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Article

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Consumer Perception and Willingness to Pay for Organic Vegetables in Savannakhet Province, Lao PDR

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Abstract

Organic vegetables play a vital role in reducing exposure to harmful substances in food. This study aimed to assess consumer perceptions and willingness to pay (WTP) for organic vegetables, and identify factors influencing respondents' WTP for such vegetables in Savannakhet province, Lao PDR. A total of 368 respondents participated, with data collected using a structured questionnaire. Descriptive statistics, contingent valuation method, and logit models were employed for analysis. Results indicated that 60.30% of tested fresh vegetables were free from chemical contamination and toxins. High and moderate levels of chemical contamination were observed in only 6.25% and 25% of fresh vegetables, respectively. Approximately 35.29% of consumers reported regular weekly purchases of organic vegetables, with an average consumption of 3.78±2.45 kg/week, priced between 0.37 USD and 3.09 USD. Organic vegetables were favored for their perceived health benefits and quality, with 98.53% of consumers expressing future demand. The mean WTP for organic vegetables was found to be 1.14 USD per 1 kg. Bid premiums negatively impacted WTP for lettuce, morning glory, and mint products, while occupation exhibited a negative correlation with WTP for Chinese cabbage and onion.

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Keywords: organic vegetables; perception; willingness to pay (WTP)
JEL Classification: O13; P36; Q11

1. Introduction

The use of chemical inputs in vegetable production poses significant health risks and environmental damage, making food safety a pressing concern. Improper application of toxic pesticides during pre- and post-harvest stages threatens the health of farmers, consumers, and ecosystems. By eschewing chemosynthetic fertilizers, pesticides, and pharmaceuticals, we can sustain ecosystems and reduce pollution (Policy Department, Directorate-General for External Policies, 2021).

Organic production systems adhere to stringent standards to achieve socially, ecologically, and economically sustainable agro-ecosystems. They eschew synthetic pesticides, herbicides, chemical fertilizers, growth hormones, antibiotics, and gene manipulation. The demand for organic products has surged in recent years, driven by the growth of the world organic market, particularly in the United States and Europe. However, the ASEAN market for organic products remains underdeveloped, with organic agriculture in Laos accounting for less than one percent of nationwide agricultural land. The high degree of concentrated sales also underscores the disparity between production and consumption, indicating that much of the organic food production in regions such as Africa and Latin America is geared towards exports (Phillip & Dipeolu, 2010).

Certified organic products are currently recognized in only a few domestic markets, excluding Laos. However, organic agriculture has thrived in Laos due to the limited use of chemical inputs by farmers, with some employing indigenous organic farming practices, such as using animal manure. Despite the costliness of organic production, the market for organic products is expanding alongside increasing consumer willingness to pay for and consume them. The future of agriculture will depend largely on customer demand and their willingness to pay a premium for organically grown food. Understanding the market for organic products requires a customer-oriented approach, considering factors such as production quality, certification, infrastructure, environment, and policies (Anil & Sununtar, 2008; Caswell, 2003).

The demand for organic products is growing both domestically and internationally. This may be explained by the growing number of middle/high-income consumers due to rapid regional, economic growth, and by increasing food safety awareness and urbanization in Laos and the region. This context might offer a genuine opportunity for Laos to specialize in the production of organic products, provided producers are able to become certified. Laos has an advantage because in remote areas farmers usually do not use chemical fertilizers and pesticide as in neighboring countries. Efforts focused on enabling policy for organic production and certification would help maintain or even improve on this advantage (Sonethavixay, 2019).

While Lao consumers prioritize food security, farmers are encouraged to prioritize food safety by producing organic vegetables. However, research on these aspects, particularly in Savannakhet province, remains limited. Therefore, this study aims to investigate the factors influencing consumers' decisions to

purchase organic vegetables in Savannakhet province. Understanding these determinants is crucial not only for meeting the growing demands of consumers and guiding organic vegetable producers but also for policymakers to promote the future development of the demand for safe foods in Laos. Thus, this study also seeks to illuminate consumers' perceptions of organic vegetables and their willingness to pay for such produce.

2. Conceptual Framework

As depicted in Figure 1, the study centered on consumers' perceptions and willingness to pay for organic vegetables, influenced by characteristics such as the quality and price of organic vegetables, consumer knowledge, purchasing habits, and socio-economic factors. These factors were categorized to represent direct and indirect influences on purchasing behavior, playing a significant role in determining future consumer demand.

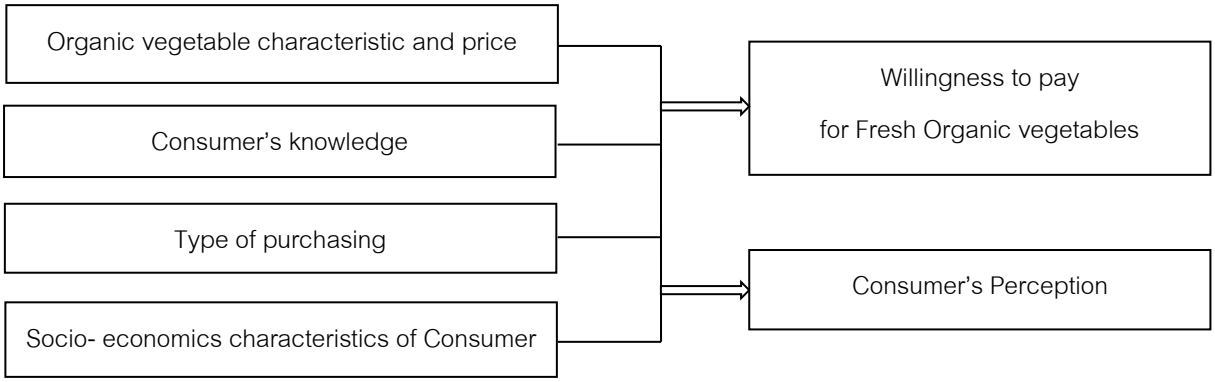

Figure 1: Conceptual framework of research study

3. Method and Data

3.1 Research design and location

This study employed a cross-sectional survey research design. Data were collected through questionnaire sets administered via individual interviews with respondents. The questionnaire was pretested to ensure the reliability, validity, precision, and accuracy of the data gathered, aligning with the study's objectives. Specifically, the questionnaire aimed to assess consumers' perceptions and willingness to pay (WTP), primarily influenced by organic vegetable characteristics, price, consumer knowledge, purchasing behavior, and socio-economic factors.

The study's respondents consisted of consumers of organic vegetables, and the research was conducted at an organic vegetable shop in Dao Heuang market. This location was chosen due to its availability, accessibility, and the cooperative and accommodating nature of the market owner.

3.2 Data collection

The consumers were considered a non-probability population. The sample size was therefore computed using Cochran's formula (1977) with an alpha level set at 10% (error of 10%), as cited by Bartlett et

al. (2001). From the total population, 368 respondents were calculated to be included in the study. Purposive sampling was further employed to select respondents who consume only organic vegetables.

3.3 Data gathering

A convenient method was applied to gather data using a structured questionnaire. Interviews were conducted only in the morning when consumers typically buy organic vegetables and the market is open. Observation techniques were also utilized to generate additional information to address the study's objectives accurately. Secondary data were gathered from available sources such as the Savannakhet provincial agriculture and forestry office, market administration office, and various websites, among others.

3.4 Data analysis

Descriptive statistics, employing the contingent value method, logit model, and mean WTP, were utilized to analyze the data of the study. In the contingent value method, responses from consumers were categorized into four types: 1) Yes-Yes, 2) Yes-No, 3) No-Yes, and 4) No-No. IBM SPSS version 20 and Microsoft Excel version 2010 were used for statistical analysis.

The logit model was employed to examine consumers' willingness to pay for organic vegetables. This model estimated the probability of consumers being willing to pay, predicting the binary outcome from a set of independent variables. The model was represented as:

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

where:

WPTi = Whether consumer i is willing to pay for organic vegetable or not;

P_i = prob ($y_i = 1$) and the left-hand side corresponds to the logit or the log of the odds ratio

β = Estimated coefficients;

X_i = Vector of exogenous variables ((gender (1=female, 0=otherwise); age (number of year); status (1 = married, 0 = otherwise); occupation (1=farmer, 0 = otherwise); education (1 = bachelor, 0 = otherwise) and income (number of incomes per month))

α = Constant value

Thus, mean WTP can be calculated by equation bellowed:

$$E\ (WTP) = \frac{\alpha^* + \sum \beta^* ME(.) \frac{n_1}{N}}{\beta^* M}$$

Where:

β^*_B = Coefficient of Bids for price estimated

β^*_M = Coefficient of other factors derived from estimated value

E(.) = Mean of each factor

N = Number of all Samples

n_1 = Number of respondents answered “yes”

α^* = Constant value

4. Result and Discussion

4.1 Consumer perception of organic and inorganic vegetables

Regarding consumers' perceptions of fresh vegetables, it was found that 39.71% considered fresh vegetables to be contaminated by chemicals, while 60.29% believed that fresh vegetables do not contain any chemical residues. In the Urban Oyo State of Nigeria, 73% of respondents had heard of growing leaf vegetables without chemicals, but some lacked adequate information on the advantages of organic leaf vegetables (Obayelu et al., 2014).

Table 1 displays four levels of chemical residues: high, moderate, low, and none, with respective consumer perception values of 6.25%, 25%, 8.49%, and 60.29%. Sources of chemical residues include inorganic fertilizers, insecticides/pesticides, heavy metals, and plant diseases. There are various perceptions regarding chemical residue levels, indicating that high, moderate, and low residue levels in fresh vegetables originate from insecticides or pesticides, inorganic fertilizers, and heavy metals, respectively. In India, a majority of respondents agreed that pesticide residues are present in fresh vegetables and fruits, posing health risks (Mishra & Prusty, 2016). Rungsrisawat (2014) also revealed that about 33% were unaware of the presence of pesticides and residues, while 30.6% were unaware of the absence of chemicals.

Table 1: The levels of chemical residues in fresh vegetable

No	Types of residues		Level of residues			
			High	Moderate	Low	None
1	Inorganic fertilizer	Freq. (n)	21	114	11	222
		Percent (%)	5.88	30.88	2.94	60.29
2	Insecticide/Pesticide	Freq. (n)	49	70	27	222
		Percent (%)	13.24	19.12	7.35	60.29
3	Heavy metal	Freq. (n)	5	76	65	222
		Percent (%)	1.47	20.59	17.65	60.29
4	Plant disease	Freq. (n)	16	108	22	222
		Percent (%)	4.41	29.41	5.88	60.29
	Total	**Freq. (n)**	23	92	31	222
		Percent (%)	**6.25**	**25**	**8.46**	**60.29**

Table 2 presents the perceived opinions of respondents on organic and inorganic vegetables. The results indicate that the majority of respondents strongly agreed (60.33%) that organic vegetables are good for health, while 33.70% stated that organic and inorganic vegetables without chemical residue are not different. Additionally, some respondents expressed the following opinions: organic vegetables do not contain any

chemical residue (26.47%), organic vegetables do not contain hazardous bio-residue (23.64%), and organic vegetables are from natural resources (19.02%). Few respondents strongly disagreed that organic vegetables do not contain hazardous bio-residue, do not contain chemical residues, and are from natural resources, with values of 8.97%, 7.34%, and 1.63%, respectively. The mean values for these opinions were 3.75±1.11, 3.78±1.09, and 3.65±0.97, respectively.

Table 2: Perception of organic and inorganic vegetables

No	Details		Level					Mean	SD	Description
			5	4	3	2	1			
1	Organic vegetable has not any hazarded bio-residue	n	87	173	70	5	33	3.75	1.11	Agree
		%	23.64	47.01	19.02	1.36	8.97			
2	Organic vegetable has not any chemical residue	n	97	152	87	5	27	3.78	1.09	Agree
		%	26.36	41.30	23.64	1.36	7.34			
3	Organic vegetable is from natural source	n	70	152	97	43	6	3.65	0.97	Strongly Agree
		%	19.02	41.30	26.36	11.68	1.63			
4	Organic and inorganic vegetables without chemical residue are not different	n	124	124	76	44	0	3.90	1.01	Agree
		%	33.70	33.70	20.65	11.96	0.00			
5	Organic vegetable is not hazard to environment	n	130	141	81	16	0	4.04	0.87	Agree
		%	35.33	38.32	22.01	4.35	0.00			
6	Organic vegetable is good for health	n	222	124	16	6	0	4.53	0.66	Strongly Agree
		%	60.33	33.70	4.35	1.63	0.00			

Note: 4.21 – 5.00 = strongly agree, 3.41 – 4.20 = agree, 2.61 – 3.40 = neither agree, 1.81 – 2.60 = disagree and 1.00 – 1.80 = strongly disagree

In terms of differences between natural and organic foods, there are variations in concentrations of nutrients and other bioactive compounds in organic compared to conventional foods. However, these differences are small, and their relevance to human health in a well-balanced diet is uncertain (The Norwegian Scientific Committee for Food Safety, 2014). Additionally, 88.6% of respondents had no knowledge about any health hazards related to the consumption of organic leaf vegetables. Nevertheless, respondents believed that organic vegetables are natural and contain fewer agrochemicals than conventional ones (Obayelu et al., 2014). Rungsrisawat (2014) reported that in Thailand and Western countries, motives to purchase organic products included health benefits, suitability for children/family, low residue, freshness, environmental benefits, and better taste. Consumption of organic products is considered trendy/fashionable in Thailand, while in Western countries, it has gained popularity due to its association with animal welfare and appearance.

Increasing consumer knowledge and awareness about organic foods, promoting their consumption in society, ensuring their accessibility in the food market, and making them affordable can influence attitudes toward these products. Consumers' perceptions of organic food products do affect their intention to purchase

them, with the most significant influences being health, environmental friendliness, and animal welfare (Wee et al., 2014).

4.2 Willingness to pay for organic vegetable

4.2.1 Frequency and motives of consumers' willingness to pay for organic vegetable

Figure 2 shows that 35.29% of consumers are willing to pay (WTP) for organic vegetables at a rate of 51-75% per week, while 7.35% usually buy organic ones at a rate of 5% per week. The motives for willingness to pay, based on salespersons, are displayed in Figure 3. Consumers preferentially purchase organic vegetables because they are perceived as healthy (52.94%) and of higher quality (44.12%) than other vegetables (2.94%).

Other motives for consumers' WTP for organic vegetables are presented in Table 3. Consumers strongly agree to WTP for organic vegetables based on convenience of purchase (54.41%), nutrition (48.53%), vegetable characteristics (42.65%), suitable price (39.71%), safety (38.24%), good quality and guarantee (27.94%), and others as suggested by respondents (13.24%). Only 1.47% of consumers strongly disagree with WTP for organic vegetables based on good quality and guarantee, safety, and other suggestions from the respondents. The WTP approach measures and interprets indicators of demand for safe leaf vegetables, such as low pesticide and nitrogenous fertilizer residue levels, heavy metals, and pathogens (Ngigi et al., 2011). In the study conducted by Deus (2009), 65% of respondents buy organic food at least once a month, 19% consume organic food once every six months, and only 17% indicated that they never consume organic food.

Consumers are most concerned with organic products having more nutrients than conventional ones and beneficial health effects, with no chemical additives used in their production (no fertilizers or plant-protection products during farm production) (Wojciechowska-Solis & Barska, 2021). In the United Kingdom, the estimated upper bound on WTP for organic products is at a rate of 15% of total expenditure, while health, environment, product quality, preference, and beliefs are precisely considered in the WTP of consumers (Griffith & Nesheim, 2008).

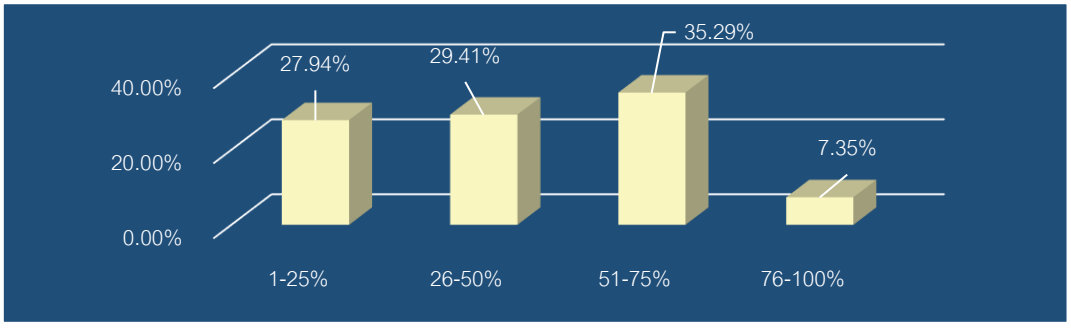

Figure 2: Frequent percentage of willingness to pay for organic vegetable within week

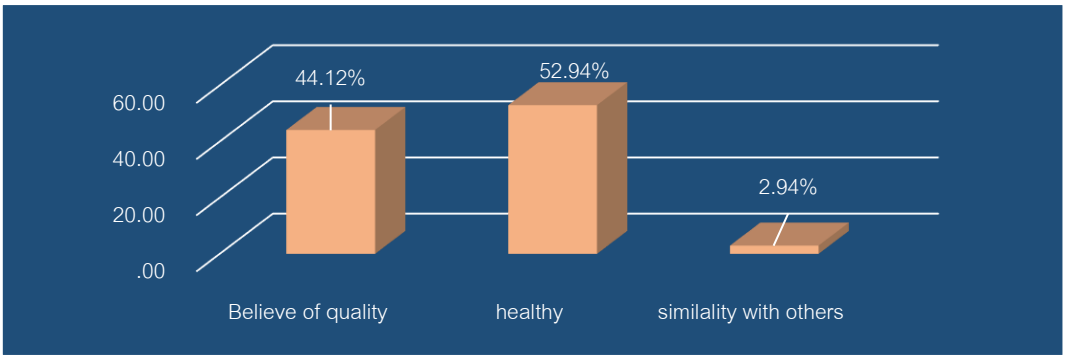

Figure 3: Motives of willingness to pay for organic vegetable from salespersons

Table 3: The motives of willingness to pay to organic vegetables

No	Details		Level					Mean	SD	Description
			5	4	3	2	1			
1	Good quality and guarantee	n	103	173	82	5	5	3.99	0.84	Agree
		%	27.94	47.06	22.06	1.47	1.47			
2	Suitable price	n	146	151	66	5	0	4.19	0.78	Agree
		%	39.71	41.18	17.65	1.47	0			
3	Convenience to buy	n	200	108	60	0	0	4.38	0.75	Strongly Agree
		%	54.41	29.41	16.18	0	0			
4	Vegetable Characteristics (fresh, clean)	n	157	130	70	11	0	4.18	0.85	Agree
		%	42.65	35.29	19.12	2.94	0			
5	Nutrition	n	179	146	38	5	0	4.35	0.73	Strongly Agree
		%	48.53	39.71	10.29	1.47	-			
6	Safety	n	141	179	43	0	5	4.22	0.77	Strongly Agree
		%	38.24	48.53	11.76	-	1.47			
7	Other	n	49	162	92	60	5	3.51	0.97	Agree
		%	13.24	44.12	25	16.18	1.47			

Remark: 4.21 – 5.00 = strongly agree, 3.41 – 4.20 = agree, 2.61 – 3.40 = neither agree, 1.81 – 2.60 = disagree and 1.00 – 1.80 = strongly disagree.

4.2.2 Needs, numbers and percent of consumers' willingness to pay for organic vegetable

Based on Figure 4, it is observed that 98.53% of consumers express certain future needs for organic vegetables, while 1.47% express uncertain future needs. According to Table 4, prices of organic vegetables range from 1 to 1.48 USD. Various types of organic vegetables have the same three bid prices, reflecting similar production costs and selling prices. The price gradually increases from 1 to 1.48 USD per 1 kg of organic vegetable, while the percentage of organic vegetable purchases decreases from 85.54% to 53.92%. Consumer motives, including quality, quantity, and similarity, influence the price of organic vegetables. Additionally, some vegetables sourced from natural resources are offered at all markets in Savannakhet town. All vegetables listed in this study are readily available and accessible at any market without any reluctance. While some consumers consider the vegetables as organic or inorganic, they prioritize purchases based on the most suitable prices.

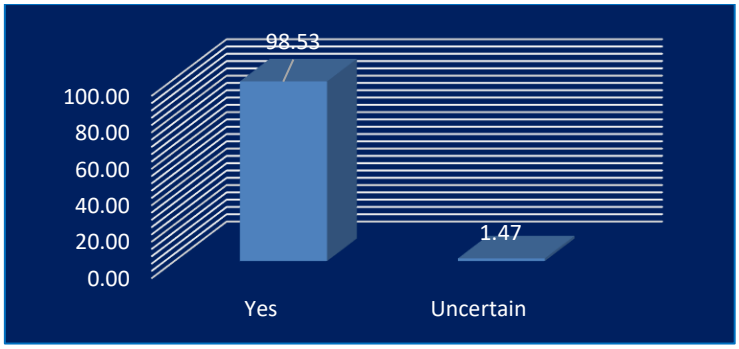

Figure 4: the needs of willingness to pay for organic vegetable in the future

Table 4: Number of consumer's willingness to pay for organic vegetables based on different prices

No	Species of organic vegetable		Organic vegetable prices					
			1 USD/kg		1.23 USD/kg		1.48 USD/kg	
			Freq. (n)	%	Freq. (n)	%	Freq. (n)	%
1	Chinese cabbage	Yes	346	94.12	325	88.24	238	64.71
		No	22	5.88	43	11.76	130	35.29
2	Lettuce	Yes	346	94.12	287	77.94	238	64.71
		No	22	5.88	81	22.06	130	35.29
3	Glory vegetable	Yes	265	72.06	211	57.35	135	36.76
		No	103	27.94	157	42.65	233	63.24
4	Onion/spring onion	Yes	325	88.24	281	76.47	189	51.47
		No	43	11.76	87	23.53	179	48.53
5	Mints	Yes	314	85.29	271	73.53	206	55.88
		No	54	14.71	97	26.47	162	44.12
6	Other vegetables	Yes	292	79.41	238	64.71	184	50
		No	76	20.59	130	35.29	184	50
	Total	**Yes**	**1,889**	**85.54**	**1,613**	**73.04**	**1,191**	**53.92**
		No	**319**	**14.46**	**595**	**26.96**	**1,017**	**46.08**

Table 5: Number and percentage of consumer's willingness to pay for organic vegetable using contingent value method

No	Vegetable species	WTP							
		Yes-Yes		Yes-No		No-Yes		No-No	
		Freq. (n)	%	Freq. (n)	%	Freq. (n)	%	Freq. (n)	%
1	Chinese cabbage	238	64.71	87	23.53	22	5.88	22	5.88
2	Lettuce	238	64.71	49	13.24	60	16.18	22	5.88
3	Glory vegetable	135	36.76	76	20.59	54	14.71	103	27.94
4	Onion/spring onion	189	51.47	92	25	43	11.76	43	11.76
5	Mints	206	55.88	65	17.65	43	11.76	54	14.71
6	Other vegetables	184	50	54	14.71	54	14.71	76	20.59
	Total	**1,191**	**53.92**	**422**	**19.12**	**276**	**12.5**	**319**	**14.46**

Table 5 illustrates that respondents answered "Yes-Yes" and "Yes-No" for willingness to buy organic vegetables at 53.92% and 19.12%, respectively. Conversely, some respondents answered "No-Yes" and "No-No" at 12.50% and 14.46%, respectively. Owusu and Anifori (2013) reported that different premium levels were randomly assigned to different respondents. Those who responded "Yes" to the first bid were assigned higher premium bids, calculated based on the lower bid price. Those who responded "No" to the first bid were assigned discount bid prices.

This study indicates that more consumers with the highest willingness to pay (WTP) observations (Yes-Yes) are willing to pay for organic vegetables, while consumers with zero WTP observations (No-No) are those who expressed unwillingness to pay (UWTP) for organic vegetables when prices increased. The attitudes and behaviors of consumers toward the purchase of organic products in an urban context, where consumption of these products is not widespread, are in a growing phase and are promoted by associations and organizations that produce and market products, with traditional marketing systems and a phase of promotion, which could also influence the results obtained (Ayaviri-Nina et al., 2022).

4.3. Factors affecting consumers' willingness to pay for organic vegetables

Table 6 presents the results of logistic regression analysis for various types of organic vegetables. The Pseudo R-Squared values are as follows: 0.212 for Chinese cabbage, 0.198 for lettuce, 0.284 for glory, 0.097 for onion, 0.113 for mints and 0.088 for compound vegetables. The results indicate a statistically significant negative effect ($p < 0.01$) of bid premiums on the willingness to pay (WTP) for lettuce and Glory products, and a statistically significant negative effect ($p < 0.05$) of bid premiums on the WTP for mints product. This suggests that as the premium price offered increases, there is a decrease in willingness to pay. The marginal effect analysis reveals that a 1% increase in bid premiums leads to a reduction in the probability of WTP for premium prices by 10.3% for lettuce, 7.54% for Glory, and 6.82% for mints. In terms of Chinese cabbage, education has a negative and significant effect ($p < 0.01$) on WTP. Therefore, as the level of education of the respondent increases, the amount the respondent is willing to pay decreases. The marginal effect suggests that an increase in educational attainment by one level leads to a decrease in WTP for a premium price by 17.1 percent. Bhattarai (2019) found that bid premium, education, household size, consumer perception about the presence of chemical residue in conventional vegetables, and experience of suffering from vegetable-borne diseases were factors influencing consumers' willingness to pay a premium price for organic vegetables. The main occupation of the consumer was a significant determinant of WTP in terms of Chinese cabbage; occupation has a negative and significant effect ($p < 0.01$) on WTP. This finding is contrary to the research results of Pandit et al. (2022). The influence of occupation on WTP for organic products is also inconclusive.

Table 6: Coefficient and mean of WTP for organic vegetables depended by socio-economic factors

	Chinese Cabbage	*Lettuce*	*Morning Glory*	*Onion*	*Mints*	*Compound*
	Coef. (dy/dx)	Coef. (dy/dx)	Coef. (dy/dx)	Coef. (dy/dx)	Coef. (dy/dx)	Coef. (dy/dx)
Constant	11.360***	5.943	7.902**	7.170**	4.541	4.708
Gender	-0.653	-0.479	0.093	-0.417	-0.467	0.038
	(-0.120)	(-0.080)	(0.010)	(-0.088)	(-0.086)	(0.007)
Age	-0.020	0.046	0.015	-0.006	0.039	-0.010
	(-0.004)	(0.008)	(0.002)	(-0.001)	(0.007)	(-0.002)
Status	0.221	0.073	-0.015	0.020	0.106	0.148
	(0.040)	(0.012)	(-0.002)	(0.004)	(0.020)	(0.027)
Occupation	-1.003***	-0.065	-0.474	-0.414**	-0.377	-0.419
	(-0.184)	(-0.011)	(-0.052)	(-0.088)	(-0.069)	(-0.075)
Education	-0.931***	-0.196	-0.121	-0.307	-0.247	-0.173
	(-0.171)	(-0.033)	(-0.013)	(-0.065)	-0.045 ()	(-0.031)
Income	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bid	-2.584	-6.162***	-6.856***	-2.729	-3.701**	-2.207
	(-0.474)	(-1.035)	(-0.754)	(-0.579)	(-0.682)	(-0.397)
Log likelihood	-36.756	-34.336	-23.766	-41.584	-37.270	-36.725
Pseudo R^2	0.212	0.198	0.284	0.097	0.113	0.088
LR χ^2 (7)	19.810	16.940	18.830	8.970	9.530	7.120

Note: *, **, *** Estimated coefficients are significant at the10, 5 and 1 percent level, respectively.

5. Conclusion

Based on the results of this study, it can be concluded that 60.30% of fresh vegetables were not contaminated by chemical elements and toxins. The levels of chemical contamination in fresh vegetables were classified as high (6.25%), moderate (25%), low (8.46%), and none (60.29%). Approximately 51-75% of consumers purchased 35.29% of organic vegetables per week, citing reasons such as quality (44.12%), health benefits (52.94%), and similarity to others (2.94%). Moreover, 98.53% of consumers expressed a future need to purchase organic vegetables. The average amount of organic vegetables consumed was 3.78±2.45 kg/week, with prices ranging from 0.37 USD to 3.09 USD. According to the contingent value method, consumers' willingness to pay (WTP) for organic vegetables was affirmative for Yes-Yes (53.92%), Yes-No (19.12%), No-Yes (12.50%), and No-No (14.46%) responses. The mean WTP for organic vegetables was found to be 1.14 USD per 1 kg. Negative coefficient values were observed for age (-5.589) and income (-5.478) of

consumers in relation to WTP, while the highest positive coefficient was observed for gender (17.257) in relation to WTP for all organic vegetables.

The results suggest to the concerned organization that the government policy should prioritize education and occupation skill-building programs to increase farmers income and thereby enhance consumer willingness to pay for organic vegetables. Additionally, organic certification and labelling are necessary to instill trust and stimulate demand for organic vegetables in domestic and international markets. Furthermore, it is crucial to incentivize farmers to produce organic vegetables, given the growing demand and awareness of the health and environmentally friendly benefits associated with organic produce.

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