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Consumer willingness to pay for commodities certified under Sri Lanka Good Agriculture Practices (SL-GAP)

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Abstract

Consumers in developing countries are increasingly concerned about the safety of the food that they consume resulting increased demand for safe foods. Agricultural supply chain, thus, need to be ready to cater to this growing demand. Estimates on consumer willingness to pay for safe food attributes are vital for policy makers to set up feasible food safety standards. This paper aims to evaluate how Sri Lankan urban consumers are concerned with the products certified under Sri Lanka Good Agriculture Practices (SL-GAP), which is a government-backed food safety management standard. A double bounded Contingent Valuation (CV) survey approach was employed to estimate the consumer willingness to pay for SL-GAP certified rice and tomato. Data was gathered from a survey carried out among 366 consumers in five urban districts in Sri Lanka for the estimation. The model for rice and tomato were jointly estimated using a multivariate probit model, which allowed error terms within and across commodities to be correlated. The estimated median values of willingness to pay for SL-GAP rice and tomato was 41.9% and 39.1% premium, respectively. The premium percentages further increased with prior consumer experience with products certified as organic.

Key words: Contingent valuation, Food safety, Good Agriculture Practices (GAP)

Introduction

Consumption of safe and healthy food is the way to achieve a healthy life. Thus, food safety is treated as a fundamental requirement for make food systems sustainable. Due to its importance, food safety is a widely discussed issue all over the world in the past few decades and its importance to global public health has been recognized internationally (Unnevehr, 2003). Usually, food safety in a country is governed by governments through laws, regulations and standards which sets the country's baseline for food safety (Wongprawmas and Canavari, 2017).

Sri Lanka, as a developing country faces issues in food safety similar to other developing countries. The measures established to address food safety issues are hardly sufficient to handle the problems. As pointed out by Munasinghe *et al.* (2014), the presence of pesticide residues in agricultural products has raised much concern in the general public as well as policymakers. The Sri Lanka Good Agriculture Practice (SL-GAP) was launched by the government in 2016 as a result of a policy initiative to address the food safety issues and to cater for the demand for safe agriculture commodities by local consumers (Presidential task force, 2016). SL-GAP is a voluntary food safety management system used to certify farmers and it covers the entire production process involved in producing agricultural commodities.

The implementation and certification under SL-GAP program is undertaken by two agencies of the Department of Agriculture (DOA). The Division of Agribusiness Counselling holds the responsibility of implementation which is undertaken through Counsellors of Agribusiness (CAb), in collaboration with the extension officers of provincial departments of agriculture, interprovincial extension and Mahaweli officers. The certification part is handled by the SL-GAP certification unit of Seed Certification Service (SCS). The technical knowhow towards the farmers on following the standard is given by the CAb and the extension officers. The farms are continuously monitored by the CAb officers and corrected wherever necessary. Once the farmer successfully adopts the standard, an internal audit is performed by the CAb officers and if farmer qualifies the internal audit the SL-GAP certification unit will be informed to conduct the final audit. The qualified farms will be awarded with SL-GAP certificate. Successful adoption of the

standard ensures quality and safety of the produce, and samples of GAP produce is tested at the pesticide registrar's office of DOA to ensure the safety.

Through SL-GAP, it is expected to provide safe agriculture commodities to Sri Lankan consumers as well as to the export market. To achieve the desired results, the standard should be adopted by the majority of farmers. Yet, farmers will need a motive to adopt the SL-GAP standard. A premium price for SL-GAP certified products is one such motive. To give a clear indication of the premium the producers can expect, it is essential to estimate the Willingness To Pay (WTP) for SL-GAP certified products. However, the studies related to WTP estimation of food safety standards are scarce in Sri Lanka.

Therefore, the objectives of this study are to estimate the Median Willingness To Pay (MWTP) of Sri Lankan urban consumers for two SL-GAP certified commodities rice and tomato, and secondly to analyze the factors influencing the WTP.

Materials and methods

Conceptual framework and Elicitation method

SL-GAP certification is a non-market attribute embedded in a marketable good and valuing it is a challenge. According to van Ravenswaay (1995), a theoretically accepted method to value health and safety is estimation of its WTP. The WTP is defined as the maximum amount a person will pay out of his income to get an improvement in a situation or to avoid a decline in a situation (Haab, 2002). The WTP for food safety can be estimated using revealed preference method for a marketable commodity attributes and stated preference technique for non-marketable attributes in a hypothetical market. This study assesses the MWTP for two commonly consumed commodities, i.e., rice and tomato. As the standard is introduced recently, the market availability of SL-GAP products is low. Out of the selected products, SL-GAP certified tomatoes are available in the market but there is no SL-GAP rice. Therefore, it is more of a hypothetical market scenario, thus we opted for a stated preference technique in this study. Many researchers have used the stated preference technique, constructing a hypothetical market due to its convenience and its ability to be used when products certified under the standard is sparse (Aizaki and Sato, 2007; Yu *et a*l., 2014).

A Contingent Valuation (CV) survey with Double Bounded Dichotomous Choice (DBDC) approach was used in this study to reveal the value placed on SL-GAP certified commodities.

Econometric Strategy

The consumer WTP for rice and tomatoes certified under SL-GAP was estimated using the econometric strategy given below.

When using DBDC elicitation format to estimate median WTP each respondent is offered with two bids, the first bid (B_i) and follow-up bids (B^d_i B^u_i)for each commodity. The bid values are set to be $B^d_i < B_i < B^u_i$. Once a respondent "i" is offered with a first bid Biand received the binary response (Yes/No), a second bid is offered. This bid can be lower or higher than the first bid which is based on the response received to the first bid, if the response to the first bid is a "no", the respondent is offered with the lower bid (B^d_i) Similarly, if the response to the initial bid is "yes", the respondent is offered with the higher bid (B^u_i) Four answers are expected for the bid questions and their potential outcomes in correspondence with WTP is given below.

i. "yes" to both bids $\pi^{yy} = \text{Prob}(WTP \geq B^u_i)$

ii. "no" to both bids $\pi^{nn} = \text{Prob}(WTP < B^d_i)$ (1)

iii. "yes" to initial bid and "no" to follow-up bid $\pi^{yn} = \text{Prob}(B_i < WTP < B^u_i)$

iv. "no to initial bid and "yes" to follow-up bid $\pi^{ny} = \text{Prob}(B^d_i \leq WTP < B_i)$

where π represents the response probability.

According to Hanemann *et al.* (1991), the potential outcomes can be assumed to follow a normal or an exponential distribution. A general equation for estimation would be,

$$WTP_i = f(X;ø,\varepsilon) \quad (2)$$

Where *X* is a vector of individual characteristics such as income, age, education, etc which is affecting WTP, ø is a vector of unknown parameters and ε is random error component (Herriges and Shogren, 1996).

The response functions used in estimating WTP for SL-GAP certified rice and tomato is given below.

Rice:

Bid1: $RRESP_1=\alpha_{R1}+\beta_{R1}RBid1+\delta_{R1}X+\varepsilon_{R1}$ (3)

Bid2: $RRESP_2=\alpha_{R2}+\beta_{R2}RBid2+\delta_{R2}X+\varepsilon_{R2}$ (4)

Tomato:

Bid1: $TRESP_1=\alpha_{T1}+\beta_{T1}TBid1+\delta_{T1}X+\varepsilon_{T1}$ (5)

Bid2: $TRESP_2=\alpha_{T2}+\beta_{T2}TBid2+\delta_{T2}X+\varepsilon_{T2}$ (6)

$RRESP_1$ and $RRESP_2$= binary response to bid 1 and bid 2 for rice

$TRESP_1$ and $TRESP_2$=binary response to bid 1 and bid 2 for tomato

*RBid*1 and *RBid*2 = bid variables for rice

*TBid*1 and *TBid*2= bid variables for tomato

X = Other variables affecting WTP,

β, δ =parameters to be estimated and **ε** = estimation error

The equations resulted in two bid levels (m=2) which can be estimated using a multivariate probit regression. Through joint estimation, it allows correlation among error terms and eliminate getting biased estimates (Park and Loomis, 1996).

Site selection, Sampling and data collection

The present availability of SL-GAP certified commodities are limited to supermarkets. Hence, the sample for the study was selected from consumers of two main supermarket chains in five urban districts namely Colombo, Gampaha, Kandy, Kurunegala, and Matale. Simple Random Sampling technique was employed in selecting the supermarket outlets. Of the two supermarket chains the outlets in each district were listed seperately and assigned a number. Then the outlets were selected using computer assisted randomization. The survey was carried out in 22 selected outlets out of 138 outlets in selected districts. The respondents were selected randomly from the consumers

entering the fruits and vegetable section of the selected supermarkets, who were aged 18 or above. The consumers buying both rice and tomatoes were selected for the survey.

Owing to time and resource limitations, the attainable sample size was decided as 350. Interviews were conducted in June 2018. Sixteen CAb officers already involved in SL-GAP program were employed, after training specifically for conducting CV surveys. The officers experience on SL-GAP were specifically selected for the survey, as the success of the CV survey depend on the quality of the information provided to the respondents (Buzby *et al*., 1995). The survey was carried out using tablet pcs' where the questions were read to respondents in their local language. The questionnaire was pretested with a focus group with 33 respondents and based on the results of the pretest, modifications were applied to the final questionnaire. The respondents were selected randomly from the consumers entering the fruits and vegetable section of the supermarket, who were aged 18 or above. The consumers buying both rice and tomatoes were selected for the survey.

Survey method and Questionnaire design

A Double Bounded Dichotomous Choice CV survey questionnaire was designed to assess the MWTP for rice and tomato. Rice was selected as the first commodity for the study owing to its importance as the staple food for Sri Lankans. Rice comprises a larger share of the food basket with an average budgetary share of 12.83% of total food consumption (Department of Census and Statistics, 2016). However, the SL-GAP standard is presently available only for fruits and vegetables. Therefore, there are no provisions to certify rice under SL-GAP standard. Thus, a hypothetical market was used for SL-GAP certified rice. Tomato, a common vegetable for Sri Lankans, is used as the second commodity. Tomato is perceived locally as a product highly exposed to pesticides (Padmajani *et al*., 2014). It is already in the SL-GAP program and the SL-GAP certified tomatoes are available in supermarkets. However, the certified tomatoes are not in sufficient volumes.

During the survey, the consumers were asked for their usually paid prices for rice and tomato. Based on the prices given by the respondents' initial bid values were automatically calculated to have a 5% to 30% increase. Six sets of bids were randomized between different respondents. The respondents offered with the initial bid, when the

answer of the respondent to the initial bid is "No" the lower bid was offered and when the answer of the respondent to the initial bid is "Yes" the upper bid was offered.

The models estimated using a multivariate probit model due to its provision of correlation of error terms within and across commodities. The statistical software STATA was used for the analysis of data.

Results and discussion

Sample characteristics, purchasing behaviour and attitudes

Table 1. Summary of respondent characteristics

Variable	Percentage	Mean	Std dev
Gender			
Female	37.2	-	-
Male	62.8	-	-
Age of the respondent (years)		45.14	11.89
Highest level of education			
Grade 8 or less	1.19	-	-
G.C.E. (Ordinary Level)	15.77	-	-
G.C.E. (Advanced Level)	54.17	-	-
University degree	28.87	-	-
Household characteristics			
Household size	-	4.05	1.1
Families with children under 5 years	35.71	-	-
Gross monthly income (Rs.) *		-	-
Less than 25,000	4.46	-	-
25,000-40,000	30.36	-	-
40,000-70,000	33.63	-	-
70,000-100,000	18.45	-	-
Above 100,000	13.1	-	-
Being the primary shopper	81.44	-	-

The sample represents the urban population of Sri Lanka as it was drawn from consumers interviewed in two major supermarkets in five urban districts in Sri Lanka, hence it is slightly upscaled from the general Sri Lankan population. A total of 363 consumers interviewed and only 323 responses were selected for analysis due to

incompleteness. Compared to national averages the sample comprised of an educated group of respondents. The median household income of the sample was Rs. 60,654.00 per month whereas the National level value is only Rs. 43,511 per month (Department of Census and Statistics, 2016). Summary statistics of socioeconomic characteristics of the sample are given in Table 1.

Table 2. Summary of GAP information sources

Source	Percentage
TV/Radio	46.77
Internet	24.19
Social media	32.26
Friends/Relatives	20.16
Retail shops	10.48
Exhibitions	39.52
Newspaper/printed	22.58

**Note Total % >100 as respondents could choose more than one source*

Out of the sample, respondents who had any information on SL-GAP prior to this study was 37.13%, which is high for a recently introduced program. However, the respondents who had any exposure to SL-GAP products was low (15.22%) which is expected as the SL-GAP products available in the market is limited. The main source of awareness for SL-GAP program is given in Table 2.

After giving a detailed description of SL-GAP, a vast majority of respondents (94.05%) reported willingness to pay a premium price for SL-GAP certified products. The summary responses on attitudes on safeness of consuming rice and tomato revealed 60.9% of respondents believed the rice in the market was safe to consume whereas for tomato it was only 32.73%. This is due to the poor consumer perception owing to heavy use in agrochemicals in vegetable production compared to rice. Most of the respondents (72.92%) are highly concerned about agrochemical use.

The average price paid for a kilogram of rice and tomatoes were Rs.103.66 and Rs. 141.17, respectively. The average rice quantity purchased was 28.76 kg/month. Due to the seasonally high price prevailingin the month of June the average tomato quantity purchased was 2.16 kg/month.

Model estimation

The results from the multivariate probit regressions (Table 3) for rice and tomato had negative coefficients for first and second bid amounts in both commodities and were statistically significant. This is expected as consumer willingness to purchase a commodity decreases with increased bid values. However, none of the demographical or attitudinal variables were significant in the model hence income, age, sex, education, household size, and attitudinal variables on agrochemical use and food safety were dropped from the model. Only prior experience of using organic products (ORG) has shown significant relationship to WTP.

Table 3. Multivariate probit regressions for rice and tomato

	Estimates	**SE**
Rice- First bid		
RBid1	-4.861***	0.488
ORG	-0.491***	0.217
Constant	-6.898***	0.635
Second bid		
RBid2	-2.808***	0.366
ORG	-0.457***	0.154
Constant	-3.621***	0.503
Tomato -First bid		
TBid1	-4.249***	0.450
ORG	-0.608***	0.200
Constant	-5.908***	0.582
Second bid		
TBid2	-2.577***	0.377
ORG	-0.608***	0.156
Constant	-3.175***	0.509
Log-L	-596.773	
DF	12	
N=323		

*Notes: *Significant at 5% level, ** Significant at 1% level, *** Significant at 0.1% level*

The prior use experience on organic products (ORG) was significant for both bid levels in rice and tomato. This might be due to prior exposure to organic products

increase the utility levels of the consumers, so they have a higher WTP. The correlation coefficients within and across rice and tomato were statistically significant (Table 4). This indicates that the model estimation has gained efficiency by using multivariate probit as it has got a correction for correlation in two bid levels.

Table 4. Correlation coefficients within and across rice and tomato

	Estimates	**SE**
$\rho\ R_2\text{-}R_1$	-0.338***	0.102
$\rho\ T_1\text{-}R_1$	-0.473***	0.098
$\rho\ T_2\text{-}R_1$	-0.336***	0.097
$\rho\ T_1\text{-}R_2$	-0.321***	0.100
$\rho\ T_2\text{-}R_2$	-0.496***	0.075
$\rho\ T_2\text{-}T_1$	-0.324***	0.099

R- Rice, T-Tomato, 1, 2 bid levels

The MWTP for rice and tomato was calculated using the model estimates. Table 5 shows the estimated MWTP and their 95% confidence intervals.

Table 5. MWTP values for rice and tomato (95% CI in parenthesis)

	MWTP (% premium of price paid)	
	1st Bid	**2nd Bid**
Rice		
General consumer	41.88 (36.58 - 47.19)	28.93 (22.53 - 35.34)
Consumer experienced with organic products	51.98 (38.06 – 65.92)	45.23 (27.62 - 62.85)
Tomato		
General consumer	39.05 (33.82 - 44.28)	23.19 (15.88 - 30.50)
Consumer with experience on buying organic products	53.37 (38.87 - 67.85)	52.60 (31.89 - 73.31)

The MWTP for rice was 41.88% premium on the current price (range 36.58% - 47.19%). The MWTP for tomato was a 39.05% premium on the current price (range 33.82% – 44.28%). Indication of the MWTP premiums in percentages is preferred for the Sri Lankan situation as the prices of food commodities show a large variation depending on location and season. When considering the consumers who buy organic products, they show higher MWTP values for SL-GAP commodities. When calculated using the

first bid, for rice it is 10.10% additional increase to MWTP whereas for tomatoes it is a 14.32% additional increase. The reason for this effect might be those who value organic also value SL-GAP because they are looking for the same safe food attribute in the commodity, which has reflected through a higher WTP for GAP commodities.

These findings are drawn from a sample of urban consumers from supermarkets which the respondents were with a better education and a higher income, this might not the same in peri-urban and rural areas. Although the results did not show a significant relationship with income and education, these factors can possibly affect the WTP for safe food in a nationally representative sample. Also, the absence of SL-GAP certified rice in the market and less availability of other SL-GAP certified commodities has made the respondents to express their WTP considering a hypothetical situation.

These estimates are comparable to similar studies on WTP estimations for food safety attributes. In a study in Japan, Aizaki and Sato (2008) revealed a 19% premium for GAP certified tomato. In India, the premium found for residue-free vegetables found is as high as 56.6% (Krishna and Qaim, 2008). In a study by Mergenthaler *et al*. (2009) found in Vietnam the consumers were willing to pay a premium of 60% for chemical residue free Chinese mustard whereas in Ghana the WTP for organic tomatoes is 50% (Coulibaly *et al.*, 2011).

Higher premium prices for safe food in developing countries could be due to consumer uncertainty of safeness of the existing conventional commodities with poor regulations. Therefore, with increased income and awareness on food hazards, consumers tend to put more value for food that is certified to be safe.

Conclusion

The results from the model estimation have shown that Sri Lankan urban consumers are willing to pay a considerable premium for safe food: they have valued SL-GAP certified rice and tomato with a MWTP of 41.88% and 39.05% respectively. Those who had hands-on experience in food safety standards such as organic food, had higher premiums. The estimated MWTP between the two commodities is not significantly different. This indicates that MWTP values are not specific to the products and respondents are valuing SL-GAP standard irrespective of the commodities. It is a

good indication for policymakers as the findings suggest strong trust in government-driven food safety programs and it also suggests an opportunity to expand the SL-GAP program. However, a public awareness of SL-GAP program covering the entire country will be pre-requited.

Due to limitations of the study discussed in earlier sections, the actual WTP might be lower than the estimates reported in this study. Therefore, generalizing of the findings should be done cautiously. It is recommended to extend the research to other markets considering peri-urban areas with a bigger and more representative sample and include other SL-GAP products. This study only concerned with the insights from the consumer, but for the successful implementation of the SL-GAP program, the costs involved in the supply chain should be taken into consideration. Out of the WTP premiums, the proportions for each supply chain actors must be carefully studied to come up with the actual premium that can be expected at the farm gate level.

References

Aizaki, H. And N. Sato. 2007. Consumers' valuation of good agricultural practice by using contingent valuation and contingent ranking methods: A case study of Miyagi prefecture, Japan. Agricultural Information Research. 16: 150-157.

Aizaki, H. And N. Sato. 2008. Comparing consumers' valuations of good agricultural practice in the Tokyo metropolitan area and Miyagi Prefecture: applications of the contingent valuation method. World Conference on Agricultural Information and IT.

Buzby, J. C., J.R. Skees and R.C. Ready. 1995. Using contingent valuation to value food safety: a case study of grapefruit and pesticide residues. Valuing Food Safety and Nutrition.

Coulibaly, O., T. Nouhoheflin, C. Aitchedji, A. Cherry and P. Adegbola. 2011. Consumers' perceptions and willingness to pay for organically grown vegetables. International Journal of Vegetable Science. 17: 349-362.

Department of Census and statistics.Sri Lanka. 2016. Census of population and housing 2016 - Final report. Retrieved from http://www.statistics.gov.lk/HIES/HIES2016/HIES2016_FinalReport.pdf

Haab, T. C. 2002. Valuing Environmental and Natural Resources. The Econometrics of Non-market Valuation, Edward Elgar Publishing.

Hanemann, M., J. Loomis, and B. Kanninen. 1991. Statistical efficiency of double-bounded dichotomous choice contingent valuation. American journal of agricultural economics. 73: 1255-1263.

Herriges, J. A. And J.F. Shogren. 1996. Starting point bias in dichotomous choice valuation with follow-up questioning. Journal of environmental economics and management. 30: 112-131.

Krishna, V. V. And M. Qaim. 2008. Consumer Attitudes toward GM Food and Pesticide Residues in India. Review of Agricultural Economics. 30: 233-251.

Mergenthaler, M., K. Weinberger and M. Qaim. 2009. Consumer valuation of food quality and food safety attributes in Vietnam. Review of Agricultural Economics. 31: 266-283.

Munasinghe, J., A. De Silva, G. Weerasinghe, A. Gunaratne and H. Corke. 2014. Food safety in Sri Lanka: problems and solutions. Quality Assurance and Safety of Crops & Foods.7: 37-44.

Padmajani, M., M. Bandara and M. Aheeyar. 2014. Assessment of pesticide usage in up-country vegetable farming in Sri Lanka.

Park, T. And J. Loomis. 1996. Joint estimation of contingent valuation survey responses. Environmental and Resource Economics. 7: 149-162.

Presidential Task Force.2016. National food production program. Presidential task force on National food production.

Unnevehr, L. 2003. Food safety in food security and food trade, International Food Policy Research Institute Washington, DC.

Van Ravenswaay, E. O. 1995. Valuing food safety and nutrition: the research needs. Valuing Food Safety and Nutrition (1995).

Wongprawmas, R. And M. Canavari. 2017. Consumers' willingness-to-pay for food safety labels in an emerging market: The case of fresh produce in Thailand. Food Policy. 69: 25-34.

Yu, X., Z. Gao and Y. Zeng. 2014. Willingness to pay for the "Green Food" in China. Food Policy. 45: 80-87.