Urban Consumers' Willingness to Pay for Quality of Leafy Vegetables along the Value Chain: The Case of Nairobi Kale Consumers, Kenya

Ngigi, M.W
Research Assistant
Department of Agricultural Economics, University of Nairobi,
Kenya. P.O. Box 29053 – 00625
Nairobi, Kenya
Email: martherngigi@gmail.com. Phone: 254 (0) 723 024 806

J.J. Okello
Assistant Professor
Department of Agricultural Economics, University of Nairobi, Kenya.
Email: jjokello@gmail.com

C.L Lagerkvist
Professor. Department of Economics, Swedish University of Agricultural Sciences,
Sweden.
Email: carl-johan.lagerkvist@ekon.slu.se

N. K. Karanja
Professor
Department of Land Management, Agricultural Resource and Technology,
University of Nairobi.
Email: nancykaranja@cgiar.org

J. Mburu
Assistant Professor
Department of Agricultural Economics, University of Nairobi
Kenya
Email: jmburu@yahoo.com

Abstract

Improvement in income in developing countries has led to emergence of middle and high income consumers. In major urban centers there has been rapid expansion of the grocery sections selling variety of leafy vegetables in leading retail stores. This study examines the willing of the urban consumers to pay for quality of leafy vegetables and the drivers of willingness to pay for the quality. It considered a broad range of quality attributes including safety, nutrition, price, sensory, convenience, environmental friendliness, hygiene and ethics. The study found that mean willingness to pay for quality was highest among high income consumers. It also found that confidence and consistency, subjective knowledge, reference point, income and age of children the consumer has were the main explanatory variable for WTP. The study concludes that there is demand for quality of leafy vegetables and discusses policy implications.

Key words: Willingness to pay, food safety, urban consumers, leafy vegetables, Kenya

1. Introduction

Half of the world's population lives in cities and towns with many poor urban dwellers facing problems in gaining access to adequate supplies of nutritionally balanced food (UN HABITAT 2010). Increasingly urban populations are turning to peri-urban areas for food sources. Indeed the main source of leafy vegetables consumed by urban population is urban and peri-urban agriculture. Peri-urban farming also generates significant livelihood opportunities, not only for urban and peri-urban farmers but also for traders, input suppliers and other service providers along the value chain (Scott *et al*., 2004; IWMI, 2006). In the policy arena, pesticide and fertilizer residues in food are major food safety concerns (Okello and Swinton, 2010). Use of sewage and polluted waste water is emerging issue in food policy. The access to clean water for irrigating vegetables is a major challenge. As an alternative, use of polluted or contaminated water is widespread. Indeed it is estimated that over 20 million hectares are cultivated with this water globally (Nabulo *et al*., 2008).

In Nairobi commercial vegetable sector has developed both within the city and in surrounding areas, taking advantage of the availability of waste and sewer water generated from residential areas and the rapid access to city markets (Prain *et al*., 2007). About 3700 farmers within a 20km radius of Nairobi centre practice irrigation agriculture and 36% of them use raw sewage water suspected to contain the full spectrum of pathogens, many of which can survive for several weeks when discharged onto fields (Amoha *et al.*, 2006). Use of sewage water for farming also results in excessive accumulation of heavy metals in soils which in turn leads to elevated levels of heavy metal uptake by crops, which in turn affects food safety (Muchuweti *et al*., 2006; Karanja *et al*., 2010). Other production-level hazards associated with fresh produce consumed in urban centers include contaminants originating from industrial wastes, vehicle exhaust, dusts from the roads and the use of uncured animal manure (Hide *et al*., 2001). Demand for aesthetic attributes (e.g., spotlessness and good looking produce especially color, shape and size) by urban consumers has also encouraged excessive use of pesticides and chemical fertilizers (Thrupp *et al*., 1995; Okello and Swinton, 2010).

These attributes are mostly untenable under the tropical climate in which theses vegetables are grown. This tropical climate encourages the production and rapid multiplication of pests and diseases making the use of pesticides unavoidable. From food safety perspective there are concerns that accompany health hazards or risks arising from such contaminants that could undermine nutritional and social development benefits of urban and peri-urban agriculture. Throughout developed countries, food quality and safety have become increasingly important attributes driven by consumers' lifestyle changes and income among other factors (Okello *et al.*, 2008; Mergenthaler *et al*., 2009). As consumers' lifestyle changes, so are the changes in demand for products with a bundle of specific attributes that often include the safety of the produce (Freidberg, 2003). Consumer concerns about the safety of the vegetables arise from the increase in the food borne illnesses (Ikeda *et al*., 2000). Improvements in income have led to emergence of middle and high income consumers that are more concerned about medical health and safety of food (Regmi and Gehlhar, 2005). Increasing proportion of this middle and high income groups consumes fresh produce (especially leafy vegetables) as salads, juice, cooked or blanched vegetable. These emerging groups of consumers are also concerned about the safety of vegetables.

At the same time, many low income households still depend on leafy vegetables sold in the wet/spot markets because they are generally inexpensive. While leafy vegetables sold in wet markets are cheaper, the middle and high income consumers generally tend to purchases from specialized retail outlets. A number of recent studies have examined consumers' willingness to pay (WTP) for food quality and safety (Batte *et al*., 2007; Poole *et al*., 2006; Liu *et al.*, 2009). Most of these studies have, however, mainly focused on developed countries. The few studies that have examined consumer valuation on food safety production processes in developing countries include Akgüngör *et al.* (2007), Lacaze *et al.* (2009), Mergenthaler *et al.* (2009) and Lippe *et al*. (2010). Moreover, studies that have assessed WTP for food safety in developing countries have focused on a narrow range of quality attributes such as pesticide residue alone (Nouhoheflin *et al*., 2004) or environmental friendliness (Schmidt and Vani-Anunchai, 2004). Yet in commodities such as leafy vegetables, the quality and safety are often bundles comprising many attributes in which pesticides residue and environmental friendliness are just a subset. This study differs from the previous one because it examines consumers' WTP for a whole range of safety attributes that comprise the quality bundle in kale. At the same time the study focuses on the various quality attributes not just at a point but throughout the value chain (i.e. from production to retailing). The study specifically addresses the following research questions;

1. Is decision of urban consumers to shop in different retail outlet driven by their concern for the quality of leafy vegetables retailed in these markets?
2. Are they willing to pay for safety of vegetables they consume?
3. If so, how much and what affects their willingness to pay for safe produce?

This study focuses on kale produced in peri-urban areas for sale in Nairobi supermarkets, high-end specialty stores and wet markets. Kale is the most important green leafy vegetables consumed by households in Nairobi and play an important role in nutritional balance (FAO/WHO, 2005). However, a large proportion of kale sold in urban areas poses a number of food safety risks, including microbial pathogens, heavy metals, and pesticide and fertilizer residues to urban consumers. KEMRI, (2004) found that there was a high level of lead in kale grown and sold along the roads with heavy traffic. Due to high perishability a significant proportion of kale sold in Nairobi emanate from the urban and peri-urban. At the same time, to keep it fresh and attractive, most retailers sprinkle or moisten it with unclean and sometimes polluted water (Mburu et al., 2007).

2. Food quality, safety and willingness to pay

There is abundance of ways in which the term quality, both in food and otherwise has been defined. There is an agreement that quality has an objective and a subjective dimension. Objective quality refers to the physical characteristics built into the product through production process. Subjective quality is the quality as perceived by consumers. The relationship between the two is at the core of the economic importance of quality: only when producers can translate consumer wishes into physical product characteristics, and only when consumers can then infer desired qualities from the way the product has been produced, will a quality be a competitive parameter for food producers.Food safety can be defined as the opposite of food risk, i.e. as the probability of not contracting a disease as a consequence of consuming a certain food. In broad sense, food safety encompasses nutritional qualities of food and wide range concerns about the properties of unfamiliar foods. As with food quality, we can distinguish from objective and subjective food safety. Objective food safety is a concept based on the assessment of the risk of consuming a certain food by scientists or food experts. Subjective food safety is in the mind of the consumers. Is safety just another dimension of quality? Food quality is everything consumer would find desirable in a food product; therefore safety certainly is a desirable quality of food.

In food industry, the willingness-to-pay (WTP) approach measures the resources individuals are willing and able to give up for a reduction in the probability of encountering a hazard that compromises their health. It is a correct measure of the value individuals attach to improvements in food safety. Consumer theory posits that consumers will balance the marginal health utility and marginal price of one unit of quality-improved food. The marginal health utility depend on the awareness and perception of risks, which are determined by consumer's socio-economic characteristics, learning ability and exposure levels to food-borne hazards (Blend and Ravensway 1999; Gao and Ted, 2009). In this study, WTP could be interpreted as an indicator of demand for safe leafy vegetables (that is, vegetables characterized by low pesticide and nitrogenous fertilizer residue levels, heavy metals and pathogens).

3. Empirical methods

Scoring method was applied to rank eight quality attributes spanning the whole value chain in consumer preference of relative importance. In kale consumers were given 50 points to allocate among the eight quality attributes. These attributes included safety, sensory, environmental friendliness, convenience, hygiene, nutrition and ethics. For this purpose, the mean weighted score of quality attribute was calculated by taking the weighted aggregate scores given by respondents in the sample to arrive at relative importance of each attribute to kale consumer before the purchase decision.This study employed valuation scenarios elicited as stated preferences. Stated preferences were more reliable for products that respondents were familiar with. Price premiums were chosen as payment vehicle within a payment card method due to its simplicity and ability to obtain precise WTP estimates and also minimized the probability biases found in interactive bidding techniques. Two product scenarios were developed. To value food safety, kales was chosen. The first scenario was that kales were sourced from peri-urban areas and grown using sewer/contaminated water or unknown water sources. They are harvested even after pesticides have just been applied. It is washed/dipped/sprinkled/moisten with brown (dirty) water contained in a bucket in the market. Sellers don't wash their hands before handling the product and keep/display the product in dirty areas.

Against this background, we developed a hypothetical (second) scenario in which through assumed changes in supply chain there would be a sustainable vegetable production husbandry practiced by the farmers including clean irrigation water and proper use of pesticides and fertilizers. Hygienic conditions would be maintained along the value chain.A column was provided with payment figures which were pre-chosen ranging from nothing (zero) to nineteen Kenyan shilling per kilogram of product type two. The respondents were asked starting at the top of the list and moving down to please consider whether they were willing to pay one shilling extra per kilogram of kale to buy the second kale just described. Or would rather not pay this amount and have the first kale described? They were asked if were almost certain that they would pay the amounts of money in the card to buy the second kale. The respondents were advised to select the additional payment only if they were prepared to pay it regularly. Bidding technique was used to settle into ultimate or maximum WTP figure.

4. Survey and Data

This study targeted an urban metropolitan area. Metropolitan areas usually have a leading role in the food system transformation for the rest of a country (Pingali, 2007). In Kenya, Nairobi is the capital city and the largest cosmopolitan city of about three million people with much heterogeneity in social status, ethnic backgrounds and perceptions.

The study sites were selected to represent markets segment frequented by high income consumers, middle income consumers and low income consumers. The study sites were first purposively selected to represent these segments. Hence low income segment was represented by wet markets (roadside and open-air markets), medium income segment by supermarkets and high income segment by high-end (specialty) stores. These three segments formed the strata used in this study thus stratified random sampling technique. The number of respondents interviewed in each stratum was based on size of the stratum. That is, probability proportionate to size sampling was used. The procedure encompassed systematic selection of every third person who bought kale. In wet markets, zoning method was applied to ensure that different areas of market where kale are sold were covered. Enumerators were then assigned in different zones in the market from where they sampled every third kale buyer in that zone. To avoid biases related to the moment of purchasing, the survey was conducted at each location at least one week day and one weekend day. Data was collected through personal interviews using pre-tested questionnaires between April and May 2010. A total of 449 responses were used in this study, roadside (n=84), open air market (n=215), supermarkets (n=113) and specialty stores (n=37).

5. Results

5.1 Reference point, WTP and explanatory variables

The Kolmogorov-Smirnov test is a standard test in order to find out whether two observations potentially belong to the same distribution. We employed this test with regard to the Null-hypothesis that served that WTP and weighted quality attribute scores come from the same underlying distribution even though they have been collected at four distinct types of the markets. Table 1 presents results of this test. According to the p-values, we have to reject the null hypothesis that WTP figures are drawn from the same underlying distribution regardless the type of the market in which they have been observed. We fail to reject hypothesis that weighted safety reference point is drawn from the same underlying distribution regardless the type of the market. This implies that consumers in different market segments viewed food safety as a paramount quality attribute. Therefore, pulling the sample without taking into account difference sample characteristics regarding the sampling place likely will not produce biased or misleading results regarding the reference point of food safety used as an explanatory factor for the WTP decision for safe kale.

Table 1: Results from a two-sample Kolmogorov-Smirnov test

	WTP in KES		Weight safety reference point	
Market (1=traditional, 2…)	Test statistic D	p-Value	Test statistic D	p-Value
1 vs. 2	1.962	0.001	0.250	1.000
1 vs. 3	4.045	0.000	0.617	0.841
1 vs. 4	4.082	0.000	1.169	0.130
2 vs. 3	4.163	0.000	0.489	0.971
2 vs. 4	4.258	0.000	1.153	0.140
3 vs. 4	2.402	0.000	0.966	0.308

The safety attribute was used as our reference point of the WTP for kale quality. The Pearson correlation between WTP and weighted safety attribute was 0.128 with P-value of 0.01. Significant correlation indicates that there is link between weighted safety attribute and the WTP for kale safety. The literature suggest that personal experience, consistency and confidence in ascertaining product quality, reference point, subjective overall risk (SOR), both subjective and objective knowledge of quality assertion can affect the WTP for food safety.

In additional, search attributes such as motivation for selecting the purchase location as well as socio-demographic characteristic are also included as explanatory variables. Therefore a series of measure for these constructs was required. Subjective knowledge about food safety (SKN) was assessed using four items with agree (coded as +1) or disagree (coded as -1) response formats drawing upon the approaches by Flynn and Goldsmith (1999). Subjective quality assessment (SQA) was assessed using a five-point zero-centered Likert-scale (strongly disagree (-2) - strongly agree (+2)) in line with Vonhonacker et al. (2007). Objective knowledge about food safety (OKN) was investigated using four statements using a true (1) – false (-1) format with a do not know alternative (0). The confidence and consistency (CC) scale was drawn from the work of McCarthy and Henson (2004) and revised according to the current study. Other variable include familiarity with kale farming, frequency of kale purchase and ever bought certified kale.

5.2 The relative importance of the quality attributes to the kale buyers

Two-sample Kolmogovor-Smirnov test on the quality attributes shows that sensory attribute, convenience, safety and ethics are not separable among different market segments, therefore pulling the sample without taking into account difference sample characteristic will not produce any biases. Safety and sensory attribute was highly ranked in all market segments while the ethic attributes was least scored. For price and nutrition, the sample is separable except for market 1 and market 2. The kale consumers in wet market therefore place much importance in price of the product and its quantity. Indeed, most kale buyers in these markets are low income earners with low education level. Hygiene attributes was separable except for market 3 and market 4. The hygiene attribute was highly ranked by kale shoppers in supermarkets and high-end specialty in comparison in wet markets. Generally, urban kale consumer considers most nutrition, sensory and safety attribute at purchase point in comparison to ethics and convenience attribute as illustrated in figure 1.

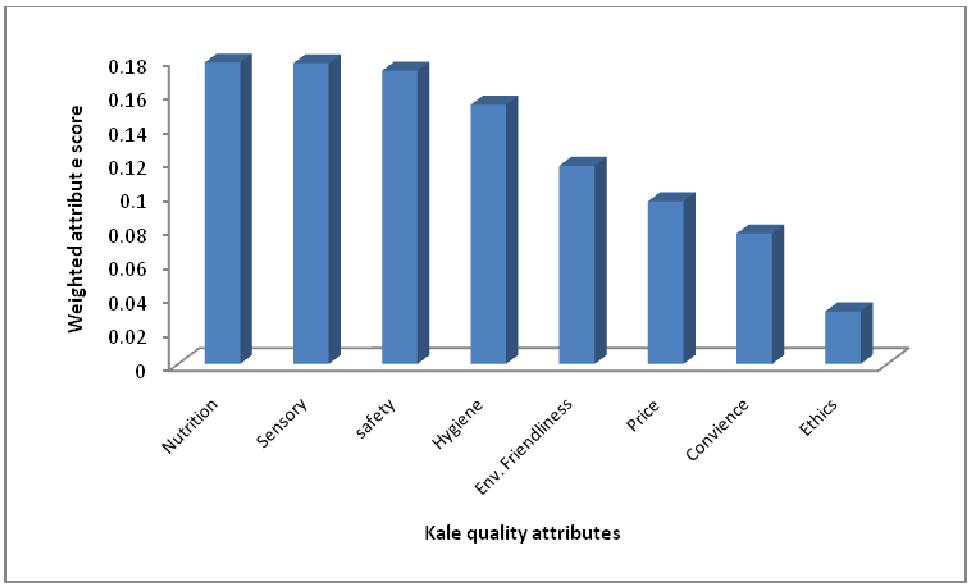

Figure 1: Relative important of kale quality attributes in Nairobi

5.3 Mean WTP for leafy vegetable safety

Results shows that the maximum mean willingness to pay for safety by kale consumers varied along market segments. Estimated maximum WTP for the leafy vegetables safety attributes was 68 percent in high-end specialty stores, 34 percent in supermarkets, 39 percent in open-air markets and 28 percent in roadside markets. The overall mean WTP for kale safety was Kshs 8.1 per Kilogram which represents a price premium greater than 39 percent per kilogram for safety attributes of kale. The results revealed that consumers who shops at high-end markets were willing to pay higher premium for safe kale than those who buy kale in wet markets. This agree to Msuya and Weinberger (2004) that consumers in high-value outlets were willing to pay more for safe vegetables, more than 50 percent of current prices as compared to consumers who purchase in local markets in Tanzania. The comparison between our findings with previous studies is fruitful in order to broaden our general understanding of food safety valuation going beyond the situation in Kenya. Several studies discussed that mean WTP for agrochemical or pesticide risk is lower in developed countries as compared to the estimated value in developing countries.

This is because food regulations in developing countries are less strict compared to the developed countries. This has led to higher pesticide and chemical residue and contamination levels and use of more toxic chemicals (Krishna and Qaim, 2008; Mergenthaler *et al*., 2009). Recent studies have indicated that consumers' WTP for safety of the food they consume could be relatively high in developing countries. In general, only a small number of studies on willingness to pay for safety improved vegetables are available in developing countries especially in Africa. For example, in Ghana mean WTP for bio-vegetables (free of pesticides) was 57 and 50 percent for cabbage and tomatoes, respectively (Nouhoheflin *et al*., 2004). In Taiwan, price increments between 46 and 75 percent were found for low pesticide residue leafy vegetables (Tsu-Tan et al., 1999). While mean WTP for residue-free vegetable in India was more than 50 percent above current market prices (Krishna and Qaim, 2008).

Mergenthaler *et al*., (2009) showed that the percentage above current market price for safety vegetables in Vietnam was around 60 percent for safe vegetables. Schmidt and Vanit-Anunchai (2004) estimated mean WTP for environmentally friendly Chinese cabbage of almost 100 percent in Thailand. Lippe *et al*. (2010) found a WTP chemical free cabbage of 91 percent in Thailand. In this study we examined consumers' willing to pay for a broad range of quality attributes than these previous studies (namely pesticide and fertilizer residue free kale, as well as free from water and soil-borne pathogens). Our results suggest that the mean WTP for safety is in the range of 30-70 percent which is heterogeneous with market segment. Our findings are therefore within the range of other studies in developing countries.

5.4 Drivers of willingness to pay for safe kale by urban consumers

Table 2: Linear, stepwise and logistic models for estimation of WTP explanatory factors

	Linear regression			**Stepwise regression**			**Logit model**		
Variables	**Coef.**	**Std. error**	**P-value**	**Coef.**	**Std. error**	**P-value**	**Coef.**	**Std. error**	**P-value**
Market type	2.35	0.470	0.000	2.54	0.460	0.000	0.66	0.305	0.029
Shopping motivation	0.61	0.454	0.182				0.48	0.394	0.211
SQA	0.39	0.156	0.013	0.37	0.162	0.015	-0.70	0.094	0.455
SKN	-0.18	0.144	0.209				0.02	0.074	0.836
OKN	0.38	0.195	0.052	0.50	0.209	0.016	0.00	0.118	0.989
Certified kale	-1.64	0.882	0.064	-1.65	0.219	0.021	-0.26	0.524	0.625
Consistence	0.59	0.113	0.000	0.55	0.118	0.000	0.13	0.068	0.060
Living area	0.66	0.611	0.278				0.69	0.431	0.111
Age	0.07	0.039	0.071	0.07	0.029	0.021	-0.02	0.373	0.191
Gender	1.15	0.625	0.065				0.50	0.014	0.176
Farming experience	0.58	0.223	0.010	0.66	0.219	0.003	-0.07	0.126	0.603
Household numbers	-0.30	0.189	0.109				-0.07	0.103	0.507
Frequency of purchase	0.19	0.110	0.079				0.03	0.058	0.629
Multi-risk score	0.74	0.301	0.015	0.80	0.349	0.022	0.24	0.176	0.161
Fnse score	0.08	0.029	0.009	0.06	0.032	0.066	0.00	0.018	0.906
SOR	-0.52	0.244	0.033				-0.34	0.145	0.019
Weighty safety score	9.60	4.379	0.029				6.92	2.580	0.007
Presence of kids	1.62	0.629	0.065				0.86	0.381	0.025
Income	1.08	0.289	0.000	0.92	0.171	0.000	0.08	0.129	0.554
Social networks	-0.50	0.666	0.452				-0.11	0.354	0.755
Got information	1.12	0.974	0.253				0.53	0.624	0.399
Constant	-20.40	4.099	0.000	-14.02	3.500	0.000	-3.26	2.395	0.173
Prob >F	0.000			0.000			0.001		
R-squared	0.449			0.417			0.146		
Log likelihood							-133.9		

The study used three model namely; linear regression, stepwise regression and binomial model to estimate the relationship between the WTP and the explanatory variables. The first two models were chosen for the study because the dependent variable distribution seems fairly normally distributed. The result of first two model shows that the choice of shopping place significantly influenced the WTP for kale safety. This implies that consumers expect to pay different prices at different market segment. Subjective quality assessment was also significant factor influencing the WTP for safe kale in both models. The confidence and consistency scale was significant in both models. The reference point on weighted safety attribute was significant in linear regression. This further supports the correlation of reference point and WTP. The kale consumers who consider the safety of food before the purchase will definite pay more for it. The study also hypothesized that presence of children in the household affect urban consumers' WTP for safe kale. To our expectation, having younger children below the five years of age of the kale consumer had significant effect on the WTP for safe kale.

The consumers with children aged five or below are very selective in the kind of kale they purchase or consume. Life-cycle models of health demand find that age to be a theoretically important determinant of WTP that decreases the value of avoiding long-term health risks, a result that suggests a positive association between children in a household and WTP. The results further shows that income of the consumer positively affects kale consumers' WTP for safety positively and significant ($p<0.01$). Conditional of WTP being positive, the increase in income by 1 unit increases the expected willingness to pay for quality of kale by approximately 10 percent for linear regression and 9 percent for the stepwise regression.

This finding corroborates those of past studies that indicate that income level of consumers increases their consumption behavior and especially the demand for credence attributes such as safety, hygiene, nutrition and environmental friendliness involved in the production and marketing process (Freidberg, 2003; Nouhoheflin *et al*., 2004; Regmi and Gehlhar, 2005; Lippe *et al*., 2010). We further hypothesized that social capital/organization or network influence WTP for safe kale by urban consumers. Contrary to our expectations, membership to social organizations reduces kale consumers' willingness to pay for kale safety. This finding is probably because most of the organizations the respondents belonged to tend to deal with social issues such as funeral arrangements, leisure and religious issues. To discuss the motives and factors affecting consumer willingness to pay or to make a distinction characteristics between willing to pay and unwilling to pay consumers, a binary logistic model was applied. The dependent variable of the model divided the respondents into two categories: those willing to pay and those unwilling to pay.

The purpose of the model was to identify the most important explanatory factors for willingness to pay. In the analysis, willingness to pay acted as a dichotomic dependent variable that received the value 1 for respondents indicating willingness to pay > 0, and, respectively, the value 0 for respondents indicating no willingness to pay. In the survey, a total of 449 respondents were included. Of this a total of 395 (88%) of the respondents indicated willing to pay, while 54 (12%) of all respondents were unwilling to pay. The purpose of this model was to identify factors distinguishing the two categories of kale consumers. Logistic model shows that market type preference distinguishes the willing to pay consumers. Different shopping place influence how much consumers are willing to pay for food safety. The consumer confidence and consistency on the quality or kind of kale bought was significant factor conditioning the WTP. The weighted safety attributes was also a significant factor influencing the WTP. This implies that kale consumers who consider safety before they purchase at point of sale will be willing to pay for food safety. The presence of young kid in the household was significant factor conditioning WTP between willing to pay consumer and unwilling to pay consumers.

6. Conclusion

This study concludes that the estimated maximum WTP for the leafy vegetables safety attribute to be 68 percent in high-end specialty stores, 34 percent in supermarkets, 39 percent in open-air markets and 28 percent in roadside markets. The study also concludes that urban kale consumer's demands nutrition, sensory and safety attributes most while ethics and convenience was least demanded attributes. The purpose of the empirical part of the study was to identify factors that explain consumer willingness to pay for kale safety. According to the findings, consumer confidence and consistency with kale safety, their subjective knowledge and weighted reference score were the most importance factors explaining their WTP. Other explanatory factors that influenced willingness to pay were income levels and presence of children in the household. Different market types also influence the willingness to pay. The main factors which distinguished willing to pay and unwilling to pay kale consumer were market type choice, weighted safety score, SOR, consistency and presence of children.

High WTP for safety of kale indicates that kale consumers place high value on the safety of leafy vegetables and suggests the existence of great potential for domestic market actors to improve the leafy vegetable value chains by focusing on delivering safety. This could possibly lead to income growth in the local producer sectors if the targeted demand can be captured. In addition, given that quality or safety attributes are credence attributes, the findings of this study imply that there is need for government or private sector regulation of the leafy vegetable production and retailing practices. Public intervention is needed to ensure effective communication to consumers by establishing reliable and credible certification and labeling systems on farm produce. The findings also imply that as incomes continue to grow, the government will need to invest in promoting hygiene in the wet markets.

References

Akgüngör, S., Miran, B. & Abay, C. (2007). Consumer Willingness to Pay for Food Safety Labels in Urban Turkey: A Case Study of Pesticide Residues in Tomatoes. *Journal of International Food and Agribusiness Marketing* 12(1): 91-107.

Amoah, P., Drechsel, P., Abaidoo, R.C. & Ntow. W.J. (2006). Pesticide and Pathogen Contamination of Vegetables in Ghana's Urban Markets. *Archives of Environmental Contamination and Toxicology*, 50:1-6.

Batte, M.T., Hooker, N.H., Haab T.C. & Beaverson, J. (2007). Putting money where their mouths are: consumer willingness to pay for multi-ingredient, processed organic food products. *Food policy* 32:145-159.

Blend, J. & Van Ravenswaay E. (1999). Consumer demand foe eco-labeled apples: survey methods and descriptive results. *Staff paper 98-20.* Michigan University.

FAO / WHO (2005). Human Vitamin and Mineral Requirements. Report of a joint FAO/WHO expert consultation Bangkok, Thailand. Rome: Food and Agriculture Organization of the United Nations.

Freidberg, S. (2003). The contradictions of clean: The supermarket ethical trade and African horticulture. *Gatekeeper Series. No. 109.* Available at www.iied.org/NR/agbioliv/gatekeepers/documents/GK109.pdf. (18th may 2010).

Flynn, L.R. & Goldsmith, R.E. (1999). A short, reliable measure of subjective knowledge. Journal of Business Research 46:57-66.

Gao, Z. & Ted, C. (2009). Effects of label information on consumer willingness to pay for food attribute. *American journal for Agricultural Economics* 91(3):795-806.

Hide, J., Kimani, J. & Kimani, J. T. (2001a). Informal Irrigation in the Peri-urban zone of Nairobi, Kenya: An analysis of farmer activity and productivity. *Report OD/TN 104, HR.*

Ikeda, M., Zhang, Z.W., Shimbo, S., Watanabe, T., Nakatsuka, H., Moon, C. S., Matsuda- Inoguchi, N. & Higashikawa, K. (2000). Urban population exposure to lead and cadmium in East and South-East Asia. *Science of the Total Environment,* 373–384.

IWMI (2006). Recycling realities: Managing health risks to make wastewater an asset, IWMI, issue 17 paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Portland, OR, July 29-August 1, 2007.

Karanja N.K., Njenga, M., Prain, G., Kangethe, E., Kironchi, G., Githuku, G., Kinyari P. & Mutua, G.K. (2010). Assessment of environmental and public health hazards in wastewater used for urban agriculture in Nairobi, Kenya to Tropical and Subtropical Agroecosystems. Tropical and Subtropical Agroecosystems, Vol 12, No 1: 85-97

KEMRI, (2004). Policy prospect for urban and peri-urban agricultural in Kenya.

Krishna, V.V. & Qaim, M. (2008). Consumer Attitudes toward GM Food and Pesticide Residues in India. *Review of Agricultural Economics* 30(2), 233-251.

Lacaze, V, Rodriguez, E & Lupin, B, (2009). Risk perceptions and willingness to pay for organic fish chicken in Argentina. Contributed paper prepared for presentation at international Association of agricultural economic conference, Beijing, China, August 16-22, 2009.

Lippe, R.S., Mergenthaler, M. & Isvilanonda, S, (2010). Consumer willingness to pay for pesticide safe produce: the case of cabbage and yellow mango in Thailand. Available at www.globalresearch.com.my/main/.../PAPER_238_ConsumerWillingness.pdf. (29/06/2010).

Liu Y., Zeng, Y. & Xiaohua Y. (2009). Consumer Willingness to Pay for Food Safety in Beijing: A Case Study of Food Additives. *Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, August 16-22, 2009.*

Mburu, J., Irungu, C., Maundu, P., Grum, M & Hoeschle-Zeledon, I. (2007). Marketing of African leafy vegetables in Nairobi. Implications for on-farm conservation of biodiversity. Acta Horticulturae 752: 197-201.

McCarthy, M. & Henson, S. (2005). Perceived risk and risk reduction strategies in the choice of beef by Irish consumers. Food Quality and Preference, 16:435-445.

Mergenthaler, M., Weinberger, K. & Qaim, M. (2009). "Consumer Valuation of Food Quality and Food Safety Attributes in Vietnam." *Review of Agricultural Economics*, 31(2): 266-283.

Muchuweti, M., Birkett, J. W., Chinyanga, E., Zvauya, R., Scrimshaw, M. D., & Lester, J. N. (2006). Heavy metal content of vegetables irrigated with mixture of wastewater and sewage sludge in Zimbabwe: implications for human health. *Agriculture, Ecosystem and Environment.* 112:41–48.

Musya, J., & Weinberger, K. (2004). Indigenous vegetables in Tanzania. Significance and Prospects. Technical bullents No 31. The world vegetable center.

Nabulo, G., Hannington, O.O., Nasinyama, W.G., Cole, D.C. & Diamond, M. (2008). Assessment of heavy metal contamination on food crops in wetlands and from vehicle emissions. In Healthy city harvests: Generating evidence to guide policy on urban agriculture.(Eds.Donald Cole,Diana Lee-Smith and George Nasinyama pp111-131).CIP Urban Harvest and Makerere University Press, Lima, Peru, pp259.

Nouhoheflin, T., Ousmane C., Andy, J. C., Ramatu, A.H & Adegbola, P.Y. (2004). Consumers' Perceptions and Willingness to Pay for organic vegetable in Benin and Ghana. African Association of Agricultural Economists. Proceedings of the Inaugural Symposium, 6 to 8 December 2004, Grand Regency Hotel, Nairobi, Kenya.

Okello, J. J & Swinton, S. M. (2010). From circle of poison to circle of virtue: pesticides, export standards and Kenya's green bean farmers. *Journal of Agricultural Economics* 61(2) 209–224.

Okello, J. J., Narrod C. & Roy, D. (2008). Food Safety Requirements in African Green Bean Exports and Their Impact on Small Farmers. *IFPRI Discussion Paper* 00737.

Pingali, P. (2007). Westernization of Asian diets and transformation of food systems; Implication for research and policy. *Food policy* 32:281-13.

Poole, N.D., Martinez, L.M. & Gimenez, F.V. (2006). Quality perception under evolving information conditions: implication for diet, health and consumer satisfaction. *Food policy* 32:175-88.

Prain, G. Blanca, A.B. & Karanja N. (2007). Horticulture in Urban Eco-systems: Some Socio-economic and Environmental Lessons from Studies in Three Developing Regions. http://www.database.ruaf.org/wuf/pdf/horticulture_uh.pdf Retrieved 10th December 2009.

Regmi, A and M. Gehlhar. (2005a). Processed food trade pressured by evolving global supply chains. Amberwaves. February 2005 Issue. USDA/ERS.

Scott C., Faruqui N. & Raschid-Sally, L. (2004). Wastewater use in irrigated agriculture: Confronting the livelihood and environmental realities. *CAB International* pp193.

Schmidt, E. & Vanit-Anunchai, C. (2004). Consumer willingness to pay for environmentally friendly produced vegetables in Thailand. *Acta Horticulture* 655:107-113.

Thrupp, L.A., Bergeron, G. & Waters, W. F. (1995). Bittersweet Harvest for Global Supermarkets: Challenges in Latin America's Export Boom (Washington, DC: Natural Resources Institute).

Tsu-Tan, F. & Jin-Tan, L. (1999). Consumer Willingness to Pay for Low-Pesticide Fresh Produce in Taiwan. *Journal of Agricultural Economics 50(2):220-233.*

UN HABITAT (2010). State of the World's Cities 2010/2011: Bridging the Urban Divide. Publisher Earthscan.pp223.

Vanhonacker, F., Verbeke, V., Poucke, E. V., & Tuyttens, A.M. (2007). Segmentation Based on Consumers' Perceived Importance and Attitude Toward Farm Animal Welfare. *International Journal of Sociology of Food and Agriculture*, 15:91-107.