Print ISSN: 2765-6934 / Online ISSN: 2765-7027
AJBE website: http://accesson.kr/ajbe
Doi: 10.13106/ajbe.2024.vol14.no3.13

Economic Valuation of Food E-labels for Restaurant Offerings*

Jinwook JEONG[1], Tongjoo SUH[2]

Received: March 27, 2024. Revised: April 10, 2024. Accepted: July 05, 2024.

Abstract

Purpose: This study explores the potential use of food e-labels for restaurants to solve the current inadequacies in food labeling within the restaurant sector. Additionally, the study examines the feasibility and scalability of implementing e-labels for food labeling purposes, investigates consumers' perceptions of e-labels for restaurant offerings, and assesses the value of implementing e-labels. **Research design, data and methodology:** The value of food e-labels was estimated using the contingent valuation method. Samples were selected from the survey, considering the distribution of population, using stratified sampling method. In the survey, respondents were provided with information explaining the food e-label and were asked whether they would accept the proposed amount for food e-labeling. **Results:** Estimation results revealed that the individual demographic factors of the respondents significantly influenced their willingness to pay (WTP), along with their food purchasing behavior and the degree of food labeling checking. Based on the estimated results, WTP was calculated to be 2,624 KRW. **Conclusions:** The study findings can serve as a reference for related businesses and policies, suggesting the need for further research and detailed discussions. To activate food e-labeling, promotion and education are essential complements to mere regulatory implementation.

Keywords : Food e-label, Restaurant offerings, Economic valuation, Korea

JEL Classification Code: C25, C51, D12

1. Introduction

In Korea, dietary habits have gradually transitioned from a simple pursuit of alleviating hunger to placing importance on nutritional food intake, reflecting various consumer desires, with a sustained dominance of consumption behaviors that prioritize health or safety (Lee et al., 2016). As a result, the value of information representing food characteristics has been highlighted, leading to the development of food labeling. Food labeling is the most crucial information exchange channel for resolving information asymmetry between companies and consumers (Kim, 2021). It serves as a vital means for consumers to obtain additional information about the products they consider purchasing (Bacarella, 2015). In most advanced countries, food labeling systems are implemented to fulfill consumers' right to know (Lee, 2022). In Korea, in 2006, nine food nutrients including calories, carbohydrates, sugars, proteins, fats, saturated fats, and trans fats were designated

* This work was supported by a New Faculty Research Grant of Pusan National University, 2023.

1 First Author. Graduate Student, Food and Resource Economics, Natural Resources and Life Science, Pusan National University, Republic of Korea. Email: bwva1010@pusan.ac.kr

2 Corresponding Author. Assistant Professor, Food and Resource Economics, Natural Resources and Life Science, Pusan National University, Republic of Korea, Email: tjsuh@pusan.ac.kr

as mandatory labeling nutrients (Park et al., 2018). In 2007, serving size standards were established (Kang et al., 2011), focusing on nutrition facts to establish standards for food labeling continuously. Although such food labeling is widely applied to processed foods and well-packaged fresh produce, restaurants' practice of not using disposable containers suitable for labeling has resulted in relatively poor application of food labeling to restaurant offerings. Mandatory nutrition labeling has been enforced for franchise restaurants with over 100 outlets, such as fast food, pizza, burgers, bakery, and ice cream chains. However, as of 2021, only 32.5% of franchise restaurants provided nutritional information, indicating inadequate implementation of food labeling in the restaurant sector (MFDS, 2022). Meanwhile, the government is piloting a project to provide food labeling information using e-labels (MFDS, 2023). With the expansion of products that can check food information using QR codes, consumers are expected to have access to the information of food, which was previously in the blind spot of food labeling, as well. This study aims to discuss the applicability of food e-labels for restaurants as part of addressing the inadequacy of food labeling in the restaurant offerings sector while also striving for the scalability of e-labels for food labeling. Accordingly, consumers' perceptions of food labeling e-labels for restaurants will be investigated and the value of food labeling e-labels for restaurants will be estimated.

2. Literature Review

Previous research on food labeling has predominantly focused on consumers' perceptions, utilization, satisfaction, and factors influencing food labeling, with many studies centering on nutrition information. Noh (2000) aimed to derive directions for improving food labeling in Korea by analyzing consumers' perceptions of food labeling. They discussed the need for improvement in labeling methods as overall satisfaction with food labeling methods was found to be low. Choi et al. (2010) analyzed the awareness level of food labeling among consumers in Seoul. They showed that over 50% of consumers in Seoul check labels when purchasing food, emphasizing their greatest concern for food safety when making food purchases. Jung and Kim (2016) analyzed the recognition and utilization of food labeling according to demographic characteristics, suggesting the importance of label size and visibility in the recognition process. According to Park (2017), the utilization capacity of food labeling among primary food purchasers exceeded the average level (3 points) of a 5-point Likert scale, reaching 3.4 points. This result indicates a close relationship between the degree of label checking and the utilization capacity of food labeling. A study by Lee (2019) on consumer awareness and satisfaction with food labeling revealed that consumers with high agricultural and food information utilization skills showed high awareness and utilization levels of food labeling as well as high satisfaction and trust levels with food labeling. Kwon et al. (2010) surveyed consumer perceptions of nutrition labeling on processed foods and restaurant menus. A total of 90.6% of respondents indicated that nutrition information provided by restaurants could influence their menu selection. Thus, nutrition information is important in the restaurant industry. Yang and Yang (2009) conducted a study estimating willingness to pay (WTP) for food labeling. Using the choice experiment method, they estimated WTP for voluntary labeling items, such as GMO, nutritional content, HACCP, and carbon labeling. They noted that respondents showed a high WTP for mark labeling compared with text labeling, which is a noteworthy finding.

Previous research on food labeling has primarily analyzed factors influencing consumers' perceptions of food labeling and their satisfaction with it. Although meaningful results have been derived, most studies have been confined to food labeling on currently available processed foods. Discussions on food labeling related to restaurant offerings have only recently emerged; thus, research in this area remains limited. In this study, the consumption patterns of respondents related to food e-labels are investigated through surveys. The economic value of food e-labels is estimated based on this information, increasing understanding of restaurant offerings regarding food labeling and consumer preferences.

3. Research Methods and Materials

3.1. Contingent Valuation Method

In the case of non-market goods, such as policies and environmental resources, although people perceive their value, the value of these goods is not easy to evaluate because of the absence of a market price that directly reflects this value (Baker & Ruting, 2014). Economists have researched various non-market valuation techniques to overcome these limitations. Among them, the contingent valuation method (CVM) has been the dominant approach for valuing nonmarket goods since the research presentation of Michell and Carson (1989) (Rakotonarivo et al., 2016). CVM investigates individuals' WTP for the benefits of goods through a survey technique, and it has a significant advantage in terms of general applicability. Thus, it allows for the assessment of the value assigned by individuals who do not consume the goods (Venkatachalam, 2004; Hanemann, 1994).

In this paper, the value of food e-labels was estimated

using the CVM to determine how respondents' personal characteristics influence their WTP. The indirect utility function that occurs in the food e-label can be defined as follows:

$$V(S_{q=1}, M - C) = V(S_{q=0}, M) \quad (1)$$

where S denotes the presence of food e-label, M denotes income, and C denotes the Hicksian compensating surplus. For the analysis of food labeling (q = 1) and without food labeling (q = 0), the utility function can be expressed in observable and unobservable components as follows:

$$V(S_{q=1}, M - C) + \varepsilon_1 = V(S_{q=0}, M) + \varepsilon_0 \quad (2)$$

where ε_q denotes the error term when food e-labeling is implemented and when it is not implemented. Assuming that a respondent has a high level of utility for food labels, the utility function can be expressed as follows:

$$\Delta v = V(S_{q=1}, M - \theta) - V(S_{q=0}, M) \geq u \quad (3)$$

where Δv denotes the difference between the left- and right-hand sides of the two indirect utility functions represented in Equation (2), θ denotes the suggested price, which is a neutral stimulus, and u denotes the error term. To calculate the probability of the respondent's WTP, the distribution function can be represented as follows by the function $F(\cdot)$:

$$F(\Delta v) = [1 + \exp(-X\beta)]^{-1} \quad (4)$$

where X denotes regressors including socio-demographic characteristics and β denotes coefficients. The WTP can be estimated by setting the suggested price and calculating the cumulative distribution as follows:

$$\text{WTP} = \int F(\Delta v)\, d\theta \quad (5)$$

3.2. Survey and Data

3.2.1. Survey Design

The target population for this study comprises individuals aged 20–69 across the nation. For the survey, a stratified sampling method was used to extract samples from the population considering the distribution of age, gender, and region. Various survey methods, such as face-to-face interviews, mail surveys, telephone interviews, and Internet surveys, are available (Dillman et al., 2014; Groves, 2005). However, this study utilized Internet surveys considering their cost and time savings compared with other survey methods as well as their relatively lower risk of nonresponse (Wright, 2005).

In the survey, respondents were first provided with information explaining the food e-label, the subject of the study, to build a virtual market. Along with the basic explanation of food labeling, the functionalities provided by e-labels (such as temporal and spatial flexibility in accessing information and increased readability for information interpretation) were described (see Figures 1 and 2).

Figure 1: Example of food labeling explanation

Next, to construct a hypothetical market for the food e-label, a scenario was conveyed to the respondents where initial costs and maintenance fees are required and donations would be solicited. This process is utilized to measure the respondents' WTP by presenting a certain donation amount and assessing their responses. Payment vehicles typically manifest in forms of mandatory payments such as taxes and forms of voluntary payments such as donations. Forms of mandatory payments and forms of voluntary payments each have their own limitations. For mandatory payments, there can be feelings of burden or reluctance due to the imposition of additional taxes, leading to protest responses (Meyerhoff & Liebe, 2010). Particularly, the high protest rate is pronounced when mandatory payments are associated with a government agency (Loomis et al., 1993) If the payment vehicles in the survey is made as forms of voluntary payments, there can be a potential for exaggeration of respondents' WTP (Ivehammar, 2009). This tendency is particularly evident in respondents who desire the implementation of the project, since they hope to encourage actual fundraising for the desired project (Shah et al, 2017). In this study donations are utilized as payment vehicles, considering that voluntary payments are relatively free from protest response issues compared to mandatory payments.

Figure 2: Example of food labeling explanation

The CVM is a technique used to estimate the value of goods for which market prices are not readily available. It involves setting up a hypothetical market and using surveys to determine the respondents' WTP for the goods, thus estimating their value. Various question formats are employed to ascertain the respondents' WTP, including open-ended, payment card, and dichotomous choice methods. Among these, the dichotomous choice method prompts the respondents to express their WTP with a "yes" or "no" response to a specified amount, similar to making decisions on purchasing goods or policy preferences. This method yields responses that closely align with individuals' actual WTP and reduces nonresponse rates because of its simplicity (McConnell, 1990; Hanemann et al., 1991). In this study, the double-bounded dichotomous choice method was employed to induce WTP, maintaining the advantages of the dichotomous choice method while obtaining sufficient information.

In our study, WTP was based on a preliminary survey, setting initial amounts at 2,500 KRW, 4,000 KRW, 5,500 KRW, 7,000 KRW, and 8,500 KRW. Depending on the respondents' WTP at the initial proposed amounts, subsequent questions were adjusted upward or downward accordingly (see Table 1).

Table 1: Bid amounts proposed in the questionnaire

Scenario	N	Initial Bid	Response	Second Bid
Funding for the activation of e-label	199	2,500 KRW	Yes	5,000 KRW
			No	1,250 KRW
	202	4,000 KRW	Yes	8,000 KRW
			No	2,000 KRW
	206	5,500 KRW	Yes	11,000 KRW
			No	2,750 KRW
	202	7,000 KRW	Yes	14,000 KRW
			No	3,500 KRW
	198	8,500 KRW	Yes	17,000 KRW
			No	4,250 KRW

3.2.2. Variable Construction

To identify factors influencing WTP, the survey was conducted by filling out information on the respondents' socio-demographic characteristics, food purchasing behavior, and the check level of food labeling together. The respondents' socio-demographic characteristics include information on age, gender, education level, and income level. Education variables were constructed based on categorical data indicating the respondents' highest educational attainment. In this study, three dummy variables, namely, high school graduate, college graduate, and graduate school graduate, were used for estimation. The variable of middle school graduate was used as the base group. The income variable was constructed based on categorical data in units of one million KRW, representing information about the respondents' monthly average income.[1)]

Variables related to food purchasing behavior indicate how and how much food provided by a restaurant is consumed. These variables are largely divided into two types depending on the purchasing method. The first variable is the frequency of dining out, which was constructed based on the respondents' answers to the question of how often they eat out in a week. The second variable is the frequency of delivery and takeout, which was constructed based on the respondents' answer to the question of how often they order food delivery (including takeout) in a week. The degree of checking food labeling is measured using a 5-point Likert scale, constructed based on responses regarding how frequently consumers check food labeling when making food purchases, from "1 = never check" to "5 = always check."

4. Results and Discussion

4.1. Descriptive Statistics

The sample size of the data constructed through the survey is 1,210, and information on respondents' characteristics, such as age, gender, education level, and income level, was constructed as variables and utilized for analysis (see Table 2). The average age of the respondents was 45.6, with most of the respondents in their 50s, and the least number of respondents was in their 20s, similar to the age distribution of the Korean population. The ratio of men to women was approximately 53:47, showing a distribution similar to that of the gender ratio in Korea.

Table 2: Data Summaries for Individual Characteristics

Variable	Explanation	Freq.	%
Gender	Female (gender = 0)	476	47.27
	Male (gender = 1)	531	52.73
Education	Middle school graduate	8	0.79
	High school graduate	246	24.43
	College graduate	654	64.95
	Graduate school graduate	99	9.83
Income	≤1 million KRW	118	11.71
	>1 million KRW and ≤2 million KRW	119	11.82
	>2 million KRW and ≤3 million KRW	221	21.95
	>3 million KRW and ≤4 million KRW	187	18.57
	>4 million KRW and ≤5 million KRW	119	11.82
	>5 million KRW and ≤6 million KRW	99	0/83
	>6 million KRW and ≤7 million KRW	62	6.16
	>7 million KRW and ≤8 million KRW	28	2.78
	>8 million KRW	54	5.36

Variable	Mean	S.D.	Min.	Max.
Age	45.6107	13.2816	20	69

The average frequency of dining out among respondents shows that dining out once a week was the most common (47.86%), followed by twice a week at 23.34%, and three times a week at 11.62% (see Table 3). The case where dining out occurred five times or more per week accounts for 5.86%. Over 92% of the respondents dined out at least once a week.

The most frequent usage of delivery service and takeout was once a week (50.74%), followed by twice a week (18.67%). Approximately 5.86% did not use delivery or takeout services. Nevertheless, three-quarters of the respondents showed food consumption from restaurant offerings through delivery or takeout.

The average frequency of dining out was approximately 1.73 times per week, whereas the average frequency of delivery service and takeout usage was approximately 1.41 times per week. Therefore, the weekly average frequency of dining out is higher than the weekly average frequency of delivery service or takeout usage. [2)]

Table 3: Restaurant food Usage Frequency by Behavior

Usage behavior	Response	Freq.	%
Average dining out frequency per week	Never dining out	78	7.75
	Once a week	482	47.86
	Twice a week	235	23.34
	Three times a week	117	11.62
	Four times a week	36	3.57
	Five or more times a week	59	5.86
Average delivery service or takeout usage frequency per week	Not using at all	159	15.79
	Once a week	511	50.74
	Twice a week	188	18.67
	Three times a week	95	9.43
	Four times a week	26	2.58
	Five or more times a week	28	2.78

Information plays a crucial role in rational consumer decision-making, and a lack of adequate information and uncertainty about the impact of choices may serve as impediments to consumers' consistent purchases of food products (Aitken et al., 2020). People who actively check food labeling are those who seek to acquire information for their food purchases. Considering the past circumstances where obtaining information about restaurant food was difficult, e-labeling could be a new means of utility for them as it facilitates the acquisition of food information. When considering the relationship between information accessibility and e-label, investigating how highly food e-label is valued relative to the degree of food labeling checking is pertinent. The degree of checking food labeling during processed food purchases was examined using a Likert scale, with "sometimes" (34.13%) as the most common response, followed by "often" (30.67%) and "rarely" (25.39%) (see Table 4). The average value of the 5-point Likert scale shows that the degree of food label checking was 3.13 points.

Table 4: Frequency of Checking Food Labeling Degrees

Degree of checking food labeling	Freq.	%
Not at all	38	3.13
Rarely	308	25.39
Sometimes.	414	34.13
Often	372	30.67
Always	81	6.68

To comprehend the advantages of e-labeling perceived by consumers, the respondents were queried during the survey about what they consider the greatest benefit of food

e-labeling. Figure 3 illustrates the responses regarding the benefit of food e-label. The results predominantly indicated that ensuring consumers' right to information was the greatest benefit, followed by the benefits of facilitating informed product selection for health maintenance and enhancing utility through the development of healthier menus by restaurants. Therefore, consumers are paying attention to individual utility increases resulting from the acquisition of information and the ability to make rational choices in terms of the benefits of food e-label.

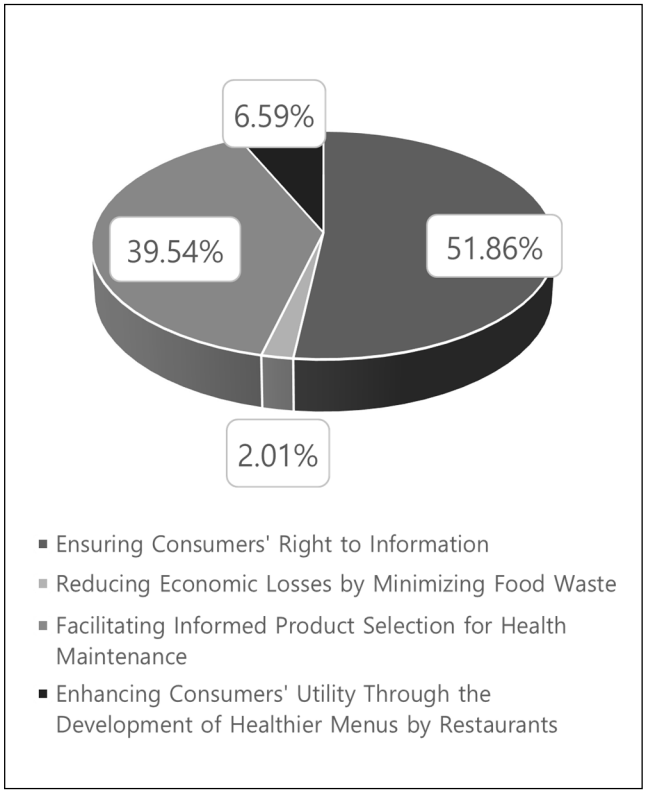

Figure 3: Primary Benefit of Food e-label as Perceived by the Respondents

4.2. Valuation Results

The food e-label valuation analysis was conducted using two approaches: estimating the model without covariates and with covariates. The first approach includes the analysis of a null model, representing the estimation results of the response to the bid amount without including covariates (see Table 5). Although this approach does not account for the socio-demographic characteristics of the respondents in the model, it can serve as a benchmark for other extended models, enabling the model to calculate the basic WTP for the suggested bid.

Table 5: Estimation Results without Covariates

Variable	Coef.	S.E.	z	95% CI	
constant	2.6411***	0.1716	15.39	2.3047	2.9775
σ	4.5030***	0.1728	26.07	4.1644	4.8416
Log Likelihood	-1286.4434				

Note: *** denotes p < 0.01

The second approach involves estimating models with covariates. Covariates include respondents' consumer behaviors and demographic characteristics related to food labeling. This approach explains the statistical relationship between covariates and WTP through model estimation.

Results from model estimation including covariates showed that demographic factors such as age, education level, and income level were statistically significant (see Table 6). The coefficient for age was positive, indicating that WTP for restaurant food e-labels increases with age. Thus, older age groups may have a higher interest in the ingredients and components of restaurant food compared with younger age groups, and given the readability and convenience of e-labels, older individuals may prefer food e-labels.

All variables related to education level were positive, with a statistically significant variable for graduate school graduate. In terms of food safety awareness, the higher the level of education, the more the person is correctly aware of food safety (Pak et al., 2009). Therefore, the higher the level of education, the greater the interest in the safety of restaurant food. This tendency of educated people is reflected in their WTP.

Income was also shown positive, representing that WTP is proportional to income. Income shows a positive correlation with WTP, and the analysis results also support this economic principle. Gender was not statistically significant, and gender differences do not have a significant impact on the preference for food e-labels for restaurant offerings.

The estimation results of the model represent that the factor of food purchasing behavior has a significant impact on WTP. Frequency of dining out and frequency of delivery service or takeout usage were statistically significant. The frequency of dining out was positive, which supports the previous research findings, wherein the majority of people responded that nutrition labeling could influence their choices when dining out (Kwon et al., 2010). The usage of delivery service and takeout was also positive. The significant correlation between the quality of delivery food and overall satisfaction (Park & Bae, 2020) indicates that those who frequently use delivery services can expect food e-labels to contribute to consuming high-quality food delivered from restaurants. Similarly, attitudes toward takeout also have similar tendencies.

Regarding the degree of checking food labeling, it is

found to be statistically positive, indicating that people who check food labels more frequently are more willing to pay for food e-labels for restaurant offerings. Checking food labeling occurs more frequently in people with a high need for food information. This tendency can also be applied to restaurant offerings, and e-labels can improve the information accessibility regarding restaurant offerings; therefore, the preference for food e-labels can be higher in cases where food labeling is checked more frequently.

Table 6: Estimation Results with Covariates

Variable	Coef.	S.E.	z	95% CI	
Age	0.0233*	0.0133	1.75	-0.0028	0.0494
Gender	-0.1128	0.3230	-0.35	-0.7458	0.5203
Dining_out	0.3141**	0.1398	2.25	0.0401	0.5881
Delivery_usage	0.4438***	0.1584	2.80	0.1333	0.7543
High_school	2.6836	2.4185	1.11	-2.0564	7.4237
College	3.0273	2.4119	1.26	-1.6999	7.7545
Grad_school	4.4428*	2.4587	1.81	-0.3762	9.2617
Income	0.1866**	0.0804	2.32	0.0289	0.3443
F_label_check	0.5180***	0.1654	3.13	0.1939	0.8421
constant	-5.7650**	2.6009	-2.22	-10.8628	-0.6672
σ	4.3824***	0.1678	26.11	4.0534	4.7113
Log Likelihood	-1255.8053				

Note: ***, **, and * denote p < 0.01, p < 0.05, and p < 0.1, respectively.

Based on the estimated results from the models, WTP was calculated to be 2,641 KRW and 2,606 KRW for the model without covariates and with covariates, respectively (see Table 7). The average WTP calculated from the two models was 2,624 KRW. Considering Korea's total population (51.35 million) as of October 2023 (KOSIS, 2023), the introduction of food e-labels for restaurant offerings can be estimated to create a value of approximately 134.74 billion KRW.

Table 7: WTP Estimation Results

	Coef.	S.E.	z	95%conf.interval	
Model 1	2641.1089***	171.6279	15.39	2304.724	2977.493
Model 2	2606.5790***	169.9787	15.33	2273.427	2939.732
WTP	2623.8440				

Note: *** denotes p < 0.01.

5. Conclusions

Amidst the continuous rise in consumption of dining out and food delivery services, concerns regarding health implications have increased because of the large portion sizes and high levels of calories and sodium in restaurant offerings among other factors. Food labeling provides consumers with information on available menu choices, impacting consumer behavior. Thus, food labeling for restaurant food could serve as a crucial supplement to combat overconsumption and nutritional imbalances associated with excessive intake of restaurant food. Additionally, the implementation of food labeling may prompt suppliers to develop healthier menu options, leading to a reinforcing cycle.

Despite these advantages, food labeling regulations have been well-applied to processed foods only, whereas they remain inactive in restaurant offerings. The ongoing pilot project for e-labeling initiated by the Ministry of Food and Drug Safety suggests the potential expansion of food labeling to restaurants. This study estimated the WTP for food e-labels in restaurants based on survey data and investigated factors influencing WTP by examining consumer behaviors. The estimation results revealed that demographic factors such as age, income level, and education level significantly influence WTP, along with food purchasing behavior and the degree of checking food labeling. The estimated WTP for food e-labels for restaurant offerings amounted to 2,624 KRW per person, indicating a total value creation of 134.74 billion KRW.

The findings of this study can serve as a reference for related businesses and policies, suggesting the need for detailed discussions. The result of the study reveals that preferences for food e-labels for restaurant offerings may vary depending on respondent characteristics, implicating that governments should proceed with initiatives for food e-labels taking this into account. For example, e-label designers can prioritize the information demanded by the main consumer group, and the design can be customized according to consumer characteristics. Through tasks like this, the convenience of e-labels for consumers is enhanced, and the value of food e-labels for restaurant offerings can be elevated.

To activate food e-labeling, promotion and education are essential complements to regulatory implementation. Considering the correlation between food labeling awareness and the capacity to utilize agricultural and food information, raising awareness and motivation for utilizing food e-labels through education and promotion can facilitate the establishment of the system and promote the utilization of e-labels.

Particularly, our finding shows that WTP increases with age. Considering that many elderly individuals may lack digital literacy, information gaps should be addressed. Appropriate education along with promotion is necessary to enhance information utilization, suggesting the need for measures. Providing guidelines on installing e-label-related apps on mobile devices, utilizing QR codes, accessing information through e-labels, and interpreting the provided information can serve as alternatives.

This study elicited respondents' WTP through a donation

scheme while constructing a hypothetical market. However, it is subject to the limitation that the risk of respondents' WTP being exaggerated cannot be ruled out, given that voluntary payments were utilized. In future studies, it will be necessary to apply various payment vehicles while designing questionnaires and to accompany the process with comparing the derived WTP to find the most appropriate approach.

References

Aitken, R., Watkins, L., Williams, J., & Kean, A. (2020). The positive role of labelling on consumers' perceived behavioural control and intention to purchase organic food. *Journal of Cleaner Production, 255*, 120334.

Bacarella, S., Altamore, L., Valdesi, V., Chironi, S., & Ingrassia, M. (2015). Importance of food labeling as a means of information and traceability according to consumers. *Advances in Horticultural Science, 29*(2/3), 145-151.

Baker, R., & Ruting, B. (2014). *Environmental policy analysis: A guide to non-market valuation*. Melbourne: Productivity Commission.

Choi, M., Youn, S., Ahn, Y., Seo, K., Park, K., & Kim, G. (2010). A Survey on the Consumer's Recognition of Food Labeling in Seoul Area. *Journal of the Korean Society of Food Science and Nutrition, 39*(10), 1555-1564.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. New Jersey: John Wiley & Sons.

Groves, R. M. (2005). Survey errors and survey costs. John Wiley & Sons.

Hanemann, M., Loomis, J., & Kanninen, B. (1991). Statistical efficiency of double-bounded dichotomous choice contingent valuation. *American journal of agricultural economics*, *73*(4), 1255-1263.

Hanemann, W. M. (1994). Valuing the environment through contingent valuation. *Journal of economic perspectives*, *8*(4), 19-43.

Ivehammar, P. (2009). The payment vehicle used in CV studies of environmental goods does matter. *Journal of Agricultural and Resource Economics*, *34*(3), 450-463.

Jung, H., & Kim, H. (2016). Consumer's Perception and Utilization of Food Labels by Age and Gender. *Journal of the Korean Society of Food Science and Nutrition*, *45*(3), 437-444.

Kang, H., Shin, E., Kim, H., Eom, K., Kwon, K., Kim, S., Moon G., Jang, B., & Kim, J. (2011). Food nutrition labeling (processing food, food service business) in Korea. *Food Science and Industry*, *44*(1), 21-27.

Kim, S. (2021). Seeking Activation Strategy for Consumer Food Label Use. *International Business Education Review*, *18*(2), 224-246.

KOSIS (2023). *Population by administrative district and gender*. Korea: KOSIS. Retrieved December 30, 2023, from https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1B040A3

Kwon, K., Yoon, S., Kim, S., Kang, H., Kim, H., Kim, J., Kim, S., Kim, K., Lee, J., Jeong, S., Ock, S., Lee, E., Kim, J., Kim, M., & Park, H. (2010). A Survey on Customers' Perceptions of Nutrition Labeling for Processed Food and Restaurant Meal. *Journal of Nutrition and Health*, *43*(2), 181-188.

Lee, E. (2022). Trends of Foreign Legislation on Food Labeling and Its Implications. *Journal of Consumer Law, 8*(4), 99-125.

Lee, K., Kim, S., & Heo, S. (2016). *An in-depth analysis of the food consumption of Koreans*. Naju, Korea: Korea Rural Economic Institute.

Lee, Y. (2019). Determinants of Consumers' Awareness, Satisfaction and Trust of Food Labeling. *Consumer policy and education review*, *15*(4), 97-122.

Loomis, J., Lockwood, M., & DeLacy, T. (1993). Some empirical evidence on embedding effects in contingent valuation of forest protection. *Journal of Environmental Economics and Management*, *25*(1), 45-55.

McConnell, K. E. (1990). Models for referendum data: the structure of discrete choice models for contingent valuation. *Journal of environmental economics and management*, *18*(1), 19-34.

Meyerhoff, J., & Liebe, U. (2010). Determinants of protest responses in environmental valuation: A meta-study. *Ecological Economics*, *70*(2), 366-374.

MFDS (2022, November 18). *MFDS joins hands with chicken industry to expand nutrition labeling!* [Press release]. https://www.mfds.go.kr/brd/m_99/view.do?seq=46827

MFDS (2023, August 30). *Various products to check food information via QR codes will be released* [Press release]. https://www.mfds.go.kr/brd/m_99/view.do?seq=47593#none

Mitchell, R. C., & Carson, R. T. (2013). *Using surveys to value public goods: the contingent valuation method*, New York: Rff Press.

Noh, Y. H. (2000). A Study on Consumer Awareness of Food Labeling. *Journal of consumer policy studies*, (23), 20-37.

Pak, J., Choi, E., Choi, J., Shim, S., Park, K., Moon, H., & Ryu, K. (2009). Assessment of Consumer's Food Safety Perceptions and Practices. *Journal of food hygiene and safety*, *24*(1), 1-11.

Park, J. (2017). The Use Characteristics and the Use Competencies of Food Label among Main Food Buyers of Households. *Journal of consumer policy studies*, *48*(3), 1-31.

Park, J. E., Lee, H. S., & Lee, Y. (2018). Study of the Coverage of Nutrition Labeling System on the Nutrient Intake of Koreans-using the 2013 Korea National Health and Nutrition Examination Survey (KNHANES) Data. *Korean Journal of Community Nutrition*, *23*(2), 116-127.

Park, M, & Bae, H. (2020). Analysis of the factors influencing customer satisfaction of delivery food. *Journal of Nutrition and Health*, *53*(6), 688-701.

Rakotonarivo, O. S., Schaafsma, M., & Hockley, N. (2016). A systematic review of the reliability and validity of discrete choice experiments in valuing non-market environmental goods. *Journal of environmental management*, 183, 98-109.

Shah, S. A., Hoag, D. L., & Loomis, J. (2017). Is willingness to pay for freshwater quality improvement in Pakistan affected by payment vehicle? Donations, mandatory government payments, or donations to NGO's. *Environmental Economics and Policy Studies*, *19*, 807-818.

Venkatachalam, L. (2004). The contingent valuation method: a review. *Environmental impact assessment review*, *24*(1), 89-124.

Wright, K. B. (2005). Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of computer-mediated communication*, *10*(3), JCMC1034.

Yang, S. B, & Yang, S. R. (2009). Economic Values of Voluntary Food Labelling. *Journal of Channel and Retailing*, *14*(4), 79-93.

Endnotes:

1. The income variable was constructed based on categorical data but exhibits the characteristics of an interval variable. It was treated as a continuous variable in the model for convenience.

2. If the respondents dine out or utilize delivery services more than five times a week, it was calculated as five times for the weekly average frequency.