

ORIGINAL

Nutritional Education

Editor

Lígia Amparo da Silva Santos

Conflict of interest

The authors declare that there are no conflict of interests.

Received

April 25, 2023

Final version

November 8, 2023

Approved

February 8, 2024

Factors affecting nutrition literacy: a pilot study among Turkish adults

Fatores que afetam a alfabetização em nutrição: um estudo piloto entre adultos turcos

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How to cite this article: Oral EA, Kiziltan G. Factors affecting nutrition literacy: a pilot study among Turkish adults. Rev Nutr. 2024;37:e230074. <https://doi.org/10.1590/1678-9865202437e230074>

ABSTRACT

Objective

The aim of this study was examined the effects of sociodemographic characteristics and health status of adults on nutritional literacy.

Methods

This cross-sectional study was conducted among adults (aged >20 years) in Ankara, Turkey between April to June 2022. The first part of the survey consisted of questions aimed at determining the sociodemographic characteristics and health status of the individuals. In the second part, the Nutrition Literacy Instrument adopted in Turkish was utilized to assess the nutrition literacy status of the participants. Based on this scale, a score above 38 was classified as “adequate”, a score between 29 and 38 as “borderline” and a score below 29 as “inadequate”.

Results

In this study 676 individuals was participated, among whom 50.6% (n=342) were women and 49.4% (n=334) were men. The average total nutritional literacy score of the individuals was 33.06 ± 3.49 . It was found 9.3% of Individuals had inadequate nutrition literacy, 87.4% had borderline nutrition literacy, and 3.3% had adequate nutrition literacy. Nutrition literacy levels were found to be statistically significant between genders, with women exhibiting greater levels of nutrition literacy than men ($p < 0.05$). Furthermore, a significant relationship was found between education levels and nutritional literacy ($p < 0.05$). Specifically, individuals who graduated from high school and university demonstrated higher levels of nutritional literacy compared to those who graduated from primary and secondary school.

Conclusion

It has been determined that gender and education among socio-demographic characteristics have a significant effect on nutritional literacy.

Keywords: Body mass index. Education. Gender. Health. Nutrition literacy.

RESUMO

Objetivo

O objetivo deste estudo foi examinar os efeitos das características sociodemográficas e do estado de saúde de adultos sobre o letramento nutricional.

Métodos

Este estudo transversal foi realizado entre adultos (>20 anos) em Ancara, Turquia, entre Abril a Junho de 2022. No formulário, na primeira parte, havia perguntas para determinar características sociodemográficas e estado de saúde dos indivíduos. Na segunda parte, o Instrumento de Alfabetização Nutricional adotado em turco foi usado para determinar o estado de alfabetização nutricional dos indivíduos. De acordo com essa escala, uma pontuação acima de 38 foi classificada como “adequada”, uma pontuação entre 29 e 38 como “limítrofe” e uma pontuação abaixo de 29 como “inadequada”.

Resultados

Participaram deste estudo 676 indivíduos, dos quais 50,6% (n=342) eram mulheres e 49,4% (n=334) eram homens. A média do escore total de alfabetização nutricional dos indivíduos foi de 33,06±3,49. Verificou-se que 9,3% dos indivíduos tinham alfabetização nutricional inadequada, 87,4% tinham alfabetização nutricional limítrofe e 3,3% tinham alfabetização nutricional adequada. Os níveis de alfabetização nutricional foram estatisticamente significativos entre os gêneros, sendo que os níveis de alfabetização nutricional das mulheres foram maiores do que os dos homens ($p<0,05$). Encontrou-se relação significativa entre escolaridade e alfabetização nutricional ($p<0,05$). O nível de alfabetização nutricional dos indivíduos com Ensino Médio e Superior se mostrou mais adequado em relação aos indivíduos com Ensino Fundamental e Médio.

Conclusão

Foi determinado que o gênero e a educação entre as características sociodemográficas têm um efeito significativo na alfabetização nutricional.

Palavras-chave: Índice de massa corporal. Educação. Gênero. Saúde. Alfabetização nutricional.

INTRODUCTION

Nutrients play a fundamental role in healthy growth and development, improving the quality of life and preventing some chronic diseases [1]. Therefore, healthy eating habits are an important factor in improving any health promotion program [2]. If individuals can adopt healthy eating habits, it may lead to a reduction in the incidence of chronic diseases [1].

Diet and nutrition information can be easily reached through various resources and individuals, allowing to make informed choices about health and unhealthy foods [2]. Health literacy can be defined as understanding health and nutrition, requiring adequate literacy and numeracy skills as well [3]. According to the World Health Organization health literacy is defined as “cognitive and social skills that determine the motivation and ability of individuals to access, understand and use information in ways to promote and maintain good health” [2,3]. The levels of health literacy of individuals is correlated with educational qualifications, socioeconomic level, ethnicity, living and working conditions, and also culture. Individuals with lower health literacy often encounter significant difficulties in understanding nutrition-related issues. For this reason, Nutrition Literacy (NL) is regarded as a domain of health literacy [1].

Previous studies mostly defined Nutrition literacy as “the degree to which individuals have the capacity to obtain, process, and understand basic nutrition information and nutrition services needed to make appropriate health decisions” [2-4]. Moreover, NL is defined as an individual’s ability to receive, process and understand nutrition information, along with the capability to adopt appropriate, adequate and healthy eating behaviors [1].

Nutrition literacy can be categorized as functional, interactive and critical nutrition literacy. Functional nutrition literacy can be defined as an individual’s capacity to understand and comprehend nutrition concepts and messages. Interactive nutrition literacy can be defined as the cognitive skills necessary to address nutrition issues when interacting with partners, professionals and affiliated stakeholders. Critical nutrition literacy can be defined as an individual’s capacity to critically evaluate

nutrition information, raise awareness among peers and the social environment, and be active in addressing nutrition issues and barriers [5]. The goal of nutritional literacy is to increase an individual's ability to make informed decisions about dietary intake, identifying which food is better and how much is essential to their health. Thus, nutrition literacy serve as a fundamental principle in promoting healthy eating habits as well as promoting overall health [6].

The NL is an important concept because inadequate NL can hinder the adoption of a healthy diet, which is often associated with a high prevalence of chronic diseases. However, there are relatively few adequately validated tools available to measure NL and these tools vary considerably [7]. Addressing nutrition literacy can be achieved through strategies that incorporate a technological component aiming to enhance the quality and dissemination of nutrition education. Mothers are an ideal target group for nutrition education intervention, because the primary meal decision makers in family households, preparing meals and serving as role models for health practices [8].

Similar to healthy literacy, nutritional literacy is influenced by socio-demographic characteristics such as age, gender, educational status, socio-economic level, and nutritional habits [9]. The aim of this study is to investigate the impact of sociodemographic characteristics and health status among adult individuals on nutritional literacy.

METHODS

This study is a cross-sectional study conducted in Ankara between April 2022 and June 2022. The study included individuals aged 20 and above, excluding, pregnant and lactating individuals. In this study, it was planned to work with at least 619 individuals in order to determine a small effect size ($f^2=0.04$) with 95% confidence and 5% error probability using the multiple linear regression method. A total of 676 individuals participated in the study, comprising 50.6% women and 49.4% men. The sampling size was calculated using the power analysis program G*Power 3.1.3 (Franz Faul, Universitat Kiel, Germany).

The individuals in this study participated voluntarily. The questionnaire, which included sociodemographic characteristics, health status, and the nutritional literacy scale was prepared using Google Forms. It was distributed online to individuals who met the criteria through social media platforms such as Facebook, Twitter and Instagram utilizing the accounts of the researchers. In the sociodemographic characteristics section, gender, age, educational status, marital status were included. In the health status section, questions were asked about disease status and diet history. Cardiovascular diseases, diabetes, hypertension, hyperlipidemia, and endocrine diseases were classified as cardiometabolic diseases. While dietitians and doctors were considered as "health professional" as sources of nutritional information, books, magazines and social media sources were analyzed under the title of "others".

Nutritional Literacy Scale (NLS)

The Turkish adaptation, validity and reliability study, of the Nutrition Literacy Assessment Instrument, originally developed by Gibbs [10], to determine the nutritional literacy status of individuals, was conducted by Yıldırım M et al. [11], "Nutrition Literacy Assessment" was used. The Nutrition Literacy Assessment measures both reading comprehension and an individual's ability to understand nutritional information. It consists of 6 questions about general nutritional knowledge in the first part, 6 questions about reading comprehension in the second part, 16 questions about

the food groups in the third part, 6 questions about the portion amounts in the fourth part, and 6 questions about reading food labels in the fifth part. Each correctly answered question earns “1 point”, while incorrect questions answers or unanswered questions receive “0 points”. A score above 38 indicates “adequate NL”, a score between 29 and 38 “borderline NL” and a score lower 29 shows “inadequate NL”.

Statistical Analysis

In comparisons between groups, the characteristics of the participants were compared using the Pearson chi-square test for categorical variables, and Student's *t*-test and analysis of variance (ANOVA) for continuous variables. Data were presented as percentages (%) and absolute values (n) for categorical variables and as mean and Standard Deviation (SD) for continuous variables. Multiple linear regression analysis was conducted with adjustments for age, gender, marital status, education, cardiometabolic disease, Body Mass Index (BMI) and nutrition information resource to assess factors related to nutrition literacy. The results from the multiple linear regression analysis are presented as β (standardized coefficients beta) \pm SE (standard error). A standardized beta coefficient compares the strength of the effect of each individual independent variable to the dependent variable. Standardized coefficients are unitless and indicate how many standard deviations a dependent variable will change, per standard deviation increase in the predictor variable. The higher the absolute value of the beta coefficient, the stronger the effect. Statistical analysis was performed using the IBM®SPSS® version 26.0 (SPSS Inc., Chicago, IL, USA). All statistical tests were two-sided and the significance level was set as $p < 0.05$.

The study protocol was approved by the Baskent University Institutional Review Board and Ethics Committee (n° KA22/136). Informed consent was obtained from all participants. The study was conducted in accordance with the principles of the Declaration of Helsinki.

RESULTS

Table 1 presents the sociodemographic and health-related characteristics and BMI values of the individuals. The average age for women and men's was 31.1 ± 10.62 and 30.8 ± 10.63 years, respectively. There were no significant differences observed in the years and levels of education between men and women ($p > 0.05$). However, women exhibited a higher prevalence of cardiometabolic diseases ($p < 0.05$) and tended towards having an adequate level of health nutrition compared to men ($p > 0.05$). Upon examining the nutritional information sources of individuals are examined, it was noted that women receive more information from health professionals than men ($p < 0.05$). The body mass index was 22.7 ± 3.63 kg/m² for women, 25.5 ± 3.82 kg/m² for men ($p < 0.05$). When comparing the BMI categories between the genders, the frequency of overweight and obesity individuals was significantly higher in men as compared to women ($p < 0.05$).

The average total nutritional literacy score of the individuals was 33.1 ± 3.49 (Table 2). Women exhibited higher scores in general nutritional information and nutritional content understanding compared to men ($p < 0.05$). The mean food portion determination scores of women were 3.93 ± 1.17 whereas for men, they were 3.38 ± 1.32 ($p < 0.05$). No difference was observed between genders in food group determination and reading and understanding of food labels ($p > 0.05$). The average total nutritional literacy for women, while for men it was 33.70 ± 3.23 and 32.4 ± 3.63 , and this difference was statistically significant ($p < 0.05$). It was determined that 9.3% of the individuals had inadequate nutrition literacy, 87.4% had borderline nutrition literacy, and 3.3% had adequate

nutrition literacy. Women exhibited higher levels of borderline nutrition literacy (90.3% vs 84.4%) and adequate nutrition literacy (4.4% vs 2.1%) compared to men and the differences in nutrition literacy levels between genders were found to be statistically significant ($p < 0.05$) (Table 2).

Nutritional literacy levels according to sociodemographic characteristics and body mass index values were shown in Table 3. Among individuals with adequate nutrition levels, 45.5% were normal weight, 40.9% were overweight and 13.6% were obese. A statistically significant difference was observed between nutritional literacy levels according to BMI ($p < 0.001$). Also, there were significant differences were found between age, education and nutritional literacy levels ($p < 0.05$).

Table 1 – Sociodemographic and health-related characteristics and body mass index for men and women and in total. Ankara, Turkey, April to June 2022.

Sociodemographic and health-related characteristics and body mass index	Men (n=334)	Women (n=342)	Total (n=676)	<i>p</i>
Age - Mean±SD	30.8±10.63	31.1±10.62	30.9±10.62	0.744
Marital Status - % (n)	36.8 (123)		36.2 (245)	0.755
Married	63.2 (211)	35.7 (122)	63.8 (431)	
Single		64.3 (220)		
Education years - Mean±SD	11.7±3.88	12.3±3.78	12.0±3.83	0.076
Education - % (n)				0.198
Primary school	9.6 (32)	6.1 (21)	7.8 (53)	
Secondary school	27.2 (91)	26.6 (91)	26.9 (182)	
High school	25.4 (85)	23.1 (79)	24.3 (164)	
University / Post Graduate	37.7 (126)	44.2 (151)	41.0 (277)	
Cardiometabolic diseases - % (n)				0.030*
Yes	8.7 (29)	14.0 (48)	11.4 (77)	
No	91.3 (305)	86.0 (294)	88.6 (599)	
Nutrition information resource - % (n)				0.044*
Health professionals	60.5 (107)	70.2 (144)	65.7 (251)	
Others	39.5 (70)	29.8 (61)	34.3 (131)	
Adequate Level of Healthy Nutrition - % (n)				0.224
Yes	50.6 (169)	55.3(189)	53.0 (358)	
No	49.4 (165)	44.7(153)	47.0 (318)	
Body Mass Index - Mean±SD	25.5±3.82	22.7±3.63	24.1±3.99	0.001*
Body Mass Index (kg/m ²) - % (n)				0.001*
Under weight	0.9 (3)	9.9 (34)	5.5 (37)	
Normal	50.9 (170)	69.6 (238)	60.4 (408)	
Overweight	37.1 (124)	16.1 (55)	26.5 (179)	
Obesity	11.1 (37)	4.4 (15)	7.7 (52)	

Note: * $p < 0.05$. SD: Standard Deviation.

Table 2 – The mean scores of the subgroups of nutritional literacy and distribution of adequate nutrition literacy levels for women and men. Ankara, Turkey, April to June 2022.

Nutritional Literacy Score	Men			Women			Total	<i>p</i>
	Mean±SD	Min	Max	Mean±SD	Min	Max	Mean±SD	
General nutritional information	4.89±1.07	1.0	6.0	5.16±0.88	2.0	6.0	5.02±0.98	0.002*
Nutritional content understanding	5.25±1.04	0.0	6.0	5.49±0.74	2.0	6.0	5.37±0.91	0.001*
Food group determination	14.20±1.33	9.0	16.0	14.38±1.33	8.0	16.0	14.29±1.33	0.306
Food portion determination	3.38±1.32	0.0	6.0	3.93±1.17	1.0	6.0	3.66±1.27	0.000*
Reading and understanding of food labels	4.68±1.39	0.0	6.0	4.74±1.30	0.0	6.0	4.71±1.35	0.202
Total nutritional literacy	32.4±3.63	20.0	39.0	33.70±3.23	22.0	39.0	33.1±3.49	0.000*
Nutritional Literacy Levels	Men (n=334)			Women (n=342)			Total	<i>p</i>
	n	%		n	%		% (n)	
Inadequate NL	45	13.5		18	5.3		9.3 (63)	0.000*
Borderline NL	282	84.4		309	90.3		87.4 (591)	
Adequate NL	7	2.1		15	4.4		3.3 (22)	

Note: * $p < 0.05$.

Table 3 – Nutritional literacy levels according to socio-demographic characteristics and body mass index. . Ankara, Turkey, April to June 2022.

Socio-demographic characteristics and body mass index	Nutritional Literacy Levels						X ²	p
	Inadequate NL		Borderline NL		Adequate NL			
	n	%	n	%	n	%		
Age Groups (years)							20.188	0.010*
≤20	6	9.5	44	7.4	-	-		
21-30	25	39.7	325	55.0	13	59.1		
31-40	24	38.1	110	18.6	2	9.1		
41-50	5	7.9	60	10.2	4	18.2		
≥51	3	4.8	52	8.8	3	13.6		
Education							15.309	0.018*
Primary school	7	11.1	46	7.8	-	-		
Secondary school	19	30.2	163	27.6	-	-		
High school	16	25.4	142	24.0	6	27.3		
University / Post Graduate	21	33.3	240	40.6	16	72.7		
Marital Status							0.443	0.801
Married	21	33.3	215	36.4	9	40.9		
Single	42	66.7	376	63.6	13	59.1		
Chronic disease							1.419	0.492
Yes	18	28.6	152	25.7	8	36.4		
No	45	71.4	439	74.3	14	63.6		
Body Mass Index							16.591	0.011*
Under weight	3	4.8	34	5.8	-	-		
Normal	28	44.4	370	62.6	10	45.5		
Overweight	22	34.9	148	25.0	9	40.9		
Obesity	10	15.9	39	6.6	3	13.6		

Note: * $p < 0.05$.

Table 4 displays the results of the the multiple linear regression examining the impact of age, gender, marital status, education, cardiometabolic diseases, BMI and nutrition information resource on NL. The modeling revealed that age, marital status, cardiometabolic diseases and BMI did not have a statistically significant effect on nutritional literacy. However, gender, education level and the source of nutrition information demonstrated a significant effect on nutritional literacy. In Model 7, after adjusting for age, gender, marital status, education, cardiometabolic disease, and BMI values, the NL level was found to be negatively associated with 0.124 points in men compared to women ($p < 0.05$) Also, in model 7, education in years was significantly positively associated with levels of NL ($p < 0.05$). It was observed that getting nutritional information from other sources compared to getting information from health professionals associated statistically significant positively with 0.246 points on NL ($p < 0.001$).

DISCUSSION

Non-communicable Diseases (NCD) such as cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases significantly impact human mortality in low- and middle-income countries [12]. In Turkey, NCD-related death rates are similar to those in other countries within the WHO European Region. Approximately 87.5% of all deaths in Turkey are attributed to non-communicable diseases [13]. An unhealthy lifestyle, characterized by an unbalanced diet, along with inadequate sleep, physical inactivity, psychological stress, environmental pollution, smoking, or excessive alcohol intake contributes to metabolic alterations. These alterations can serve as trigger for the development of NCD [14]. Unhealthy nutrition stands as one of the behavioral risk factors for non-communicable diseases. Besides this, low levels of nutritional literacy can lead to adverse health effects and an increase in the prevalence of chronic diseases [15]. This study shows to explore the relationship between nutritional literacy and sociodemographic characteristics and health factors among in Turkish adults.

Table 4 – Results from Multiple Linear Regression Analysis Models That Evaluated Determinants Of Nutrition Literacy. Ankara, Turkey, April to June 2022.

Socio-demographic characteristics and body mass index	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	$\beta \pm SE, p$	$\beta \pm SE, p$	$\beta \pm SE, p$	$\beta \pm SE, p$	$\beta \pm SE, p$	$\beta \pm SE, p$	$\beta \pm SE, p$
Age, years	-0.035±0.013, 0.363	-0.037±0.012, 0.324	-0.059±0.016, 0.224	-0.058±0.016, 0.224	-0.064±0.016, 0.189	-0.051±0.017, 0.312	-0.063±0.016, 0.197
Gender							
Women		-0.186±0.265,	-0.186±0.265,	-0.176±0.262,	-0.174±0.263,	-0.153±0.286,	-0.124±0.279,
Men		<0.0001*	<0.0001*	<0.0001*	<0.0001*	<0.0001*	0.002*
Marital Status							
Single			-0.034±0.350,	0.040±0.346,	0.039±0.346,	0.045±0.348,	0.042±0.337,
Married			0.474	0.402	0.415	0.346	0.364
Education, years				0.164±0.034, <0.0001*	0.160±0.035, <0.0001*	0.161±0.035, <0.0001*	0.155±0.034, 0.000*
Cardiometabolic Disease							
Yes					0.022±0.444,	0.029±0.447,	0.012±0.434,
No					0.580	0.481	0.761
BMI, kg/m ²						-0.058±0.038, 0.183	-0.071±0.037, 0.093
Nutrition information resource							
Health professional							0.246±0.266,
Others							<0.0001*

Note: * $p < 0.05$. Model 1 adjusted for age; Model 2 adjusted for age and gender; Model 3 adjusted for age, gender and marital status; Model 4 adjusted for age, gender, marital status and education; Model 5 adjusted for age, gender, marital status, education and cardiometabolic disease; Model 6 adjusted for age, gender, marital status, education, cardiometabolic disease and BMI; Model 7 adjusted for age, gender, marital status, education, cardiometabolic diseases, BMI and nutrition information resource. β : Standardized coefficients beta; SE: Standard Error.

In the study, the average total nutritional literacy level was found to be 33.06 ± 3.49 , with women displaying a higher nutritional literacy level than men. Across the subgroups of nutritional literacy, including general nutritional knowledge, nutritional content understanding and food portion determination women exhibited higher scores compared to men. Interestingly, while some studies have reported higher total nutrition literacy scores in women compared to men, there are exceptions. For instance, in studies focusing on elderly the nutritional literacy score of male individuals, was found to be higher than females [7,16,17]. However, a study by Zoellner et al. [5], found no significant difference between genders in nutritional literacy. The higher nutritional literacy scores observed in of women could be explained by the fact that women are more responsible for home nutrition practices than men. In addition, the use of different nutritional literacy tools may lead these differences.

Education plays a significant role in both health and nutrition literacy [15]. In this study, it was found with a high school education and those with university or postgraduates degrees exhibited a sufficient level of nutrition literacy compared to those with primary and secondary school education. Similarly, another study indicated that the majority of individuals with adequate nutrition literacy levels received undergraduate or postgraduate education, while most individuals with borderline nutritional literacy were high school graduates [18]. In a study carried out in Elazig in Turkey, also emphasized the importance of education level in promoting an increase in the level of nutrition literacy [19]. The opportunity for individuals to receive education on nutrition or to access references on this subject during the education period may have positively affected their nutritional literacy score.

Age is another factor that impacts nutritional literacy score. In this study, a significant difference was found between age groups and nutritional literacy levels. However, regression analyzes, revealed that the nutritional literacy score decreased as age increased. Consistent with this study, several studies in the literature have also determined inverse relationships between age and nutritional literacy score [17,20]. The active use of various sources of information by young adults may have contributed to this difference.

In this study, it was observed that individuals with normal body mass index had a higher prevalence of borderline and adequate nutritional literacy levels compared to overweight and obese individuals ($p < 0.05$). When the factors that have an effect on the nutritional literacy score were excluded, it was observed that the nutritional literacy score decreased as the BMI increased, but it was not found to be statistically significant ($p > 0.05$). Monteiro et al. [1] and Bahramfard et al. [9], showed a significant relationship between nutritional literacy levels and BMI in their studies. In contrast, some studies have not confirmed a significant difference between BMI and nutritional literacy [2,5,21]. It's possible that Individuals with normal BMI have higher nutritional literacy scores because they may be more interested in nutrition than individuals with high BMI. However, since BMI will not only be affected by the nutritional literacy level, it should be examined by considering other variables.

In this study, although the nutritional literacy score of single individuals was higher than married individuals ($p > 0.05$). Açıkkupu [19], also found that the nutritional literacy scores of single individuals were higher than those of married individuals. On the other hand, in on study, it has been found that the nutritional literacy scores of single and married individuals were similar [16].

It has been reported that there is a link between health status and nutritional literacy suggesting that individuals with insufficient health and nutritional literacy have inadequate disease management skills [4]. However, in this study, no significant difference was found in nutritional literacy levels between individuals with and without chronic disease. Although similar results were obtained in other studies [16,21], Unal et al. [22], reported that the nutritional literacy scores of individuals with chronic diseases were significantly high. This discrepancy may be attributed to the fact that individuals with chronic diseases tend to seek guidance from health professionals more frequently due to their condition, and resulting in a better understanding of nutrition. In this study, it was observed that women preferred health professionals more than men as a source of nutrition information. At the same time, it was determined that the preference of health professionals as a source of information has a positive effect on nutritional literacy. The results from studies in the literature also revealed that although social media is a popular source of information, health professionals take the first place in terms of perceived reliability [23,24].

This study has some limitations. The body weight and height values of the individuals were not measured by the researchers, and the height and body weight of the individuals were self-reported since the data were collected through google forms. Another limitation is that the individuals participating in the study are mostly young individuals.

CONCLUSION

Healthy eating behavior is affected by many factors, and nutritional literacy plays a crucial role in developing healthy eating behaviors. As demonstrated in this study, women tend to spend more time in the kitchen and show a greater interest in nutrition, resulting in higher nutritional literacy levels. It is suggested that providing men with kitchen shopping and cooking skills as much as women may contribute to increasing nutritional literacy levels. Considering that nutritional literacy levels are affected by both age and education level, it should be aimed to increase nutrition literacy levels in every period of life and at every education level. Additionally, according to the results of this study, the relationship between obesity and low nutritional literacy level should be taken into consideration by health professionals and awareness should be raised about the importance of nutritional literacy in ensuring body weight control.

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