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Types of Home Meal Replacement and Determinants of Consumption in South Korea

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Abstract HMR is a home-style food product designed for convenience and cooked outside the home leaving out cumbersome cooking process and consumed at home. The present paper aims to find out factors that influence the consumption of HMR by analyzing data on food consumption during the 3 years between December 2010 and November 2013. Following the classification of Costa et al. (2001), this study categorized HMR products as 3 types as follows: C1 (ready to eat), C2 (ready to heat) and C3 (ready to cook), and examined factors affecting purchase rate and per capita purchase price for each type of HMR product. The results of our analysis show that only the purchase rate of C3 products was influenced by whether the purchaser was housewife with job or not. For those who do not live together with parents, per capita purchase price for HMR was high; and the more they ate out, the higher the purchase rate of HMR was.

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1 Introduction

Recently, the HMR (Home Meal Replacement) industry has grown rapidly in developed countries. Research by the NRA (National Restaurant Association) of the United States shows that 30% of households that eat at home use packaged foods. 75% of the goods sold at supermarkets in the USA were HMR products (Moonaw, 1996). According to the data of Foodservice Industry Research Institute in Japan, the HMR market in 2011 was 8.5 trillion yen, showing a consistent growth. In contrast to the restaurant market, which has seen a gradual decline due to the long-term recession and aging population, it is anticipated that the HMR market will continue to grow (Chung, 2005).

The HMR market has also grown rapidly in Korea. The HMR market was 0.71 trillion won in 2009, 0.7747 trillion won in 2010, 0.9529 trillion won in 2012, and 1.3 trillion won in 2013 (Shim, 2014). HMR foods include those found in deli shops in department stores and box lunches at convenience store. Hypermarkets have HMR corners selling about 300 HMR foods. The sales growth of hypermarkets is especially remarkable. HMR sales at Emart in 2013 showed a 65% growth compared to the previous year, and HMR sales at Homeplus showed a 35% growth (Kim, 2014).

HMR is a food product that has drawn attention recently, and there are not many studies on it (Chung 2005, Olsen et al., 2012). HMR is differentiated from convenience food (Costa et al., 2001). The present study tries to determine the factors that affect purchase of HMR by Korean consumers. In other words, this paper tries to find out whether the consumption of HMR is influenced by whether the housewife is employed outside the home or not, what other demographic variables there are, and what the substitutes for HMR are.

The present study defines the concept of HMR by its types. Based upon previous research, this study summarizes the factors affecting the consumption of HMR and

the consumption of convenience food, which has properties similar to HMR. It examines studies on the consumption of HMR according to the employment status of the housewife. This study will identify factors that influence the per capita purchase price and purchase rate by making use of data on food consumption in 3 years between December 2012 and November 2013. Analysis of data, correlation analysis, t-test, and multiple regression analysis were used.

2 Literature Review

2.1 Definition of HMR and Types

HMR refers to a one-dish meal that can be consumed both at home and in stores and does not require the purchaser to go through a cumbersome cooking process, but instead is simply heated before eating. Yet HMR has the sincerity, taste and nutrients of homemade food (Chung, 2005, Kwon et al., 2005). Therefore, HMR does not include snacks like dessert, cereal as a snack, yogurt, and candy bars, but includes the staple food/diet and side dishes (Costa et al., 2001). Cereal as a substitute for breakfast can be an HMR. Since in Korea rice is the staple food, this study regards cereal made of grains as a substitute for a meal, hence classified as HMR.

HMR is defined as follows. HMR is called 'instant food,' 'delivery food,' 'convenience food' and 'packaged food' (Lee et al., 2005). In particular, Gibson (1999) defines HMR 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. 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) maintains that as the Korean term for HMR, 'home meal replacement' is appropriate, and defines HMR as 'food fully cooked or half-cooked sold outside the household that is eaten right after purchase or after simple cooking.'

The Korea Food and Drug Administration (2011) divides HMR into 3 types: instant-eating food, instant-cooked food, and fresh convenience food. Instant-cooked food is food that has been produced and processed with additives added to animal or vegetable raw materials, including foods like soup and broth that can be eaten after simply heating. Fresh convenience food is the food like salad and sprouts made from agricultural or forest products after undergoing processing like washing, peeling, cutting or chopping, or the addition of foods or food additives to agricultural or forest products.

Linda Lipsky (1999) has pointed out that HMR is characterized by the fact that it has the character of dinner and the distinction of being less complicated than a home meal. Also it should be easily kept and should satisfy consumers' expectations in terms of nutrition. It should also be sensuous and easy to distribute.

Table 1 Characteristics of HMR products

Characteristics	Content
Formal dinner	Characteristics of formal dinner with appetizer, main dish, and dessert
Distinction	Differentiated as food more complicated than food eaten at home
Possibility of storing	Can be eaten after a few hours or the next day; has an expiration
dateNutrition	Satisfying consumers' expectation of health and nutrition
Sensuous	Should be food with good store atmosphere or food appealing to the sense of consumers

Data : quoted from Linda Lipsky (1999); Kwon et al. (2005)

HMR products are divided into 4 categories according to cooking time and cooking process. Costa et al. (2001) categorized HMR products with 4 preparation ratings of C1, C2, C3, and C4 according to a consumer-oriented classification system: ready to eat, ready to heat, ready to end-cook, ready to cook. As the preparation rating increases from C1 to C4, the time spent on cooking or the complexity of the process increases.

Chung (2005) adapted the HMR classification system developed by Costa et al. (2001) to Korean food by classifying HMR in 3 categories: Ready to eat (side dish, kimchi, salad, sandwich, gimbap (dried seaweed rolls), etc.,) ready to heat (rice, gruel, food in retort pouch, frozen pizza, etc.), ready to end-cook (frozen dumplings, frozen cutlet, seasoned meat, assorted stew ingredients, etc.) categorized by the attributes of convenience and shelf-life.

Table 2 HMR types

Type	Name	Definition	Example
C1	Ready to eat	To be consumed as it is purchased, with no preparation	Chilled sandwich, chilled pie, simple salad, etc.
C2	Ready to heat	Simple heating is needed before consumption (less than 10 minutes in microwave)	Frozen pizza, frozen cooked rice, frozen staple food or gruel, soup, frozen soup / broth / pot stew. Dried soup and spaghetti, canned soup and staple food, etc.
C3	Ready to cook	Prepared at the minimum for cooking (dressing & cleaning, peeling, cutting, cleaning etc.) but in a state requiring complete cooking for some or all ingredients	Chilled pot stew, frozen seafood with vegetables, chilled meat or fish with side dishes Chilled and frozen noodles, some frozen menus (soup / broth / pot stew), ready-to-heat pasta, frozen rice cake, stir-fried rice cake, etc.

* Source : Costa et al (2001)

2.2 Determinants of HMR purchase

Research into the consumption of convenience food started in the 1960s. Through the household production model, Becker (1965) has argued that since the opportunity cost is lower when the housewife works outside than when preparing meals, the housewife with job will consume more convenience food. Countering this claim, there have been many studies that report the opposite (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 whether it is a weekend or a weekday and whether one eats alone or together with family or friends. Psychological variables influencing the purchase and consumption of convenience food include 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 time pressure and convenience attitudes etc. influence the consumption of HMR. When one is overweight or when one lacks cooking skills, one tends to buy more ready meals (Chung, 2005, Horst et al., 2010). As for ready to heat food, purchase intention was higher when the person was female, had a higher level of education, was health-oriented (Olsen et al, 2012).

Therefore, we find that variables affecting consumption of convenience food and HMR are similar. Now, we will examine what variables influence HMR food.

Table 3 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, appearance, flavor, texture, odor

3 Methods

3.1 Data Collection

The present study used data on consumer purchasing built by the Rural Development Administration during the 3 years between December 2009 and November 2012. The Rural Development Administration recruited about 1,000 households, taking into account the population distribution in 200 Eup, Myeon, and Dong districts in Seoul and the Metropolitan Area. Data was built by collecting once a month the receipts and records of the purchases of agricultural products, livestock products, processed foods and marine products. Information regarding the product, place of purchase, date of purchase, purchase price, and place of origin, etc. was documented. Based on the classification of Costa et al. (2001) and Chung (2005), HMR products used for analysis were selected. For C1 products, gimbap (dried seaweed rolls), side dishes and cereal were selected; for C2 products, soup, curry (liquefied), and instant rice were selected; for C3 products, chilled noodles and frozen rice cakes (stir-fried rice cake) were selected. For convenience, C4 was subsumed under the C3 type.

3.2 Parameter Setting

In order to determine factors affecting the purchasing behavior regarding HMR, we would like to conduct Z-test, correlation analysis, and multiple regression analysis. HMR consumption, which is a dependent variable, was divided into two variables. The first dependent variable is per capita purchase price for HMR. This is calculated by dividing the amount of money spent on HMR for three years by the number of households. Because the person with a large amount of money spent on HMR is the person who purchased a large amount of HMR, that person is suitable for target marketing. The second dependent variable is the purchase rate for HMR per household. This refers to the rate of the purchase price for HMR as it relates to the purchase price for food for 3 years. Households with high HMR purchase rates can be classified as potential customers and may become the targets of purchase promotion.

As for HMR types, 3 variables were set. Based on the classification by Costa et al. (2001), the products were divided into C1 (ready to eat), C2 (ready to heat), and C3 (ready to cook) according to the effort needed for preparation. They were then used as dependent variables. Differences in variables affecting each product feature were examined to be used for segments. Based on HMR types, per capita purchase price, and purchase rate per household, a 4X2 matrix was made as shown in the Table. This study will compare different factors influencing 8 dependent variables.

Table 4 Dependent variables

Category	Per capita purchase price	Purchase rate per household
HMR	$Y1i$	$Y2i$
C1 (ready to eat)	$Y1j$	$Y2j$
C2 (ready to heat)	$Y1k$	$Y2k$
C3 (ready to cook)	$Y1l$	$Y2l$

Independent variables included the frequency of eating out, the cost of eating out, whether the consumer was a housewife, income, education, number of children, whether the consumer lives with parents, and alternative products available. Because HMR is included due to its similarity to the attribute of eating out, the frequency of eating out and cost of eating out were included (Hong, 2002). 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. As substitutes, rice cake, barley, potato, sweet potato, rice cake (stir-fried rice cake) were included among main category items as proposed by the National food composition table.

3.3 Analysis method

For our analysis method, correlation analysis, T-test, and multiple regression analysis were used. Before carrying out multiple regression analysis, the present study will

test between variables through correlation analysis, examine if the employment status of housewife influences HMR consumption through the T-test, and then examine the suitability of model and the degree of influence of each variable through multiple regression analysis.

(1) Correlation analysis

As a statistical technique to analyze the degree of linear relationship between variables, correlation analysis can be a criterion to show how closely two or more variables are related to each other. Correlation analysis can express the correlation in terms of values between -1 and 1 by calculating covariance between variables and correlation coefficients, which is standardized covariance. In general, it can be inferred that the greater the size of absolute value of correlation, the closer the linear relationship between variables. Also, in the event that the analysis of the population is unrealistic, a population correlation coefficient can be inferred through correlation coefficient r derived from a particular sample. The process of inferring a 2-variable model with simple form and testing its significance can be explained as follows:

For example, in the two way ANOVA model on population X, Y, the model is set as follows: if variables X and Y follow normal distribution . Whether a correlation between variable X and Y exists is statistically inferred by testing if correlation coefficient ρ is 0 or not.

$$\begin{pmatrix} X \\ Y \end{pmatrix} \sim N\begin{pmatrix} \mu_X \\ \mu_Y \end{pmatrix}\begin{pmatrix} \sigma_x^2 & \rho\sigma_x\sigma_y \\ \rho\sigma_x\sigma_y & \sigma_x^2 \end{pmatrix}$$

Hypothesis is as follows:

$$H_0(Null\ hypothesis) : \rho = 0$$
$$H_1(Alternative\ hypothesis) : \rho \neq 0$$

In this significance test model, t value can be used as test statistic. Distribution follows the t-distribution with a degree of freedom of the (n-k). Therefore, the statistical significance of the correlation coefficient can be tested by t-test.

(2) T-test

T-test is a kind of parametric test comparing the means of one or two groups, to compare the means signifies that measurements take the normal distribution so that the means are considered to be figures representing the group concerned. Because T-distribution is symmetrically distributed around 0 and depends on the degree of freedom, the degree of freedom is the parameter of the T distribution. In testing a hypothesis, if the observed value of t is greater than the statistical value, the hypothesis is dismissed. The statistical value of t is generally selected by the significance level to adopt or dismiss the hypothesis.

This study will divide data into two different groups of housewives with jobs and housewives, and test the differences in the impact of the two groups on each dependent variable.

The T-value can be derived as follows.

$$t = \frac{(\overline{X_1} - \overline{X_2}) - (\mu_1 - \mu_2)}{\sqrt{S_p{}^2} \cdot (\frac{1}{n_1} + \frac{1}{n_2})}$$

Hypothesis is as follows:

$$H_0(Null\ hypothesis) : \mu_1 = \mu_2$$
$$H_1(Alternative\ hypothesis) : \mu_1 \neq \mu_2$$

(3) Multiple regression analysis

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

Error term e assumes independence, normality, and homoscedasticity, β is a regression coefficient and a partial differential coefficient of the explanatory as a parameter.

Therefore, it represents influence when the values of other explanatory variables are fixed.

The following is a multiple regression equation representing the relationship between explanatory variables that influence the purchase price of HMR and the purchase rate of HMR.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + e$$

y : per capital purchase price for HMR, purchase rate for HMR, additional analysis of C1, C2, C3 types

x_1 : number of eating out

x_2 : cost of eating out

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 : substitute

In order to determine the suitability of the model, F value is used, or the rate at which dependent variables can be predicted by explanatory variables, i.e., explanatory power, is marked as R^2.

R^2 has a value between 0 and 1, is assessed to have greater explanatory power for the model as it is closer to 1. Conversely, it is assessed that it has lower explanatory power and lower suitability when it is closer to 0.

4 Results

4.1 Sample characteristics

Of 1,000 consumers, 684 who had purchased HMR were analyzed based on demographic characteristics. In the HMR group, the average number of household members is 4, and the average number of children is 2. The most of the households are not living with parents. 31.6% of households eat out 3 times per month and 30.6% of households eat out 2 times per month. In terms of the cost of eating out each time, 22.4% spent 100,000~150,000 won, 22.1% spent 40,000~60,000 won, 12.6% spent 150,000~200,000 won, and 11.4% spent 20,000~40,000 won. 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, showing an even distribution overall. The average age was 46.5. The youngest was 28, and the oldest was 68. 54.8% of households had the housewife, which was slightly more than the number of housewives with jobs. As for education level, 50.6% were high school graduates, while 36.1% were college graduates.

Table 5 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
Frequency of eating out	fewer than	63	9.2
	once per 3 months	22	3.2
	once per 2 months	54	7.9
	once per month	108	15.8
	twice per month	209	30.6
	more than 3 times per month	216	31.6
Cost of eating out each time	under 20,000 won	36	3.6
	2,000~40,000 won	78	11.4
	40,000~6,000 won	151	22.1
	6,000~80,000 won	66	9.6
	80,000~100,000 won	12	1.8
	100,000~150,000 won	153	22.4
	150,000~200,000 won	86	12.6
	200,000~250,000 won	53	7.7
	250,000~300,000 won	15	2.2
	more than 300,000 won	32	4.7
	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	housewife	375	54.8
	housewife with a job	307	44.9
	missing data	2	0.7
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

4.2 Results of correlation analysis

Correlation between dependent variables and explanatory variables were analyzed. Explanatory variables included age, income, whether living with parents, number of children, education level (divided by above and below college), frequency of eating out, cost of eating out, whether the subject was a housewife or not, per capita purchase price for rice, purchase rate for rice, per capita, purchase price for potato, purchase rate for potato (purchase rate), per capita purchase price for sweet potato, purchase rate for sweet potato, per capita purchase price for rice cake, purchase rate for rice cake, per capita purchase price for barley, purchase rate for barley.

Correlation analysis shows that the more highly educated the person is, the less the person lives with parents, the fewer children the person has, and the more frequently the person eats out. The higher the cost of eating out was, the higher per capita purchase price for HMR was. Per capita purchase price for C3 tended to increase as income rose. Because the purchase rate for potatoes and purchase rate for barley had a negative (-) correlation with each other, it can be assumed that potato and barley are substitutes for each other. Because the per capita purchase price for C2 and purchase rate for sweet potatoes had a negative (-) correlation with each other, and per capita purchase price for C3 has negative (-) correlation with purchase rate for rice and purchase rate for barley, each item can be called substitutes for each type.

Table 6 Correlation between per capita purchase price for HMR and explanatory variables

Category	Content
Per capita purchase price for HMR	age (-0.099**), Whether living with parents (-0.148**), number of children (-0.171**), education level above college (0.187**), number of times eating out (0.195**), cost of eating out (0.117**), whether the person is a housewife with job or not (0.076*), per capita rice cake purchase price for (0.126**), per capita potato purchase price for (0.162**), potato purchase rate (purchase rate) (-0.092*), per capita sweet potato purchase price for (0.169**), per capita rice cake (rice cake) purchase price for (0.292**), rice cake (rice cake) purchase rate (purchase rate) (0.079*), barley purchase rate (purchase rate)(-0.188**)
Per capita purchase price for C1	Whether living with parents (-0.114**), number of children (-0.156**), education level above college (0.107**), number of times eating out (0.118**), cost of eating out (0.087*), per capita purchase price for rice cake (0.108**), per capita purchase price for potato (0.128**), per capita purchase price for sweet potato (0.186**), purchase rate for sweet potato (0.081*), per capita purchase price for rice cake (0.220**), purchase rate for rice cake (0.080*)
Per capita purchase price for C2	Whether living with parents (-0.091*), number of children (-0.214**), education level above college (0.108**), number of times eating out (0.160**), cost of eating out (0.087*), per capita purchase price for rice cake (0.191**), purchase rate for rice cake (0.091*), per capita purchase price for potato (0.107**), purchase rate for sweet potato (-0.094*), per capita purchase price for rice cake (0.114**)
Per capita purchase price for C3	Age (-0.131**), whether living with parents (-0.104**), children of the family (-0.155**), income (0.097*), education level above college (0.206**), number of times eating out (0.168**), purchase rate for rice cake per household (-0.113**), per capita purchase price for potato (0.089*), per capita purchase price for rice cake (0.209**), purchase rate for rice cake (0.087*), purchase rate for barley (-0.128*)

**p<0.01, *p<0.05

Variables that had a significant correlation with purchase rate for HMR include age, number of children, education level, frequency of eating out, per capita purchase price for rice cake, purchase rate for rice cake, per capita purchase price for potatoes, per capita purchase price for sweet potatoes, per capita purchase price for barley, etc. Those who had high purchase rates for HMR were people with high educational backgrounds, and they ate out often. Because the purchase rate for rice cake had a negative (-) correlation with the purchase rate for HMR, it can be assumed that rice cake substituted for HMR. Variables that correlated with the purchase rate of C1 type included age, number of children, and frequency of eating out. Because C1 type had a negative (-) correlation with rice cake, potato, sweet potato, and barley, it is assumed to have the effect of substitute. There were correlations between C2 type and the frequency of eating out and the cost of eating out. Because C2 type had a negative (-) correlation with potato, it can be assumed that potato was a substitute. Variables that correlated with C3 type included education level, frequency of eating out, and whether the subject was a housewife with job or not. Rice cake, potato, and sweet potato acted as substitutes.

Table 7 Correlation between purchase rate for HMR and explanatory variables

Category	Content
Purchase rate for HMR	age (-0.316**), number of children (0.098*), education level above college (0.144**), number of times eating out (0.168**), per capita purchase price for rice cake (-0.189**), purchase rate for rice cake (-0.145**), per capita purchase price for potato (-0.150**), purchase rate for potato (-0.076*), per capita purchase price for sweet potato (-0.192**), purchase rate for sweet potato (-0.141**), per capita purchase price for barley (-0.165**)
Purchase rate for C1	age (-0.214**), number of children (0.103**), number of times eating out (0.110**), per capita purchase price for rice cake (-0.130**), purchase rate for rice cake (-0.076*), per capita purchase price for potato (-0.142**), per capita purchase price for sweet potato (-0.122**), per capita purchase price for barley (-0.111*)
Purchase rate for C2	number of times eating out (0.125**), cost of eating out (0.127**), purchase rate for potato (-0.088*)
Purchase rate for C3	age (-0.237**), education level above college (0.193**), number of times eating out (0.176**), whether the person is a housewife with job (0.083*), per capita purchase price for rice cake (-0.149**), purchase rate for rice cake (-0.153**), per capita purchase price for potato (-0.094*), per capita purchase price for sweet potato (-0.098*), purchase rate for sweet potato (-0.083*)

Variables that have correlations between per capita purchase price for HMR and purchase rates were whether living with parents, number of children, frequency of eating out, and cost of eating out. A dependent variable that had significant correlation with income was per capita purchase price in C3 type, and a dependent variable that had significant correlation with whether the person was a housewife with job or not was the purchase rate of C3 type. With the T-test, we are going to analyze whether the subject is a housewife with job or not influences each HMR type.

4.3 Results of T-test

Per capita purchase price for HMR was 58,000 won for the household of a housewife and 61,000 won for the household of a housewife with a job, showing no difference between the 2 groups. Per capita purchase price for C1 products was 39,000 won for both the housewife with a job and the housewife. Per capita purchase price for C2 products was 6,900 won for the housewife with a job and 7,500 won for the housewife. Per capita purchase price for C3 products was about 12,000 won for the housewife with a job and about 14,000 won for the housewife. From this it can be seen that difference in per capita purchase price is significant on 0.1 level.

Table 8 T-test of per capita purchase price for HMR according to whether the person is housewife with job

Category		N	Mean	Standard Deviation	t-value	Significance Probability (two-tail)
Per capita purchase price for HMR	housewife with job	307	58139.54	46338.26	-.892	.373
	housewife	375	61085.94	39902.05		
Per capita purchase price for C1	housewife with job	307	39584.59	40305.46	.064	.949
	housewife	375	39410.81	30825.35		
Per capita purchase price for C2	housewife with job	307	6969.43	10853.06	-.643	.521
	housewife	375	7548.65	12361.17		
Per capita purchase price for C3	housewife with job	307	12443.48	12822.16	-1.661	.097
	housewife	375	14126.48	13439.71		

The purchase rate for HMR was 1.50% for housewives with jobs and 1.60% for full-time housewives. The purchase rate for C1 products was 1.03% for both housewives with jobs and housewives. The purchase rate for C2 products was about 0.17% for housewives with jobs and about 0.20% for housewives. The purchase rate for C3 products was about 0.32% for housewives with jobs and about 0.37% for housewives. The results of the T-test show that there was a significant difference in the purchase rate for C3 between housewives with jobs and housewives. As the above table confirms, housewives had a 0.05% higher rate for purchasing HMR than housewives with jobs in view of overall food consumption. Because C3 products take more time to cook than products of other types, housewives with jobs might have consumed less of C3 products because of convenience.

Table 9 T-test of purchase rate for HMR according to whether the person is a housewife with job or not

Category		N	Mean	Standard Deviation	t-value	Significance Probability (two-tail)
Purchase rate fir HMR	housewife with job	308	1.50	0.86	-1.399	.162
	housewife	375	1.60	0.89		
Purchase rate for C1	housewife with job	308	1.03	0.85	-.005	.996
	housewife	375	1.03	0.71		
Purchase rate for C2	housewife with job	308	0.17	0.20	-1.023	.307
	housewife	375	0.20	0.32		
Purchase rate for C3	housewife with job	308	0.32	0.27	-2.122	.034
	housewife	375	0.37	0.33		

4.4 Results of multiple regression analysis

The results of multiple regression analysis show that variables that influence the purchase rate for HMR were frequency of eating out and the purchase rate for sweet potatoes. That is, the person who eats out often tends to consume more HMR among their overall food consumption. Also, since there is a negative (-) relationship between the purchase rate for sweet potatoes and the purchase rate for HMR, it can be assumed that HMR is a substitute for sweet potatoes. One variable influencing the purchase rate for C1 products was the number of children. The more children in the household, the higher the purchase rate for C1 products was. The purchase rate for C2 products was higher in those who ate out more often, and the purchase rate for C3 products was higher in those with higher educational attainment.

It is confirmed that per capita purchase price for HMR increases for the person who does not live with parents, and as they spend more for rice cake. The per capita purchase price for C1 products too increased as the purchase price for rice cake increased. Per capita purchase price for C2 products increased as the number of children was fewer and per capita purchase price for rice cake was greater. Per capita purchase price for rice cake also has a positive (+) effect on C2 products, which means that those who purchase rice cake at a higher price purchase HMR at a higher price. Per capita purchase price for C3 products increased as the number of children in the family was fewer and the education level was higher.

The results of our analysis show that the determinants affecting purchasing behavior for the whole HMR and the determinants affecting purchasing behavior for each rating can be different. Costa et al. (2006) suggest the criterion to distinguish C1, C2, and C3. Yet the results of multiple regression analysis found no characteristics related to the criterion to distinguish them. As for C3 products that take the longest time to cook, the analysis was conducted with the prediction that housewives will consume more of them. Yet there was no correlation between housewife vs. housewife with job and purchasing behavior.

Table 10 Regression analysis of per capital purchase price for HMR

Dependent variable / Explanatory variables	Non-standardized coefficients (T-Value)			
	Per capita purchase price for HMR	Per capita purchase price for C1	Per capita purchase price for C2	Per capita purchase price for C3
Whether living with parents	-0.23* (-2.04)	-0.12 (-0.86)	-0.18 (-0.78)	-0.19 (-0.98)
Income	0.04 (0.98)	-0.01 (-0.23)	0.04 (0.58)	0.12 (1.86)
Number of children	-0.06 (-1.56)	-0.05 (-1.23)	-0.17* (-2.45)	-0.13* (-2.24)
Whether the person is a housewife with job	0.06 (0.74)	-0.04 (-0.43)	-0.17 (-1.10)	0.19 (1.53)
Education level above college	0.11 (1.51)	0.04 (0.50)	0.23 (1.55)	0.28* (2.26)
Number of times eating out	0.04 (1.94)	0.03 (1.20)	0.06 (1.49)	0.02 (0.73)
Cost of eating out	0.00 (0.37)	0.00 (0.82)	0.00 (0.85)	0.00 (-0.92)
Purchase price for rice cake	0.01 (0.41)	0.01 (0.33)	0.17* (2.44)	-0.06 (-1.14)
Purchase price for barley	-0.01 (-0.16)	0.02 (0.38)	-0.02 (-0.27)	-0.02 (-0.36)
Purchase price for potato	0.07 (1.57)	0.04 (0.78)	0.03 (0.38)	0.08 (1.07)
Purchase price for sweet potato	-0.02 (-0.64)	-0.02 (-0.41)	-0.10 (-1.48)	-0.03 (-0.60)
Purchase price for rice cake	0.11* (2.70)	0.10* (2.16)	0.05 (0.67)	0.11 (1.74)
R2	0.11	0.05	0.1	0.08

** p<0.01 * p<0.05

Table 11 Regression analysis of purchase rate for HMR

Dependent variable / Independent variable	Non-standardized coefficients (T-Value)			
	Purchase rate for HMR	Purchase rate for C1	Purchase rate for C2	Purchase rate for C3
Whether living with parents	-0.02 (-0.18)	0.02 (0.16)	0.09 (0.26)	0.00 (0.02)
Income	-0.04 (-1.19)	-0.08 (-1.73)	-0.20 (-1.79)	0.02 (0.23)
Number of children	0.06 (1.92)	0.11* (2.92)	-0.05 (-0.51)	0.03 (0.53)
Whether the person is a housewife with job	-0.09 (-1.22)	-0.14 (-1.59)	-0.29 (-1.30)	0.12 (0.92)
Education level above college	0.12 (1.65)	0.03 (0.34)	-0.08 (-0.38)	0.37* (3.01)
Number of times eating out	0.04* (2.13)	0.03 (1.57)	0.08 (1.30)	0.04 (1.31)
Cost of eating out	0.00 (-0.69)	0.00 (-0.12)	0.00* (1.97)	0.00 (-1.35)
Purchase rate for rice cake	-0.05 (-1.38)	-0.03 (-0.72)	0.03 (0.31)	-0.11 (-1.88)
Purchase rate for barley	-0.01 (-0.22)	0.02 (0.59)	0.00 (-0.01)	-0.01 (-0.26)
Purchase rate for potato	0.01 (0.15)	0.01 (0.29)	-0.14 (-1.13)	-0.04 (-0.57)
Purchase rate for sweet potato	-0.10* (-3.15)	-0.08 (-1.90)	0.06 (0.60)	-0.07 (-1.27)
Purchase rate for rice cake	0.00 (-0.04)	0.03 (0.57)	-0.15 (-1.19)	-0.05 (-0.76)
R2	0.09	0.06	0.05	0.08

** p<0.01 * p<0.05

5 Discussion

Home Meal Replacement (HMR) is a meal consumed at home or at stores that does not require the purchaser to carry out a cumbersome cooking process. This study divided HMR into 3 types, and determined factors affecting each type. The results of our study can be summarized as follows:

First, there was a difference in the purchase rates for the C3 (ready to cook) category between housewives with jobs and housewives. The per capita purchase price for HMR and the purchase rate had no correlation with the employment stats of the housewives. But as for C3 products that required the housewife to cook and can replace eating out, the housewife with a job purchased more than the housewife.

Second, as eating out increases the purchase rate for HMR increases. Because HMR products have the merits of both eating out and a home meal, it can be assumed that the purchase rate of HMRs increased in line with restaurant visits. Since the purchase of an HMR is not related to the cost of eating out, it seems that it would be advisable to develop HMR products that can help the group of people who are inclined to eat out and at the same time want inexpensive meals.

Third, it is confirmed that sweet potatoes are a substitute for HMR products. As sweet potatoes are known as a diet food with high dietary fiber, many people increasingly substitute sweet potatoes for a meal. Because the purchase rate for HMRs and the purchase rate for sweet potatoes have negative (-) correlations, it appears advisable to utilize sweet potatoes for HMR products and to develop products promoting better health.

Fourth, factors affecting the purchases of convenience food and HMR are different. The dominant perception is that convenience food is not very healthy. Thus, employed housewives with high incomes tended to avoid convenience food. But housewives with jobs show interest in HMR products that are health-oriented and at the same time reduce cooking and preparation time. The group of people that consumes great amounts of convenience food does not prefer eating out. It has been found that that the group of people that consumes HMR products also prefers eating out. It is expected that further research on variables affecting purchases of convenience food and HMR products will be able to identify these attributes in more detail.

The limitations of the present study lie in the fact that one-person households were only 0.6% in the panel data used for this study, despite the fact that consumption of HMR food by one-person households is increasing (Internet news, 2013), which made more intensive analysis of this difficult. According to Statistics Korea, the rate of one-person households increased from 15.5% in 2000 to 25.3% in 2012. As a sales strategy for HMR products, it would be important to comprehend the purchasing behavior of one-person households. Therefore, further research is expected on the characteristics of one-person households and the determinants of purchase.

Products used for analysis were selected according to literature of Chung (2005) and Costa et al. (2001), but not all products classified as KMR were used for analysis, and only some of them were selected for analysis according to the subject view of researchers. Therefore, in order to enhance the research, diverse products should be selected for analysis and future research should complement this.

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