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**The relationship between the consumer health concern and the categories  
of convenience food: The case of South Korea**

**Kyeongah Ahn, Sohyun Kim, Yunchan Choe**

**Seoul National University  
Agricultural Economics and  
Rural Development  
[minhui2@empal.com](mailto:minhui2@empal.com)  
[isolatedzany@snu.ac.kr](mailto:isolatedzany@snu.ac.kr)  
[aggi@snu.ac.kr](mailto:aggi@snu.ac.kr)**

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# **Home Meal Replacement Market Segmentation: A Food-Related Life Style**

## **Abstract**

This study empirically examines and suggests categories of convenience food affected by the concerns for health-seeking consumers. Convenience food is defined as “any fully or partially prepared foods in which significant preparation time, culinary skills, or energy inputs have been transferred from home kitchen to the food processor or distribution”

Existing studies showed that convenience food is not related with consumer health. However, the current trends are health and convenience orientated. First, consumers are aware that low-calorie and low-salt diets are good for health. There is a high incidence of illnesses such as obesity, diabetes, and atherosclerosis, which are common in developed countries. Second, more consumers today are considering convenience as a factor of food choice.

In this study, we examined categories of convenience food consumed by health-seeking consumers. We used cluster analysis, principle component analysis, and multiple regression analysis to evaluate convenience food consumption. First, we classified the categories of convenience food through cluster analysis. Second, we designated convenience food as dependent variables through principle component analysis. Third, we found explanatory variables that affect convenience food consumption.

The results of the cluster analysis and principle component analysis identified two segments for convenience food: ‘ready-to-eat’ and ‘ready-to-cook’. The results of our analysis shows that there are difference between ‘ready-to-cook’ and ‘ready-to-eat’ although they are same convenience food. But the explanation power of the model is low because panel data have distortion. This can be overcome by collecting single-person households.

**Key words:** convenience foods, health concern, convenience concerns

## Introduction

Convenience food is defined as “any fully or partially prepared foods in which significant preparation time, culinary skills, or energy inputs have been transferred from home kitchen to the food processor or distribution” (Traub et al., 1979). Consumers purchase convenience food because of the lack of time and skills to prepare their own food. The existing research separates convenience food into four categories according to the preparation time: ready-to-eat, ready-to-heat, ready-to-end-cook and ready-to-cook (Costa et al., 2001). Other researchers classified the four groups according to the degree of transferring the complicated cooking process to the manufacturer and distributor: non-convenience, basic convenience, complex convenience, manufactured convenience (Havlicek et al., 1983). In other studies, the categories of convenience food are classified conceptually. However, very few cases are empirically classified.

Existing studies showed that convenience food is not related with consumer health. However, consumers require products that fulfill not only convenience but also health. In the food sector of South Korea, the current trends are health orientation and convenience orientation. First, consumers are aware that low-calorie and low-salt diets are good for health. There is a high incidence of illnesses such as obesity, diabetes, and atherosclerosis, which are common in developed countries. Second, more consumers today are considering convenience as a factor of food choice. In Korea, social participation by housewives is increasing and one or two-person households have exceeded 50% of the total households. The new generation has less opportunity to learn cooking skills as a result of the change in society. Thus, consumers want to reduce the hassle of preparing a meal at home. The topic of this study is related to the connection of food and health. In this study, we examine categories of convenience food consumed by health-seeking consumers.

We will use cluster analysis, principle component analysis, and multiple regression

analysis to evaluate convenience food consumption. First, we will classify the categories of convenience food through cluster analysis, which does not assume any particular distributions of the population. Second, we designated convenience food as dependent variables through principle component analysis. Third, we found explanatory variables that affect convenience food consumption.

## **Literature review**

### **1. Definition of Convenience food**

The convenience food refers to meal that can save time, energy and skill to cook. The convenience food consumption is shortening Food consumption process (Darian & Cohen, 1995, Marshall. 1995). Food consumption process includes planning, shopping, storage, preparation, cooking, consumption and cleaning-up.

Convenience food is defined as follows. Food types are classified ‘Non-convenience’, ‘basic convenience’, ‘complex convenience’ and ‘manufactured convenience’ according to complexity of food consumption process (Havlicek et al, 1983, Harrison, 1979).

In many case, convenience food is mixed with Home meal replacement. HMR is defined as a homemade-type ready-made hot meal that can be eaten outside a store or placed on a countertop in a convenience food market (Gibson, 1999). Costa et al. (2001) define it as a main dish or ready-made main dish containing protein, carbohydrates, and vitamins that has been devised to quickly replace a main dish which is similar to a meal made at home, and is provided in a 1-serving container. Chung (2005) defines HMR as ‘food fully cooked or half-cooked sold outside the household that is eaten right after purchase or after simple cooking’ by according to the Korean eating habit.

## 2. Determinants of Convenience food purchase

Research about the consumption of convenience food is started in the 1960s. Becker (1965) has argued that the housewife with job will consume more convenience food because the housewife works outside has lower opportunity cost is lower to buy convenience food rather than preparing meals. After this claim, there have been many studies that report to argue with Becker (Kim, 1989). Variables include social position, life cycle stage, income, prices, and income of the housewife (Anderson, 1971, Darian and Klein, 1989, Capps et al., 1985). Situational variables affecting the consumption of convenience food include psychological variables influencing the purchase and consumption. These variables perceived time pressure, perceived budget, cooking skill, and intention to reduce waste (Chung, 2005, Bava et al., 2008, Botonaki et al., 2009, Brunner et al., 2010).

It has been found that psychological variables like time pressure and convenience attitudes etc. influence the consumption of convenience food. (Chung, 2005, Horst et al., 2010). As for ready to heat food, purchase intention was higher when the person was female, had a highly educated and had health orientation (Olsen et al, 2012).

Table1. Variables influencing convenience food

Author(year)	Dependent variable	Independent variables
Anderson(1971)	Convenience food	Socioeconomic status, life cycle stage
Darian and Klein(1989)	Convenience food	Moderate-earning working wife
Capps et al(1985)	Convenience food	Less than 35 years old, income, White household, price
Verlegh and Candel(1999)	Convenience food, TV dinner	Time-related situation(weekends and weekdays), social situation(alone, with family, with friends)
Chung(2005)	HMR	Time resource, convenience attitude
Bava et al(2008)	Convenience food	Time, unpredictable event, cooking skill, Bourdieu's habitus
Botonaki et al(2009)	Convenience food	Perceived time pressure, perceived money budget
Brunner et al(2010)	Convenience food	Age, nutrition knowledge, children, cooking skill, avoiding waste
Horst et al(2010)	Ready meal	Overweight, cooking skill
Olsen et al(2012)	Ready to heat	Age, gender, education, health orientation, overall liking(appearance, flavor, texture, odour)

## Methods

### 1. Data collection

The current study surveyed housewives in Korea and obtained 684 panel data from the Rural Development Administration. The data includes almost four years of daily household food consumption records from December 2009 through November 2013. The parameters of convenience foods are convenience foods expenditures in proportion to entire food expenditures. Also an additional survey was conducted to panel on 08~09 May 2013. And the survey measures panels' food-related lifestyle, role overload, and the involvement of meal preparation. The total collected survey answers were 755 but only 575 survey data were used because of the missing data.

### 2. Parameter setting

#### 2.1 Dependent variables

Convenience food consumption is the dependent variable which is per capita purchase value for convenience food. This is calculated by dividing the amount of money spent on convenience food for three years by the number of households. Because the person who spend large amount of money spent on convenience is suitable for convenience food target marketing. The variables, convenience food consumption and total food consumption, are compared.

To analyze categories of convenience food as dependent variables, we conduct cluster analysis and principle component analysis (PCA) to the sum of convenience food. First, we classified the categories of convenience food through cluster analysis, which does not assume any particular distributions of the population. And we divided convenience food into 2 variables according to the result of cluster analysis. 2 variables were named C1(ready to eat) and C2(ready to cook) based on the classification by Costa et al (2001), because items of 2 variables are similar to items of C1 and C2.

Second, we used convenience food as dependent variables through principle component analysis. If the results of PCA coincide with the result of cluster analysis, the dependent variables are statistically significant. According to the PCA results, we classified convenience food into 2 groups. The results are as follows.

Table 2. The result of principle component analysis

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.48298	1.51702	0.1088	0.1088
Comp2	1.96597	0.445269	0.0614	0.1703
Comp3	1.5207	0.145934	0.0475	0.2178
Comp4	1.37476	0.050345	0.043	0.2608
Comp5	1.32442	0.077862	0.0414	0.3022
Comp6	1.24656	0.02491	0.039	0.3411
Comp7	1.22165	0.038574	0.0382	0.3793
Comp8	1.18307	0.018986	0.037	0.4163

According to the PCA results the products were divided into 2 variables. And the items of these 2 variables coincided with the result of cluster analysis. So, C1 and C2 were used as dependent variables.

Table 3. Dependent variables

Category	Per capita purchase price
Convenience food	$Y1_i$
C1 (ready to eat)	$Y1_k$
C2 (ready to cook)	$Y1_l$
Total food	$Y2$

### 2.1 Independent variables

Independent variables included the age, whether the consumer was a housewife, income, education, number of children, whether the consumer lives with parents and health concern. For variables influencing the consumption of prepared food, income, employment status of the housewife, and location were examined (Redman, 1980). Considering the effect on food consumption, whether or not the person lived with his/her parents was included. Health concern is included to reflect the trend of Korea food consumption.



### 3. Analysis method

For our analysis method, cluster analysis, PCA and multiple regression analysis were used. Before conducting multiple regression analysis, the present study classified variables through cluster analysis and PCA and then examine the suitability of model and the degree of influence of each variable through multiple regression analysis.

#### 3.1. Cluster analysis

Cluster analysis or clustering is grouping a set of similar objects to each other in the same group (called a cluster) than to those in other groups (clusters). Cluster analysis has various ways to grouping variables. In this case, we used Density-based clustering.

In density-based clustering clusters are defined as areas of higher density than the remainder of the data set. Objects in these sparse areas that are required to separate clusters are usually considered to be noise and border points.

#### 3.2. Principle component analysis

Principal component analysis (PCA) is a statistical analysis to convert a set of correlated observations by using an orthogonal transformation. By omitting the small axes and their corresponding data sets, we can lose only the corresponding data. The process that are sensitive to scaling the data. And it should be noted that there is no agreement how to get best result to scale up.

#### 3.3. Multiple regression

Multiple regression analysis is used when multiple explanatory variables are in cross-sectional data. Multiple regression analysis can show not only significant variables but also the degree of the influence of each variable.

$\beta$  is a regression coefficient as a parameter, when error term  $e$  assumes independence, normality and homoscedasticity. Therefore, it represents the influence of explanatory variable when the values of other explanatory variables are fixed. The following is a multiple regression equation representing the relationship between dependent variables and independent variables.

$$y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \beta_7x_7 + \beta_8x_8 + e$$

y: per capital purchase value for total food, per capital purchase value for convenience food, additional analysis of C1, C2, C3 types

$x_1$  : age  
 $x_2$  : number of household members  
 $x_3$  : whether the consumer is housewife  
 $x_4$  : income  
 $x_5$  : education  
 $x_6$  : number of children  
 $x_7$  : whether living with parents  
 $x_8$  : health concern

F value is used to determine the suitability of the model. And explanatory power can be predicted by explanatory variables as  $R^2$ .  $R^2$  is a value between 0 and 1, and explanatory power for the model is great if  $R^2$  is closer to 1.

## Results

### 1. Sample characteristics

684 panels who had purchased convenience food were analyzed based on demographic characteristics. In the convenience food group, the average number of household members is 4. Most of the households are not living with parents. As for household income, 16.1% had a monthly income of 3 million~3.5 million won, 13.9% 2 million~2.5 million won, and 12% 2.5 million~3 million won. The average age was 46.5. The youngest was 28, and the oldest was 68. 54.8% of households had the housewife. As for education level, 50.6% were high school graduates, while 36.1% were college graduates. About health concern, 80.1% of households concerned about health.

Table 4. Descriptive statistics of the survey

Item	Category	Frequency	Percentage
Number of household members	1	4	0.6
	2	64	9.4
	3	166	24.3
	4	341	49.9
	5	74	10.8
	more than 6	33	4.8
	missing data	2	0.3
Number of children	no	32	4.7
	1	184	26.9
	2	388	56.7
	3	70	10.2
	more than 4	8	1.2

	missing data	2	0.3
Whether living with parents	not living with parents	624	91.2
	Living with parents	58	8.5
	missing data	2	0.3
Household monthly income	income	5	0.7
	under 2 million won	81	11.8
	2~2.5 million won	95	13.9
	2.5~3 million won	82	12.0
	3~3.5 million won	110	16.1
	3.5~4 million won	77	11.3
	4~4.5 million won	49	7.2
	4.5~5 million won	65	9.5
	5~5.5 million	63	9.2
	6~7 million won	20	2.9
	more than 7 million won	33	4.8
	missing data	4	0.6
Age	20s	3	0.4
	30s	139	20.3
	40s	297	43.4
	50s	202	29.5
	60s	41	6.0
	missing data	2	0.3
Whether the housewife has a job or not Education level	housewife	375	54.8
	housewife with a job	307	44.9
	missing data	2	0.7
Health Concern	Very concerned about health	184	28.6
	concerned about health	245	38.0
	Little concerned about health	87	13.5
	middle	55	0.9
	Not little concerned about health	4	0.01
	Not concerned about health	6	0.01
	never concerned about health	4	0.01
	Missing data	59	0.1
Education level	middle school graduate	47	6.9
	high school graduate	346	50.6
	college graduate	247	36.1
	above higher than graduate school	13	1.9
	missing data	31	4.5

## 2. The results of cluster analysis and PCA

The results of cluster analysis and PCA are as follows. We considered Korean eating

habit and the results of cluster analysis and PCA, so convenience foods are divided into 2 groups. The type C1 to be consumed as it is purchased, with no preparation and the type C2 to is defined to be consumed as it is purchased, with preparation

Table5. Convenience food types

Type	Name	Definition	Example
<b>C1</b>	Ready to eat	to be consumed as it is purchased	Korean side dish, Hamburger, pizza, lunch box, etc.
<b>C2</b>	Ready to cook	To be consumed as it is purchased, with preparation	Instant rice, instant noodle, chilled pot stews, etc.

### 3. The result of multiple regressions

The results of multiple regression analysis show that variables that influence the Per capita purchase value for Total food and Per capita purchase value for Convenience food were age, number of household members and income. Younger aged consumers consume more within the two categories of convenience food ( $p < 0.05$ ) while they consume less total food. The number of households also has negative (-) effect on consumption of convenience food but has positive effects on consumption of total food. That means, people who are older and have many household members preferred inconvenience food than convenience food. The higher income, both the consumption of total food and convenience food increase. The per capita purchase value for convenience food increases for the person who is older, have less household members and higher income.

It is confirmed that per capita purchase value of C2 increases for the person who has less number of household members, higher income and higher educational attainment. These factors did not affect or had negative effect on per capita purchase value for C1. Especially, person who concerns health consume C2.

The results of our analysis show that the determinants affecting purchasing behavior for the whole Convenience food and the affecting purchasing behavior for each types of convenience food can be different. Health concern is not related per captia purchase value for

convenience food and per capita purchase value for C1, but has an effects on per capita purchase value for C2.

Table. 6 Regression analysis of per capital purchase value for convenience food and Total food

Dependent variable Explanatory variables	Non-standardized coefficients (T-Value)	
	Per capita purchase value for Total food	Per capita purchase value for Convenience food
age	206471.3**	-4479.097**
Number of household members	2397233**	-65990.03**
Whether the person is a housewife with job	-1420334**	-6247.87
Whether living with parents	-1287498	7.042754
income	7761.033**	237.5736 **
Education level above college	1287957*	9334.375
Number of children	-1550839	1601.328
Health concern	-133242	4058.997
R <sup>2</sup>	0.1574	0.1842

\*\* p<0.01 \* p<0.05

Table. 7 Regression analysis of per capital purchase valuefor convenience food and Total food

Dependent variable Explanatory variables	Non-standardized coefficients (T-Value)	
	Per capita purchase valuefor C1	Per capita purchase valuefor C2
age	-0.1181 **	-0.0446**
Number of household members	-0.1557	-0.4140**
Whether the person is a	0.0964	-0.1396

housewife with job		
Whether living with parents	-0.21896	0.4179
income	-0.0007**	0.0012**
Education level above college	-0.01957	.2596987*
Number of children	0.5132**	0.4097*
Health concern	-0.02269	0.1044*
R <sup>2</sup>	0.3748	0.1121

## Discussion

Convenience food is any fully or partially prepared food significant preparation time, culinary skills, or energy inputs have been transferred from home kitchen to the food processor or distribution. This study divided convenience food into 2 types and determined factors affecting each type. The results of our study can be summarized as follows

First, factors affecting the purchases of convenience food and total food are different. Housewife's job and education level have an effect on the purchases of total food. But in case of convenience food, only age, number of household members and income affect the amount of purchasing. Convenience food consumption behavior is different from compared to total food consumption.

Second, 2 types of convenience food have different characteristics although they belong to the convenience food. Especially, health concern affects the purchasing the type C2, 'ready-to-cook'. If consumer concerns about health, they will by type C2, 'ready-to-cook' rather than C1. Number of household and education level also influence C2 but does not have an effect on C1.

The limitations of the present study are as follows: .According to Statistics Korea, the rate of one-person households is 25.3% in 2012 and follows growing trend. Consumption of convenience food by one-person households is increasing (Internet news, 2013). But one-person households were only 0.6% in the data used for analysis. So it would be important to collect data of one-person households for further research.

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