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Assessing Consumer Willingness to Pay a Premium for Organic Food Product: Evidence from Ghana

¹Victor Owusu and ²Michael Owusu Anifori

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^{1, 2} Kwame Nkrumah University of Science and Technology, Department of Agricultural Economics, Agribusiness and Extension, Kumasi, Ghana.

¹ vowusu.agric@knust.edu.gh

² kanifori@yahoo.com

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Abstract

This paper examines the willingness of consumers to pay a premium for organic food product with a contingent valuation data from urban Kumasi of Ghana. Consumer's willingness to pay a premium is estimated with a bivariate Tobit model. The empirical findings indicate that apart from socioeconomic characteristics and consumer perceptions, product attributes tend to influence consumer preferences for organic water melon and lettuce. The estimated mean WTP premium for 1 kilogram of water melon is GH¢0.5554 (US\$ 0.4575) and that of organic lettuce is GH¢1.2579 (US\$1.0361).

Keywords: Consumer Perception, Ghana, Organic Foods, Willingness to Pay

1. Introduction

Organic fruits and vegetables are the fruits and vegetables like water melon and lettuce which are produced without the use of chemical fertilizers and pesticides. Due to food safety and environmental quality concerns, policy makers worldwide are attaching more importance to the production and consumption of such food products. Notably, consumption of fresh organic food products could enhance the prevention of some of the health hazards associated with the consumption of conventional foods. Indeed, the risk of consuming conventional foods in Africa including Ghana could be traced to inappropriate use of chemical pesticides and inorganic fertilizers by agricultural producers who may or may not be aware of the associated health hazards of the chemical residues (Nouhoheflin et al., 2004).

Fresh organic vegetables and fruits could contribute significantly to employment generation, wealth creation and poverty alleviation in Ghana. They constitute important raw materials for the local food industries as well as the fast growing restaurants and supermarkets in the country (Nouhoheflin et al., 2004; Norman, 2007). Traditionally, households in Ghana have consumed conventional fruits and vegetables. An important approach to achieve food safety and minimize health hazards associated with fruits and vegetable consumption is the promotion of consumption of organic fruits and vegetables in the country. This in turn requires reliable information on consumer willingness to pay a premium for organic fruits and vegetables, specifically water melon and lettuce, and their determinants in Ghana.

In spite of the numerous advantages of consumption of organic food products, information on their market demand and prospects in Ghana appear to be limited (IFOAM 2003). A number of consumer studies have examined the consumption of organic food products in developed countries (Wier and Calverly, 2002; Cranfield and Magnusson, 2003; Voon et al., 2011). However, few consumer studies on organic food products exist in Ghana (Nouhoheflin et al., 2004) and other developing economies (Piyasiri and Ariyawardana, 2002; Rodriguez et al., 2007; Aryal et al., 2009). In particular, issues concerning consumer willingness to pay (WTP) a premium for organic fruits and vegetables in Ghana have not been rigorously addressed.

The main goal of the present paper is to analyze the willingness of consumers to pay a premium for organic water melon and lettuce in Ghana. The paper contributes to the literature on consumer preference for organic food products in Africa. The main hypothesis tested is that apart from socioeconomic characteristics of consumers, consumer perceptions concerning product attributes tend to influence consumer willingness to pay (WTP) a premium for organic water melon and lettuce.

The next section briefly discusses the literature on consumer WTP a premium for organic food products. Section 3 presents the conceptual framework and the specification of the empirical model

estimated in the paper. Section 4 describes the data employed. Section 5 discusses the empirical results. Section 6 provides the relevant conclusions.

2. Literature on Consumer Willingness to Pay a Premium for Organic Foods

Consumer demand for organic products has received some attention in the consumer choice literature. Various authors have employed different techniques such as the contingent valuation (Krystallis and Chryssohoidis, 2005; Quagraine, 2006; Kimenju and De Groot, 2008) and choice experiments (Wang and Sun, 2003; Stolz et al., 2010). In contingent valuation surveys, hypothetical markets are set up in which consumer willingness to pay for products are solicited by asking respondents to value the products contingent on the available market. Misra et al. (1991) and Boccaletti and Nardella (2000) used contingent valuation and analyzed consumer willingness to pay for pesticide-free fruits and vegetables in Italy and United States of America. Where market prices already exist for the product, contingent valuation surveys tend to focus on the premiums that consumers are willing to pay for the product. Gil et al. (2000) for instance employed contingent valuation and found that the willingness of consumers to pay premiums for organic fruits and vegetables was high in Spain.

Nouhoheflin et al. (2004) employed the hedonic pricing approach, which is an indirect method of valuation, to assess consumer perceptions and willingness to pay premiums for organic vegetables in Benin and Ghana. Their empirical findings revealed a consumer willingness to pay of more than 50 percent price premium for chemical-free vegetables. With choice experiments (CE), Wang and Sun (2003) examined consumer preferences and demand for organic apples and milk in a conjoint analysis framework. Stolz et al. (2010) employed latent class models and established that consumers who strongly prefer organic products are less price sensitive than those who prefer conventional products.

Other studies have analyzed consumer preferences for organic products on the market with various statistical techniques. Employing a two-limit Tobit model, Gifford and Bernard (2006) found out that the likelihood that consumers will purchase organic foods is influenced by the potential benefits from organic methods and perceived risk from conventional agricultural methods. Briz and Ward (2009) applied a multinomial logit model in their study on consumer awareness of organic products, and found out that awareness of organically-produced foods alone does not necessarily translate into actual consumption. Rather, the demand for organically grown products is achieved through understanding the linkages between the awareness and purchasing decisions of the consumer. Verhoef (2005) investigated consumer purchases of organic meat with a probit model and found out that not only are rational economic motives necessary for consumers to pay premiums for organic products, but emotional motives such as fear, empathy and guilt are relevant. Michaelidou and Hassan (2010) examined the factors which affect rural consumer purchase of organic and free-range produce in Scotland and found direct relationships between consumer attitudes toward organic food and factors such as food safety concerns, ethical lifestyle and price perceptions.

Most of the rigorous consumer studies on organic products have not paid much attention to Ghana, making market information on organic products scanty. The present paper contributes to our understanding of consumer choice of organic products in Africa. It provides empirical estimates of consumer willingness to pay premiums for organic water melon and lettuce in Ghana.

3. Conceptual Framework and Specification of the Empirical Model

Consumers generally face two-fold choice decisions. These include which good to choose and how much to consume of the chosen good. Consumer willingness to pay a premium for a particular good is considered as a choice problem within the framework of consumer stated preference. A rational consumer i is assumed to choose from a bundle of organic agricultural product (γ^1) and conventional produce (γ^0) that gives the highest utility. Thus the consumer is willing to pay a premium for a given organic food product if the expected utility of consuming the organic product $E[\Omega(\gamma^1)_i]$ is positive and

exceeds the expected utility of consuming the conventional food product $E[\Omega(\gamma^0)_i]$. Consumer WTP a premium for a food product is specified as a function of a change in utility arising out of the consumption choice: $WTP = h[\Delta\Omega(\gamma)]$, where $\Delta\Omega(\gamma)$ is the change in utility and $h' > 0$. Notably, the consumer chooses the organic food γ^1 over the conventional food γ^0 if the change in utility is positive $[\Delta\Omega(\gamma) = \Omega(\gamma^1) - \Omega(\gamma^0) > 0]$ for all $\gamma^1 \neq \gamma^0$. The utility of the consumer is however not observable. What is observed is whether or not the consumer chooses to pay a premium for the organic product. To analyze this consumer choice behavior, the present paper employs the double-bounded dichotomous choice framework proposed by Hanemann et al. (1991).

The present paper employs a bivariate Tobit model to quantify the effects of the determinants of WTP premiums. This approach is justified because of the possible zero WTP responses; it also takes account of the joint cross-equation correlation among the WTP premiums for organic water melon and lettuce (Blundell and Meghir, 1987; Carlsson and Johansson-Sterman 2000; Greene, 2008). The bivariate Tobit model for organic water melon and lettuce is expressed in Equation (1):

$$R_{ij}^* = \begin{cases} Z_{ij}\beta + \varepsilon_{ij} & \text{if } R_{ij}^* > 0; \varepsilon_{ij} \sim MVN(0, \Sigma); j = \text{organic water melon or lettuce} \\ 0 & \text{if } R_{ij}^* \leq 0 \end{cases} \quad (1)$$

where R_{ij} is a censored dependent variable indicating the proposed premium or monetary amount in Ghana Cedis per kilogram (GHC/kg) that a consumer i who responds "YES – YES" or "YES – NO" or "NO – YES" to the two bids is willing to pay for the organic food product j , and zero observation for a consumer i who responds "NO – NO" to the two bids. β is vector of parameters to be estimated, Z_i summarizes the consumer specific and socioeconomic characteristics, consumer awareness and perceptions of organic food attributes, and ε_{ij} is the error term which is multivariate normally distributed.

4. Survey Design and Sampling Method

The data employed in this paper comes from a contingent valuation survey conducted among consumers in the Kumasi metropolis of Ghana in 2008. The city of Kumasi is the second largest and one of the fastest growing urban centers in Ghana with an estimated population of 1.2 million and annual growth rate of 2.6 percent (Ghana Statistical Service, 2000). The economically active population in the metropolis is about 71.4 percent and a majority of them is self-employed in the private informal sector. The Kumasi Metropolitan Assembly, which has the administrative oversight over the city has stratified the metropolis into low (50.7%), middle (30%) and high (19.3%) income residential areas based on the population density, housing quality and the level of community facilities (GLSS, 2000). The low-income area comprises of 28 suburbs, the middle-income areas have 32 suburbs and the high-income areas comprise of 17 suburbs.

A two-stage stratified sampling procedure was employed in this study, based on the income stratification of households in the city. The income stratification supports the widely-held view that incomes of households influence their consumption patterns (Boccaletti and Nardella, 2000) and Kimenju et al., (2005). The city's suburbs were first randomly selected, followed by a random selection of household heads and individuals in charge of food purchases in the household. To ensure one-third proportional representation of each income stratum in the sample, 10 suburbs were randomly selected from the low-income suburbs, 11 suburbs from the middle-income suburbs, and 6 suburbs from the high income suburbs in the metropolis. Finally, 218 consumers, 127 consumers and 84 consumers respectively were randomly selected from the sampled low, middle and high-income suburbs making a total sample of 429 consumers.

The prices of fresh conventional water melon and lettuce were collected from food retail points at the Asafo and Central Markets in Kumasi. Additional information on prices of lettuce and water melon was obtained from the Gyinyase Organic Vegetable Growers' Association (GOVGA) in Kumasi, and from the Ghana Organic Agriculture Network (GOAN). The average market price of 0.5kg of conventional lettuce was GH¢0.10 (US\$0.08). An average price premium of GH¢0.15 (US\$0.12) which is 50% more than the price of the conventional lettuce was used as a lower bid price for the organic lettuce. Different respondents were randomly assigned higher premium bids of 60%, 70%, 80% and 100% more than the base price of GH¢0.10 (US\$0.08). For example, if a respondent responds "YES" to the first higher bid of 60% more than the base price, then a higher premium bid is randomly assigned to him/her. If the response to the first higher bid is "NO" then the lower premium price of 50% more than the base price is offered to the respondent. Similarly, the average market price of 3.50kg of conventional water melon was GH¢1.50(US\$1.24). An average price premium of GH¢1.80 (US\$1.48) which is 20% higher than the conventional water melon was calculated and used as the lower bid. Different respondents were randomly assigned higher price premiums of 40%, 60%, 80% and 100% more than the base price.

5. Descriptive Results

Consumers with zero WTP observations consist of those with UWTP price premiums. Consumers with WTP observations are those who recorded WTP price premiums for the two organic foods. Table 1 shows that respondents exhibited varying WTP premium responses. About 71% expressed WTP price premiums of above 50% for organic lettuce whereas 82% indicated WTP of about 1%–50% price premiums for organic water melon. The double-bounded dichotomous choice responses to the proposed bids also showed some differences in the consumer WTP price premiums for organic lettuce and water melon. Notably, the "YES – YES" response to consumer WTP premium for organic lettuce was slightly higher than that of organic water melon.

INSERT TABLE 1

The definitions and sample statistics of the relevant variables and the analytical results of the differences in the means of the variables are presented in Table A1 and Table A2 in the Appendix (in the interest of brevity, the tables are not presented). Regarding the socioeconomic characteristics, perceptions and preferences for organic food attributes, the significant levels suggest some differences between respondents who expressed willingness to pay (WTP) and those who indicated unwillingness to pay (UWTP) price premiums for organic lettuce and water melon. For instance, some significant differences exist between respondents with WTP and UWTP price premiums for organic lettuce with regards to children who are less than 15 years of age and education levels of respondents. Notably, the children of consumers with WTP premiums who are less than 15 years are significantly higher than those with UWTP price premiums.

The awareness on chemical residues in conventional foods by respondents with WTP price premiums is relatively higher than those with UWTP price premiums. Although the mean perception index of respondents with UWTP price premiums is significantly higher than those who with WTP price premiums, their perceptions on the benefits and quality of organic vegetables and fruits are generally positive (see Table 2). For example, more than half of the respondents strongly agree that organic lettuce and water melon are healthier, tastier and have no harmful effects. About 20% of the respondents agree that organic foods are healthier and tastier whereas 36% and 33% respectively agree that organic foods have no harmful effects and are of superior quality than the conventional foods. Averaging the scores for health and taste led to a positive benefit perception index, BPI=0.76. Similarly, averaging the scores for quality perceptions gave a positive quality perception index, QPI=0.60. Hughner et al. (2007) point out that WTP price premiums of consumers are influenced by their perceptions on the benefits from consuming the organic food products.

INSERT TABLE 2

6. Empirical Results

The maximum likelihood estimates of the bivariate Tobit model are provided in Table 3. The variable representing children less than 15 years of age (CHILD) had positive significant relationships with consumer WTP premiums for the two organic food products. These empirical results concur with a study by Gao et al. (2011) that consumers with children within the cluster group of 6 to 12 years for instance tend to have more preferences for quality of fresh citrus fruits than those without children. The NOEDU variables representing consumers with no formal education are negative and significant at 5% levels in the WTP premium models for organic lettuce and water melon. The coefficient of junior high school education (JHSEDU) is positive and statistically significant at the 5% level in the WTP premium model for organic lettuce and water melon. This finding suggests that educated consumers are willing to pay higher premiums for organic food products than the less educated consumers. The empirical results also agree with the studies by Du Toit et al. (2003) for consumers in South Africa and Akgüngör et al. (2007) for Turkish consumers.

INSERT TABLE 3

The variables representing high income (INCHIGH) and middle income (INCMID) earners exhibit the hypothesized positive signs and are significant at the 10% level in the WTP premium model for organic lettuce. Asafo-Adjaye (2000) pointed out that income variables are expected to have significant positive relationships with consumer WTP premium in order to agree with economic theory. The age and gender variables produced statistically insignificant and mixed results. Gao et al. (2011) also found similar empirical results with their study on consumer preferences for fresh citrus attributes by US consumers.

Awareness of consumers on organic food products (ORINFO) has a positive significant relationship at the 5% level with the WTP premium for water melon. The empirical result agrees with a U.S. consumer survey by Govindasamy et al. (2006) which posits that when consumers are aware of organic products, they are likely to pay higher premiums for them. Consumer awareness on chemical residues in conventional food products (KNOW) positively influences their willingness to pay premiums for organic lettuce and water melon. The empirical results also indicate significant positive relationships between consumer perceptions on taste and price of organic products and the WTP premium for the organic food products. Empirical evidence provided by Nouhoheflin et al. (2004) also supports the awareness and perception hypotheses.

Product attributes such as freshness, size, cleanness and insect damage investigated in the WTP models also reveal quite interesting empirical results. Consumers were asked if they consider these food product attributes when purchasing organic lettuce and water melon. Freshness and cleanness of fruits have significant positive effects indicating that consumers place much premium on organic water melon that is fresh and clean. The negative significant coefficient of vegetable size indicates that consumers are not influenced much by the size of organic lettuce. Consumers on the other hand, pay much attention to insect damage to organic lettuce. The empirical findings thus suggest that consumers tend to consider insect damage to organic lettuce more than its size when purchasing organic lettuce. Also freshness and cleanness are relevant product attributes consumers look out for when they want to purchase organic water melon for consumption.

INSERT TABLE 4

The estimated mean WTP price premiums for 1 kg of organic lettuce and water melon as indicated in Table 4 are GH¢1.2579 (US\$1.0361) and GH¢0.5554 (US\$ 0.4575) respectively (table not presented in the interest of brevity). Due the possibility of predicted negative WTP premium estimates, median values are reported. Notably, the median WTP premium for 1kg organic lettuce is GH¢1.5257 (US\$1.2567) and that of organic water melon is GH¢0.5829(US\$0.4801).

7. Conclusions

Organic products are considered as superior in quality to conventionally-produced food products in terms of health and environmental benefits. This study has investigated the willingness of consumers to pay premium prices for organic water melon and lettuce, using a recently collected contingent valuation

data from 429 consumers in the Kumasi metropolis of Ghana. Consumer knowledge and perceptions of organic food products have been measured with perception indices. The factors which influence consumers' WTP price premiums for organic water melon and lettuce have been analyzed with a bivariate Tobit model. The empirical findings from the study provide insights into consumer choice of organic fruits and vegetables in Ghana. Consistent with existing studies on consumer preferences for organic food products, the empirical results show that socioeconomic factors such as human capital and income level as well as consumer awareness and perceptions are relevant. Quite apart from the socioeconomic characteristics, product attributes such as freshness and cleanness tend to have positive effects on consumers' WTP premiums for organic water melon, whereas product size has a negative influence on consumers' WTP premiums for organic lettuce. Insect damage to vegetables has a positive effect. The estimated median WTP premium for 1kg organic lettuce is GH¢1.5257 (US\$1.2567) and that of 1kg of organic water melon is GH¢0.5829 (US\$0.4801).

Based on the study's findings that consumers in Ghana are willing to pay higher premiums for organic water melon and lettuce, governments, non-governmental organizations and other stakeholders should formulate policies that would encourage and promote the consumption of organic food products in the Kumasi metropolis in Ghana. These policy measures should include creating awareness on the relevance of consuming organic water melon and lettuce through effective marketing strategies and educational campaigns. In particular, these strategies should focus on labeling to assist consumers to differentiate organic food products on the market from the conventional foods, and the educational campaigns should put emphasis on the health benefits of consuming organic water melon and lettuce. Business managers and retailers of organic water melon and lettuce in the Kumasi Metropolis should pay more attention to handling and storage of the organic food products as freshness, cleanness and insect damage are crucial to consumers' willingness to pay premiums for these products. Agribusiness managers, wholesalers and retailers of fresh vegetables and fruits could be assisted and provided with the technical expertise on how to maintain the freshness of organic water melon and lettuce so as to attract the maximum price premium from consumers and increase the patronage of the consumption of organic foods.

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Table 1: Distribution of WTP price premiums for organic lettuce and water melon

	Lettuce	Water Melon
Weight of products (kg)	0.15	3.50
Average market price of conventional food products(GH¢)	0.10	1.50
Lower premium bid for organic food products (GH¢)	0.15	1.80
Not willing to pay	13.1% (56)	13.5%(58)
Willingness to pay 1% – 50% premium	16.3% (70)	82.0%(352)
Willingness to pay above 50% premium	70.6% (303)	4.5%(19)
YES–YES responses	63.6% (271)	62.2% (267)
YES–NO responses	9.3% (40)	10% (42)
NO–YES responses	14.0% (60)	14.2% (61)
NO–NO responses	13.1% (56)	13.5% (58)

Note: Figures in parentheses are frequencies of respondents.

1 US Dollar (\$) =1.2141 Ghana New Cedi (GH¢) in 2008.

Source: Authors' calculations

Table 2: Consumer attitude and perceptions on organic food products

Perception statements	Benefit			Quality		
	Organic products are healthier	Organic products are tastier	Benefit perception index (BPI)	Organic products have no harmful effects	Organic products have superior quality	Quality perception index (QPI)
<i>Number of consumers</i>						
Strongly disagree (score = -1)	2	2		1	7	
Disagree (score =- 0.5)	5	3		6	9	
Neutral (score = 0)	3	4		3	4	
Agree (score=0.5)	20	21		36	33	
Strongly Agree (score= 1)	70	70		54	47	
<i>Mean score</i>						
Consumer aware	0.67	0.69	0.68	0.58	0.5	0.54
Consumer not aware	0.81	0.83	0.82	0.77	0.52	0.65
Overall	0.75	0.76	0.76	0.68	0.51	0.60

Source: Authors' calculations

Table 3: Bivariate Tobit estimates on consumer WTP premiums for organic food products

	Lettuce		Water melon	
	Coefficient	z-value	Coefficient	z-value
CONSTANT	-1.1988 ***	-2.42	0.3053***	3.30
<i>Socio-economic characteristics</i>				
AGE 1	0.1929	1.03	0.0211	0.59
AGE 2	0.1937	0.96	-0.0056	-0.14
FEMALE	-0.0774	-0.31	-0.0641	-1.34
MARISTAT	-0.0428	-0.33	0.0292	1.17
CHILD	0.0658 ***	2.53	0.0133***	2.68
NOEDU	-0.5422 **	-2.00	-0.0985**	-1.93
JHSEDU	0.4718 **	2.08	0.0944**	2.22
SHSEDU	0.3292	1.32	0.0390	0.83
TEREDU	0.4673	1.13	0.0591	0.74
INCMID	0.4402 *	1.75	0.0344	0.72
INCHIGH	0.2417 *	1.74	0.0356	1.34
<i>Awareness and perception</i>				
ORINF	-0.0120	-0.09	0.0603**	2.38
KNOW	0.3191 *	1.77	0.0845**	2.44
TASTEDUM	0.6032 **	2.06	-0.0513	-0.95
PRICEDUM	1.3501 ***	9.08	0.2141***	8.19
<i>Product attributes</i>				
FRESH	0.0017	0.02	0.0464***	2.68
SIZE	-0.3425 **	-2.08	-0.0214	-1.15
CLEAN	0.0432	0.30	0.0567**	2.15
INSDAM	0.1980 **	2.12	-0.0158	-0.81
Observations		429		
Log-likelihood		-528.9052		
χ^2 – statistic		189.42***		
Cross-equation correlation (ρ_{L_WM})		0.7587***		

*** =significant at 1%

** =significant at 5%

* = significant at 10%

Source: Authors' calculations