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Nutrition Labels: Attention to, Understanding and Use in Food Choice by People Referring to Health Houses in Tehran, Iran

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A B S T R A C T

Background: Nutrition labels can be used as a guide for choosing healthier foods and adopting a better diet. The aim of this study was to determine users' attention to, understanding, and, use of nutrition labels and their relationship with sociodemographic characteristics and anthropometric status.

Methods: This cross-sectional study was conducted from spring to summer 2017. Using random cluster sampling, a total of 384 adults were selected from among the people referring to health houses in Tehran. Data were collected using a researcher-designed questionnaire completed by interviewing the subjects and analyzed through stepwise multiple regression analysis.

Results: Women were more prone to pay attention to nutrition labels (P=0.05). People with academic education understood nutrition labels (about 7 times) more than other people (P=0.02). Furthermore, the participants' understanding of nutrition labels decreased with aging (P< 0.001). People with a higher economic level and a recent history of going on a specific diet used nutrition labels more than other people (P<0.001). In addition, people with a history of diabetes mellitus were more likely to pay attention to nutrition labels (P=0.03) and use in food choice (almost 8 times more than healthy subjects) (P=0.04).

Conclusion: Attention to, understanding and use of nutrition labels by the subjects were strongly associated with age, economic status, educational level and recent history of going on a particular diet. Individuals with a normal body weight paid more attention to, and were willing to use the information contained in, food labels.

Introduction

Unhealthy diet is recognized as one of the risk factors for non-communicable diseases [1]. Nutrition information on food labels (FLs) can be used as a guide for choosing healthier food and adopting a better diet [2]. One of the important information on FLs is nutritional facts table that provides information about energy and nutrients (such as protein, carbohydrate, total fat, saturated fat, trans-fat, salt, sugar, vitamins and minerals) [3]. The amount of nutrients and energy are determined in a serving of a food product (a specific amount of food that all of food label information is based on). Other information presented on FLs are nutrition claims (such as "low fat" or "good source of fiber") and health claims (such as statements about health properties of probiotics) [4-5]. The new nutrition labeling system utilizes color markers or traffic lights, in which colors are used to represent low (green), medium (amber), or high (red); the colors determine the amount of certain nutrients that the public health system in every community recommends to be limited (such as sugar, total fat, salt, and trans-fatty acids in Iran) [5].

Many health issues may be improved by enhancing the effectiveness of FLs; hence, a wide range of consumer research studies have tried to find answers to the following questions: Do consumers pay attention to nutrition

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information on FLs? Is it easy for consumers to understand this information on FLs? Do they use this information in their choices?

The effectiveness of FLs is also associated with individual factors such as gender, social factors such as education, economic status, etc. Review study have shown that women, people with higher incomes, those who are worried about their health, and those with a higher level of education are more likely use FLs [6]. Additionally, a study in North Carolina showed adults who try to lose weight are more likely to use FLs as a guide to choose healthy foods [7].

A small number of studies have been conducted on this topic in Iran. Therefore, this study aimed to evaluate the level of users' attention to, understanding, and, use of the information on FLs and their relationship with sociodemographic characteristics and anthropometric status of people referring to health houses of Tehran in 2017.

Subjects and methods

Study Design and Participants

This cross-sectional study was conducted on people referring to Tehran health houses from spring to summer 2017. The health houses are subdivisions of Saraye-Mahalleh (named by Tehran municipality in different parts of Tehran) and included various clubs such as the Elderly club, Youth Club, Mother and Baby Club, Obesity Prevention Club, Diabetes Prevention Club, etc. People of different age and sex groups refer to these health houses to take advantage of very cheap services provided there. Sample size was determined by using Cochran formula. Using random cluster sampling method, a total of 384 adults aged above 20 years old were selected equally from among people referring to health houses in four regions of Tehran (northeast, northwest, southeast, and southwest of Tehran). Inclusion criteria were adults over 20 years old and were responsible for food purchasing for the household. We did not exclude anyone.

Data Collection

A questionnaire that was designed in two sections. The first part some questions regarding nutrition information on FLs such as nutrition claim, health claim, size of serving, energy per serving, nutrition facts table, and color markers (or traffic lights). The second part was used to collect data on sociodemographic and anthropometric factors. The questionnaire was finalized by professors' opinions in Department of Community Nutrition and completed by interview after obtaining written informed consent from all participants.

Nutrition information on FLs data. First of all, we collected the professors' opinions in Department of Community Nutrition, since each section of nutrition information on FLs hasn't same information value. Accordingly, a weighted mean score of 1 to 10 was obtained for each part of the label (Table 1).

Table 1. Weighted Mean Score for Each Part of Information

Nutrition information	Weighted mean score*
Nutrition claim	5.3
Health claim	3.9
Serving size	4.1
Energy per serving	4.7
Nutrition facts table	8.6
Color markers or traffic lights	8.4

*Weighted mean score of 1 to 10 was obtained from mean professors' opinions

The participants' attention to nutrition information was assessed by evaluating their responses to the following six questions: Do you pay attention to words such as "low fat", "low calorie" or "high source of fiber" on FLs? Do you pay attention to words including "probiotic product" or "semolina product" on FLs? Do you look at information about the "size of serving" on FLs? Do you look at the "energy per serving" on FLs? Do you look at the "nutrition facts table"? Do you look at the "color markers" on FLs? The participants answered the questions using a Likert-type scale with five options: always, most of the time, sometimes, rarely, and never.

The participants' understanding of nutrition information was measured by evaluating their response to the following questions: Is it easy to understand "the above-mentioned phrases" on FLs? The participants answered the questions using a Likert-type scale with five options: perfectly (very easy), somewhat easy, moderate (somewhat difficult), slightly (difficult), and at all (quite difficult).

The participants' use of nutrition information was assessed by evaluating their responses to the following question: Do you use "the above-mentioned phrases" when making a choice to buy or consume a food product? For example, I buy or consume a low-fat product; I am more inclined to buy or consume a product with the term "probiotic" printed on the label, rather than a similar product without this label; I use the "size of serving" to choose the amount of food

consumed; I use this information to choose a specific food product when shopping or adjust my intake when consuming that food product. The participants answered the question using a Likert-type scale with five options: always, most of the time, sometimes, rarely, and never. Finally, we used the following Likert scale scoring systems: (2=always/most of the time, 1=sometimes, 0=rarely/never) and (2=perfectly/ somewhat easy, 1=moderate, 0=slightly/ at all).

To analyze the participants' attention to and understanding of nutrition information and use of the information, the scores obtained for attention to, understanding, and use were calculated through summing up the Likert scale points multiplied by their weighted mean score.

Sociodemographic data

These variables included sex, age, marital status, education level, household economic status, household composition, number of children, and having children less than 18 years of age. The questionnaire was also used to investigate a recent history of going on a particular diet (yes or no) and the participants' perception of their body weight (thin, normal, and obese). Moreover, an item of the questionnaire was used to investigate the history of chronic diseases such as hypertension, diabetes, and dyslipidemia [8-9].

In order to determine household economic level, the participants were asked about the number of facilities available at home (including furniture, personal car, automatic washing machine, LCD TV, dishwasher, side-by-side refrigerator, handcraft carpet, computer/ Laptop, and microwave) and the status of home ownership (personal, rented, etc.).

Anthropometric data

Anthropometric status of the participants was assessed by a nutritionist. Their height was measured using a meter strip, and their weight was measured using a pre-calibrated digital Seca scale. Participants were weighed fully clothed, but without their shoes. Body mass index (BMI) was determined by dividing weight in kilograms (kg) by height in meters squared (m^2); it was used to assess each person's weight status. The World Health Organization (WHO) cut points [10] were used to classify the subjects as underweight, normal weight, overweight, and obese.

Data Analysis

The level of attention to, understanding, and use of nutrition information on FLs for each participant were determined using the obtained score.

We evaluated the association between attention, understanding, and use of nutrition information as our outcomes and other variables as our explanatory variables. The stepwise multiple regression method was used to determine the associations. All the analyses were performed using SPSS software version 16. Findings were considered as significant when $P< 0.05$.

Results

Socioeconomic and Anthropometric Data

The general characteristics of the studied participants are presented in (Table 2). In this study, 113 persons were male (29.4%) and 271 persons were female (70.6%), and the mean age of the participants was 39.5±12.27 years.

Table 2. Socioeconomic and Anthropometric Data for People Referring to Health Houses of Tehran

Characteristics		
Sex, n=384		
Male, n (%)	113	(29.4)
Female, n (%)	271	(70.6)
Age, n=382		
mean(±SD)	39.52	(12.27)
Marital status, n=383		
Single, n (%)	80	(20.9)
Married, n (%)	291	(76)
Divorced or widowed, n (%)	12	(3.1)
Educational status, n=384		
Under high school, n (%)	39	(10.2)
High school graduate, n (%)	126	(32.8)
University graduate, n (%)	219	(57)
Household economic level, n=375		
mean(±SD)	6.85	(2.55)
household composition, n=383		
mean(±SD)	3.35	(1.27)
Number of children, n=383		
mean(±SD)	1.56	(1.33)
Having child under 18 years old, n=383		
No, n (%)	212	(55.2)
Yes, n (%)	171	(44.5)
History of disease, n=384		
History of diabetes, n (%)	58	(15.1)
History of hypertension, n (%)	64	(16.7)
History of dyslipidemia, n (%)	75	(19.5)
Person's perception of body weight, n=384		
Thin, n (%)	35	(9.1)
Normal, n (%)	212	(55.2)
Obese, n (%)	137	(35.7)
Recent history of following a specific diet, n=384		
No, n (%)	260	(67.7)
Yes, n (%)	124	(32.3)

Table 2. Socioeconomic and Anthropometric Data for People Referring to Health Houses of Tehran		
BMI, n=384		
mean(±SD)	25.69	(4.11)
BMI status, n=384		
Underweight, n (%)	8	(2.1)
Normal, n (%)	160	(41.7)
Overweight, n (%)	164	(42.7)
Obese, n (%)	52	(13.5)

*number of facilities available at home (including furniture, personal car, automatic washing machine, LCD TV, dishwasher, side-by-side refrigerator, handcraft carpet, computer/Laptop, and microwave) and the status of home ownership (personal)

Attention to Nutrition Information on FLs

Almost half of the participants (49.7%) always paid attention to nutritional claims on FLs, while only less than 10 percent (8.1%) reported that they always paid attention to color markers (Figure 1). The mean score of attention was 47.2 (out of 100).

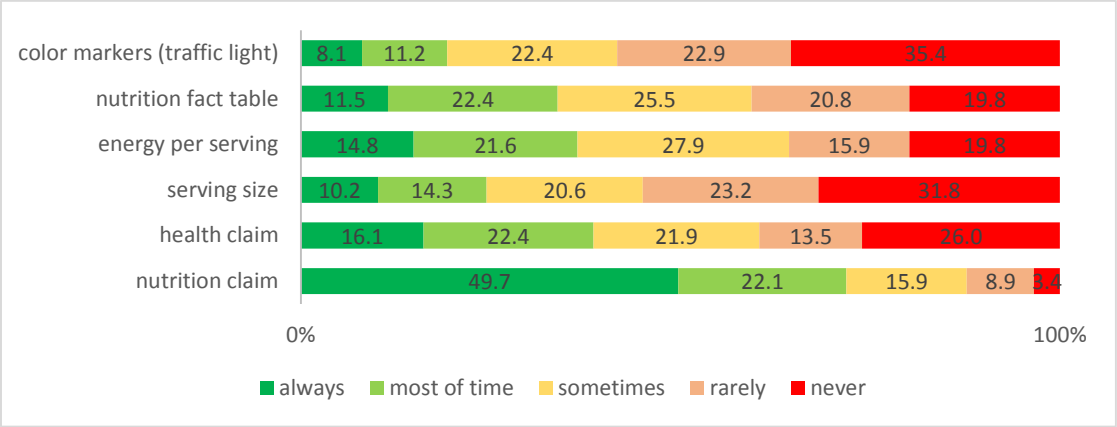

Figure 1. Attention to Nutrition Information on Food Labels for People Referring to Health Houses of Tehran

Linear regression model showed that the use of nutrition information was significantly influenced by age, level of education, history of going on a particular diet, history of diabetes, economic level, and sex. As compared with men, women were more prone to pay attention to nutrition information (P=.05). Women's attention score was about 6 times higher than that of men. Moreover, with aging, the level of people's attention to nutrition information on FLs decreased (P=.006). People with a higher economic level significantly paid more attention to nutrition information on FLs (P<.001). People with a recent history of going on a specific diet significantly paid more attention to nutrition information (10 times more than other people) (P<.001). In addition, people with a history of diabetes mellitus were more likely to pay attention to this type of information (8.22 times more than healthy subjects) (P=.03) (Table 3).

Understanding of Nutrition Information on FLs

As reported by the studied individuals, among all the phrases or information on FLs, the "nutrition claims" were the most understandable (the easiest) and the "color markers" were the least understandable (most difficult) part of the FLs. More than half of the people (65.4%) reported that they "perfectly" understood the nutrition claims on FLs, and almost a quarter of the people (23.7%) did not understand the color markers "at all" (Figure 2). The mean score of understanding was 70.78 (out of 100).

Table 3. Correlation Between Attention, Understanding and Using Score and Effective Variables (Regression Step by Step Forward Model) for People Referring to Health Houses of Tehran (n=384)					
Variables					
Attention Score	B	SE	β	t	P
constant	32.794	6.185		5.302	.000
Age, (years)	-.324	.116	-.143	-2.791	.006
Educational status, (Not having university education)	6.060	3.154	.108	1.921	.055
Having history of diabetes, (not having)	8.220	3.771	.106	2.180	.030
History of following a particular diet, (not having)	10.503	2.905	.176	3.615	.000
Economic level, (number of items)*	2.091	.593	.192	3.525	.000
Sex (male)	6.108	3.053	.100	2.000	.046
Understanding Score	B	SE	β	t	P

Table 3. Correlation Between Attention, Understanding and Using Score and Effective Variables (Regression Step by Step Forward Model) for People Referring to Health Houses of Tehran (n=384)					
constant	63.233	6.015		10.512	.000
Age (years)	-.533	.112	-.247	-4.758	.000
Educational status (Not having university education)	7.049	2.986	.132	2.361	.019
History of following a particular diet, (not having)	7.543	2.732	.133	2.761	.006
Marital status, (single)**	7.064	3.130	.113	2.256	.025
Economic level, (number of items)*	1.671	.559	.161	2.991	.003
Sex, (male)	7.423	2.879	.128	2.578	.010
Using Score	B	SE	β	t	P
constant	23.911	5.765		4.148	.000
Economic level, (number of items)*	2.564	.570	.234	4.498	.000
History of following a particular diet, (not having)	12.182	2.862	.202	4.257	.000
Educational status, (Not having university education)	8.048	3.049	.142	2.640	.009
Age, (years)	-.312	.114	-.137	-2.750	.006
Having history of diabetes, (not having)	7.507	3.712	.096	2.022	.044

*Number of living facilities available at home and ownership of house, **Single, divorced or widowed were considered in one group,

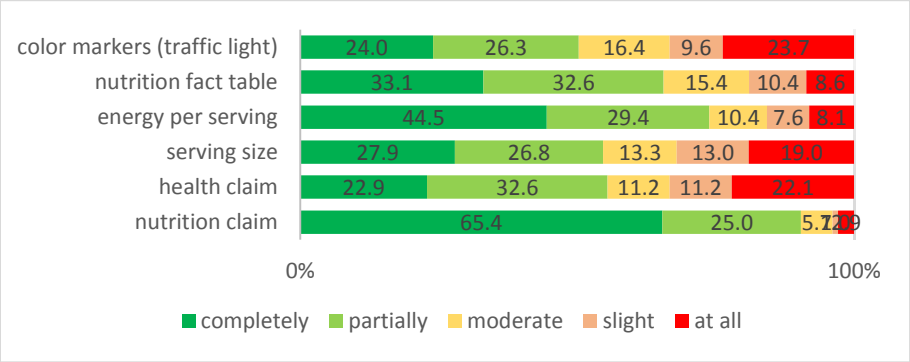

Figure 2. Understanding of Nutrition Information on food labels for People Referring to Health Houses of Tehran

Linear regression model showed that the participants' understanding of information on FLs was significantly influenced by age, level of education, marital status, history of going on a particular diet, economic level, and sex. People with academic education understood information on FLs (about 7 times) more than the other people (P=.02). Furthermore, the participants' understanding of FLS decreased with aging (P<.001). The score of understanding was significantly higher (almost 7 times) among those with a recent history of going on a specific diet (P=.006). People with a higher economic level understood nutrition information on FLs more significantly (P=.003). Women understand this information (about 7 times) more than men (P=.01) (Table 3).

Use of Nutrition Information on FLs

According to the participants, "nutrition claims" were more useful than other information, and almost one third of the subjects (32.8%), "always" used nutritional claims on FLs for making a food choice. As they reported, "Color markers" were less useful than other sections and almost half of the people "never" used it (Figure 3). The mean score of the use was 39.16 (out of 100).

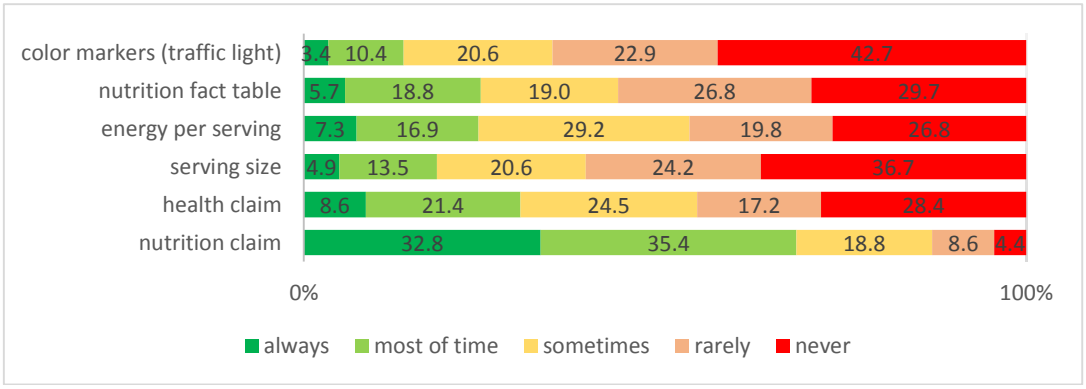

Figure 3. Use of Nutrition Information on food labels for People Referring to Health Houses of Tehran

Table 3 presents the correlation between use score and effective varia¬bles. Linear regression model showed that people with a higher economic level used the information on FLs more than other people (P<.001). People with academic education used the information on FLs more significantly (about 8 times) than other people (P=.009). In addition, the use of nutrition information on FLs decreased with aging (P=.006). People with a recent history of going on a specific diet used the information on FLs more significantly (12 times) than other people (P<.001) and people with a history of diabetes mellitus were more likely to use nutrition information (7.51 times) than the healthy subjects (P=.04).

Discussion

The aim of this study was to assess the users' attention to, understanding, and, use of the information on FLs and their relationship with sociodemographic characteristics and anthropometric status.

Individuals may look at the nutrition information on FLs, but it does not necessarily mean that the information printed on FLs affects their choices. In this study, we tried to answer the differences; for example, half of the participants always paid attention to nutritional claims on FLs and nearly a third of the people always considered nutritional claim when making a choice. However less than 10% of the studied people always paid attention to color markers and less than 5% always used them when making a choice. In a study by Jessie et al., almost half of the studied people often used the nutrition facts table [7]. In our study, only one-quarter of the participants always or often used the nutrition fact table, this finding may be due to the fact that people often ignore the valuable role of the nutrition facts table, or even disregard FLs as a tool to improve their food choices.

A review showed that traffic light labels might be more effective [11]. Based on the results of our study, traffic lights received less attention and were less utilized, as compared with other parts of the label; it can be attributed to the fact that this labeling policy has been recently introduced and used in Iran and thus it is new to the consumers. The print of color markers or traffic lights on FLs by manufacturers has become mandatory about two years ago [5], therefore, more time is needed to raise people's awareness of this policy.

Nielson's global report showed that full understanding of nutrition labels is low [12]. In our study, users' understanding of nutrition information on FLs was not low. The participants' understanding of color markers and nutritional claims on FLs, respectively, were at the lowest and highest level.

In the present study, women paid more attention to information, which is in line with the results of previous studies [8-9, 13-14]. Review studies have shown that women are more likely than men to pay attention to nutritional labels [15-17]. In addition, this study showed that women had a better understanding of nutrition information than men. This can be due to the fact that women are more likely to participate in health programs. Consistent with other studies [13, 9, 18], the levels of attention to, understanding, and use of information were higher in younger people. Possibly, younger people value prevention more than cure. This study showed that a higher level of education was associated with higher levels of attention to, understanding, and use of information; our finding supports the results of previous studies [7-8, 13-14, 18-19]. Previous studies have shown that married people used nutrition labels more than singles [16-20] but in our study there was no relationship between marital status and the use of nutritional information. Consistent with the published studies [13-14, 18, 21], we observed that those with a better economic status paid a higher level of attention to and more frequently used this information. This is probably due to the fact that for people with a low economic level, other factors such as price and financial aspects may be more important than health and nutritional factors.

Previous studies have found that adults with chronic diseases more frequently use nutrition facts on FLs [22-23]. According to a study in Korea, people with a history of lipid disorders, diabetes, and high blood pressure are more likely to read nutrition labels [9]. In our study, people with a history of diabetes paid more attention to nutrition information and used this information for making food choices. This is likely due to the fact that; such people are more concern about food choices.

Earlier studies on adults have also shown that obesity is associated with increased attention to certain sections of the nutrition label, which likely indicates people's concern about weight loss or health conditions [24]. A recent study indicated that adults whose current weight is more than their optimal weight are more likely to

use calorie information on food packaging [25]. Contrary to our expectations, there was no statistically significant relationship between BMI and the levels of attention to, understanding, and use of the information.

The results of our analysis also showed that those who recently went on a particular diet paid more attention to nutrition information on FLs and used information when making their food choices; it supports the findings of previous studies [7, 14, 26] . In future studies, we can examine the use of information by diet quality.

Our study had some limitations. First, our study included only those who referred to health houses (those who were more interested in health programs) and we did not include people who were less concerned about health plans. Further studies are recommended to compare the two above-mentioned groups. Second, in our study, the type of food product was not determined. The use of information in food choices are not the same in different types of food packaging (dairy products, carbonated beverages, and salty or sweet snacks such as chips or cakes). Other studies are needed to find out in which type of food products, people are more inclined to read and use nutrition information on FLs.

Based on the findings of this study, it can be concluded that attention to, understanding and use of nutrition labels by the subjects were strongly associated with age, economic status, educational level and recent history of going on a particular diet. Individuals with a normal body weight paid more attention to, and were willing to use the information contained in, food labels, but the association was not statistically significant.

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Conflict of interest

None of authors have conflict of interests.

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Authorship

Mansouri P and Dorosti-Motlagh AR participated in formulating the research question, designing and analyzing the study. Mansouri P participated in writing the manuscript. Djazayery A participated in designing the study and final revision of the manuscript.

Ethical Standards Disclosure

This study was conducted according to the guidelines laid down in the Helsinki Declaration of 1975 as revised in 1983 and all procedures involving human subjects/patients were approved by the Ethics Committee of the research deputy of the Islamic Azad University, Science and Research Branch. Written informed consent was obtained from all participants.

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