Research article

Analysis of the impacts of social class and lifestyle on consumption of organic foods in South Korea

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A R T I C L E   I N F O

A B S T R A C T

The purpose of this study is to analyze the impact of social class and lifestyle on the consumption of organic foods in South Korea. Consumer behavior regarding organic foods is influenced by lifestyle, as well as income-level and education. This study provides a new perspective on the socio-economic structure of organic food consumption patterns in urban areas by extracting information from big data. The organic food consumption patterns are then analyzed through visualization of the geographical distribution of organic food stores. In addition, this study estimates the effects of social class and lifestyle variables on the consumption of organic foods based on survey data. This study finds that social class characteristics are factors that influence the consumption of organic foods. However, individual lifestyle plays a more important role in actual buying behavior.

1. Introduction

The improvement of living standards leads to an increased interest in health and the environment. Food safety and environmental impacts are becoming essential selection criteria for food consumption (Kesse-Guyot et al., 2022). Consumers' perception of the quality of food and concern about its environmental impact drives a growing demand for organic foods (Aitken et al., 2020; Weatherell et al., 2003; Kesse-Guyot et al., 2022).[1]

Research on consumer behavior in the context of organic food aims to highlight the various factors affecting consumption (e.g., Gil et al., 2000; Rimal et al., 2005; Bravo, 2013; Yu et al., 2014; Kapuge, 2016; Bryla, 2016). Most studies have attempted to elucidate the role of economic, cultural, socio-demographic, and psychological factors in consumer choice (e.g., Zanoli and Naspetti, 2002; Chen, 2007; de Magistris and Gracia, 2008; Michaelidou and Hassan, 2010; Bravo et al., 2013; Marian et al., 2014; for a comprehensive review, see Katt and Meixner, 2020; Kushwah et al., 2019; Zhang and Dong, 2020). The findings of these studies vary considerably. Some studies argue that the consumption of organic foods is due to social factors, such as altruism and environmental

preservation (McEachern and Willock, 2004; Tarkiainen and Sundqvist, 2005; Chen, 2007). Others argue that such consumption comes from individual aspects, like food safety, health concerns, and nutrition (Forleo et al., 2016; McEachern and McClean, 2002; Makatouni, 2002; Haghiri et al., 2009).

Despite the trend in consuming organic foods, there are barriers to the diffusion of organic food consumption. Consumers have to pay higher costs such as money, time, and effort (Rodríguez-Bermúdez, 2020; Torjusen et al., 2001; Padel and Foster, 2005). In addition to economic capacity, an appropriate level of education is needed for the consumption (Torjusen et al., 2001; Lockie et al., 2002; Storstad and Bjørkhaug, 2003; Stobbelaar et al., 2007; Ureña et al., 2008). Above all, consumers use money and time and have the willingness to pay a premium when they are confident about the positive effects of organic food (Berger and Mitchell, 1989; Soler et al., 2002; Hunghner et al., 2007). Moreover, consumption arises because of a growing awareness of the health and environmental impact of organic food and the intent/capacity to acquire information about it (Lockie et al., 2004; Lea and Worsley, 2005; Teng and Wang, 2015; Demirtas, 2019).

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[1] In South Korea, eco-friendly food (or product) is generally used instead of organic food. The term, eco-friendly foods, describes agricultural products with low usage or absence of chemical materials, which could affect environmental preservation and consumer diets. Organic, pesticide-free, non-antibiotic and organic processed foods are certified as eco-friendly foods (https://www.naqs.go.kr/eng/contents/contents.do?menuId=MN20568). This is analogous to organic food defined by FAO, so in this study, organic food is used to avoid confusion (https://www.fao.org/organicag/oa-faq/oa-faq1/en/).

In tandem with the growing organic food industry, research on the consumption behavior of organic foods is being conducted in various countries. While a majority of this research is focused on Europe, North America and Australia (Torjusen et al., 2001; Lockie et al., 2002; Vindigni et al., 2002; Lea and Worsley, 2005; Li et al., 2007; Thøgersen, 2010; Bravo et al., 2013), newer studies are taking place in Asian countries as well (Posri et al., 2006; Roitner-Schobesberger et al., 2008; Tung et al., 2012; Truong et al., 2012; Teng and Wang, 2015; Le-Ahn and Nguyen-To, 2020). South Korea is no exception to this trend and shows a significant increase in organic food consumption in the recent few years (Suh et al., 2012; Kim and Ikemoto, 2015; KREI, 2016; Kim and Lee, 2019). However, despite the increasing consumption of organic foods in South Korea, research on organic food purchase intent and behavior has been very limited (Kushwah et al., 2019). As consumers' consumption patterns for organic food vary across countries (Rojik et al., 2022), it is necessary to understand the characteristics of organic food consumption by Korean consumers.

This study aims to explore the effects of social class and lifestyle on the consumption of organic foods in South Korea through two strategies. First, we analyze the organic food stores and socio-economic characteristics of consumers in Seoul Special City, the capital city of South Korea (hereinafter, Seoul), through big data. Second, the analysis targets are expanded nationwide to estimate the impact, not only of socio-economic characteristics, but also of variables that represent individual lifestyles through survey data. There is ample evidence that suggests socio-economic and demographic attributes can generalize consumers' organic food consumption propensity to some extent. However, lifestyle cannot be attributed to demographic and/or socioeconomic characteristics such as gender, age, education, and income (Törőcsik, 2007). Prior studies have reported that consumers' intention or willingness to purchase may not always translate into actual buying of organic foods (Hunghner et al., 2007; Vermeir and Verbeke, 2008; Singh and Verma, 2017). Therefore, the effect of socio-economic and lifestyle factors on actual buying behavior is comparatively examined in this study.

The approach, using map visualization based on information extracted from big data, enables the spatial analysis of consumption patterns of organic foods in urban areas, which reflects the socio-economic structure of a particular society. In addition, socio-economic and demographic backgrounds could explain the generality of the consumption patterns of organic foods (Rimal et al., 2005; Gracia and de Magistris, 2007; Quartz and Asp, 2015). According to Kotler and Keller (2011), lifestyle means the relationship between the individual's personality and his or her surroundings, which can explain the consumption patterns of organic foods in a particular society. Through these approaches, this study finds that, although social class characteristics influence the consumption of organic foods, individual lifestyle plays a relatively more important role in actual consumption. The findings of this study can be used as a foundation in policy discussions related to consumer behavior towards organic food consumption.

The remainder of this paper is organized as follows. The following section describes the theoretical background and reviews literature on consumer behavior toward organic foods, followed by the research methods. The next section then presents the results, followed by discussion and implications. The last section concludes the study.

2. Theoretical background and literature review

Green products are considered an expensive option, and regular consumers of organic foods typically tend to be educated, affluent and belong to the high social class (Torjusen et al., 2001; Lockie et al., 2002; Storstad and Bjørkhaug, 2003; Padel and Foster, 2005; Stobbelaar et al., 2007; Ureña et al., 2008; Smith et al., 2009). Rodríguez-Bermúdez (2020), Jolly (1991), Fotopoulos and Krystallis (2002), and O'Donovan and McCarthy (2002) proved that high price is one of the most significant factors limiting the consumption of organic foods. Considering the results of these studies, price can evidently be regarded as a factor that influences organic food consumption.

Social class is a complex construct that profoundly impacts psychological processes and behaviors of individuals (Kraus et al., 2009; Ostrove and Cole, 2003). It constitutes a social context that constrains individuals over a long period (Kraus and Stephens, 2012). Through shared experiences, members of a particular social class develop specific knowledge systems and behavioral trends that determine how they perceive, feel, and relate to others. At the individual level, the consumption of organic foods is a privileged act. This is because such consumption can only be enjoyed by those with the economic capacity to do so. In addition, an appropriate level of education is needed (Padel and Foster, 2005; Stobbelaar et al., 2007). That is, consumers need a fair amount of disposal income, the leisure time to research their purchasing decision, and a certain level of education to understand the true meaning behind the ingredient labels of organic foods (Aitken et al., 2020). Therefore, income level and educational background are representative factors of social class influencing consumer behavior towards organic foods (Rimal et al., 2005; Gracia and de Magistris, 2007).

In the modern consumer society, a person's consumption choices reveal significant information about them. People buy products that reflect who they are and how others might think of them (Quartz and Asp, 2015). This is because consumption touches the most basic social instincts, and is fundamentally an extension of the self. What we purchase reflects who we want to be, what group we want to belong to, and what values we share (Rich and Jain, 1968; Fisher, 1987; Iftikhar et al., 2013; Carey and Markus, 2016; Shavitt et al., 2016). According to Bourdieu (1984), the symbols of certain consumer goods aim for a distinctive effect and satisfy the desire to distinguish oneself from others. In other words, consumers span various social classes. Individual consumption behaviors become a means to distinguish one's self from the group to which one belongs. Although the price is relatively expensive compared to the quality of the product, consumers tend to buy green products to signal their status to others (Griskevicius et al., 2010). In other words, consumers gain psychological rewards by emitting a flaunt signal that they can afford these extra costs. Therefore, they purchase organic foods to reflect their socio-economic position.

Although several studies reported that people with higher income are more likely to purchase organic foods (Lockie et al., 2002; Storstad and Bjørkhaug, 2003; Padel and Foster, 2005; Zhang et al., 2008; Smith et al., 2009), other studies have proved that income is not correlated with positive attitude towards organic food consumption (Durham, 2007; Zepeda and Li, 2007). One possible reason the results are not consistent is that many studies focus on using the contingent valuation approach to identify how high price premium consumers are willing to pay for organic foods (Kushwah et al., 2019; Zepeda and Li, 2007). Intention or willingness can certainly be a good subject of analysis for predicting consumption behavior (Ajzen, 1991). However, it does not represent the actual consumption (Hunghner et al., 2007; Wheale and Hinton, 2007; Vermeir and Verbeke, 2008; Singh and Verma, 2017). If we analyze the association between the socio-economic background and actual consumption or consumption routine, it would be possible to clarify the relationship between them. Accordingly, this study hypothesizes the following:

H1. *Social class hypothesis*: High-income earners and more educated individuals are more likely than other groups to buy organic food. Income and education is likely to be positively associated with organic food consumption.

Lifestyle is a social factor based on the basic human needs and is strongly affected by their simultaneous need for integration and differentiation (O'Sullivan et al., 2005; Szakály et al., 2012). The lifestyles arising from the same sub-culture or social class and having similar professions are not necessarily the same. Lifestyle, therefore, cannot be attributed to demographic or socioeconomic characteristics such as gender, age, education, and income. Lifestyle contains a dimension of value orientation as well, which, together with a further chosen attribute, defines which lifestyle segment a consumer occupies (Törőcsik,

2007). Overall, lifestyle means the relationship between the individual's personality and his or her living environments (Kotler and Keller, 2011). In modern society, the pursuit of specific values in consumption is reflected in the consumption behavior of individuals (Caruana, 2007). Therefore, in addition to the influence of socioeconomic and demographic characteristics, lifestyle can be associated with individual consumption behavior, which can be even more influential in a post-industrial society.

Lifestyle research on the attitudes, interests, and opinions tradition was criticized for its lack of theoretical foundation (Anderson and Golden, 1984). Brunsø and Grunert (1995) theoretically explained how lifestyle can bridge the gap between cognitive categories and behavior. Grunert et al. (1997), Brunsø and Grunert (1998), and Brunsø et al. (2004) explained the individual's lifestyle and consumption behavior through hierarchical cognitive structure formation. According to their description, personal values are defined as abstract, trans-situationally aggregated cognitive categories on the top level of their hierarchy. Product perceptions are defined as situation-specific input to a categorization process on the bottom level (Brunsø and Grunert, 1995; Grunert and Grunert, 1995; Brunsø et al., 2004). Lifestyle is, thus, defined as an intervening system of cognitive structures linking situation-specific product perception to abstract cognitive categories, which leads to actual buying behavior.

Since Brunsø and Grunert (1998) found a relationship between lifestyle and the purchase of certain food categories, various studies have provided evidence of the relationship between them. According to the results of studies by Hoek et al. (2004), Bredahl and Grunert (1997), Brunsø et al. (2004), Buckley et al. (2005), Szakály et al. (2012), and Verain et al. (2012), lifestyle is a mediator of the relationship between cognitive categories and perception of the consumption of certain types of foods. In previous studies in particular, consumers' lifestyle was employed and it was positively related with consumption of certain types of foods (Gil et al., 2000; Soler et al., 2002; Lea and Worsley, 2005; Basha et al., 2015; Soroka and Wojciechowska-Solis, 2019). These studies suggested that lifestyle was the dominant predictor of positive organic food beliefs, intention to buy them or actual consumption as opposed to socio-economic or demographic backgrounds. However, in a study by Lockie et al. (2004), lifestyle considerations had only a minor effect on the actual consumption of organic foods compared to other factors. Except for these, few other studies have provided evidence of the association between lifestyle and consumption of certain types of foods.

Several studies have proved how values or norms affect the consumers' intention or willingness to purchase organic food (e.g., Saba and Messina, 2003; Tarkiainen and Sundqvist, 2005; Anssi and Sanna, 2005; Chen, 2007; Paul and Rana, 2012; Teng and Wang, 2015; Yilmaz and Ilter, 2017; Le-Ahn and Nguyen-To, 2020; Pacho, 2020; Vega-Zamora et al., 2020), but have failed to elucidate the role of lifestyle in actual consumption or consumption routine. Thus, the present study aims to test whether lifestyle, as defined above, is a mediator of the cognitive-to-behavior relation or whether other demographic/socio-economic backgrounds are more influential. This study thus hypothesizes the following:

H2. *Lifestyle hypothesis*: Individual lifestyle is likely to be associated with consumer behavior for organic food consumption. Thus, elements reflecting lifestyle can influence organic food consumption substantially.

3. Research methods

We proceed with two empirical strategies to investigate the effects of social class and lifestyle on the consumption of organic foods. First, we propose that the consumption patterns of organic foods can be captured through big data. We extract the information of organic food stores located in Seoul from commercial information data and use social class distribution data provided by the Korea Employment Information Service. We analyze the consumption patterns of organic foods through

visualization of the geographical distribution of organic food stores and the relationship between the socioeconomic characteristics of local residents and the number of stores. However, the results only provide limited support for Hypothesis 1 and do not provide evidence for how consumers' lifestyle affects their consumption. Second, to prove Hypotheses 1 and 2, we estimate the effects of lifestyle as well as social class variables on the consumption of organic foods based on 2019 food consumption behavior survey provided by the Korea Rural Economic Institute, which is the public think tank under the Prime Minister's Office. The survey was conducted from May to August 2019 and focused on food buyers aged 18–74 years old from households selected nationwide (3300 respondents) (see Supplementary Material SectionA). The multi-stage area probability sampling method is utilized to extract the samples, and the field survey is conducted through person-to-person interview.

3.1. Analyzing consumption patterns for organic foods through big data

The purpose of this approach is to find patterns in comprehending the relationship between the analysis targets and an intuitive understanding of the phenomenon. Studies of consumer demand for organic foods have heavily relied on survey, interview, or self-reporting. Map visualization provides insight into socio-economic structure of the patterns of organic food consumption in urban areas, which may not be found by survey, interview, or self-reporting.

The spatial distribution of residents according to socio-economic characteristics reflects the consumption patterns (Nash, 2013; Sohn and Oh, 2019). Therefore, if the consumption of organic food is a privileged act, the spatial analysis will reflect the patterns of organic food consumption among social classes. The regional target for map visualization analysis is Seoul. As city size increases, diversity also increases and shows society's overall social structure (Shevky and Bell, 1955; Duranton and Puga, 2000). As of 2020, Seoul's population is about 9.8 million, accounting for about 18.8% of the total population of South Korea (about 51.84 million). Accordingly, analysis of Seoul can show the consumption pattern of organic foods, which is not limited to the space of the specific city, rather society. In other words, in terms of analyzing the socio-economic characteristics of consumers and organic food stores in this metropolis, this section shows an aspect of the characteristics of organic food consumption in South Korean society.

In the map visualization and correlation graph analysis in Seoul, the specific information (type of business, industrial code, name, district, latitude, and longitude) of organic food stores (78 shops) were extracted using OpenAPI commercial information database (total 367,535 shops in Seoul) (see Supplementary Material SectionB). By district, social class characteristics of residents were extracted using social class distribution data. In terms of educational background, university (including vocational college) graduation or above is classified as high, and high school graduation or below is classified as low. In regard to income, the fourth quartile is classified as high, and the first quartile is classified as low. The ratio of working population of the upper tier to the lower tier in each data was measured based on national census data (Han, 2022; KEIS, 2019).

3.2. Empirical estimation model

By expanding the target of analysis from Seoul to South Korea, this study proposes an ordered probit model to prove the hypothesis that organic food consumption behavior is influenced by the characteristics of social class and lifestyle.[2] Since the frequency of purchasing organic

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[2] Unlike the ordered logit model that assumes a logistic distribution for the error term (ε_i), the ordered probit model assumes a normal distribution for the error term. There is little difference in log likelihood between the two models (see Table 1 and Table C1). The results are largely qualitatively similar to the ones reported in the result section.

foods (a dependent variable) is a sequence scale variable (from none to everyday), this study applies the ordered probit model as a model for analysis of frequency of food consumption (Cranfield and Magnusson, 2003; Greene, 2012; Posri et al., 2006; Senyolo et al., 2014).

3.3. Variables

The dependent variable is the frequency of purchase of organic foods (from none to everyday). This reflects the consumer's consumption routine, not the purchase intention or attitude towards organic food. The explanatory variables for social class include average monthly household income and education level. These are representative variables that reflect the social class of citizens (Hollingshead 1975). In addition, an individual's lifestyle can be defined as interests, opinions, and activities (Lazer 1964; Wells and Togert, 1971; Anderson and Golden 1984). The variable denoting the experience of participating in food-related education/promotion events reflects consumers' positiveness about obtaining knowledge about food consumption. Participation in on-site events is one aspect that most directly represents an individual's lifestyle (Benckendorff and Pearce, 2012). In addition, following variables are utilized: individuals' interest in organic foods, awareness of the health and environmental impacts of organic food consumption, and willingness to consume organic foods at higher prices (Berger and Mitchell, 1989; Soler et al., 2002; Lockie et al., 2004; Lea and Worsley, 2005; Hunghner et al., 2007; Teng and Wang, 2015; Demirtas, 2019; Aitken et al., 2020).

Control variables included gender, age, single-person household, number of family members, and residential area (Seoul metropolitan area, urban). It is believed that gender is related to organic food consumption (Fagerli and Wandel, 1999; Lockie et al., 2004; Kim and Lee, 2019). Lockie et al. (2002) and Stobbelaar et al. (2007) found that women were more positive towards organic products. Magnusson et al. (2001) proved that a higher proportion of women than men preferred organic foods. There are studies that found a significant relation between age and the consumption of organic foods (Thomson and Kidwell, 1998; Smith and Riethmuller, 1999; Robinson and Smith, 2003). Magnusson et al. (2001) reported that younger respondents were more likely to purchase organic foods. Rimal et al. (2005) proved that older respondents were less likely to buy organic foods than younger respondents.

While Thompson and Kidwell (1998) and Rimal et al. (2005) found that families with more members were more likely to buy organic foods, Basha et al. (2015) found that nuclear families were more likely to buy them than families with more members. The widening of the gap between urban and rural areas is a socio-economic phenomenon found in economic development (OECD, 2018). Accordingly, the area in which they live can influence consumption patterns (Yıldırım and Ceylan, 2007; Smith et al., 2009; Molnar et al., 2017; Cao et al., 2020). Therefore, the residential area variables (Seoul metropolitan area and urban area) are included in the model because they may affect consumer behavior regarding organic foods (Kim and Lee, 2019). If the first analysis shows the differences in organic food consumption between regions within Seoul, the second analysis can show the differences between the Seoul metropolitan area and other regions. In South Korea, phrases that represent specific spaces, such as the Seoul metropolitan area versus rural provinces, and Gangnam (rich south of the Han River) versus Gangbuk (poor north of the Han River) districts in Seoul reflect individuals' identity, socio-economic status, and social class (Han, 2022). Comparison of organic food consumption within Seoul and between Seoul and other regions will imply the characteristics of overall patterns of organic food consumption in South Korea.

Household income, education, interest, awareness, and willingness are ordinal variables. Ordinal variables with five or more categories can often be used as continuous variables, without harming the analysis (Johnson and Creech, 1983; Zumbo and Zimmerman, 1993; Norman, 2010; Sullivan and Artino, 2013). Therefore, this study treats them as continuous variables (see Table A2 in Supplementary Material SectionA for more details).

4. Results

4.1. Analysis results of big data

Figure 1 shows the total number of organic food stores by district in Seoul.[3] It shows that the largest number of organic food stores are located in Gangnam district. Next, several organic food stores are also in Seocho and Songpa districts. Figure 2 shows the map visualization of the location information of organic food stores in Seoul.

Source: Organic food store data is from Small Enterprise and Market Service (see Table A1 for more details).

Looking at Figures 1 and 2 together, more organic food stores are located in southern region (Gangnam, Seocho, and Songpa districts) and the southwestern regions of the Han River compared to other regions. That is, organic food stores are distributed throughout Seoul, but more of them are located south of the Han River and the difference in the numbers is clearly observed spatially. Given these data, why are these stores concentrated in the above districts? In Figure 3, we can see the relationship between residents' income and education level, and the number of organic food stores by district. This allows us to understand what kind of relationships they are in.

Figure 3 intuitively shows the relationship between high income, high education and the number of organic food stores. This simple and intuitive measurement framework is suitable for constructing an empirical approximation of association between social class and patterns of organic food consumption. We can find the high correlation between high income, high education, and the number of organic food stores. The inference through this descriptive analysis is that the higher the residents' income and education level, the more organic food stores there are. While it is not surprising to find that three measures are correlated with each other based on literature, it is nonetheless notable how strong the correlation at the aggregate level actually is. The estimated correlation coefficient between high income and the number of organic food stores and between high education and the number of organic food stores is 0.7, respectively.

To understand the relationship between social class and organic foods consumption patterns more clearly, we can narrow down the analysis targets and analyze organic food specialty stores and consumer co-operatives whose main business objective is selling organic foods, excluding other stores that consumers can visit for a variety of purposes other than organic food consumption.

Looking at the number of consumer co-operatives and organic food specialty stores by district in Figure 4, Gangnam District has the largest number of stores. Seocho, Songpa, Yangcheon, and Eunpyeong districts followed, which is similar to what is illustrated in Figure 1.

Looking at Figure 5, compared to other regions, there are many consumer co-operatives and organic food specialty stores in Gangnam, Seocho, and Songpa district, and the southwestern regions. There are also more stores in the southeastern area where the Yangcheon district is located.

Figure 6 shows the relationship between income, education and the number of consumer co-operatives and organic food specialty stores. The estimated correlation coefficient between high income and the number of the stores, and between high education and the number of the stores is 0.7, respectively. That is, the higher the residents' income and education

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[3] The organic food store defined in this section for map visualization refer to a retail store in which certified organic foods are managed, and at least a part of organic foods is sold in a separate space; the sales are calculated separately (KREI, 2016; Agro-food New Marketing Institute, 2019).According to this definition, consumer co-operatives, eco-friendly food specialty stores, super supermarkets (supermarkets operated in a chain format by large distribution companies, SSM), agricultural co-operatives Hanaro Marts, hypermarkets, and department stores are subjects for analysis (see Supplementary Material B Section).
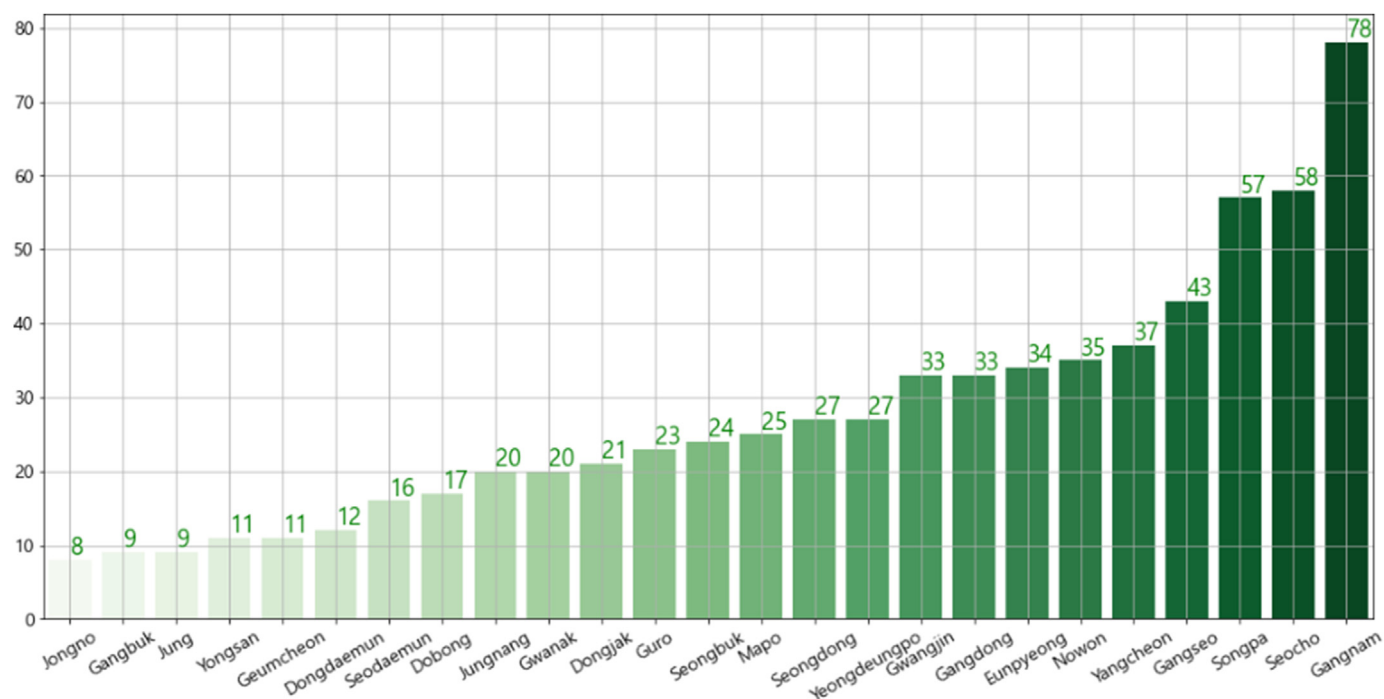
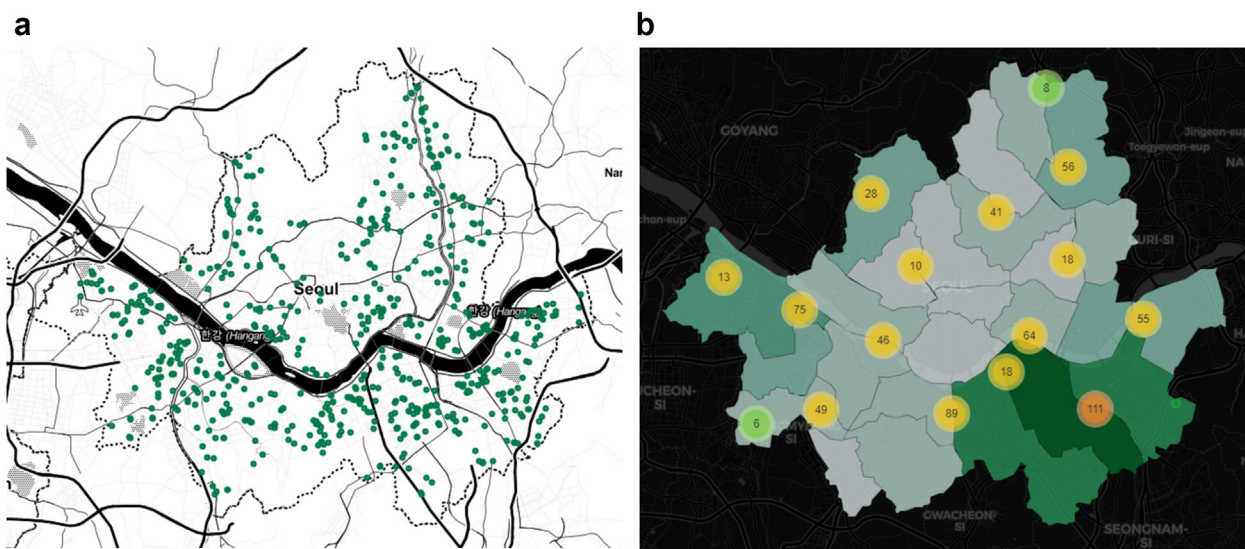**Figure 1.** Organic food stores by district in Seoul.

Figure 2. Map of organic food stores in Seoul.

level, the more consumer co-operatives and organic food specialty stores there are. By narrowing down the targets for analysis, we can better understand the socio-economic structure of organic food consumption patterns in urban area, Seoul. The consumption patterns of citizens are closely linked with the socio-economic structure of Korean society (Han, 2022).

In this section, we can identify the association between socio-economic characteristics of consumers and the number of organic food stores in Seoul. The analysis results are as follows: In Seoul, where about 9.8 million people live accounting for about 18.8% of the total population of South Korea, stores specializing in organic food sales are concentrated in certain areas where those with high income and advanced education degrees live. These results show the dietary routine of certain groups of people living in affluent areas, which spatially affirm previous findings that people with higher income and higher education

levels are more likely to consume organic foods (Lockie et al., 2002; Storstad and Bjørkhaug, 2003; Torjusen et al., 2001; Padel and Foster, 2005; Rodríguez-Bermúdez, 2020; Stobbelaar et al., 2007; Ureña et al., 2008).

4.2. Ordered probit model estimation results

This section analyzes the effects of social class and lifestyle on the frequency of organic foods. Table 1 shows the ordered probit model's estimation results for the frequency of purchasing organic foods. This result proves both hypotheses 1 and 2 of this study.

Our findings show support for Hypothesis 1, income and education positively influence organic food consumption, and Hypothesis 2, lifestyle positively influences organic food consumption. Models 1, 3 and 4 the results for Hypothesis 1. As expected for Hypothesis 1, respondents
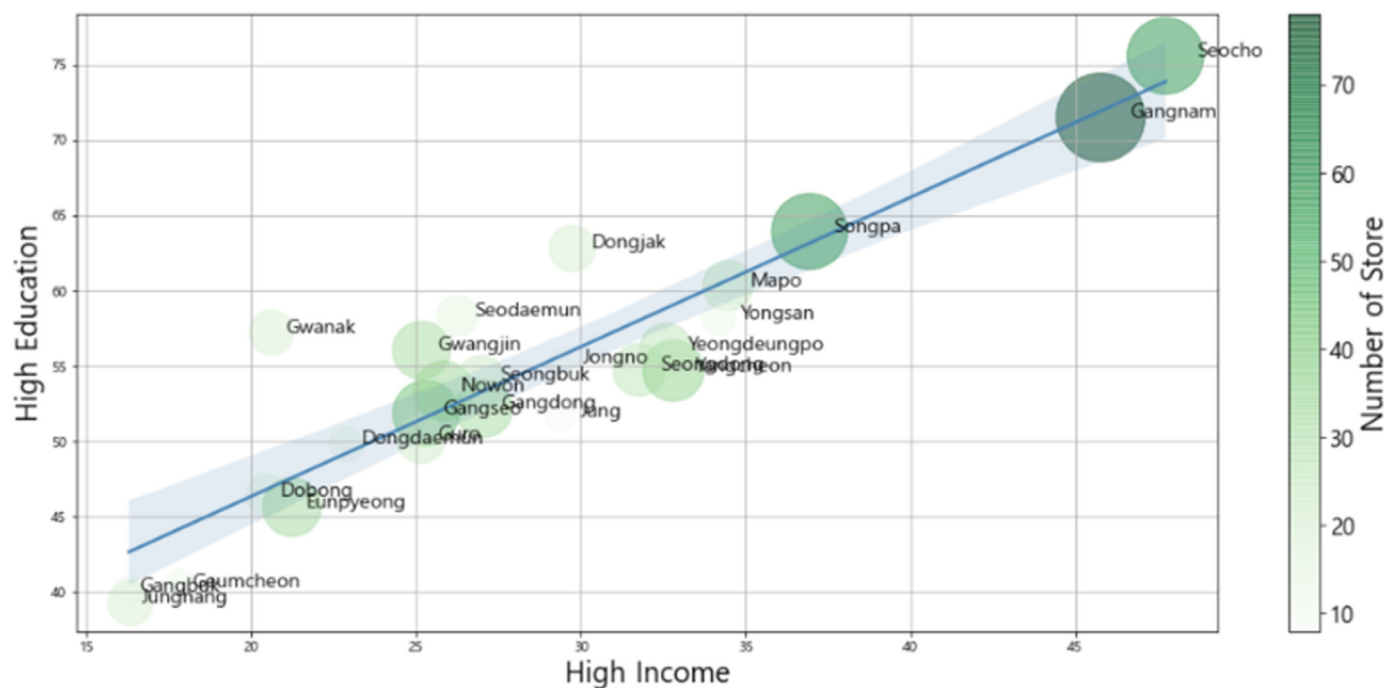
Figure 3. Correlation between high income, high education, and organic food stores in Seoul ($ci = 95$).
Source: High income and High education data is from Korea Employment Information Service; Organic food store data is from Small Enterprise and Market Service (see Table A1 for more details).
Note: High income is the result of calculating the ratio of the Q4 (high) working population to the Q1 (low) working population. High education is the result of calculating the ratio of the highly-educated (Tertiary education or higher) working population to the low-educated population (Upper secondary education or lower) working population.
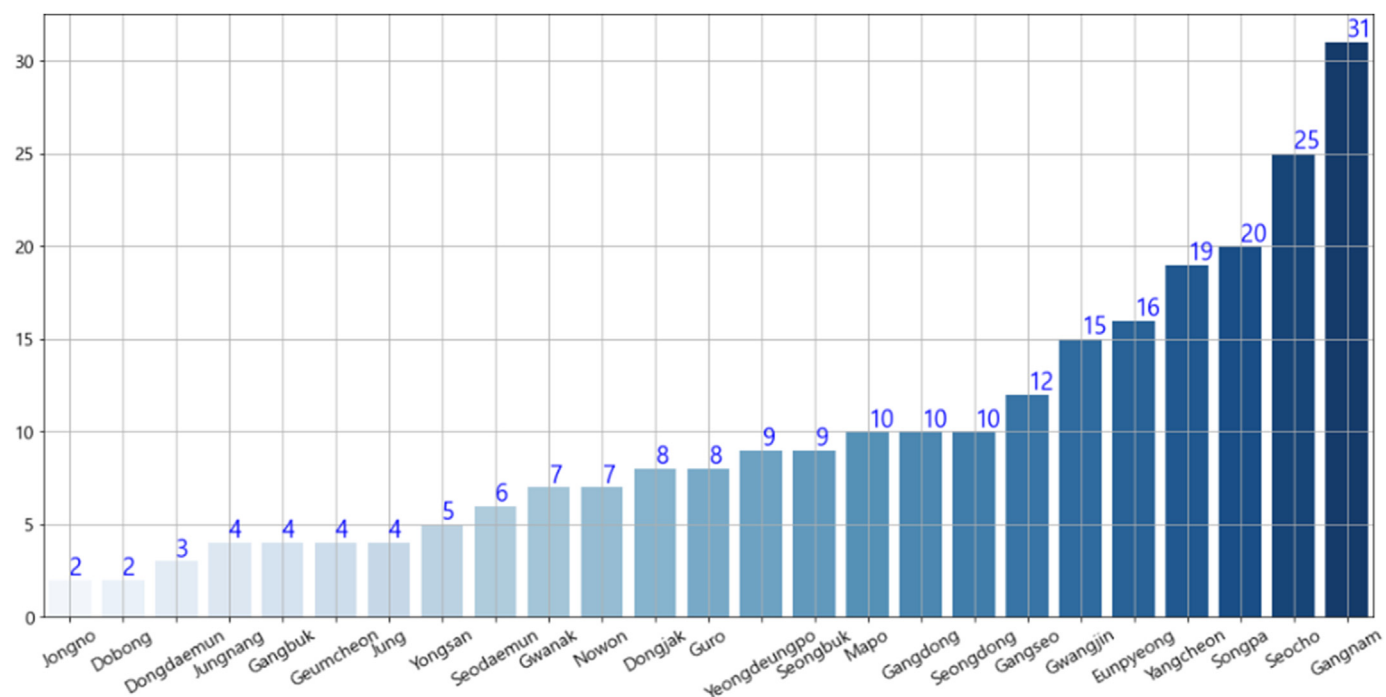

Figure 4. Total number of consumer co-operatives and organic food specialty stores by district in Seoul.

with a higher household income and education level are significantly more likely to buy organic foods than respondents with a low household income and education level. Following Hypothesis 2, lifestyle is significantly associated with the consumption of organic foods in Models 2, 3 and 4. Although all the explanatory variables are statistically significant at either 5% or 1% level and positively associated with the consumption of organic foods, coefficient value comparison demonstrates that the magnitudes of participation and interest are relatively greater than those of other explanatory variables. Put differently, lifestyle and consumption of organic food have a particular relationship; individuals who are
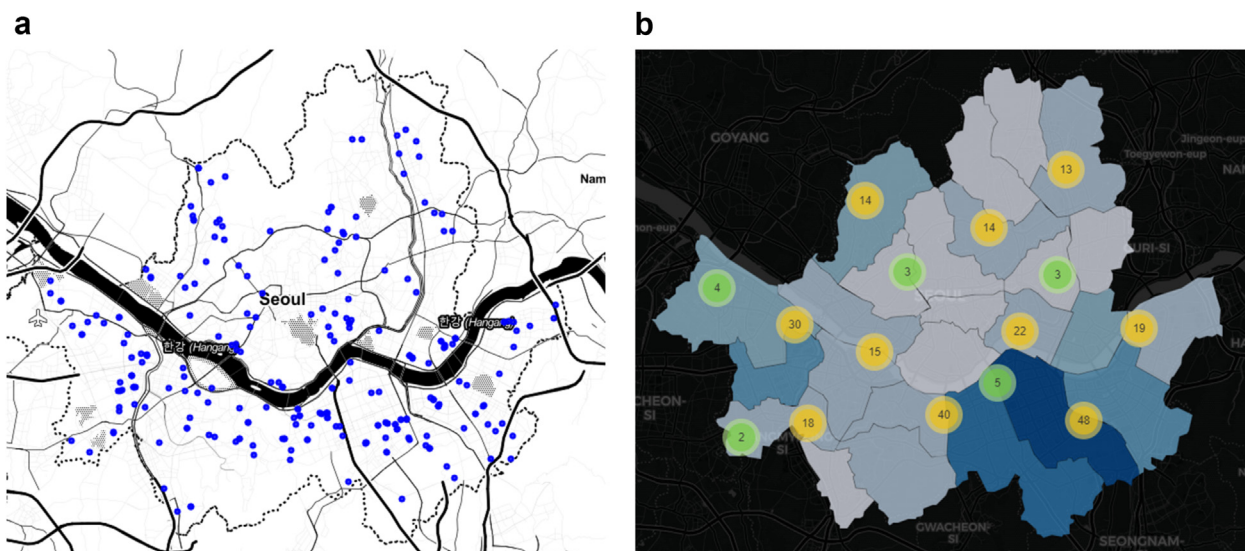
Figure 5. Map of consumer co-operatives and organic food specialty stores in Seoul.
Source: Consumer co-operatives and organic food specialty store data is from Small Enterprise and Market Service (see Table A1 for more details).
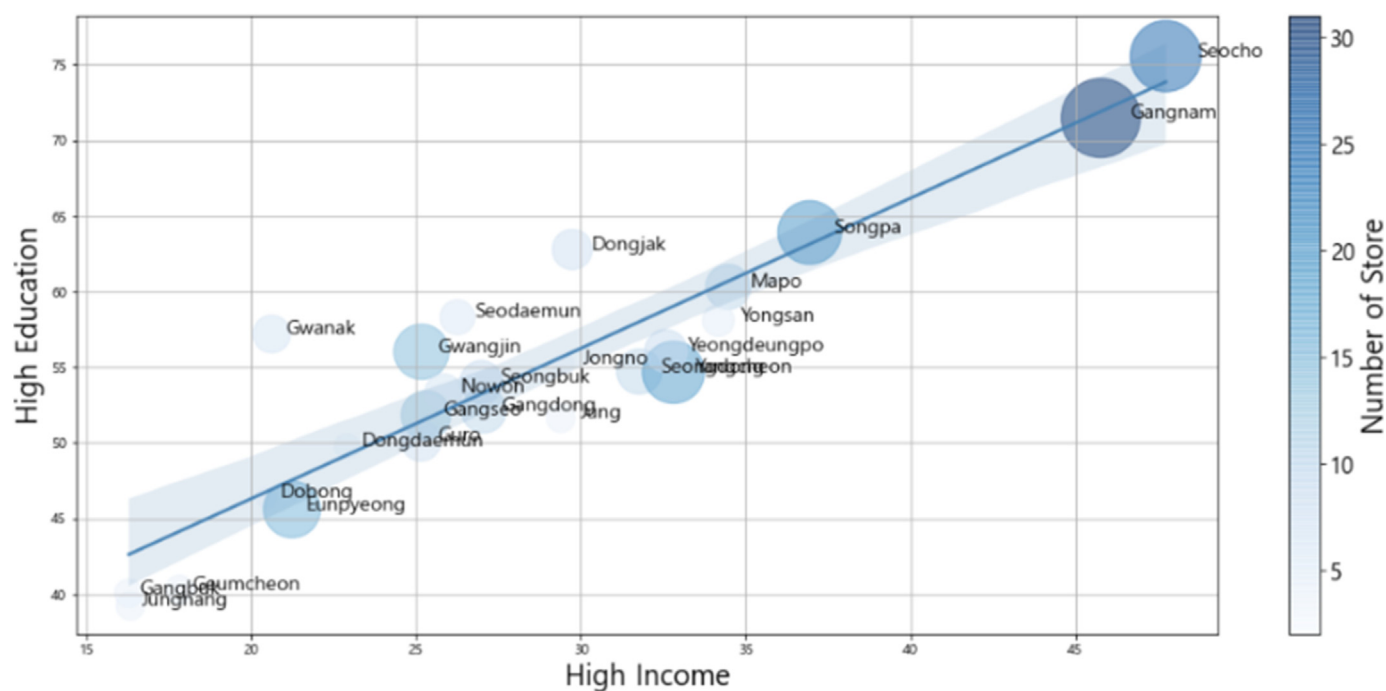

Figure 6. Correlation between high income, high education, and consumer co-operatives and organic food specialty stores in Seoul ($ci = 95$).
Source: High income and High education data is from Korea Employment Information Service; Consumer co-operatives and organic food specialty store data is from Small Enterprise and Market Service (see Table A1 for more details).
Note: High income is the result of calculating the ratio of the Q4 (high) working population to the Q1 (low) working population. High education is the result of calculating the ratio of the highly-educated (Tertiary education or higher) working population to the low-educated (Upper secondary education or lower) working population.

interested in organic products and have experience participating in related events tend to consume more organic food.

Because interpretation of the ordered probit coefficients in Table 1 is not straightforward, we plot predicted probabilities to show the effects of explanatory variables in Figures 7–12. In order to explain the substantive influences of explanatory variables on the dependent variable, the probabilities of buying organic foods once a week are computed (from Model 4 specified in Table 1), considering that the marginal effects of variables are greatest and statistically significant at 5% and 1% level
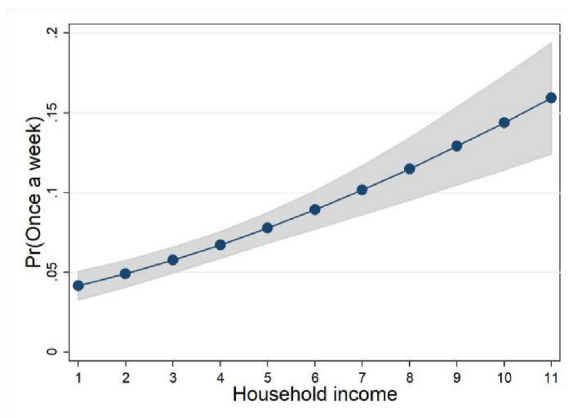
when consuming organic foods once a week (see Supplementary Material SectionD). The marginal effects are plotted according to the scale of each explanatory variable, holding other variables at their means. In addition, 95% confidence intervals are added to control for prediction uncertainties.

In Figure 7 housing income, a shift from 1 to 11 on the housing income scale increases the probability of buying organic food from 4.1% to 15.9%. In Figure 8 education level, a shift from 1 to 5 on the education level scale increases the probability of buying organic food from 4.8% to
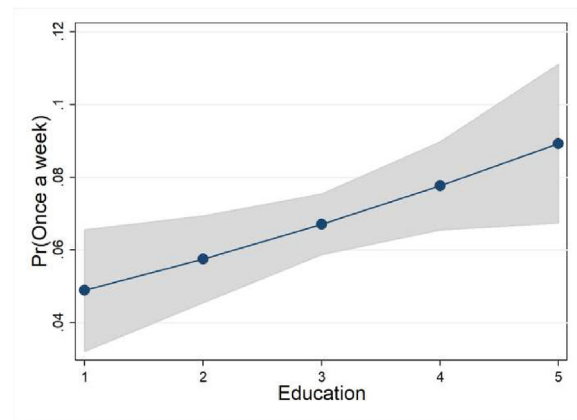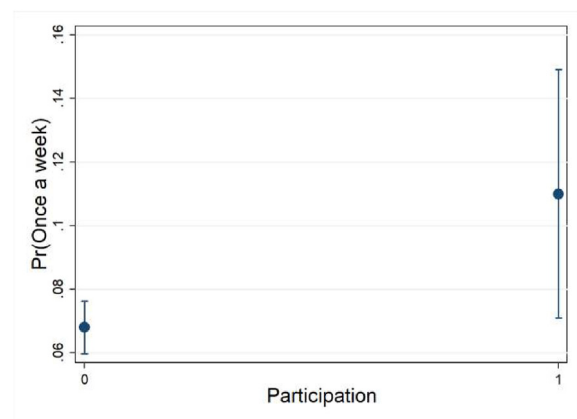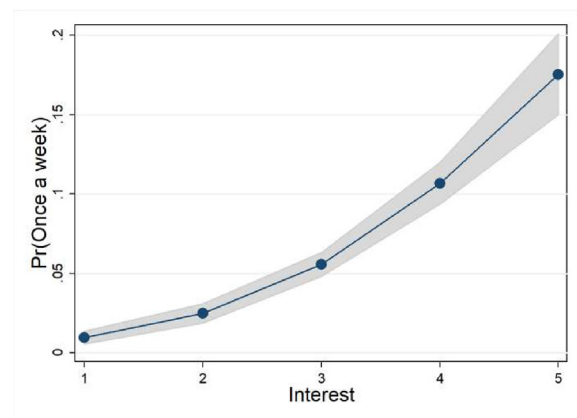
Table 1. Ordered probit model estimation results.

	(1)	(2)	(3)	(4)
Household income	0.1050***		0.0934***	0.0871***
	(0.0109)		(0.0110)	(0.0130)
Education	0.2062***		0.1713***	0.0882**
	(0.0293)		(0.0299)	(0.0394)
Participation (Participation = 1)		0.4811***	0.3694**	0.3103**
		(0.1248)	(0.1254)	(0.1261)
Interest		0.4524***	0.4229***	0.4027***
		(0.0318)	(0.0321)	(0.0324)
Awareness		0.0932**	0.0717**	0.0693**
		(0.0272)	(0.0274)	(0.0275)
Willingness		0.1579***	0.1438***	0.1212***
		(0.0340)	(0.0343)	(0.0346)
Gender (Female = 1)				0.2289***
				(0.0648)
Age				−0.0080**
				(0.0023)
Single household (Single household = 1)				−0.1584**
				(0.0688)
Family				−0.0939**
				(0.0272)
Seoul metropolitan area (Seoul metropolitan area = 1)				0.2084***
				(0.0453)
Urban (Urban = 1)				0.1346**
				(0.0524)
Log likelihood	−4624.48	−4566.82	−4485.67	−4449.88
N	3300	3300	3300	3300

*$p < 0.1$, **$p < 0.05$, ***$p < 0.001$.

Figure 8. Marginal effects of Education.

Figure 9. Marginal effects of Participation.

Figure 7. Marginal effects of Household income.

Figure 10. Marginal effects of Interest.

8.9%. In Figure 9 participation, a shift from non-participation to participation increases the probability of buying organic food from 11% to 16.2%. In Figure 10 interest, a shift from 1 to 5 increases the probability of buying organic food from 9.5% to 17.5%. In Figure 11 awareness, a shift from 1 to 5 increases the probability of buying organic foods from 5% to 8%. Lastly, in Figure 12 willingness, a shift from 1 to 5 increases the probability of buying organic food from 3.8% to 9.1%.

If we turn to control variables, age, single household and family size turn out to be negatively associated with consumption of organic food. On the other hand, individuals living in Seoul metropolitan area and urban regions on average are more likely to buy organic food. These findings allow us to draw a general picture of the organic food consumer profile in South Korea: non-single households but small households,

women, younger people and living in Seoul metropolitan and urban area. This consumer profile matches with previous empirical studies (Thomson and Kidwell, 1998; Magnusson et al., 2001; Lockie et al., 2002, 2004; Rimal et al., 2005; Basha et al., 2015; Kim and Lee, 2019).

Here, among control variables, we need to pay attention to the Seoul metropolitan variable. In the previous analysis, we found the close relationship between social class and patterns of organic food consumption in Seoul and found its spatial structure. In this analysis, we found differences in organic food consumption between Seoul and other regions. Put differently, this suggests that there are clear disparities in organic food consumption regionally in Korean society. A number of
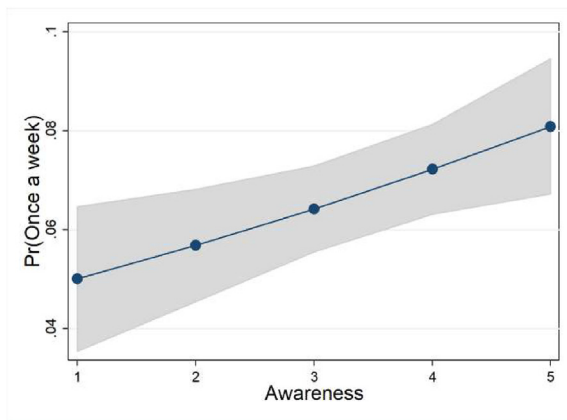
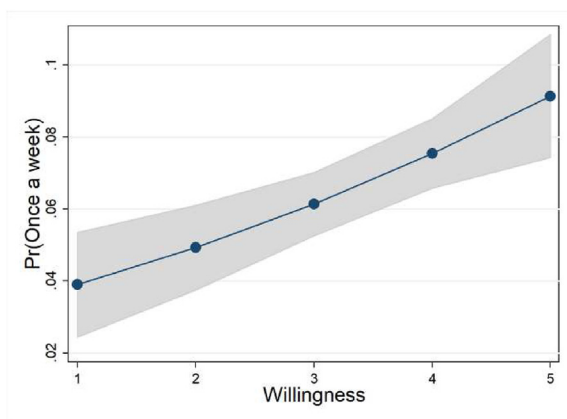**Figure 11.** Marginal effects of Awareness.

Figure 12. Marginal effects of Willingness.

studies have discussed the extreme socio-economic disparities between regions in South Korean society (Han, 2022; Kim and Jeong, 2003). The socioeconomic disparities between regions are reflected in organic food consumption as well.

The current study conducted several robustness checks. First, we conducted both probit and logit estimations (see Table 1 and Table C1). Both estimations show consistent results, indicating that the results of our analysis are not sensitive to the choice of estimation models. Second, the results are largely qualitatively the same, even if the variables are sequentially included (see Table 1). In other words, the effects of the explanatory variables are consistent regardless of the inclusion or exclusion of other variables. Third, demographic attributes are included as control variables in the models, which we believe means taking confounding variables into account in the analysis.

In summation, we found a strong correlation between social class and the consumption of organic foods in Figures 3 and 6. However, socio-economic conditions do not explain all of the behavior of organic food consumption. Looking at the results of the probit model, lifestyle variables (for example, consumers' positivity in obtaining knowledge about food consumption, interest in organic food) have relatively stronger effects on the frequency of purchasing organic foods than income and education level. This implies that lifestyle affects a specific behavior of an individual by mediating between an individual's perception of a specific product and cognitive categories, which becomes a consumption routine.

5. Discussion and implications

As discussed in prior studies, consumption of organic food is highly related to social class (Torjusen et al., 2001; Lockie et al., 2002; Storstad

and Bjørkhaug, 2003; Padel and Foster, 2005; Stobbelaar et al., 2007; Ureña et al., 2008). Organic food stores are highly concentrated in certain areas with a greater segment of socio-economically affluent people. In addition, in the probit model, income and education were statistically significant at the 5% and 1% level, which proves Hypothesis 1, "Income and education positively influence organic food consumption." In general, consumers need a fair amount of disposal income to purchase organic foods at premium costs. This explains why, in many of the previous studies, price has been considered a crucial factor influencing the consumption of organic foods (Fotopoulos and Krystallis, 2002; O'Donovan and McCarthy, 2002; Stobbelaar et al., 2007; Ureña et al., 2008).

Another finding of this research is to confirm the significant influences of lifestyle variables. Looking at the effects of explanatory variables on the frequency of purchasing organic foods, having experience of attendance at food-related education/events, interest in organic foods, awareness of impact of organic foods, and willingness to purchase organic foods exerts and influence on the consumption of organic foods. They were statistically significant at the 5% and 1% level, which proves Hypothesis 2, "Lifestyle positively influences organic food consumption." This can explain the consumer behavior in terms of mediating cognitive structures and observable behavior.

Consuming organic foods is a privileged act. This is because such consumption can only be enjoyed by experiencing it and affording it. Therefore, there is no coincidence that social class background affects consumer behavior on organic food consumption. However, in the ordered probit model analysis, we found that a lifestyle reflecting an individual's interest, self-confidence, and values have a greater influence on the consumption of organic foods. This means that although social class characteristics evidently influence consumer behavior, individual lifestyle plays a relatively more important role in actual consumption. The fact that more organic food stores are located in regions with higher income and education levels is a logical conclusion of the expectation that consumption of specific consumer goods would be large owing to social class background. Clearly, from the standpoint of food stores in the private sector, it is expected that consumers will consume more organic foods if they have a higher level of income and educational background. However, it should be noted that in general society, factors reflecting lifestyle more strongly influence the consumption of organic foods.

This research has implications promoting consumption of organic foods. The necessity of consuming organic foods for personal healthy eating and environmental protection will continue to be emphasized. The fact that organic food specialty stores are concentrated in certain areas means that organic foods are still more expensive than other foods and the price impact on consumption cannot be ignored. The high price not only affects consumer behavior, but also affects physical accessibility (i.e., concentrating the stores in certain areas). Therefore, the price barrier to organic food consumption should be considered in promoting organic food consumption. In addition, it is necessary to prepare policy measures that expand the types of organic foods available and to introduce a differential certification system so that consumers with a high interest in organic foods and a willingness to consume them can continue to feel satisfied. In turn, this can lower the barriers to entry for organic food consumption for consumers with a low interest in organic foods. This will allow consumers to expand the range of choices within the organic food market, and to expand the market by supplying organic foods with various prices and quality.

When consumer lifestyles are largely divided into cognitive (interests and opinions) and practical areas (activities) in the consumption of organic foods, participation in food-related events/education falls into the practical domain, while interest in organic food, awareness of the impact of organic foods, and willingness to purchase falls into the cognitive domain. Considering the result of this study—effects of participation overwhelm other factors—it can be assumed that specific activities, such as attending events and education, will improve the consumption of organic food. Therefore, it is necessary to go one step

further from the passive approach that expects improvement in organic food consumption in terms of consumers' cognitive aspects. It is necessary to disseminate education through various food-related events that enables consumers to fully recognize the value of organic food, norms related to environment, and ethical consumption. This facilitates the application of their understanding to induce practical action in their day to day lives (Squires et al., 2001; Michaelidou and Hassan, 2010; Bravo et al., 2013).

Lifestyle can either relate to integration in a certain larger social segment or be a tool for self-expression by the individual. If an individual's lifestyle has a stronger impact on organic foods consumption than other factors, it is also necessary to consider ways to change the quality of consumer communication about organic food. In other words, organic food not only emphasizes unique attributes, such as environmental impact and ethical consumption for society, but it also emphasizes the image of successfully managing oneself through a healthy diet and sustainable consumption.

6. Conclusion

This research attests to the role of socio-economic characteristics and lifestyle on consumption of organic. From the results of this study, we confirmed that consumption patterns reflect social class characteristics. The fact that organic food stores are concentrated in regions with high income and education levels clearly means that the patterns of food consumption differ among social classes. However, the findings of this study—lifestyle factors have a relatively greater influence on the consumption of organic foods than socio-economic and demographic factors—imply that various approaches are needed to promote consumption of organic foods.

This study has a few theoretical and empirical limitations. This study's proposed causal link between lifestyle and consumption behavior is tentative and begs further exploration. Although the findings of this study help us understand the association between lifestyle and consumption patterns of organic food, it does not present how one's lifestyle can be influenced and shaped. Furthermore, the application of the approach with big data is limited to Seoul. The gap between the metropolitan area and other regions was confirmed through the probit model results. This means that there was a gap in access to organic food stores in Seoul, but the gap between Seoul and other regions might be much greater. It needs to be discussed through follow-up studies, although we discussed it in brief.

Declarations

Author contribution statement

Seungwoo Han; Yookyung Lee: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data associated with this study has been deposited at http://www.krei.re.kr/foodSurvey/selectBbsNttView.do?key=809&bbsNo=451&nttNo=132650&searchCtgry=&searchCnd=all&searchKrwd=&pageIndex=1&integrDeptCode=.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

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