The results showed that attitude towards moringa products, perception of moringa product were positively related to WTP for labelled and certified moringa products. The study also revealed a low level of awareness of moringa products among the consumers probably owing to the quality of information they had about the products. Thus, intensification of awareness and sensitization programs would enhance effective move towards certification and standardization of the moringa products. Campaign and orientation programs to improve consumers' perception and attitudes towards labelling and certification should also target the men folks and the singles with different promotional and sales programs.

The positive relationship between WTP (for moringa tea and powder) and age suggests that the marketers of these products should target the aging population, owing to their nutrition consciousness. Any policy that will increase the per capita monthly expenditure (such as increasing the minimum

Appendix I. Variable definitions and apriori expectations

Variables	Variable name	Expected sign	References
Age	AGE	Positive or Negative	Adesope et al., 2010 Millock et al., 2003 Childs and Poryzees, 1997
Marital status	MARISTAT	Negative or Positive	De Jong et al., 2003 Gil et al., 2000
Sex	SEX	Positive	Adesope et al., 2010 Childs and Poryzees, 1997
Household size	HHSIZE	Positive or Negative	Yusuf et al., 2011 Ghorbani and Hamraz, 2009
Level of education	EDUCAT	Positive	Adesope et al., 2010 Munene, 2006
Price	PRICE	Positive	Adesope et al., 2010 Gil et al., 2000
Per capita monthly expenditure	HHMPCXDIST	Positive	
Awareness of moringa products index	AWAREM	Positive	Munene,(2006
Perception of moringa products index	PERCEPMOR	Positive	Maynard and Franklin, 2003 Moon and Balasubramanian, 2004
Current consumption & purchasing pattern index	PATTERN	Positive or negative	Munene, 2006
Attitude towards moringa products index	ATTITMOR	Positive	Munene, 2006 Berch-Larsen and Grunert, 2003
Perception of labelling index	PERCEPLAB	Positive	Lacaze et al., 2009 Jeddi and Zaiem, 2010
Attitude towards labelling and certifications index	ATTITUDELAB	Positive	Quagrainle et al., 1998 Lacaze et al., 2009
Health history of consumers	HHISTORY	Positive	Munene, 2006 Louviere et al., 2000
Knowledge of Nutrition and health	KNOWNH	Positive	Adesope et al., 2010 Maynard and Franklin, 2003

wage and birth control measures) will enhance the likelihood of consumers' willingness to pay for labelled and certified moringa spice. In order to maximize profit, it is recommended that marketers should package moringa tea and spices in satchets; and moringa oil in kegs.

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