보건학석사학위논문

Use of the Nutrition Label in Patients with Chronic Disease: KNHANES, 2013-2015

만성질환 환자들의 영양표시 이용:

국민건강영양조사 2013-2015 자료를 바탕으로

2018년 2월

서울대학교 보건대학원

보건학과 보건학 전공

조 인 형

ABSTRACT

Use of the Nutrition Label in Patients with Chronic Disease: KNHANES, 2013-2015

Inhyung Cho
Department of Epidemiology
The Graduate School of Public Health
Seoul National University

Introduction: Dietary habits and dietary patterns are changing due to various socio-cultural factors such as improving living standards, increasing nuclear families, and shortening domestic working hours due to increased social participation of women. This phenomenon increases the intake of processed foods and animal foods, induces various chronic diseases, and poses a health risk. Chronic diseases such as diabetes, hypertension, obesity and cancer are increasing worldwide, and patients with chronic diseases need to know food information for healthy eating. Nutrition labels are the easiest way to get information about packaged foods, and nutrition labeling is one way of getting health literacy, which ultimately leads to health cost savings. Therefore, this study aims to identify factors that affect the use of nutrition labeling and the nutrients of interest in patients with chronic diseases, and to utilize them as basic data for future policy making.

Methods: This study was conducted on 15127 adults aged 19 years or older from the National Health and Nutrition Examination Survey (2013-2015). The target diseases were diabetes, hypertension and dyslipidemia, which are chronic diseases related to eating habits. Each disease was answered as 'Yes' to the question 'Have you ever been diagnosed with a doctor for each disease?' The use of nutrition labeling was defined as 'yes' to the question 'Do you read nutrition labeling when buying or choosing processed food?' Nutrition labeling Non-users were both those who said they did not read the nutrition label and those who said they did not know the nutrition label. The definition of the nutrients of interest was determined by asking the users of nutrition labels the question "What nutrients are most interested in nutrition labeling?" Logistic regression analysis was used to analyze the data.

Results: Female were more likely to use nutrition labeling than male. The higher the age, the higher the income level, and the higher the education level, the higher the rate of using nutrition labeling. The percentage of using nutrition labeling was higher for people with spouses than people without spouses. Compared to those who did not use nutrition labeling, those who used it were 1.11 times higher but it was not significant. The number of people who used it compared to those who did not use nutrition labeling was 1.03 times higher among diabetic patients and 0.98 times higher among patients with dyslipidemia, but these were also not significant. However, in hypertension patients, the use of nutrition labeling was significant (OR: 1.26, CI: 1.09-1.46). In relation to the nutrients of interest and patients, the person with at least one diseases among those three

diseases has the most choice of carbohydrate (OR: 2.18, CI: 1.57-3.04). Diabetes patients showed the highest number of carbohydrates (OR:5.33, CI:3.52-8.05) and patients with dyslipidemia were more likely to choose carbohydrate (OR: 2.04, CI: 1.39-2.99) and fat (OR: 1.37, CI: 1.09-1.71). Patients with hypertension were found to be more aware of sodium information(OR: 1.21, CI: 0.83-1.77), but the results were not significant.

Conclusion: This study examined the use of nutrition labeling in patients with chronic diseases those who need dietary control, through the use of nutrition labeling and analysis of nutrients in patients with chronic diseases. In the case of any disease (have at least one disease)group, diabetes group, and hypertension group, the use of nutrition labeling was higher than that of non - disease group. However, except for hypertension, there was no significant difference. In the case of diabetic patients, carbohydrate was selected as the most interested nutrient and it showed significant difference. For dyslipidemia patients, fat selection was significantly higher, but hypertension patients didn't have any statistically significant result. This result can be used as a basic data of nutrition labeling education and policy for patients with chronic diseases and it will help development of more effective nutrition labeling method in the characteristics of patients with chronic diseases which have a high proportion of the elderly.

Key words: Nutrition label, Chronic disease, Nutrients of interest

CONTENTS

TABLES

FIGURES

1. Introduction

1.1 Background

Dietary habits and food consumption patterns are changing due to various socio - cultural factors such as improvement of living standards due to economic growth, increase of nuclear family, and reduction of domestic working hours due to increase of social participation of women. This phenomenon increases the intake of processed foods and animal foods, and causes various chronic diseases, and poses a health threat(Kim, 2012).

Most of the processed foods are high in energy content, so they often increase their body weight when consumed frequently, and often have a high percentage of sodium or sugar. Therefore, in the case of patients with chronic diseases who need to control their intake, it is necessary to know what ingredients are in the food for the healthy diet.

Many chronic diseases such as diabetes, hypertension, obesity, and cancer are increasing worldwide. Likewise in the republic of Korea, the prevalence of chronic diseases over the age of 30 is continuously increasing, as shown in Figure 1.

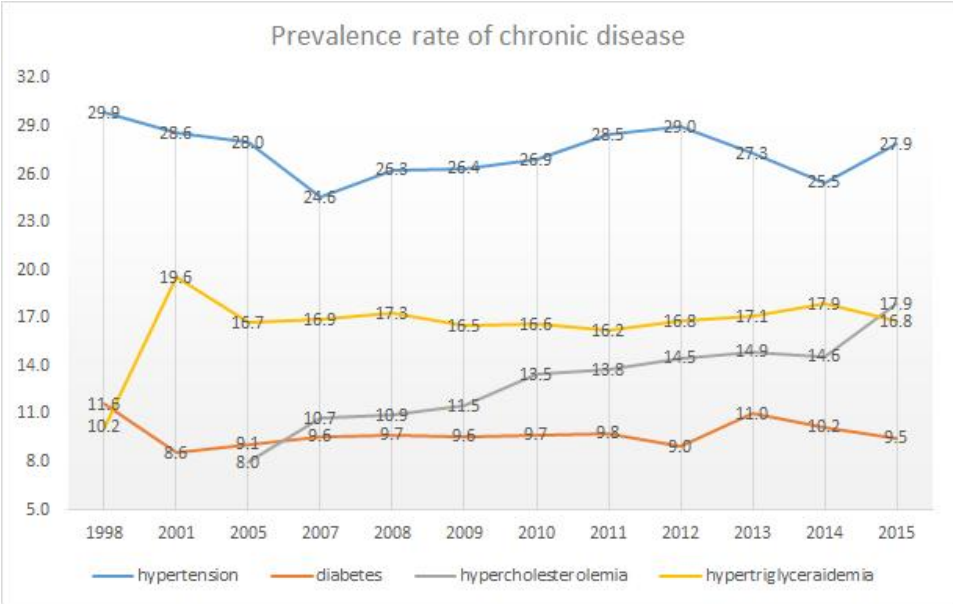

Figure 1 Prevalence rate of chronic disease

Most of the previous studies on the use of nutrition labelling have mainly focused on healthy people (eg. Housewives, college students, women in their twenties), and there have been few studies on patients with chronic diseases in which dietary control is important.

1.2 literature review

1.2.1 Health literacy

Health literacy is the ability of an individual to obtain, read, understand, and use the health care information needed to make an appropriate health decision.(Kindig, 2004) This concept is of concern to everyone involved in health promotion as well as disease prevention and policy formulation, whose capacity is adjusted by education, and its suitability is influenced by the characteristics of culture, language, and health-related settings. health literacy is largely composed of interaction between culture, society, health system, and education system, and health literacy has the effect of reducing health outcomes and medical costs(Kindig, 2004).

One example of this health literacy is nutrition labeling. Increasing the use of nutrition labels will ultimately lead to health outcomes and reduced health care costs. Providing clear nutrition information to

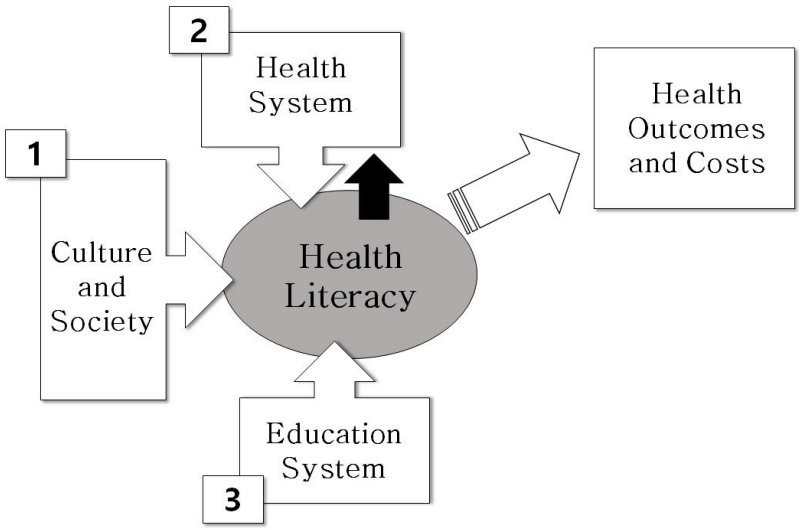

Figure 2 proportional points for intervention in the health literacy framework.

consumers is a population-based public health strategy aimed at eradicating health literacy(Yoo, 2017).

1.2.2 Nutrition labelling system

Nutrition labeling system is a system that expresses the nutritional characteristics of processed foods according to certain standards and methods, and helps the consumers to choose products that are better for their health by conveying the nutritional characteristics of the products to consumers. The nutrition labeling system has nutrition labeling information that indicates the content of nutrients in a certain style and nutrition claims that highlight the nutritional characteristics of the product using specific terms.

Nutrition Facts table

Nutritional content is expressed as the value contained per 1 package, per unit volume, per reference intake, and the indicated nutritional components are calories, sodium, carbohydrates, saccharides, fats, trans fats, saturated fats, cholesterol, protein, and other nutritional markers and nutritional supplements

By using the ratio of nutrient content to daily nutrient content, you can select or compare better

Figure 3 sample of nutrition label

foods for your health. The list of ingredients on the product label also provides important information for selecting healthy foods.

1 day Nutrition Facts Standard

As you can see from Figure 3, the ratio to the daily nutritional reference value represents the total content of the food, or the amount provided by 100 g / ml, per nutrient standard value. Therefore, the ratio of 1 day to the nutrient standard value shows how many percent of the nutrients the food should contain per day, and it is easy to understand whether the nutrient content of the food is high or low. The ratio of 1 day to the nutritional standard is shown on the right side of the nutrient table and the values for sodium, carbohydrate, sugar, fat, saturated fat, cholesterol, and protein are listed. Calories and trans fats do not indicate the ratio of 1-day nutrient standard value because the nutrient ingredient standard value is not set for 1 day.

The ratio of 1 day to the nutrition ingredient standard value is used as a reference of the nutrition ingredient content claim. For example, foods that contain more than 10% of the protein's daily nutrient content per total content may use the expression "contain" the protein or the food as the "source" of the protein. In addition, food containing more than 15% of the vitamin or mineral content of the daily nutritional ingredient standard value per total content can use the expression "containing" or "source" for vitamins or minerals.

Nutrition claims

The level of nutrients contained in the product may be expressed using specific terms without reading the nutrition label, such as "fat

free", "low calorie", "vitamin C added", "calcium supplement" To be emphasized in terms of "low," "no," "high (or abundant)," or "contain (or source)."

The labeling of foods that do not contain any nutrients at all in the food (eg, "no cholesterol" in vegetable oil) should not be marked as a misleading or misleading indication by the consumer. Cholesterol is only found in animal foods, and not all vegetable oils contain cholesterol.

nutrition labeling campaign

The Fourth National Health Promotion Comprehensive Plan (2016-2020)'s goal is to reach 30% of adults using nutrition labeling. However, as of 2013, the use rate of nutrition labeling is only 23.1%. Accordingly, the Korea Food and Drug Administration (KFDA) is promoting a campaign to expand awareness of nutrition labeling to the public.

Up to now, the nutrition labeling campaign has a nutrition labeling reading campaign for elementary school seniors, and a self-nutrition labeling campaign for cooking out food. The Nutrition Labeling Campaign is conducted by the Food and Drug Administration for the purpose of helping elementary school students understand the information provided by this nutrition label and learn how to apply it to actual food purchases. The campaign for self-nutrition labeling of food-eateries has been conducted from July 2008 to the present, and is a campaign to display nutritional information on foods sold at coffee shops, family restaurants, and large theaters.

Understanding and using nutrition label is important especially the

patients who has to follow dietary recommendations. Zarkin et al. (Zarkin, 1993) reported that the use of nutrition labeling reduced the risk of chronic dietary diseases such as cardiovascular disease and cancer. The US, which mandated nutrition labeling for all processed foods for the first time, It is estimated that 39,207 diseases will be prevented from occurring, 12,902 deaths will be prevented, and 80,930 lives will be extended, resulting in a national economic benefit of US $ 44-22 billion. This prediction is based on the assumption that the use of nutrition labels affects consumers' meals. The improvement of meals is important in terms of health policy in that it can have a beneficial effect on health and consequently prolong the life span and reduce medical expenses. (Golan, 2001) So many countries have implemented nutrition labeling as part of their policy to promote health (Hawkes, 2004)

It is reported that users of nutrition labeling have a stronger perception of health and healthy eating than those of non-users, and have a tendency to eat food in a desirable direction for health (Drichoutis, 2005; Kreuter, 1997; Perez-Escamilla, 2002). Adults who did not use the nutrition label and were not affected by nutrition label showed higher frequency of drinking (males), and the frequency of intake of ramen was higher, while the frequency of intake of desirable foods such as milk, yogurt and soy milk was lower. (Bae, 2014)

1.2.3 Chronic diseases relate to food intake

There are also prior studies on the relationship between the occurrence of chronic diseases and eating habits and lifestyle habits. Low SES is associated with a high prevalence of type 2 diabetes(Kanjilal S,) and low fruit and vegetable intake(Thompson FE/Trudeau E,). Lifestyle modifications, including optimal diets, are an effective method of preventing type 2 diabetes(Knowler WC). Diet with high fat and few fruits and vegetables increases the risk of dietary-related chronic diseases including type 2 diabetes, cardiovascular disease, obesity and some cancers (R Doll / Sanders TA / Weisburger JH). Reducing the burden of diseases related to hypertension has been identified as the World Public Health Priority (WHO). High sodium intake and low potassium intake are among the major risk factors for hypertension (Danaei G / Elliott P). The sodium reduction strategy is cost-effective and effective, and studies in low and high-income countries are significant.(Palar K / mith-Spangler CM). The total calories and excess fat and cholesterol intake have been reported to have a significant effect on blood lipid levels (Kim WS 2013). Therefore, when dietary fat and cholesterol intake were reduced in hypercholesterolemic patients, serum LDL-cholesterol (Waldon et al., 1997). And also, Nutritional intake may result in triglyceride lowering effects ranging from 20% to 50%.(Jacobson, 2015)

Nutrition label and chronic disease

And dietary changes that increase fruit, vegetable and fiber intake and reduce total energy and dietary fat consumption can therefore contribute significantly to reducing the risk of chronic disease. (satia

ja) Studies have shown that use of food labels positively affects nutrition knowledge(Petrovici DA,/Boulanger PM), fruit and vegetable intake(Satia JA,), and is negatively associated with fat intake(Neuhouser ML).

1.3 Objectives

The purpose of this study is to examine the following hypothesis by analyzing the relationship between the utilization rate of nutrition labeling of patients with chronic diseases.

First, the person with the disease will have a higher rate of nutrition label use. Individuals with type 2 diabetes, hypertension, hyperlipidemia, or a combination of these three diseases use more food labels than patients without this disease. (robert e) So I set up my first hypothesis to verify whether the preceding study actually is true.

Second, people with diabetes will use carbohydrate information more than other information among nutrition labelling information

Third, those with hypertension will use sodium information more.

Forth, people with dyslipidemia will use fat information more in nutrition labeling.

2. METHOD

2.1 Study population

Korea National Health and Nutrition Examination Survey (KNHANES) is performed every year by the Ministry of Health and welfare and Korea Centers for Disease Control and Prevention (KCDC). It is conducted to assess the health and nutritional status of the Koreans, select health vulnerable groups that should have policy priorities and calculate the statistics needed to assess whether health policies and projects are being delivered effectively. KNHANES survey about 10,000 household members aged 1 year or older by extracting 23 households from 192 districts as probabilistic sample every year.

The sixth Korea National Health and Nutrition Examination Survey (KNHANES-Ⅵ) includes a total of 22948 people. For this study, children and adolescent under 19 years old were excluded and 15127 people in total were remained.

2.2 Measures

2.2.1 Assessment of chronic diseases

We selected inadequate nutrition-related chronic diseases, including diabetes, hypertension, dyslipidemia for our analysis. These diseases were defined by the answer of self-reported questions which is any of these followings: 1) Have you ever heard from your doctor that you had diabetes? 2) Have you ever heard from your doctor that you had hypertension? 3) Have you ever heard that you had hyperlipidemia from your doctor?.

2.2.2 Assessment of using nutrition label

In KNHANES-Ⅵ, nutrient labeling questionnaires were used to determine whether they were recognized, whether they were used, whether they were affected, and the nutrients they were interested in. Nutrition label recognition was defined as the response to the question "Do you know the nutrition label?" For those who responded that they knew the nutrition label, the use of the nutrition label was defined by asking them 'Do you read the nutrition label when buying or choosing the processed food?'. For the users of nutrition labeling, the question 'Does nutrition labeling affect food selection?' was asked and defined as nutrition labelling affection.

In this study, nutrition labelling affection variable was not used. Other two variables, nutrition labelling recognition and nutrition labelling use, was combined into nutrition label use variable for this study. The combination of the two can get three responses to the question "do you use nutrition label when you buy processed food?": (1) use nutrition labels, (2) not use nutrition labels, (3) not know nutrition labels. "Nutrition labeling non-users" was defined as a combination of a person who said they did not use the nutrition label and a person who said they did not know the nutrition label.

And follow-up question were asked of the use of specific nutrition information. Participants can answer to the question " What nutrients do you find most interesting in nutrition labeling?" among total energy, carbohydrates, sugars, protein, total fat, saturated fat, trans fat, cholesterol, sodium and etc. For this study, the nutrients were classified into 5 categories: total energy, carbohydrates, protein, fat, sodium and etc.

2.2.3 Other Variables

Demographic characteristics included age, gender, living area, educational status, occupation, income level, marriage status.

The ages were classified into the younger (19-39), middle-aged (40-59), and elderly (over 60). The residential areas were classified into large cities, small cities and rural areas. Large cities were composed of Seoul, Busan, Daegu, Incheon, Kwangju, Daejeon, Ulsan. Gyeonggi-do, Chungcheongnam-do, Jeollabuk-do, Gyeongsangnam-do were classified into small cities, and rest of them(Gangwon-do, Jeollanam-do, Gyeongsangbuk-do, Jeju-do) were classified as rural areas. The economic status of household income is classified into 'less than 2 million won per month', 'from 2 million won to less than 4 million won per month' and 'more than 4 million won per month'.

Marital status was classified as 'has spouse' and 'no spouse'. 'No spouse' included not only single, but also separation, bereavement, and divorce. Occupations were classified as white - collar, blue-collar, sales, and unemployed. White-collar was consisted of manager, Experts and related workers, and Office worker and Experts in agriculture and forestry fishing, Functional Person and Related Function Person were included in blue-collar. Service worker and Salesperson were classified into sales.

2.3 Data analysis

All Data analyses were done using SAS 9.4. The results in Table 2 and Table 3 were produced by PROC SURVEYLOGISTIC and the odds ratio and confidence intervals were adjusted for the covariates in Table 1(eg. Age, gender, income level, education level, occupation, living area(urbanity), marital status).

3. Results

3.1 General characteristics of study population

Table 1 and Table 2 show general characteristics of study subjects.

Table 1 was stratified by year. the proportion of men increased from 42.17% in 2013 to 43.03% in 2015 and the average age increased from 49.66 to 51.48. In residential areas, the proportion of people living in big cities has increased and decreased slightly, while the proportion of people living in small cities and rural areas has remained unchanged, and has increased or decreased. Income level was the highest in all three years with more than 4 million won, and the education level was the highest under the high school. In the case of occupation, unemployed was the most and the sales was lowest for the three year. The percentage of married people increased from 70.99% (2013) to 72.43% (2014) and decreased to 69.65% (2015). The proportion of chronic diseases was highest in each year, and the proportion of diabetes, hypertension, and dyslipidemia increased with time.

Table 1 General characteristics of the study subjects stratified by year.

N(%)		2013	2014	2015
Study population(N)		5274	4901	4952
Gender	Male(%)	2224(42.17)	2029(41.40)	2131(43.03)
Mean age	y(SD)	49.66(16.52)	50.95(16.74)	51.48(16.71)
Location	Big city	2432(46.11)	2306(47.05)	2248(45.40)
	Midium-size city	1917(36.35)	1779(36.30)	1879(37.94)
	Rural area	925(17.54)	816(16.65)	825(16.66)
Income	< 200	1674(31.74)	1632(33.30)	1572(31.74)
	200-399	1718(32.57)	1512(30.85)	1398(28.23)
	400 ≤	1882(35.68)	1757(35.85)	1982(40.02)
Educational level	< High school	1785(33.85)	1701(34.71)	1690(34.13)
	High school	1851(35.10)	1618(33.01)	1669(33.70)
	College ≤	1638(31.06)	1582(32.28)	1593(32.17)
Occupation	White-collar	1136(21.54)	1094(22.32)	1119(22.60)
	Blue-collar	1217(23.08)	1154(23.55)	1189(24.01)
	Sales	703(13.33)	604(12.32)	615(12.42)
	None	2218(42.06)	2049(41.81)	2029(40.97)
Marrital status	Yes(%)	3744(70.99)	3550(72.43)	3449(69.65)
Chronic disease	Diabetes, Yes(%)	475(9.01)	424(8.65)	457(9.23)
	Hypertension, Yes(%)	1116(21.16)	1096(22.36)	1259(25.42)
	Dyslipidemia, Yes(%)	705(13.37)	681(13.90)	827(16.70)

Table 2 shows the general characteristics according to gender. A total of 6384 males, 8743 females and 1.37 times more females. The average age of male and female was 50.69 years and 50.66 years respectively. In the residential areas, both genderes had the largest number of metropolitan areas and the smallest number of rural areas. Income level was the highest among men and women over 4 million won, but the lowest among men was less than 2 million won, while the lowest among women was less than 2 million won and less than 4 million won. The education level was the highest in male high school graduates but the highest in female high school graduates. In the occupation, there was a difference between male and female, while blue collar was the most frequent male and sales was the least, while female was the most unemployed. Hypertensive ratios were the highest in both men and women in the case of chronic diseases, and in males and females in diabetes mellitus.

Table 2 General characteristics of the study subjects stratified by Gender

N(%)		Male	Female	Total
Study population		6384	8743	15127
Mean age	y(SD)	50.69(16.82)	50.66(16.56)	50.67(16.67)
Location	Big city	2900(45.43)	4086(46.73)	6986(46.18)
	Midium-size city	2346(36.75)	3229(36.93)	5575(36.85)
	Rural area	1138(17.83)	1428(16.33)	2566(16.96)
Income	< 200	1935(30.31)	2943(33.66)	4878(32.25)
	200-399	2018(31.61)	2610(29.85)	4628(30.59)
	400 ≤	2431(38.08)	3190(36.49)	5621(37.16)
Educational level	< High school	1775(27.80)	3401(38.90)	5176(34.22)
	High school	2349(36.80)	2789(31.90)	5138(33.97)
	College ≤	2260(35.40)	2553(29.20)	4813(31.82)
Occupation	White-collar	1716(26.88)	1633(18.68)	3349(22.14)
	Blue-collar	2172(34.02)	1388(15.88)	3560(23.53)
	Sales	696(10.90)	1226(14.02)	1922(12.71)
	None	1800(28.20)	4496(51.42)	6296(41.62)
Marrital status	Yes(%)	4787(74.98)	5956(68.12)	10743(71.02)
Chronic disease	Diabetes, Yes(%)	654(10.24)	702(8.03)	1356(8.96)
	Hypertension, Yes(%)	1497(23.45)	1974(22.58)	3471(22.95)
	Dyslipidemia, Yes(%)	756(11.84)	1457(16.66)	2213(14.63)

3.2 General characteristics of nutrition label users

General characteristic distribution of participants who use nutrition label among patients with chronic disease is demonstrated in Table 3. The percentage of female using nutrition labels was more than twice than that of male, and the highest percentage of people living was in big cities. By age, the older the age, the higher the rate of using the nutrition label. The higher the income level, the higher the education level, the higher the rate of using the nutrition label.

Marital status was twice as high among married people who use nutrition labeling compared to unmarried people. In chronic diseases, hypertension and dyslipidemia were weighted by about 1.8%, but diabetes was 0.78%.

Table 3 Weighted frequency of using nutrition label by general characteristics

		N	weighted N	weighted %
Gender	Male	759	7506531	7.00
	Female	2345	16280393	15.19
Location	Big city	1472	11543034	10.77
	Midium-size city	1213	9300865	8.68
	Rural area	419	2943025	2.75
Age	19-39	1437	12685522	11.83
	40-59	1331	9587371	8.94
	60+	336	1514031	1.41
Income	< 200	524	3739809	3.49
	200-399	1060	8244198	7.69
	400 ≤	1520	11802917	11.01
Educational level	< High school	317	1843930	1.72
	High school	1252	9811910	9.15
	College ≤	1535	12131084	11.31
Occupation	White-collar	953	7730165	7.21
	Blue-collar	408	3227577	3.01
	Sales	445	3369051	3.14
	None	1298	9460130	8.83
Marrital status	Yes	2239	15850080	14.79
	No	865	7936844	7.40
Chronic disease	Diabetes	135	839602	0.78
	Hypertension	321	1936815	1.81
	Dyslipidemia	325	1950401	1.82

Table 4 shows the general characteristics of people who answered that they use nutrition labeling among patients with chronic illness. In the case of any disease, gender, age, residence area, occupation showed significant results. The number of men with at least one chronic disease was 175, and among women, 388 had more than one chronic disease, and the proportion of females was higher. For diabetes, 55 was men and 80 was women while 112 and 209, and 77 and 248 for hypertension and dyslipidemia, respectively. For age, the most common age group was 40-59 with 5730, the aged 19-39 was 4349 and those who were 60 years old or older was 5048. In the case of any disease and hypertension, the highest rate was 40-59 years, and the proportion of diabetes was 40-59 years and over 60 years old. In the case of dyslipidemia, the highest rate was over 60 years. Looking at the residential areas, 6986 people live in metropolitan areas, 5575 people live in small and medium cities, and 2566 live in rural areas. The proportion of each disease was the highest in the metropolitan area. In the occupation, there were 6296 unemployed, 3560 blue collar workers, and 3349 white collar workers. The rate of unemployment was the highest even if we examined by disease.

Table 4 General characteristic distribution of participants who use nutrition label among patients with chronic disease

N(%)

	Total Pop. Size	any disease	p-value	diabetes	p-value	hypertension	p-value	dyslipidemia	p-value
Gender									
Male	6384	175(31.08)	<.0001	55(40.74)	0.0665	112(34.89)	0.0018	77(23.69)	<.0001
Female	8743	388(68.92)		80(59.26)		209(65.11)		248(76.31)	
Age (years)									
19-39	4349	47(8.35)		15(11.11)		11(3.43)		25(36.00)	
40-59	5730	301(53.46)	<.0001	60(44.44)	<.0001	163(50.78)	<.0001	183(7.69)	<.0001
60 ≤	5048	215(38.19)		60(44.44)		147(45.79)		117(56.31)	
Location									
Big city	6986	283(50.27)		64(47.41)		153(47.66)		170(52.31)	
Midium-size city	5575	201(35.70)	0.0107	51(37.78)	0.5065	118(36.76)	0.2522	111(34.15)	0.2811
Rural area	2566	79(14.03)		20(14.81)		50(15.58)		44(13.54)	
Occupation									
White-collar	3349	112(19.89)		27(20.00)		60(18.69)		63(19.38)	
Blue-collar	3560	117(20.78)	<.0001	32(23.70)	<.0001	77(23.99)	<.0001	62(19.08)	<.0001
Sales	1922	83(14.74)		17(12.59)		44(13.71)		47(14.46)	
None	6296	251(44.58)		59(43.70)		140(43.61)		153(47.08)	

* Any disease mean the patients who has at least one disease among diabetes, hypertension or dyslipidemia

3.3 Interested nutrition information in nutrition labelling among patients with chronic disease

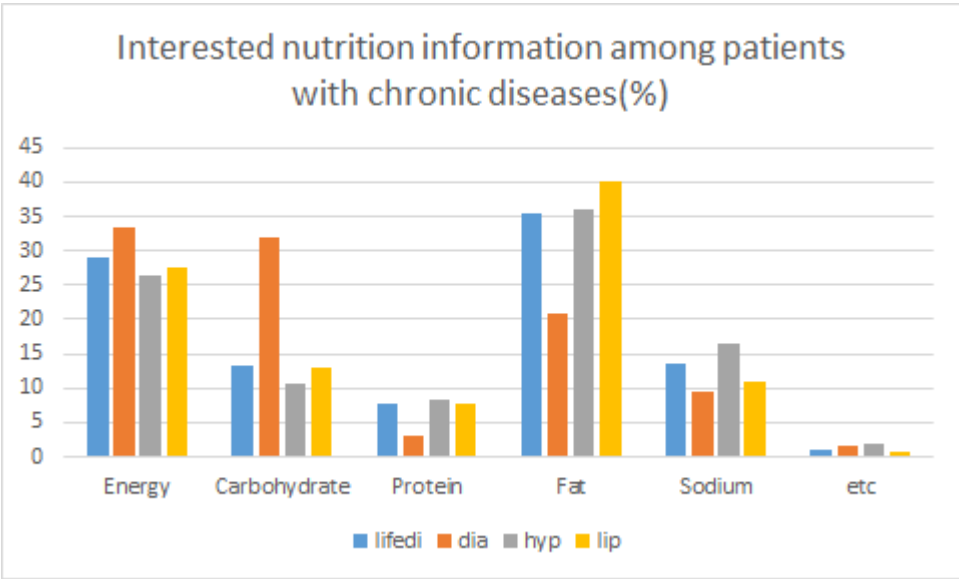

Figure 4 proportion of subject's interested nutrition information among patients with chronic diseases

Figure 4 shows proportion of subject's interested nutrients by chronic diseases. Proportion of subjects who selected Energy was highest for diabetes, and fat was the highest for other diseases.

From Tables 5 to 11 are analyzes of the nutrients of interest in nutrition labelling..

Table 5 shows the frequency of applying the weights of people who answered that they use nutrition labeling among patients with chronic illnesses. The most common nutrient was kcal for those who had at least one disease. Each rate is the percentage of people who

have the disease and who have chosen the nutrient of interest as the target nutrient. That is, each ratio is calculated for a total of 15,127 people, so the value is small.

Table 5 Weighted frequency of nutrients used in the nutrition label among patients with chronic disease

		Any disease			Diabetes			Hypertension			Dyslipidemia		
		N	%	Std Err	N	%	Std Err	N	%	Std Err	N	%	Std Err
Total(overall)	Yes	563	3.72	0.15	135	0.89	0.08	321	2.12	0.12	325	2.15	0.12
(N=3104)	No	2541	16.80	0.30	2969	19.63	0.32	2783	18.40	0.32	2779	18.37	0.31
Energy	Yes	164	1.08	0.08	45	0.30	0.04	85	0.56	0.06	90	0.60	0.06
(N=1228)	No	1064	7.03	0.21	1183	7.82	0.22	1143	7.56	0.21	1138	7.52	0.21
Carbohydrate	Yes	75	0.50	0.06	43	0.28	0.04	34	0.22	0.04	42	0.28	0.04
(N=262)	No	187	1.24	0.09	219	1.45	0.10	228	1.51	0.10	220	1.45	0.10
Protein	Yes	43	0.28	0.04	4	0.03	0.01	27	0.18	0.03	25	0.17	0.03
(N=184)	No	141	0.93	0.08	180	1.19	0.09	157	1.04	0.08	159	1.05	0.08
Fat	Yes	199	1.32	0.09	28	0.19	0.03	116	0.77	0.07	130	0.86	0.08
(N=928)	No	729	4.82	0.17	900	5.95	0.19	812	5.37	0.18	798	5.28	0.18
Sodium	Yes	76	0.50	0.06	13	0.09	0.02	53	0.35	0.05	36	0.24	0.04
(N=464)	No	388	2.57	0.13	451	2.98	0.14	411	2.72	0.13	428	2.83	0.13

* Any disease mean the patients who has at least one disease among diabetes, hypertension or dyslipidemia
* N which is under the nutrient means the total number of subjects who answered that nutrition among all participants.

Table 6 Association between nutrients used in the nutrition label among patients with chronic disease compared to people who don't have the disease(not adjusted)

	Any disease			Diabetes			Hypertension			Dyslipidemia		
	OR	95% CL		OR	95% CL		OR	95% CL		OR	95% CL	
Total(overall)	2.42	2.18	2.68	2.56	2.10	3.13	3.06	2.68	3.49	1.58	1.39	1.80
Energy	3.35	2.81	3.99	2.90	2.12	3.96	4.49	3.53	5.72	2.31	1.82	2.93
Carbohydrate	1.10	0.84	1.43	0.47	0.34	0.65	1.89	1.30	2.75	0.83	0.59	1.18
Protein	1.61	1.13	2.30	5.87	2.07	16.68	1.88	1.22	2.91	1.16	0.74	1.80
Fat	1.70	1.45	2.00	3.47	2.31	5.21	2.14	1.75	2.62	1.07	0.88	1.30
Sodium	2.27	1.75	2.95	3.41	1.91	6.08	2.25	1.65	3.05	1.89	1.31	2.74

* Any disease mean the patients who has at least one disease among diabetes, hypertension or dyslipidemia

Table 7 Association between nutrients used in the nutrition label among patients with chronic disease compared to people who don't have the disease(adjusted)

	Any disease			Diabetes			Hypertension			Dyslipidemia		
	AOR	95% CL		AOR	95% CL		AOR	95% CL		AOR	95% CL	
Total(overall)	1.11	0.98	1.26	1.03	0.83	1.28	1.26	1.09	1.46	0.98	0.80	1.18
Energy	0.98	0.80	1.18	1.21	0.86	1.68	0.80	0.61	1.06	1.05	0.81	1.34
Carbohydrate	2.18	1.57	3.04	5.33	3.52	8.05	1.07	0.69	1.65	2.04	1.39	2.99
Protein	0.94	0.62	1.42	0.23	0.08	0.66	0.79	0.47	1.31	1.24	0.79	1.94
Fat	1.06	0.87	1.29	0.52	0.34	0.78	0.88	0.70	1.10	1.37	1.09	1.71
Sodium	1.06	0.78	1.44	0.67	0.37	1.22	1.21	0.83	1.77	0.96	0.65	1.42

* Any disease mean the patients who has at least one disease among diabetes, hypertension or dyslipidemia

Table 6 demonstrates the association between nutrients used in the nutrition label among patients with chronic disease compared to people who don't have the disease. For diabetes patients, all of the odds ratio values were significant. The value of kcal and fat information of hypertension patients and carbohydrate information of dyslipidemia patients were not significant, while other infromation were significant. The OR value of people with diseases compared to those without disease was the highest in carbohydrate of 0.91 for any disease, those who have at least one chronic disease among diabetes, hypertension, and dyslipidemia, but not significant. In the case of hypertension, the highest OR value was kcal (1.20) but this was also not significant and the OR value of sodium in response to the nutrients of interest was 0.29 The OR value of dyslipidemia patients who responded to fat as a nutrient of interest was 0.45 and the highest OR value was carbohydrate (0.94) but not significant.

Table 7 shows the odds ratio values adjusted for age, gender, living area, educational status, occupation, income level, and marriage status. In relation to overall nutrition label information and disease, people with illness read more nutrition labels, but only hypertension was significant. In the case of dyslipidemia, different results (OR: 0.98, CI: 0.80-1.18) was obtained.

If you look at the relationship between nutrient information of interest and disease, people with any illness picked carbohydrate information, while diabetics chose carbohydrate information the most. Hypertensive patients chose sodium information as a nutrient of interest and carbohydrates in the case of dyslipidemia. Patients with dyslipidemia also selected fat information as an interest nutirition, too.

Table 8 Association between using nutrition label among patients with at least one chronic disease

		Any disease (N=4778)			Diabetes (N=1356)			Hypertension (N=3471)			Dyslipidemia (N=2213)		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Location	Big city	1.10	0.95	1.28	1.10	0.95	1.28	1.10	0.94	1.27	0.98	0.78	1.23
	Midium-size city	1.15	1.00	1.34	1.15	1.00	1.34	1.15	1.00	1.34	1.18	0.94	1.48
	Rural area	REF			REF			REF			REF		
Age	19-39	2.96	2.45	3.59	2.82	2.35	3.38	2.99	2.49	3.59	5.01	3.61	6.95
	40-59	2.25	1.89	2.68	2.18	1.83	2.59	2.27	1.91	2.69	3.94	2.88	5.39
	60 ≤	REF			REF			REF			REF		
Gender	Male	REF			REF			REF			REF		
	Female	3.05	2.73	3.40	3.04	2.72	3.38	3.03	2.72	3.38	2.93	2.53	3.39
Income	< 200	REF			REF			REF			REF		
	200-399	1.22	1.06	1.39	1.22	1.06	1.39	1.22	1.06	1.39	1.22	0.99	1.51
	400 ≤	1.26	1.08	1.46	1.25	1.08	1.45	1.25	1.08	1.45	1.31	1.06	1.61

Table 8 Association between using nutrition label among patients with at least one chronic disease(continued)

		Any disease (N=4778)			Diabetes (N=1356)			Hypertension (N=3471)			Dyslipidemia (N=2213)		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Occupation	None	1.25	1.09	1.44	1.25	1.09	1.44	1.25	1.09	1.44	1.23	1.01	1.51
	Blue-collar	REF			REF			REF			REF		
	Sales	1.15	0.99	1.35	1.15	0.99	1.35	1.15	0.99	1.35	1.30	1.03	1.66
	White collar	1.09	0.93	1.28	1.09	0.93	1.28	1.09	0.93	1.28	1.09	0.87	1.38
Education level	< High shool	REF			REF			REF			REF		
	High shool	3.42	2.87	4.07	3.38	2.83	4.02	3.41	2.87	4.06	3.63	2.70	4.87
	college ≤	4.81	3.94	5.89	4.75	3.89	5.81	4.81	3.94	5.88	4.78	3.48	6.56
Marrital status	Yes	1.12	1.00	1.26	1.12	1.00	1.25	1.12	1.00	1.25	0.63	0.53	0.74
	No	REF			REF			REF			REF		
Total (overall)	Yes	1.11	0.98	1.26	1.03	0.83	1.28	1.26	1.09	1.46	0.98	0.80	1.18
	No	REF			REF			REF			REF		

* Any disease mean the patients who has at least one disease among diabetes, hypertension or dyslipidemia

Table 8 shows the association between using nutrition label among patients with at least one chronic disease. The younger the age, the higher the rate of using nutrition labeling and women were more likely to use nutrition labeling than men. Similarly, the higher the level of education, the higher the use of nutrition labeling. The results of age, gender and educational level were all significant. Compared to those who did not use nutrition labeling, those who used it were 1.11 times higher but it was not significant. The number of people who used it compared to those who did not use nutrition labeling was 1.03 times higher among diabetic patients and 0.98 times higher among patients with dyslipidemia, but these were also not significant. However, in hypertension patients, the use of nutrition labeling was significant (OR: 1.26, CI: 1.09-1.46).

From Table 9 to Table 12 demonstrate association between nutrients used in the nutrition label among chronic disease patients.

Table 9 is the result of association between interest nutrients and any chronic disease patients. Almost all the factors of age, gender, educational level, marrital status were significant. But the presence of chronic disease was not significant except carbohydrate(OR: 2.18, CI:1.57-3.04). People aged 19-29 years compared to those aged 60 and over selected kcal five times higher, and other nutrients tend to be more than twice as likely. In terms of gender, the ratio of female to all nutrients except protein(OR:0.93, CI:0.67-1.28) were about twice than that of male. The income level of all the nutrients in the range of 2.00-3.99 milion won was higher than that of the ones of less than 2 milion won. However, there were no significant differences in the results except kcal(OR:1.31, CI:1.06-1.61) and fat(OR:1.28, CI:1.01-1.63)

of over 4 million won. In terms of education level, all nutrients showed a significant difference in OR of over 1, compared to 'under graduation of high school', but the protein(OR:1.42, CI:0.84-2.40) selection in college graduates was not significant.

Table 9 Association between nutrients used in the nutrition label among patients with at least one chronic disease

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Location	**Big city**	0.98	0.78	1.23	1.44	0.94	2.19	1.09	0.69	1.72	1.09	0.89	1.34	1.05	0.75	1.48
	Midium-size city	1.18	0.94	1.48	1.36	0.88	2.10	0.99	0.61	1.59	1.03	0.84	1.28	1.02	0.72	1.45
	Rural area	REF			REF			REF			REF			REF		
Age	**19-39**	5.01	3.61	6.95	2.96	1.75	5.03	1.97	1.08	3.60	1.31	0.98	1.76	2.65	1.66	4.24
	40-59	3.94	2.88	5.39	1.80	1.11	2.89	1.14	0.69	1.89	1.66	1.29	2.15	1.70	1.09	2.66
	60 ≤	REF			REF			REF			REF			REF		
Gender	**Male**	REF			REF			REF			REF			REF		
	Female	2.93	2.53	3.39	1.79	1.32	2.43	0.93	0.67	1.28	3.00	2.50	3.61	2.15	1.70	2.71
Income	**< 200**	REF			REF			REF			REF			REF		
	200-399	1.22	0.99	1.51	1.22	0.80	1.86	1.05	0.67	1.65	1.18	0.95	1.46	1.09	0.80	1.49
	400 ≤	1.31	1.06	1.61	1.19	0.76	1.87	1.03	0.65	1.62	1.28	1.01	1.63	0.92	0.66	1.29

Table 9 Association between nutrients used in the nutrition label among patients with at least one chronic disease (continued)

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Occupation	None	1.23	1.01	1.51	1.40	0.90	2.20	0.85	0.56	1.28	1.04	0.83	1.31	1.99	1.35	2.95
	Blue-collar	REF			REF			REF			REF			REF		
	Sales	1.30	1.03	1.66	0.81	0.46	1.43	0.82	0.50	1.35	0.87	0.66	1.16	2.00	1.33	3.00
	White collar	1.09	0.87	1.38	1.19	0.73	1.93	0.80	0.50	1.29	0.98	0.76	1.26	1.78	1.19	2.65
Education level	< High school	REF			REF			REF			REF			REF		
	High school	3.63	2.70	4.87	2.73	1.69	4.42	1.98	1.21	3.24	2.78	2.13	3.63	2.90	1.89	4.45
	College ≤	4.78	3.48	6.56	3.17	1.86	5.40	1.42	0.84	2.40	3.58	2.62	4.89	4.43	2.84	6.92
Marrital status	Yes	0.63	0.53	0.74	1.46	1.06	2.01	1.45	1.02	2.05	1.36	1.13	1.63	2.06	1.58	2.70
	No	REF			REF			REF			REF			REF		
Chronic disease	Yes	0.98	0.80	1.18	2.18	1.57	3.04	0.94	0.62	1.42	1.06	0.87	1.29	1.06	0.78	1.44
	No	REF			REF			REF			REF			REF		

Table 10 Association between nutrients used in the nutrition label among diabetes patients compared to people who don't have diabetes

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Location	**Big city**	0.98	0.78	1.24	1.45	0.95	2.21	1.09	0.69	1.72	1.09	0.89	1.34	1.05	0.75	1.47
	Midium-size city	1.18	0.94	1.48	1.35	0.87	2.08	0.99	0.62	1.59	1.04	0.84	1.28	1.02	0.72	1.45
	Rural area	REF			REF			REF			REF			REF		
Age	**19-39**	5.24	3.78	7.28	3.08	1.81	5.23	1.77	1.04	3.01	1.17	0.89	1.55	2.44	1.59	3.73
	40-59	4.08	2.98	5.59	1.94	1.19	3.17	1.04	0.65	1.68	1.53	1.19	1.96	1.60	1.05	2.42
	60 ≤	REF			REF			REF			REF			REF		
Gender	**Male**	REF			REF			REF			REF			REF		
	Female	2.94	2.55	3.40	1.87	1.38	2.53	0.91	0.66	1.25	2.95	2.45	3.54	2.12	1.68	2.68
Income	**< 200**	REF			REF			REF			REF			REF		
	200-399	1.22	0.99	1.51	1.25	0.82	1.91	1.05	0.67	1.64	1.17	0.94	1.46	1.09	0.80	1.48
	400 ≤	1.31	1.06	1.62	1.23	0.78	1.94	1.02	0.65	1.60	1.27	1.00	1.61	0.92	0.65	1.28

Table 10 Association between nutrients used in the nutrition label among diabetes patients compared to people who don't have diabetes(continued)

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Occupation	None	1.23	1.01	1.51	1.33	0.85	2.09	0.87	0.58	1.30	1.06	0.85	1.33	2.01	1.36	2.97
	Blue-collar	REF			REF			REF			REF			REF		
	Sales	1.30	1.03	1.65	0.78	0.44	1.37	0.83	0.51	1.36	0.88	0.66	1.17	2.00	1.33	3.01
	White collar	1.09	0.87	1.37	1.13	0.70	1.84	0.81	0.50	1.30	0.98	0.76	1.27	1.79	1.20	2.66
Education level	< High school	REF			REF			REF			REF			REF		
	High school	3.66	2.73	4.91	2.74	1.68	4.48	1.96	1.19	3.22	2.72	2.08	3.55	2.85	1.85	4.40
	College ≤	4.83	3.52	6.61	3.19	1.84	5.52	1.39	0.82	2.37	3.48	2.55	4.74	4.34	2.77	6.81
Marrital status	Yes	0.63	0.53	0.74	1.47	1.06	2.04	1.44	1.02	2.05	1.35	1.13	1.63	2.06	1.57	2.70
	No	REF			REF			REF			REF			REF		
Diabetes	Yes	1.21	0.86	1.68	5.33	3.52	8.05	0.23	0.08	0.66	0.52	0.34	0.78	0.67	0.37	1.22
	No	REF			REF			REF			REF			REF		

Table 10 is about the association between interest nutrients and diabetes patients. Almost all the factors of age, gender, educational level, marrital status were significant. Whether diabetes was significant for carbohydrate(OR:5.33 ,CI:3.52-8.05), protein(OR:0.23 ,CI:0.0.8-0.66) and fat(OR:0.52 ,CI:0.34-0.78). This result seems to have resulted in an OR value of less than 1, since the item asking for the nutrients of interest does not allow duplicate responses. In this table, it was found that the older, the higher the income, the higher the educational level, the more the nutrients were picked. Interestingly, in the occupation, the unemployed were more likely to checked nutrients, with a significant difference in kcal (OR: 1.23, 1.01-1.51) and Sodium (OR: 2.01, CI: 1.36-2.97).

Table 11 is about the association between interest nutrients and hypertension patients. This table also shows the same tendency in age, income, and education level. Almost all the factors of gender, educational level, marrital status were significant. But whether hypertension was not significant for all nutrients. Although not significant, the highest value was Sodium(OR:1.21, CI:0.83-1.77).

Table 12 is about the association between interest nutrients and dyslipidemia patients. Most of the factors of age, gender, educational level, marrital status were significant. In the case of age, for people aged 20-39 years, the Odds ratio of all nutrients except for fat was two times higher than that of those aged 60 years or older. Marrital status showed significant differences in all nutrients, Odds ratio of nutrients except kcal(OR:1.05, CI:0.53-0.74) of people with spouse were above 1 compared to those without spouses. Whether dyslipidemia was significant for carbohydrate(OR:2.04, CI:1.39-2.99) and fat(OR:1.37, CI:1.09-1.71).

Table 11 Association between nutrients used in the nutrition label among hypertension patients compared to people who don't have hypertension

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Location	Big city	0.98	0.78	1.24	1.44	0.94	2.20	1.09	0.69	1.72	1.09	0.89	1.34	1.05	0.75	1.48
	Midium-size city	1.18	0.94	1.48	1.36	0.88	2.10	0.99	0.61	1.59	1.04	0.84	1.28	1.02	0.72	1.45
	Rural area	REF			REF			REF			REF			REF		
Age	19-39	4.66	3.34	6.50	1.93	1.14	3.24	1.86	1.01	3.41	1.21	0.92	1.60	2.79	1.73	4.49
	40-59	3.73	2.73	5.12	1.38	0.84	2.28	1.09	0.65	1.83	1.57	1.23	2.02	1.77	1.12	2.79
	60 ≤	REF			REF			REF			REF			REF		
Gender	Male	REF			REF			REF			REF			REF		
	Female	2.91	2.51	3.36	1.72	1.27	2.34	0.92	0.67	1.27	2.97	2.47	3.58	2.16	1.71	2.74
Income	< 200	REF			REF			REF			REF			REF		
	200-399	1.22	0.99	1.51	1.23	0.80	1.87	1.05	0.67	1.64	1.18	0.95	1.46	1.09	0.80	1.49
	400 ≤	1.30	1.06	1.61	1.17	0.74	1.84	1.02	0.65	1.61	1.28	1.00	1.62	0.92	0.66	1.30

Table 11 Association between nutrients used in the nutrition label among hypertension patients compared to people who don't have hypertension(continued)

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Occupation	None	1.24	1.01	1.51	1.41	0.90	2.21	0.85	0.57	1.28	1.05	0.84	1.31	1.99	1.34	2.94
	Blue-collar	REF			REF			REF			REF			REF		
	Sales	1.30	1.03	1.65	0.80	0.46	1.42	0.82	0.50	1.35	0.87	0.66	1.17	2.00	1.33	3.00
	White collar	1.09	0.87	1.37	1.17	0.72	1.90	0.80	0.50	1.29	0.98	0.76	1.26	1.78	1.19	2.65
Education level	< High school	REF			REF			REF			REF			REF		
	High school	3.56	2.65	4.78	2.51	1.54	4.10	1.96	1.20	3.20	2.73	2.09	3.56	2.94	1.90	4.53
	College ≤	4.68	3.41	6.42	2.87	1.67	4.92	1.40	0.83	2.36	3.49	2.56	4.78	4.50	2.87	7.05
Marrital status	Yes	0.63	0.53	0.74	1.46	1.06	2.02	1.45	1.02	2.05	1.35	1.13	1.63	2.06	1.58	2.70
	No	REF			REF			REF			REF			REF		
Hypertension	Yes	0.80	0.61	1.06	1.07	0.69	1.65	0.79	0.47	1.31	0.88	0.70	1.10	1.21	0.83	1.77
	No	REF			REF			REF			REF			REF		

Table 12 Association between nutrients used in the nutrition label among dyslipidemia patients compared to people who don't have dyslipidemia

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Location	Big city	0.98	0.78	1.24	1.43	0.94	2.18	1.08	0.69	1.71	1.09	0.89	1.34	1.05	0.75	1.48
	Midium-size city	1.18	0.94	1.48	1.36	0.88	2.10	0.98	0.61	1.58	1.04	0.84	1.28	1.02	0.71	1.45
	Rural area	REF			REF			REF			REF			REF		
Age	19-39	5.14	3.71	7.12	2.37	1.43	3.93	2.15	1.25	3.69	1.39	1.05	1.86	2.55	1.64	3.97
	40-59	4.01	2.94	5.48	1.57	0.98	2.52	1.20	0.74	1.93	1.73	1.34	2.22	1.66	1.08	2.55
	60 ≤	REF			REF			REF			REF			REF		
Gender	Male	REF			REF			REF			REF			REF		
	Female	2.93	2.53	3.39	1.70	1.25	2.30	0.92	0.67	1.27	2.98	2.48	3.58	2.14	1.69	2.71
Income	< 200	REF			REF			REF			REF			REF		
	200-399	1.22	0.99	1.51	1.22	0.80	1.85	1.05	0.67	1.65	1.17	0.94	1.46	1.09	0.80	1.49
	400 ≤	1.31	1.06	1.61	1.16	0.74	1.82	1.03	0.65	1.62	1.28	1.01	1.62	0.92	0.66	1.29

Table 12 Association between nutrients used in the nutrition label among dyslipidemia patients compared to people who don't have dyslipidemia(continued)

		Energy			Carbohydrate			Protein			Fat			Sodium		
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Occupation	None	1.23	1.01	1.51	1.41	0.90	2.22	0.85	0.56	1.27	1.04	0.83	1.31	1.99	1.35	2.95
	Blue-collar	REF			REF			REF			REF			REF		
	Sales	1.30	1.03	1.66	0.81	0.46	1.42	0.82	0.50	1.35	0.88	0.66	1.17	2.00	1.33	3.00
	White collar	1.10	0.87	1.38	1.18	0.72	1.91	0.80	0.50	1.29	0.98	0.76	1.26	1.78	1.19	2.65
Education level	< High school	REF			REF			REF			REF			REF		
	High school	3.65	2.72	4.89	2.58	1.59	4.17	2.01	1.23	3.28	2.80	2.15	3.65	2.88	1.87	4.42
	College ≤	4.81	3.51	6.59	2.97	1.75	5.06	1.43	0.85	2.43	3.61	2.65	4.92	4.39	2.81	6.86
Marrital status	Yes	0.63	0.53	0.74	1.46	1.06	2.01	1.45	1.02	2.05	1.36	1.13	1.63	2.06	1.58	2.70
	No	REF			REF			REF			REF			REF		
Dyslipidemia	Yes	1.05	0.81	1.34	2.04	1.39	2.99	1.24	0.79	1.94	1.37	1.09	1.71	0.96	0.65	1.42
	No	REF			REF			REF			REF			REF		

4. DISCUSSION AND CONCLUSION

4.1 Result summary

The percentage of people using nutrition labels was more than twice that of men and the highest percentage of people living in big cities. By age, the older the age, the higher the rate of using the nutrition label. The higher the income level, the higher the education level, the higher the rate of using the nutrition label. Marital status was twice as high among married people who use nutrition labeling compared to unmarried people.

As for patient who has at least one disease among diabetes, hypertension, and dyslipidemia, the proportion of females were higher than males and proportion of younger age(19-39) was not large. About half of the patients lived in big city and unemployed people showed higher rates than other occupations.

The nutrients that people see the most among nutrition labels were calories. The following results were obtained in relation to the relationship between nutrients and chronic disease patients. For patients who has at least one of three diseases, they checked carbohydrate information most(OR:2.183) and it was significant. Both diabetes patients and dyslipidemia patients checked carbohydrate most(OR:5.326, OR:2.037, respectively) and they were significant, too. However, the result of hypertension patients didn't show any significant value.

4.2 Discussion

Individuals with type 2 diabetes, hypertension, hyperlipidemia, or a combination of these three diseases read more food labels than patients without this disease. (robert e). This study also found that people with the disease use more nutrition labels than people who do not have the disease. Although hypertension only showed a significant value. But, unlike the results of the existing literature, in dyslipidemia, the use of nutrition labeling was rather less, although this was also not significant.

Before adjusting for other variables in the relationship between nutrition label use and disease, the opposite result was found, which was the effect of age and education level. The higher the age, the higher the probability of having a disease, while the lower the probability of using nutrition labeling. The level of education was also related to the use of disease and nutrition labeling, and the level of education was also related to age. Therefore, when adjusted for age and education, the relationship between nutrition label use and disease is the same as in previous studies. In addition, gender, income level, occupation, and marital status also influence the use of nutrition labeling.

In this study, an analysis of the nutrients of interest which was not analyzed in the previous studies was added. All the diabetic group, the hypertensive group, the dyslipidemic group, and the group with at least one of these diseases had an OR value greater than 1, confirming more carbohydrate information than the group without the disease. However, there was no significant difference in hypertension group and significant difference in other groups. In addition, the OR value of the any disease group's fat and sodium information, diabetic

group's kcal information, hypertensive patients group's sodium information was greater than 1, but not significant. In the dyslipidemia patient group, all of the nutrients except Sodium were more selected than the non-patient group, but only fat was the significant result except the above-mentioned carbohydrates.

Although it is desirable to use labels and know nutritional information before being diagnosed with chronic diseases, it is possible to reverse disease symptoms according to lifestyle changes such as adopting healthy eating habits. (Shintani TT / Ornish D). Thus, providing information about the use of nutrition labels and information about major national campaigns, such as salt reduction campain, can help people encourage the adoption of healthy eating regimens.

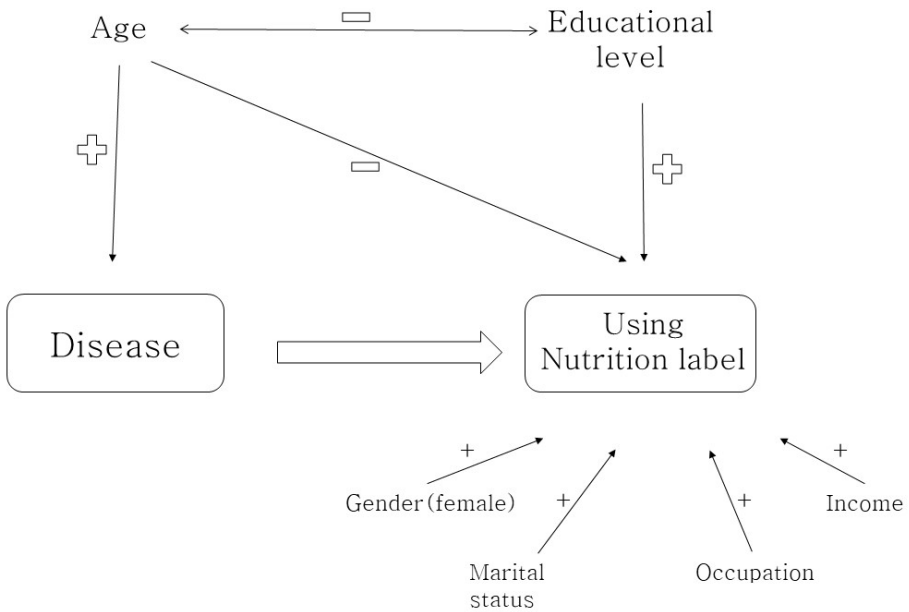

Figure 5 Factors Affecting Disease and Using Nutrition Label

4.3 Strengths and Limitations

This study is meaningful in that it is a study on patients with chronic diseases rather than healthy people, and it is a study that investigates not only whether to use nutrition labeling but also which nutrients are mainly used. Despite the fact that nutrition labeling information contains a lot of information, there is little research on what kind of information is used, and the results of this study will be beneficial to patients with chronic diseases who need to know nutrition information in particular.

This study has a few limitations. First, as KNHANES data is cross-sectional, this study could not prove the causality. One may be using food labels and knowing nutritional information before he/she is diagnosed with a chronic disease. And we do not know whether participants use nutrition labels and know better about diet recommendations as an answer to diagnosis. Second, the data were from self-reported questionnaire so that there can be information bias, and there may can be random and systematic biases (Armstrong BK), too. Third, participants can not be determined whether they are using labels only for certain foods and / or comparing labels for other foods. Forth, we also do not know where these participants are advised to use nutritional information and recommendations. People with lower levels of education tend to obtain and rely on physicians, television, and neighbors for nutrition information than those with higher education levels. (McKay DL2006) In order to determine the target of education, it is necessary to investigate what path the patients get nutrition information through the follow-up study. Lastly, for the nutrient of interest, multiple responses were not possible so equivalent comparison between nutrients wasn't possible. Further

analysis and research will need to be added.

4.4 Conclusion

Nutrition labeling regulations are also related to the manufacturer's ability to improve the nutritional content of foods. For example, in Canada, the trans fat content of pre-packaged products decreased after trans fat in 2005 was a mandatory indication for nutrition labeling. (Health Canada. 'Trans Fat Monitoring Program: Highlights.) So results of this study will also provide useful information to policy makers planning nutrition information campaigns and ultimately, change the food industry.

In previous study, the most preferred form of nutrition labeling was the figure and graph format(Lee, 2004). As the chronic disease patients are elderly, it is necessary to study the development of nutrition labeling method which is more readable and easy to understand using various color, bigger letters or specific mark.

References

Adedeji, OO. 1994. 'The plasma lipid concentrations of healthy Nigerians', *Tropical and geographical medicine*, 46: 23-26.

Administration, Food and Drug. 'Nutrition label information - Food and Drug Administration', Accessed 2017.11.20. https://www.mfds.go.kr/nutrition/content/view.do?contentKey=22&menuKey=143.

Armstrong, Bruce K, Emily White, and Rodolfo Saracci. 1992. 'Principles of exposure measurement in epidemiology', *Monographs in epidemiology and biostatistics*, 1: ALL-ALL.

Bae, Yun-Jung. 2014. 'Evaluation of nutrient and food intake status, and dietary quality in Korean adults according to nutrition label utilization', *Journal of Nutrition and Health*, 47: 193-205.

Bauer, Florianne, Joline Beulens, Daphne van der A, Cisca Wijmenga, Diederick Grobbee, Annemieke Spijkerman, Yvonne Schouw, and N. Onland-Moret. 2013. 'Dietary patterns and the risk of type 2 diabetes in overweight and obese individuals', *European Journal of Nutrition*, 52: 1127-34.

Bhattacharya, Jay, Kavita Choudhry, and Darius Lakdawalla. 2008. 'Chronic Disease and Severe Disability Among Working-Age Populations', *Medical Care*, 46: 92-100.

Boulanger, Paula McKernan, Rafael Perez-Escamilla, David Himmelgreen, Sofia Segura-Millan, and Lauren Haldeman. 2002. 'Determinants of nutrition knowledge among low-income, Latino caretakers in Hartford, Conn', *Journal of the American Dietetic Association*, 102: 978-81.

Campos, Sarah, Juliana Doxey, and David Hammond. 2011. 'Nutrition

labels on pre-packaged foods: a systematic review', *Public health nutrition*, 14: 1496-506.

Danaei, Goodarz, Eric L Ding, Dariush Mozaffarian, Ben Taylor, Jürgen Rehm, Christopher JL Murray, and Majid Ezzati. 2009. 'The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors', *PLoS medicine*, 6: e1000058.

Deen, Darwin. 2004. 'Metabolic syndrome: time for action', *American family physician*, 69.

Drichoutis, Andreas C, Panagiotis Lazaridis, and Rodolfo M Nayga. 2005. 'Nutrition knowledge and consumer use of nutritional food labels', *European Review of Agricultural Economics*, 32: 93-118.

Du, Shufa, Andrea Neiman, Carolina Batis, Huijun Wang, Bing Zhang, Jiguo Zhang, and Barry M Popkin. 2014. 'Understanding the patterns and trends of sodium intake, potassium intake, and sodium to potassium ratio and their effect on hypertension in China', *The American journal of clinical nutrition*, 99: 334-43.

Elliott, Paul, Lesley L Walker, Mark P Little, John R Blair-West, Robert E Shade, D Rick Lee, Pierre Rouquet, Eric Leroy, Xavier Jeunemaitre, and Raymond Ardaillou. 2007. 'Change in Salt Intake Affects Blood Pressure of Chimpanzees', *Circulation*, 116: 1563-68.

Fitzgerald, Nurgül, Grace Damio, Sofia Segura-Pérez, and Rafael Pérez-Escamilla. 2008. 'Nutrition knowledge, food label use, and food intake patterns among Latinas with and without type 2 diabetes', *Journal of the American Dietetic Association*, 108: 960-67.

Folsom, Aaron R, Yihe Li, Xuxu Rao, Runchao Cen, Kui Zhang, Xiaoqing Liu, Lin He, Sandra Irving, and Barbara H Dennis. 1994. 'Body mass, fat distribution and cardiovascular risk factors in a lean population of south China', *Journal of clinical epidemiology*, 47: 173-81.

Golan, Elise, Fred Kuchler, Lorraine Mitchell, Cathy Greene, and Amber Jessup. 2001. 'Economics of food labeling', *Journal of Consumer Policy*, 24: 117-84.

Goodman, Samantha, David Hammond, Francy Pillo-Blocka, Theresa Glanville, and Richard Jenkins. 2011. 'Use of nutritional information in Canada: national trends between 2004 and 2008', *Journal of Nutrition Education and Behavior*, 43: 356-65.

Group, Diabetes Prevention Program Research. 2002. 'Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin', *N Engl j Med*, 2002: 393-403.

Hawkes, Corinna, and World Health Organization. 2004. 'Nutrition labels and health claims: the global regulatory environment'.

Hawthorne, Keli M, Karen Moreland, Ian J Griffin, and Steven A Abrams. 2006. 'An educational program enhances food label understanding of young adolescents', *Journal of the American Dietetic Association*, 106: 913-16.

Hu, Frank B, JoAnn E Manson, Meir J Stampfer, Graham Colditz, Simin Liu, Caren G Solomon, and Walter C Willett. 2001. 'Diet, lifestyle, and the risk of type 2 diabetes mellitus in women', *New England journal of medicine*, 345: 790-97.

Hubert, Helen B, Manning Feinleib, Patricia M McNamara, and William P Castelli. 1983. 'Obesity as an independent risk factor for cardiovascular disease: a 26-year follow-up of participants

in the Framingham Heart Study', *Circulation*, 67: 968-77.

Jacobson, Terry A, Kevin C Maki, Carl E Orringer, Peter H Jones, Penny Kris-Etherton, Geeta Sikand, Ralph La Forge, Stephen R Daniels, Don P Wilson, and Pamela B Morris. 2015. 'National Lipid Association recommendations for patient-centered management of dyslipidemia: part 2', *Journal of clinical lipidology*, 9: S1-S122. e1.

Kakinami, Lisa, Stephanie Houle-Johnson, and Jennifer J. McGrath. 2016. 'Parental Nutrition Knowledge Rather Than Nutrition Label Use Is Associated With Adiposity in Children', *Journal of Nutrition Education and Behavior*, 48: 461-67.e1.

Kanjilal, Sanjat, Edward W Gregg, Yiling J Cheng, Ping Zhang, David E Nelson, George Mensah, and Gloria LA Beckles. 2006. 'Socioeconomic status and trends in disparities in 4 major risk factors for cardiovascular disease among US adults, 1971-2002', *Archives of Internal Medicine*, 166: 2348-55.

Kim, MyoSung, JungSoon Kim, and JungOk Yu. 2012. 'Factors Relating to Use of Food Labels among Adults with Metabolic Syndrome', *Korean Journal of Health Education and Promotion*, 29.

Kim, Sung-Yong, Rodolfo M Nayga Jr, and Oral Capps Jr. 2000. 'The effect of food label use on nutrient intakes: an endogenous switching regression analysis', *Journal of Agricultural and resource Economics*: 215-31.

Kim, Sung Yong, Rodolfo M Nayga, and Oral Capps. 2001. 'Food Label Use, Self Selectivity, and Diet Quality', *Journal of Consumer Affairs*, 35: 346-63.

Kim, Tae Yang, Doo Bong Han, Jeong Hoon Ahn, and Sang Hyeon

Lee. 2013. 'Effect of Mothers' Identification on Nutrition Labelling to Children's Obesity', *The Korean Journal of Health Economics and Policy*, 19: 51-82.

Kindig, David A, Allison M Panzer, and Lynn Nielsen-Bohlman. 2004. *Health literacy: a prescription to end confusion* (National Academies Press).

King, Abby C, William L Haskell, Deborah R Young, Roberta K Oka, and Marcia L Stefanick. 1995. 'Long-term effects of varying intensities and formats of physical activity on participation rates, fitness, and lipoproteins in men and women aged 50 to 65 years', *Circulation*, 91: 2596-604.

Kreuter, Matthew W, Laura K Brennan, Darcell P Scharff, and Susan N Lukwago. 1997. 'Do nutrition label readers eat healthier diets? behavioral correlates of adults' use of food labels', *American journal of preventive medicine*, 13: 277-83.

Kung, Hsiang-Ching, Donna L Hoyert, Jiaquan Xu, and Sherry L Murphy. 2008. 'Deaths: final data for 2005', *Natl Vital Stat Rep*, 56: 1-120.

Kwon, En Ha, and Soon Lae Kim. 2003. 'Effect of Health Promotion Program on Self-efficacy, Healthy Lifestyle and Serum Lipid Level in Employees with Hyperlipidemia ', *Community Nursing*, 14.

Kwon, Kwang Il, So Hyun Park, Jun Hyung Lee, Jee Young Kim, Kwang Soo Yoo, Jee Sun Lee, Seo Young Kim, Hyuni Sung, Hye Seon Nam, and Jong Wook Kim. 2007. 'Prevalence of nutrition labeling and claims on processed, and packaged foods', *Korean Journal of Community Nutrition*, 12: 206-13.

Lee, EJ. 2008. 'The effect of the middle school home economics

curriculum on the students's perception of nutrition labels and their choice of processed food', *Masters degree thesis. Dongguk University*: 83-87.

Lee, Hye Young, and Mi Kyung Kim. 2008. 'Dietary Behavioral Correlates of Nutrition Label Use in Korean Women', *Korean Journal of Nutrition*, 41: 839-50.

Lee, Kang-Ja, and Youn-Hee Lee. 2004. 'Consumer's Recognition and Using State about Food-Nutrition Labeling System among Twenties', *J East Asian Soc Dietary Life*, 14: 54-63.

Lee, Kye Im, Sang Hyo Kim, and Sung Yoon Heo. 2016. 'In-Depth Analysis of Food Consumption in Korea', *Korean Rural Economic Institute Basic Research Report*: 1-254.

Lewis, John E, Kristopher L Arheart, William G LeBlanc, Lora E Fleming, David J Lee, Evelyn P Davila, Alberto J Cabán-Martinez, Noella A Dietz, Kathryn E McCollister, and Frank C Bandiera. 2009. 'Food label use and awareness of nutritional information and recommendations among persons with chronic disease', *The American journal of clinical nutrition*, 90: 1351-57.

Lewis, John E., Kristopher L. Arheart, William G. Leblanc, Lora E. Fleming, David J. Lee, Evelyn P. Davila, Alberto J. Cabán-Martinez, Noella A. Dietz, Kathryn E. McCollister, Frank C. Bandiera, and John D. Clark. 2009. 'Food label use and awareness of nutritional information and recommendations among persons with chronic disease', *The American journal of clinical nutrition*, 90: 1351.

Lin, Chung-Tung Jordan, Jonq-Ying Lee, and Steven T Yen. 2004. 'Do dietary intakes affect search for nutrient information on

food labels?', *Social Science & Medicine*, 59: 1955-67.

Lindström, Jaana, Pirjo Ilanne-Parikka, Markku Peltonen, Sirkka Aunola, Johan G Eriksson, Katri Hemiö, Helena Hämäläinen, Pirjo Härkönen, Sirkka Keinänen-Kiukaanniemi, and Mauri Laakso. 2006. 'Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study', *The Lancet*, 368: 1673-79.

McKay, Diane L, Robert F Houser, Jeffrey B Blumberg, and Jeanne P Goldberg. 2006. 'Nutrition information sources vary with education level in a population of older adults', *Journal of the American Dietetic Association*, 106: 1108-11.

Misra, Ranjita. 2007. 'Knowledge, attitudes, and label use among college students', *Journal of the American Dietetic Association*, 107: 2130-34.

Nam, Tae Young, and Jung Hee Kim. 2014. 'An Evaluation of the Effectiveness of Nutrition Counseling for Adults with Risk Factors for Dyslipidemia', *Korean J Community Nutrition*, 19: 28-41.

Neuhouser, Marian L, Alan R Kristal, and Ruth E Patterson. 1999. 'Use of food nutrition labels is associated with lower fat intake', *Journal of the American Dietetic Association*, 99: 45-53.

Ornish, Dean, Larry W Scherwitz, James H Billings, K Lance Gould, Terri A Merritt, Stephen Sparler, William T Armstrong, Thomas A Ports, Richard L Kirkeeide, and Charissa Hogeboom. 1998. 'Intensive lifestyle changes for reversal of coronary heart disease', *Jama*, 280: 2001-07.

Perez-Escamilla, Rafael, Lauren Haldeman, and Sharon Gray. 2002.

'Assessment of nutrition education needs in an urban school district in Connecticut: establishing priorities through research', *Journal of the American Dietetic Association*, 102: 559-62.

Peto, R. Doll & R. 1983. "The causes of cancer. Quantitative estimates of avoidable risk of cancer in the United States today: By R. Doll & R. Peto. Oxford University Press, Oxford, 1981. pp. 116. £4.95. (Book Review)." In, 512-13.

Petrovici, Dan A, and Christopher Ritson. 2006. 'Factors influencing consumer dietary health preventative behaviours', *BMC Public Health*, 6: 222.

Polar, Kartika, and Roland Sturm. 2009. 'Potential Societal Savings from Reduced Sodium Consumption in the U.S. Adult Population', *American Journal of Health Promotion*, 24: 49-57.

Post, Robert E., Arch G. Mainous, Vanessa A. Diaz, Eric M. Matheson, and Charles J. Everett. 2010. 'Use of the nutrition facts label in chronic disease management: results from the National Health and Nutrition Examination Survey', *Journal of the American Dietetic Association*, 110: 628.

Sanders, Tom AB. 2003. 'High-versus low-fat diets in human diseases', *Current Opinion in Clinical Nutrition & Metabolic Care*, 6: 151-55.

Satia, Jessie A, Joseph A Galanko, and Marian L Neuhouser. 2005. 'Food nutrition label use is associated with demographic, behavioral, and psychosocial factors and dietary intake among African Americans in North Carolina', *Journal of the American Dietetic Association*, 105: 392-402.

Shintani, Terry T, Sheila Beckham, AC Brown, and HK O'Connor. 2001. 'The Hawaii Diet: ad libitum high carbohydrate, low fat

multi-cultural diet for the reduction of chronic disease risk factors: obesity, hypertension, hypercholesterolemia, and hyperglycemia'.

site., Health Canada Web. 'Trans Fat Monitoring Program: Highlights. ', Accessed November 20, 2017. https://www.canada.ca/en/health-canada/services/nutrition-science-research/food-nutrition-surveillance/trans-fat-monitoring-program/fourth-monitoring-data.html#highlights.

Smith-Spangler, Crystal M., Jessie L. Juusola, Eva A. Enns, Douglas K. Owens, and Alan M. Garber. 2010. 'Population strategies to decrease sodium intake and the burden of cardiovascular disease: a cost-effectiveness analysis', *Annals of internal medicine*, 152: 481.

Smith, Shannon C, Jeffrey G Taylor, and Alison M Stephen. 2000. 'Use of food labels and beliefs about diet - disease relationships among university students', *Public health nutrition*, 3: 175-82.

Sui, Xuemei, Steven P Hooker, I-Min Lee, Timothy S Church, Natalie Colabianchi, Chong-Do Lee, and Steven N Blair. 2008. 'A prospective study of cardiorespiratory fitness and risk of type 2 diabetes in women', *Diabetes care*, 31: 550-55.

Tessaro, Irene, Sheila Rye, Lindsey Parker, Carol Mangone, and Susan McCrone. 2007. 'Effectiveness of a nutrition intervention with rural low-income women', *American journal of health behavior*, 31: 35-43.

Thompson, Frances E, Douglas Midthune, Amy F Subar, Timothy McNeel, David Berrigan, and Victor Kipnis. 2005. 'Dietary intake estimates in the National Health Interview Survey, 2000: methodology, results, and interpretation', *Journal of the*

American Dietetic Association, 105: 352-63.

Trudeau, Elyse, Alan R Kristal, SUE Li, and Ruth E Patterson. 1998. 'Demographic and psychosocial predictors of fruit and vegetable intakes differ: implications for dietary interventions', *Journal of the American Dietetic Association*, 98: 1412-17.

Weisburger, JH. 2002. 'Lifestyle, health and disease prevention: the underlying mechanisms', *European journal of cancer prevention: the official journal of the European Cancer Prevention Organisation (ECP)*, 11: S1-7.

Yoo, H. Y., E. Ryu, J. S. Kim, and K. D. Han. 2017. 'Association between awareness of nutrition labels and menstrual cycle irregularity in Korean women: The fifth Korea national health and nutrition examination survey (2010~2012)', *Journal of Korean Academy of Nursing*, 47: 133-41.

Zarkin, Gary A, Nancy Dean, Josephine A Mauskopf, and Richard Williams. 1993. 'Potential health benefits of nutrition label changes', *American Journal of Public Health*, 83: 717-24.

SUMMARY IN KOREAN

국문초록

만성질환 환자들의 영양표시 이용: 국민건강영양조사 자료를 바탕으로

조인형

보건학과 보건학전공

서울대학교 보건대학원

연구배경 및 목적: 식습관과 식이 섭취 패턴은 생활수준 향상과 핵가족 증가, 여성의 사회적 참여 증가로 인한 가사노동시간 단축 등의 다양한 사회문화적 요소로 인해 변화하고 있다. 이러한 현상은 가공식품 및 동물성 식품의 섭취를 증가시키고 다양한 만성질환을 유발하며 건강에 위협을 가하게 된다. 당뇨병, 고혈압, 비만 및 암 등의 만성질환이 전 세계적으로 증가하는 추세이며, 이러한 만성질환 환자들은 건강한 식이 섭취를 위해 식품정보를 알 필요가 있다. 포장식품에 있어서 정보를 가장 알기 쉬운 방법이 바로 영양표시이며, 영양표시는 건강정보이해능력의 한 가지 방법으로서 궁극적으로 건강비용절감 효과를 가져 올 수 있는 방법이다. 따라서 본 연구를 통해 만성질환 환자들의 영양표시 이용에 미치는 요인과 만성질환 환자들의 관심영양소를 파악하여 추후 정책 마련의 기초자료로 활용하고자 한다.

연구방법: 이 연구는 국민건강영양조사 제 6기(2013-2015) 자료의 19세 이상 성인 15127명을 대상으로 하였다. 식습관과 관련된 만성질환인 당뇨병, 고혈압, 이상지질혈증을 대상으로 하였으며 각 질환은 '의사에게 각 질환을 진단 받은 적이 있습니까?'라는 질문에 '예'라고 답한 것으로 하였다. 영양표시 이용 여부는 '가공식품을 사거나 고를 때 '영양표시'를 읽으십니까?'라는 질문에 '예'라고 답한 것으로 정의하였으며, 영양표시 비이용자는 영양표시를 읽지 않는다고 답한 사람과 영양표시를 모른다고 답한 사람을 합하였다. 영양표시 이용자들 중 '영양표시 항목에서 가장 관심 있게 보는 영양소는 무엇입니까?'라는 질문에 대한 응답으로 관심 영양소를 정의 하였다. 자료 분석은 가중치를 고려하여 로지스틱회귀분석을 사용하였다.

연구결과: 남성보다 여성이, 나이가 어릴수록, 소득수준이 높을수록, 교육수준이 높을수록 영양표시를 이용하는 비율이 높았다. 배우자가 있는 사람이 그렇지 않은 사람에 비해 영양표시를 이용하는 비율이 더 높았다. 영양표시를 사용하지 않는 사람에 비해 사용하는 사람은 질환을 하나라도 가지고 있는 사람들의 경우에 1.11배 높았으나, 유의하지 않았다. 당뇨환자들 중에서는 1.03배, 이상지질혈증 환자들 중에서는 0.98배 높았으나 이들 또한 유의하지 않았다. 하지만 고혈압 환자의 경우에는 영양표시를 사용하는 사람이 유의한 값을 보였다(OR:1.26, CI:1.09-1.46). 관심영양소와 환자들과의 관계에서는 질환을 하나라도 가지고 있는 사람이 탄수화물을 가장 많이 선택했다.(OR:2.18, CI:1.57-3.04) 당뇨병 환자들은 탄수화물을 가장 많이 보는 것으로 나타났으며(OR"5.33, CI:3.52-8.05) 이상지질혈증 환자들은 탄수화물(OR:2.04, CI:1.39-2.99)과 지방(OR:1.37, CI:1.09-1.71)을 많이 보았다. 고혈압환자들은 나트륨을 많이 확인하는 것으로 나타났으나(OR:1.21, CI:0.83-1.77) 유의하지 않았다.

결론: 이 연구는 만성질환 환자들의 영양표시 이용과 관심영양소 분석을 통해 식이조절이 필요한 만성질환 환자들의 영양표시 이용 실태를 알아보았다. 질환을 하나라도 가지고 있는 군, 당뇨병 군, 고혈압 군에서 영양표시 이용을 더 많이 하는 것으로 나타났으나 고혈압을 제외하고는 유의하지 않았다. 당뇨환자들의 경우에는 영양표시 중 관심 영양소를 탄수화물을 선택한 경우가 유의하게 높게 나타났고, 이상지질혈증의 경우에도 지방을 선택한 경우가 유의하게 높았으나, 고혈압의 경우에는 유의한 결과가 없었다. 이 결과는 만성질환 환자들을 대상으로 한 영양표시 교육 및 정책의 기초자료로 사용될 수 있을 것이며, 노인의 비율이 높은 만성질환 환자들의 특성 상 보다 효과적인 영양표시 방법의 개발에도 도움이 될 것이다.

주요어: 영양표시, 만성질환, 관심영양소
학번: 2016-24016