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Examination of food literacy, health literacy, and food label reading attitudes among adult individuals living in Istanbul

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Abstract

Purpose – Given the importance of health and food literacy in interpreting food labels and making informed dietary choices, this study aimed to evaluate health and self-perceived food literacy, as well as attitudes toward food-label reading, among adults in Türkiye.

Design/methodology/approach – This cross-sectional study included adults aged 18–65 years in Istanbul, Türkiye, recruited through online snowball sampling between November 20, 2023 and March 13, 2024. Food-label reading attitudes, self-perceived food literacy and health literacy were assessed using the Food Label Reading Attitude Scale (FLRAS), Self-Perceived Food Literacy Scale (SPFLS) and Turkish Health Literacy Scale-32 (THLS-32), respectively. Data were analyzed using descriptive, correlation, group comparison and multiple linear regression analyses.

Findings – A total of 595 participants were included. Mean FLRAS, SPFLS and THLS-32 scores were 69.3 ± 17, 91.1 ± 22.8 and 30.5 ± 9.6, respectively. Significant positive correlations were observed between THLS-32 and SPFLS ($r = 0.34$), THLS-32 and FLRAS ($r = 0.24$), and SPFLS and FLRAS ($r = 0.52$) (all p-values < 0.001). Higher education, sufficient nutritional knowledge and SPFLS were independently associated with higher FLRAS. Female gender, THLS-32 and FLRAS scores were associated with SPFLS scores. Better self-rated health, sufficient nutritional knowledge and SPFLS scores were independently associated with THLS-32, whereas age was inversely associated. Findings support targeted strategies to improve food-label interpretation and public nutrition and health literacy.

Research limitations/implications – The findings cannot be generalized to the entire adult population of Istanbul or Türkiye. Future studies should incorporate representative sampling and direct assessment of label comprehension. Healthy dietary choices and attitudes enable individuals to manage their health more effectively. According to the findings of this study, food label reading attitudes, perceived food literacy and health literacy positively and significantly influenced each other. For individuals to lead a healthier life, they need to understand their own health status, acquire detailed information about the foods they consume, and correctly interpret the concepts presented on food labels. Approaches aimed at enhancing these factors will contribute to the protection and improvement of public health.

Practical implications – The findings highlight the importance of integrating food-label education with broader food and health literacy initiatives. Practical interventions should focus not only on providing nutrition information but also on developing consumers' skills to interpret nutrient declarations, ingredient lists, serving sizes, and nutrition and health claims. Such interventions may be particularly beneficial for individuals with lower educational attainment, limited nutritional knowledge, lower self-perceived food literacy, and older adults.

Social implications – This study establishes a strong relationship between Label Reading Tendency and Healthy Food Perception, underscoring the fundamental role of label literacy in promoting public health. Demographic variances observed in label reading status indicate significant inequity in consumers' ability to

Conflicts of interests: The authors declare that there are no conflicts of interest in this study.

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access and use health information. The findings necessitate that public policies mandate targeted label literacy training aimed at mitigating these disparities, thereby strengthening healthy food perception and fostering informed consumption across all social segments.

Originality/value – To the best of the authors' knowledge, this study is among the first to simultaneously examine these three constructs using validated instruments in the Turkish adult population.

Keywords Food labeling, Food literacy, Health literacy, Nutritional knowledge, Public health

Paper type Research paper

Introduction

Unhealthy dietary habits are among the major risk factors for chronic diseases such as obesity, diabetes mellitus, cardiovascular diseases and various malignancies. According to the Global Burden of Disease 2021 estimates, diet-related risk factors (e.g. low fruit/vegetable intake, high sodium consumption and processed food intake) continue to account for millions of deaths worldwide [Institute for Health Metrics and Evaluation (IHME), 2024]. In parallel, the World Health Organization (WHO) reported that noncommunicable diseases (NCDs) accounted for approximately three-quarters of all global mortality in 2021 (WHO, 2023). Although the WHO has established numerous policies regarding NCDs, a study covering 194 countries reported that only one-third (32.8%) of the 19 recommended policies were implemented as of 2020 (Allen *et al.*, 2021).

Beyond health outcomes, healthy and sustainable diets also provide economic and environmental benefits. Modeling studies suggest that shifting toward predominantly plant-based diets could substantially reduce greenhouse gas emissions and household food expenditures (Springmann *et al.*, 2021). Given these health, economic and environmental benefits, promoting healthy dietary behaviors is essential, and improving health literacy, food literacy and nutrition knowledge represents a key population-level strategy to support healthy food choices and contribute to NCD prevention (Cammock *et al.*, 2021; Çelik and Semerci, 2022).

Health literacy, a key determinant of population health and well-being, is broadly defined as the skills and motivation required for individuals to access, understand, appraise and apply health-related information communicated via various channels such as verbal explanations, brochures or posters to maintain or improve health (Madalı *et al.*, 2017). Food literacy, considered a component of health literacy, encompasses the knowledge, skills, actions and behaviors required to make informed food choices and to effectively select, prepare and consume foods, thereby enhancing individuals' ability to interpret written and visual messages and to use nutrition-label information effectively (Karademir, Bayrak and Cebirbay, 2022; Silva, 2023; Silva *et al.*, 2023).

Food labels provide information on nutritional content, product quality, origin, processing and preservation, supporting healthier food choices and representing an important public health strategy (Pahlani *et al.*, 2025; Yıldırım and Çakır, 2025). Food-label literacy, a component of health literacy, refers to the ability to obtain, understand and use nutrition information on food labels to support healthy dietary decisions (Aktaş and Özdoğan, 2016; Amuta-Jimenez *et al.*, 2019). However, the availability of label information alone does not ensure its effective use; consumers must also be willing and able to interpret and apply this information when making food choices. Therefore, food-label reading attitudes may provide a practical indicator of whether broader health- and food-literacy competencies are translated into everyday purchasing behavior (Miller *et al.*, 2015; WHO, 2022). Previous studies have linked higher health, food and nutrition literacy with healthier food-related behaviors and greater use of nutrition labels, although interpreting label information may still be challenging (Sponselee *et al.*, 2021; Forray *et al.*, 2023; Yang *et al.*, 2024).

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While interest in the relationship between health literacy and dietary behavior is growing, a systematic review published in 2026 found that health literacy, food literacy and nutrition literacy are consistently associated with dietary behaviors. However, the direction of these relationships is still unclear because the available evidence is derived largely from cross-sectional studies conducted in high-income countries. Furthermore, few studies have simultaneously examined health literacy, food literacy and food-label reading attitudes within the same sample (Steinke *et al.*, 2026).

In Türkiye, food labels are regulated under the Türkiye Food Codex (TFC) Regulation on Food Labeling and Consumer Information [Turkish Food Codex (TFC), 2017], which standardizes the nutrition and product information available to consumers; however, its public-health value depends on consumers' ability and willingness to understand and use this information.

Recent studies from Türkiye have further highlighted the importance of nutrition-related literacy by reporting positive associations between e-nutrition literacy and nutrition attitudes (Yilmaz *et al.*, 2026) and between sustainable food literacy and healthy-eating attitudes (Helvacı *et al.*, 2025), while Koc *et al.* (2024) developed a valid short nutrition-literacy scale for the Turkish population. Nevertheless, evidence simultaneously evaluating health literacy, self-perceived food literacy, and food-label reading attitudes using validated instruments in a general adult population remains limited, particularly within Türkiye.

To address this gap, this study aimed to evaluate food-label reading attitudes, self-perceived food literacy, and health literacy among adults living in Istanbul, Türkiye, examine the relationships among these constructs, and identify the sociodemographic and health-related characteristics associated with each. The study investigated three research questions:

RQ1. What are the levels of food-label reading attitudes, self-perceived food literacy, and health literacy among adults living in Türkiye?

RQ2. What are the direction and magnitude of the relationships among these three constructs?

RQ3. Which sociodemographic and health-related characteristics are associated with each construct?

Materials and methods

Study design

This study was designed as a cross-sectional, descriptive study. Data were collected using an online questionnaire consisting of four sections, administered between November 20, 2023 and March 13, 2024, among 595 volunteer participants aged 18–65 years, who were native Turkish speakers living in Istanbul. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki-Tokyo, and the study protocol was approved by the Acıbadem University and Acıbadem Health Institutions Medical Research Ethics Committee (Approval No: 2023-18/605). Written informed consent was obtained from all participants.

Study population and sampling

The target population comprised 10,771,628 adults aged 18–65 years living in Istanbul, Türkiye (Türkiye Statistical Institute, 2022). The sample size was calculated using OpenEpi,

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assuming a 50% anticipated prevalence, a 95% confidence level, and a 5% margin of error, resulting in a minimum required sample size of 385 participants. Individuals were eligible to participate if they: (1) were between 18 and 65 years of age, (2) resided in Istanbul during the data-collection period, (3) were able to read and understand Turkish, (4) voluntarily agreed to participate, and (5) completed the online questionnaire. Individuals younger than 18 or older than 65 years, those not residing in Istanbul, and those who did not provide informed consent were excluded.

Participants were recruited using an online snowball sampling method because of the large target population and the practical challenges of reaching participants. Data were collected using a Google Forms questionnaire. The questionnaire link was initially distributed to eligible adults through WhatsApp, Instagram, university mailing lists, professional networks or community groups. The initial participants were selected based on the above criteria. They were subsequently invited to share the questionnaire link with other adults who met the study eligibility criteria. No financial or other incentive was provided for participation. A total of 603 volunteers participated in the study. Although all survey items were mandatory to complete, 8 participants were excluded due to not meeting the inclusion criteria (e.g. age restrictions) or providing biologically implausible values/data entry errors (e.g. a reported height of 290 cm). Consequently, data from the remaining 595 participants were included in the final analysis.

Data collection tools

The questionnaire used in the study consisted of four sections:

Sociodemographic and health-related questionnaire

Section 1 included 19 questions on sociodemographic characteristics (gender, age, education, employment, marital status, etc.), anthropometric measurements (self-reported height and body weight, from which BMI was calculated using the formula: BMI = weight (kg)/height $(m)^2$), lifestyle habits (smoking, alcohol use, special diet status), and food label reading habits and frequency.

Food label reading attitude scale. Section 2 included the Food Label Reading Attitude Scale (FLRAS), which was developed and validated in Türkiye by Seçkin Sığırcı and Ziver Sarp (2024). The FLRAS is a 20-item, five-point Likert-type scale, with total scores ranging from 20 to 100. Higher scores indicate greater sensitivity toward food labels. In the original development study, the scale demonstrated a Cronbach's α of 0.93.

Self-perceived food literacy scale. Section 3 included the Self-Perceived Food Literacy Scale (SPFLS). Poelman *et al.* (2018) developed and validated the original scale among adults in The Netherlands, and Selçuk *et al.* (2020) subsequently adapted and validated it for Turkish adults. SPFLS consists of 29 items rated on a 5-point Likert scale and includes eight subdimensions: food preparation skills, resilience, healthy snacking, social and mindful eating, examination of food labels, daily meal planning, spending on healthy foods, and keeping healthy foods at home. Higher scores indicate greater self-perceived food literacy. Both in the original development study and the Turkish validity and reliability study, the scale demonstrated a Cronbach's α of 0.83.

Turkish health literacy scale-32. Section 4 included the Turkish Health Literacy Scale-32 (THLS-32), which was developed and validated in Türkiye by Okyay and Abacıgil (2016) based on the conceptual framework of the European Health Literacy Survey Questionnaire (Sørensen *et al.*, 2015). THLS-32 includes 32 items rated on a 5-point Likert scale and evaluates the factors of accessing, understanding, evaluating and using health-related

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information. Scores are interpreted as follows: 0–25 points: Inadequate health literacy, > 25–33 points: Problematic/limited health literacy, > 33–42 points: Sufficient health literacy, > 42–50 points: Excellent health literacy. In the original development study, Cronbach's α was 0.93.

All scales used in this study were previously adapted, validated and tested for reliability in Turkish populations. Therefore, no additional translation, cultural adaptation or pilot testing was required in this research.

Statistical analysis

All statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov test was used to assess the normality of continuous variables. Categorical variables were presented as frequencies and percentages (n, %), while continuous variables were presented as mean ± standard deviation ($\bar{X} \pm SD$). Cronbach's alpha coefficients were calculated to determine the reliability of the scales. Comparisons between two groups were performed using the independent samples *t*-test, whereas comparisons among more than two groups were performed using one-way analysis of variance (ANOVA), followed by the Scheffé post hoc test when appropriate. Pearson correlation analysis was used to examine relationships between age, BMI and scale scores (FLRAS, SPFLS and THLS-32). The effects of independent variables on dependent variables were analyzed using multiple linear regression analysis. Multivariable linear regression analysis was performed to identify factors associated with each outcome variable. Multicollinearity was assessed using tolerance values and variance inflation factors (VIF), with VIF values < 4.0 indicating no evidence of multicollinearity. Statistical significance was set at $p < 0.05$. Results were evaluated at a 95% confidence interval, and $p < 0.05$ was considered statistically significant.

Results

Demographic characteristics of participants and food label reading habits

A total of 595 participants (52.4% female, 47.6% male) were included in the study, with a mean age of 35.1 ± 13.5 years (men 36.0 ± 13.8; women 34.3 ± 13.1 years). The overall mean BMI of the participants was 24.6 ± 4.3 kg/m^2. The mean BMI was significantly higher in men than in women, with mean values of 25.5 ± 4.3 and 23.9 ± 4.1 kg/m^2, respectively ($p < 0.001$). Among the respondents, 50.3% were married, and 58.5% held a university degree. In addition, 22.4% reported having a chronic disease, 59% perceived their general health as good, and 60% rated their nutrition knowledge as inadequate (Table 1). Milk and dairy products were the food labels read most frequently, whereas alcoholic beverages and complementary foods were read least frequently (Table 2). In addition, the study revealed that participants most perceived and purchased a product as healthy when it was described as natural (78%), organic (77.8%), whole grain (67.8%) or high in fiber (66.2%).

Food label reading attitudes, self-perceived food literacy and health literacy

Mean scores for the FLRAS, SPFLS and THLS-32 were 69.3 ± 17, 91.1 ± 22.8 and 30.5 ± 9.6, respectively. The corresponding Cronbach's alpha coefficients were 0.95, 0.91 and 0.96. When stratified by gender, the mean FLRAS, SPFLS and THLS-32 scores were 69.6 ± 17.9, 93.1 ± 23.1 and 30.9 ± 10.1, respectively, among women, and 69.0 ± 16.0, 88.8 ± 22.3 and 30.0 ± 9.1, respectively, among men.

Health literacy was positively correlated with both self-perceived food literacy ($r = 0.34$) and food label reading attitudes ($r = 0.24$). A positive correlation was also observed between

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Table 1. Socio-demographic characteristics of participants

Characteristic	$\bar{X} \pm SD$ / n (%)
Age (years)	35.1 ± 13.5
Men	36.0 ± 13.8
Women	34.3 ± 13.1
Gender	
Men	283 (47.6)
Women	312 (52.4)
BMI (kg/m^2)	24.6 ± 4.3
Men	25.5 ± 4.3
Women	23.9 ± 4.1
Marital status	
Married	299 (50.3)
Single	296 (49.7)
Educational level	
Primary education	117 (19.7)
High school	130 (21.8)
University	348 (58.5)
Parent status	
Yes	262 (44)
No	333 (56)
Working status	
Yes	319 (53.6)
No	276 (46.4)
Chronic disease	
Yes	133 (22.4)
No	462 (77.6)
Self-rated health status[a]	
Bad	26 (4.4)
Medium	218 (36.6)
Good	351 (59)
Smoking	
Yes	204 (34.3)
No	391 (65.7)
Alcohol consumption	
Yes	166 (27.9)
No	429 (72.1)
Applying a special diet	
Yes	123 (20.7)
No	472 (79.3)
Nutritional knowledge[b]	
Sufficient	238 (40)
Insufficient	357 (60)

Note(s): $\bar{X}$, mean; SD, Standard Deviation; n, number of participants. Continuous variables are presented as $X \pm SD$, and categorical variables are presented as frequencies and percentages [n (%)]. [a]Self-rated health status was categorized as poor, fair or good based on participants' self-assessment. [b]Nutritional knowledge was categorized as sufficient or insufficient based on participants' self-reported assessment
Source(s): Authors' own work

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Table 2. Food label reading habits of participants

Foods	Never *(1 point)*	Rarely *(2 points)*	Sometimes *(3 points)* n (%)	Often *(4 points)*	Always *(5 points)*	$\bar{X} \pm SD$
Milk and dairy products	72 (12.1)	52 (8.7)	132 (22.2)	155 (26.1)	184 (30.9)	3.6 ± 1.3
Meat and meat products	75 (12.6)	52 (8.7)	139 (23.4)	164 (27.6)	165 (27.7)	3.5 ± 1.3
Canned goods	97 (16.3)	111 (18.7)	181 (30.4)	105 (17.6)	101 (17)	3 ± 1.3
Oils	114 (19.2)	103 (17.3)	159 (26.7)	135 (22.7)	84 (14.1)	3 ± 1.3
Frozen food	101 (17)	112 (18.8)	155 (26.1)	129 (21.7)	98 (16.5)	3 ± 1.3
Vegetables, fruit	111 (18.7)	77 (12.9)	118 (19.8)	152 (25.5)	137 (23)	3.2 ± 1.4
Honey, jam	119 (20)	112 (18.8)	174 (29.2)	103 (17.3)	87 (14.6)	2.9 ± 1.3
Cereals	159 (26.7)	113 (19)	147 (24.7)	94 (15.8)	82 (13.8)	2.7 ± 1.4
Snack biscuits, wafers etc.	105 (17.6)	88 (14.8)	169 (28.4)	138 (23.2)	95 (16)	3.1 ± 1.3
Complementary foods	295 (49.6)	89 (15)	82 (13.8)	54 (9.1)	75 (12.6)	2.2 ± 1.5
Bakery food	115 (19.3)	76 (12.8)	167 (28.1)	136 (22.9)	101 (17)	3.1 ± 1.4
Alcoholic beverage	352 (59.2)	68 (11.4)	71 (11.9)	52 (8.7)	52 (8.7)	2 ± 1.4
Soft drink	148 (24.9)	77 (12.9)	129 (21.7)	138 (23.2)	103 (17.3)	3 ± 1.4

Note(s): $\bar{X}$, mean; SD, Standard Deviation. Categorical variables are presented as frequencies and percentages [n (%)], and continuous variables as $\bar{X} \pm SD$. Food-label reading frequency was assessed using a five-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always). Higher mean scores indicate more frequent food-label reading
Source(s): Authors' own work

self-perceived food literacy and food label reading attitudes (r = 0.52) (all $p < 0.001$) (Table 3).

Differences in scale scores according to participant characteristics

Differences in scale scores according to participants' characteristics are presented in Table 3. University graduates ($p = 0.001$), participants without children ($p = 0.037$), those who perceived their health as good ($p < 0.001$), and those reporting sufficient nutritional knowledge ($p < 0.001$) had significantly higher FLRAS scores. SPFLS scores were significantly higher among female participants ($p = 0.024$), those who perceived their health as good ($p < 0.001$), and those reporting sufficient nutritional knowledge ($p = 0.002$). THLS-32 scores were negatively correlated with age ($p < 0.001$) and BMI ($p = 0.001$). In addition, significantly higher THLS-32 scores were observed among single participants ($p < 0.001$), university graduates ($p < 0.001$), participants without children ($p < 0.001$), those who were employed ($p = 0.014$), those without chronic diseases ($p = 0.009$), those following a special diet ($p = 0.015$), those who perceived their health as good ($p < 0.001$), and those reporting sufficient nutritional knowledge ($p < 0.001$).

Independent factors affecting participants' scale scores. Multivariable linear regression analyses identified several independent factors associated with FLRAS, SPFLS and THLS-32 scores (Table 4). Higher education level ($p = 0.004$), sufficient nutritional knowledge ($p = 0.004$) and higher self-perceived food literacy ($p < 0.001$) scores were independently associated with higher FLRAS scores. Female gender ($p = 0.025$), higher THLS-32 scores ($p < 0.001$) and higher FLRAS scores ($p < 0.001$) were independently associated with higher SPFLS scores. Younger age ($p < 0.001$), better self-perceived health ($p = 0.015$), sufficient nutritional knowledge ($p < 0.001$) and higher self-perceived food literacy ($p < 0.001$) scores were independently associated with higher THLS-32 scores.

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Table 3. Mean scores of scales and their distribution according to participants' characteristics

Characteristic	FLRAS $\overline{X}$ ± SD	FLRAS Test value	FLRAS *p*	SPFLS $\overline{X}$ ± SD	SPFLS Test value	SPFLS *p*	THLS-32 $\overline{X}$ ± SD	THLS-32 Test value	THLS-32 *p*
Overall mean	69.3 ± 17.0			91.1 ± 22.8			30.5 ± 9.6		
Age		−0.07[a]	0.095		−0.02[a]	0.674		*−0.28[a]*	*<0.001**
BMI		−0.07[a]	0.067		−0.01[a]	0.860		*−0.14[a]*	*0.001**
Gender		0.41[b]	0.682		*2.26[b]*	*0.024**		1.16[b]	0.245
Female	69.6 ± 17.9			93.1 ± 23.1			30.9 ± 10.1		
Male	69.0 ± 16.0			88.8 ± 22.3			30.0 ± 9.1		
Marital status		1.87	0.062[b]		0.50	0.617[b]		*4.34*	*<0.001[b*]*
Married	68.0 ± 16.7			90.6 ± 23.1			28.8 ± 9.2		
Single	70.6 ± 17.3			91.5 ± 22.5			32.2 ± 9.7		
Education level		7.28	0.001[c*]		0.24	0.787[c]		*21.00*	*<0.001[c*]*
Primary School[1]	64.7 ± 16.6			91.3 ± 23.5			26.4 ± 8.8		
High School[2]	68.1 ± 16.5			89.8 ± 21.8			28.8 ± 8.9		
University[3]	71.3 ± 17.0			91.4 ± 22.9			32.5 ± 9.7		
Parent status		2.09	0.037[b*]		0.44	0.663[b]		*5.69*	*<0.001[b*]*
Yes	67.7 ± 16.7			90.6 ± 23.2			28.0 ± 9.0		
No	70.6 ± 17.2			91.4 ± 22.5			32.4 ± 9.7		
Working status		1.08	0.280[b]		0.31	0.760[b]		*2.46*	*0.014[b*]*
Yes	70.0 ± 17.6			91.3 ± 22.5			31.4 ± 9.2		
No	68.5 ± 16.4			90.7 ± 23.2			29.5 ± 10.0		

(*continued*)

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Table 3. Continued

Characteristic	FLRAS $\overline{X}$ ± SD	FLRAS Test value	FLRAS *p*	SPFLS $\overline{X}$ ± SD	SPFLS Test value	SPFLS *p*	THLS-32 $\overline{X}$ ± SD	THLS-32 Test value	THLS-32 *p*
Chronic disease		*1.63*	*0.104*[b]		*0.62*	*0.538*[b]		*2.61*	*0.009*[b*]
Yes	67.2 ± 16.9			90.0 ± 23.0			28.9 ± 9.4		
No	69.9 ± 17.0			91.4 ± 22.7			31.0 ± 9.6		
Self-rated health status		*13.77*	*<0.001*[b*]		*9.88*	*<0.001*[c*]		*24.79*	*<0.001*[c*]
Bad[1]	60.9 ± 20.3			77.2 ± 29.7			26.6 ± 9.8		
Medium[2]	65.7 ± 17.6			88.0 ± 24.0			27.4 ± 9.0		
Good[3]	72.2 ± 15.8			94.0 ± 20.8			32.1 ± 9.0		
Applying a special diet		1.18	0.240[b]		1.42	0.157[b]		*2.45*	*0.015*[b*]
Yes	71.1 ± 19.4			93.9 ± 25.1			32.4 ± 9.9		
No	68.9 ± 16.4			90.3 ± 22.1			30.0 ± 9.5		
Nutritional knowledge		*4.84*	*<0.001*[b*]		*3.16*	*0.002*[b*]		*7.39*	*<0.001*[b*]
Sufficient	73.4 ± 16.8			94.5 ± 20.3			33.9 ± 8.8		
Insufficient	66.6 ± 16.6			88.7 ± 24.1			28.2 ± 9.5		

Note(s): [a]Pearson correlation test; [b]t test; [c]one-way ANOVA; $\overline{\mathbf{X}}$, Mean; SD, Standard Deviation *$p < 0.05$. FLRAS, Food Label Reading Attitude Scale; SPFLS, Self-Perceived Food Literacy Scale; THLS-32, Turkish Health Literacy Scale-32. Statistically significant values are shown in italic. Data associated with variables such as way of living together and smoking/alcohol consumption are not provided because these are not significant in the model
Source(s): Authors' own work

Table 4. Independent factors associated with participants' scale scores

Variable	Parameters	$\beta \pm$ SE	p	Tol.
Variables associated with FLRAS	Intercept	−±4.12	*<0.001**	
	Education level	0.12 ± 0.90	*0.004**	0.67
	Parent status			0.68
	*Yes – No***	0.02 ± 1.43	0.804	
	Self-rated health status[a]	0.07 ± 1.20	0.052	0.84
	Nutritional knowledge			
	*Sufficient – insufficient***	0.21 ± 1.26	*0.004**	0.89
	THLS-32	−0.01 ± 0.07	0.793	0.75
	SPFLS	0.49 ± 0.03	*<0.001**	0.87
	$R^2 = 0.36$	F (6–588) = 43.30; $p < 0.001$		
Variables associated with SPFLS	Intercept	-±4.55	*<0.001*	
	Gender			0.99
	*Female – male***	0.15 ± 1.55	*0.025**	
	Self-rated health status[a]	0.03 ± 1.41	0.454	0.89
	Nutritional knowledge			0.89
	*Sufficient – insufficient***	−0.09 ± 1.67	0.242	
	THLS-32	0.23 ± 0.09	*<0.001**	0.85
	FLRAS	0.46 ± 0.05	*<0.001**	0.91
	$R^2 = 0.324$	F (5–589) = 56.60; $p < 0.001$		
Variables associated with THLS-32	Intercept	-±3.81	< 0.001	
	Age	−0.23 ± 0.04	*<0.001**	0.35
	BMI	−0.01 ± 0.09	0.886	0.77
	Marital status			0.28
	*Married - Single***	0.23 ± 1.28	0.090	
	Education level	0.06 ± 0.58	0.184	0.54
	Parent status			0.25
	*Yes - No***	−0.17 ± 1.36	0.224	
	Working status			0.93
	*Yes - No***	0.13 ± 0.70	0.086	
	Chronic disease			0.78
	*No - Yes***	−0.08 ± 0.92	0.390	
	Self-rated health status[a]	0.10 ± 0.66	*0.015**	0.78
	Diet application status			
	*Yes - No***	0.17 ± 0.85	0.056	0.97
	Nutritional knowledge			
	*Sufficient - Insufficient***	0.42 ± 0.73	*<0.001**	0.90
	SPFLS	0.29 ± 0.02	*<0.001**	0.95
	$R^2 = 0.276$	F (11–583) = 20.20; $p < 0.001$		

Note(s): Multiple linear regression analysis was performed. $\beta \pm$ SE, standardized regression coefficient ± standard error; Tol., tolerance; VIF, variance inflation factor; R^2, coefficient of determination; F, ANOVA F-statistic for overall model significance; FLRAS, Food Label Reading Attitude Scale; SPFLS, Self-Perceived Food Literacy Scale; THLS-32, Turkish Health Literacy Scale-32. Reference categories (**): male for gender, single for marital status, no for parent status, no for working status, yes for chronic disease presence, insufficient for self-perceived nutritional knowledge, and no for diet application status. Statistically significant coefficients ($p < 0.05$) are shown in italic and indicated with an asterisk (*). No evidence of multicollinearity was detected among predictor variables (Tol. > 0.25; VIF < 4.0)
Source(s): Authors' own work

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Discussion

This study simultaneously examined food-label reading attitudes, self-perceived food literacy and health literacy among adults living in Istanbul. Three main findings warrant particular attention. First, food label reading varied by product type and was higher for perishable food groups such as milk, dairy products and meat products. Second, all three constructs were positively related, although the largest correlation coefficient was observed between self-perceived food literacy and food-label reading attitudes. Third, the characteristics associated with each outcome differed in the multivariable analyses: educational attainment, nutritional knowledge and self-perceived food literacy were associated with food-label reading attitudes; gender, health literacy and food-label reading attitudes were associated with self-perceived food literacy; and age, self-rated health, nutritional knowledge, and self-perceived food literacy were associated with health literacy. These findings indicate that the three constructs are interrelated but distinct and may reflect different dimensions of individuals' ability and willingness to use nutrition and health information.

In this study, participants most frequently read labels for milk and dairy products and meat and meat products, while the least frequently read labels belonged to alcoholic beverages and complementary foods. Similar findings have been reported in other studies conducted in Türkiye, where meat, meat products and/or dairy products were the most frequently labeled food groups (Coşkun and Kayışoğlu, 2018; Baş and Kayak, 2023; Çapar and Çimen, 2024). Consumers have been shown to pay particular attention to nutritional information such as energy, fat and cholesterol when purchasing dairy products (Azman and Sahak, 2014). Although another study identified the expiration date as the most checked label information (Alçın and Sevim, 2024), direct comparison is limited because label-reading behavior was not evaluated by food group. The higher frequency of label reading for dairy and meat products may reflect concerns about perishability, food safety, fat content and storage conditions. Conversely, the lower frequency observed for alcoholic beverages and complementary foods is likely related to their limited relevance for individuals who do not consume alcohol or do not have infants or young children. These findings suggest that label-reading behavior varies according to product relevance and perceived risk, rather than label-reading ability alone.

Similar findings have been reported previously. Lian (2017) found that consumers considered organic foods an important component of a healthy lifestyle and perceived them as more trustworthy, while Baş and Kayak (2023) reported that natural and organic characteristics were among the most influential factors affecting food purchasing behavior among university students. These findings suggest that consumers may use such claims as simple cues for judging product healthfulness.

Although whole-grain and high-fiber claims may provide meaningful nutritional information, *natural* and *organic* claims do not necessarily indicate a favorable overall nutrient profile. This may contribute to a health-halo effect, whereby consumers overlook less desirable characteristics such as high sugar, sodium, saturated fat or energy content. This interpretation is supported by an experimental study showing that organic labeling led participants to underestimate the calorie content of high-calorie foods and overestimate that of low-calorie foods, indicating that organic claims can influence health perceptions independently of actual nutritional quality (Besson, Durand and Zerhouni, 2025). Therefore, consumer education should encourage evaluation of the complete nutrition declaration and ingredient list rather than reliance on individual product claims.

In the present study, higher education levels, higher self-perceived food literacy, and sufficient nutritional knowledge were independently associated with more positive food-label reading attitudes. These findings are consistent with previous evidence showing that sociodemographic factors, particularly education and gender, influence food-label use and

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purchasing decisions (Silva *et al.*, 2022). However, a recent qualitative study found that formal education was not always associated with a better understanding of nutrition-label concepts, as some highly educated participants still struggled to interpret label information (Bayliss, 2025). This suggests that a positive attitude toward reading food labels does not necessarily translate into accurate label comprehension. Given that education is widely recognized as one of the most important social determinants of health (Gumà, Solé-Auró and Arpino, 2019), the association observed in the present study may reflect greater literacy, numeracy and capacity to engage with nutrition information. Taken together, these findings indicate that educational attainment may encourage engagement with food labels, whereas effective interpretation likely requires additional nutrition-specific knowledge and label-reading skills.

In this study, female participants had significantly higher self-perceived food literacy scores than male participants. Similar findings have been reported consistently in previous studies, indicating that women generally have higher food literacy scores than men (Gruber *et al.*, 2022; Lee, Kim and Jung, 2022; Zhang *et al.*, 2022). Likewise, a recent study among Turkish young adults identified gender as a significant determinant of food literacy, with men scoring significantly lower than women (Helvacı *et al.*, 2025). Grea Krause *et al.* (2018) found that women had significantly higher levels of both food and health literacy than men and were more likely to adopt healthy eating behaviors. This association may be related to gender-based differences in household food purchasing, meal preparation, caregiving responsibilities and health-information-seeking behaviors. More frequent engagement in these activities may provide women with greater opportunities to acquire and apply food-related knowledge. However, because these potential mechanisms were not directly assessed in the present study, they should be considered possible explanations rather than established causes.

Silva *et al.* (2022) reported that women read food labels more frequently than men. Nevertheless, participants commonly reported difficulties understanding label content because of the frequent use of technical and scientific terms. A recent study in Saudi Arabia found that many nutrition labels remain confusing to consumers despite general awareness of their importance (Alamri and Alaofi, 2025). Although the present study evaluated food-label reading attitudes, it did not directly assess consumers' ability to interpret nutritional information on actual food labels. Therefore, subsequent research should incorporate objective assessments of nutrition-label comprehension to better capture consumers' interpretation and decision-making processes.

In the present study, older age was independently and inversely associated with health literacy. Consistent with this finding, Forray *et al.* (2023) reported that health literacy was positively associated with female gender and education but inversely associated with age. The inverse association with age may reflect cohort differences in educational opportunities, familiarity with digital health-information sources, and the increasing complexity of health communication. Age-related changes in vision, cognition or information-processing speed may also make technical terminology and densely presented information more difficult to interpret. Participants' THLS-32 scores (30.5 ± 9.6) fall into the problematic/limited health literacy category. This finding highlights the need for interventions aimed at improving health literacy in the general population.

In this study, participants who evaluated their health as good had significantly higher levels of perceived food literacy. Individuals with greater concern for health and nutrition are more likely to pay attention to nutritional knowledge on food packages (Oostenbach *et al.*, 2019), while poor health has been associated with a lower likelihood of acquiring nutritional knowledge (Forray *et al.*, 2023). Sørensen *et al.* (2015) similarly reported that individuals who perceived their health as poor exhibited lower health literacy levels.

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In this study, health literacy was found to have a statistically significant positive relationship with both self-perceived food literacy and food label reading attitudes, while self-perceived food literacy was also significantly positively associated with food label reading attitudes. Health literacy is a broader concept encompassing food literacy. Moreover, the correct use of food labels—understanding and acting on the information—is related to food literacy and, through its role in promoting health, parallels health literacy. The present findings are also consistent with recent evidence from Türkiye showing that nutrition-related literacy competencies are positively associated with healthy nutrition attitudes (Yilmaz *et al.*, 2026). However, direct comparison should be made cautiously because the studies evaluated different literacy constructs and outcome measures. Taken together, these findings suggest that nutrition-related literacy may represent a promising target for interventions aiming to promote healthier nutrition attitudes and informed food choices in everyday food environments.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the cross-sectional design does not allow the establishment of temporal or causal relationships among health literacy, self-perceived food literacy and food-label reading attitudes. Therefore, the identified associations should not be interpreted as evidence that one construct influences or determines another. Second, participants were recruited through online snowball sampling, which may have resulted in selection bias and the overrepresentation of individuals who were more educated, digitally engaged or interested in nutrition and health. Consequently, the sample may not fully represent the adult population of Istanbul or Türkiye, limiting the generalizability of the findings. Third, the data were based on self-reported information and may therefore have been affected by recall bias and social-desirability bias. In addition, the study assessed self-perceived food literacy and attitudes toward food-label reading rather than objectively measured label comprehension or actual purchasing behavior. Future studies should use probability-based sampling methods, longitudinal designs, and performance-based assessments involving real or simulated food labels.

Conclusion

In this cross-sectional sample of 595 adults living in Istanbul, food-label reading attitudes, self-perceived food literacy, and health literacy were positively associated, with the strongest association observed between self-perceived food literacy and food-label reading attitudes. Multivariable analyses showed that each construct had distinct but overlapping sociodemographic and health-related correlates, suggesting that they represent related yet complementary dimensions of individuals' ability and willingness to obtain, interpret and apply nutrition and health information. Through examining these three constructs simultaneously, this study contributes to the limited evidence on the relationships among food-label reading attitudes, self-perceived food literacy, and health literacy among Turkish adults. The findings suggest that interventions aiming to improve food-label use should extend beyond providing general nutrition information and include practical training on interpreting nutrient declarations, ingredient lists, serving sizes and nutrition or health claims. Such approaches may be notably beneficial for individuals with lower educational attainment, limited nutritional knowledge, lower self-perceived food literacy and older adults. Because of the cross-sectional design and non-probability sampling method, the findings should be interpreted as associations rather than causal relationships and should not be generalized to the entire adult population of Istanbul or Türkiye. Future longitudinal studies using representative samples and objective assessments of food-label comprehension are warranted to confirm and extend these findings.

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All data was included in the article.

Ethics statement
This study was conducted in accordance with the ethical principles of the Declaration of Helsinki, and the study protocol was approved by the the Acıbadem University and Acıbadem Health Institutions Medical Research Ethics Committee (Approval No: 2023-18/605). Written informed consent was obtained from all participants.

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