

Examining the Food and Nutrition Literacy Levels of Middle School-Aged Children

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Abstract:

Objective: This cross-sectional study was conducted to examine the food and nutrition literacy levels of middle school children.

Methods: Data required for the study were collected online between January 22, 2025, and April 20, 2025. The study group consisted of middle school-aged children. Data were collected using an online survey method using the Socio-Demographic Data Collection Form and the Food and Nutrition Literacy Scale for Children (FNLSC) from 374 middle school-aged children who volunteered for parental consent and were selected using a non-probability sampling method. The statistical analysis of the data obtained in the study was carried out using SPSS 27.0 data analysis software, which employed the following methods: T-test, Oneway Anova, and Kolmogorov-Smirnov test.

Results: Of the middle school students participating in the study, 60.2% (n=225) were males and 39.8% (n=149) were female students, with a higher proportion of male students participating. The reliability coefficient of the food and nutrition literacy scale for children was found to be 0.55, while the harmful consumption subscale was 0.45, the packaging reading subscale was 0.50, the beneficial consumption subscale was 0.45, and the interaction subscale was 0.50. In examining food and nutrition literacy levels, significant differences were found within the subscale based on age, gender, grade, family, and nutritional status, but these differences were not statistically significant ($P>0.05$).

Conclusion: In the study examining the food and nutrition literacy levels of middle school children, no differences were found based on some variables. It is recommended that research be conducted to examine children's food and nutrition literacy levels by considering different factors.

Keywords: Middle School Child, Food, Nutrition, Literacy, Review

Food literacy is often referred to as "food literacy" in English, while nutrition literacy is referred to as "nutrition literacy." While these two concepts are closely related, they have different focuses. Food literacy is defined as a framework that enables people to maintain the quality of their diets under changing conditions and build nutritional resilience over time, and is considered a multifaceted

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concept [1, 2]. Nutrition literacy, on the other hand, is defined as the ability to acquire, process, and interpret nutrition-related information and skills, as well as the ability to make informed nutritional decisions. It is a process that involves making informed nutritional decisions based on this information.

Nutrition literacy, in particular, enables the understanding and application of nutrients and dietary guidelines, thereby enabling healthy eating decisions. Therefore, nutrition literacy focuses on the understanding and use of nutrition information [3]. Because food and nutrition literacy focuses on the interaction of behaviors, knowledge, and skills, it is an important factor in helping people make healthy eating choices [1, 2]. In this context, improving food and nutrition literacy, especially in children and adolescents, is of great public health importance. Obesity rates are increasing globally, and data from the World Health Organization indicate that more than 390 million children and adolescents aged 5-19 were overweight in the World by 2022. The prevalence of overweight among children and adolescents in this age range increased from 8% in 1990 to 20% in 2022 [4]. In 1990, 2% of children and adolescents aged 5-19 were obese, while by 2022, 8% of children and adolescents were living with obesity. Childhood obesity rates in Türkiye are following global trends and are steadily increasing [4, 5].

Obesity not only leads to excess weight but also paves the way for chronic diseases such as diabetes, heart disease, and hypertension [4, 6]. This situation highlights the need for urgent measures to prevent and control childhood obesity. Therefore, food and nutrition literacy can be an important tool in providing children with food and nutrition literacy skills, supporting their food-related competencies, and encouraging lifelong good eating habits. Individuals who are food and nutrition literate can make healthy food choices and prepare and consume foods correctly. These choices can help reduce the risk of obesity and other related chronic diseases. Focusing on food and nutrition literacy during the elementary and middle school years is important because this is when children begin to acquire important food-related behaviors and skills, including simple meal preparation and making food choices [7, 8].

This cross-sectional study was conducted to

examine the food and nutrition literacy levels of middle school-aged children.

Research Question: Is there a relationship between food and nutrition literacy levels among middle school children?

METHODS

Research Type

A cross-sectional study.

Place and Time of the Study

Data were collected online between January 22, 2025, and April 20, 2025, using a questionnaire and scale form (Google Form) prepared for voluntary participation of middle school-aged children with parental consent.

Research Population and Sample

The research population consisted of middle school-aged children. Data were collected from 374 middle school-aged children in Hakkari province who volunteered and obtained parental consent. Data were collected using a convenience sampling method, a non-probability sampling method. The study included middle school-aged children who had access to the internet. A survey was used as the data collection technique; the online survey form (Google Forms) was disseminated through social networks and social media to reach a wide audience. In this study, the sample size was determined based on the number of variables used in multivariate data analysis. Determining the sample size based on the number of variables is also a fundamental criterion for determining the suitability of the research data for analysis. Studies have indicated that to ensure the suitability of the data for analysis, it is necessary to reach at least 5 or even 10 times the number of participants compared to the number of variables [9, 10]. In this context, the sample for this study was selected from middle school-aged children living in Hakkari, Turkey, using a non-probability sampling method, specifically convenience sampling. The study was conducted with 374 children who met the participation criteria.

Inclusion Criteria: (1) Children participating in

the study must be middle school age; (2) Adolescents with parental consent; and (3). Those who completed the child consent form.

Exclusion Criteria: (1) Children not of middle school age; (2) Adolescents without parental consent; and (3) Those who did not complete the child consent form.

Data Collection Tools

Sociodemographic Data Collection Form

This form consists of five questions regarding age, gender, grade status, family status, and nutritional status.

Food and Nutrition Literacy Scale for Children (FNLSC)

Developed by Taniş-Özçelik *et al.* [11] in 2024, the food and nutrition literacy scale for children consists of 26 items. As a result of exploratory factor analysis, a four-factor structure consisting of 15 items (harmful consumption, packaging reading, beneficial consumption, and interaction) was obtained, and the obtained structure was confirmed by confirmatory factor analysis ($\chi^2/sd=1.729$; RMSEA=.040; SRMR=.043; CFI=.92; TLI=.90). In addition, the FNLSC was determined to have convergent and discriminant validity. Within the scope of the reliability studies of the measurement tool, Cronbach's Alpha (α) internal consistency and composite (CR) reliability coefficients were calculated, and the split-half technique was used. The obtained results revealed that the FNLSC produced reliable results.

Research Variables:

Independent Variables: Age, gender, grade status, family status, nutritional status.

Dependent Variables: Food and nutrition literacy levels.

Ethical Aspects of the Research

Permission was obtained via email from Taniş-Özçelik *et al.* [11] for the use of the Food and Nutrition Literacy Scale for Children (FNLSC). Permission for the research was obtained from the Cyprus Science University Ethics Committee (Decision no: 2025/01.002, Date: 21.01.2025). To avoid any ethical violations within the scope of the research, a consent form was obtained

from the middle school children and an informed consent form was obtained from their parents.

Statistical Analysis

Normality distribution, t-test, and one-way ANOVA analyses were used in data analysis. Descriptive statistics are presented as frequencies and percentages for categorical variables, and as mean \pm standard deviation for continuous variables. First, the Skewness-Kurtosis value of the data was examined, and the Kolmogorov-Smirnov test was used to determine the data were normally distributed. Second, a t-test was applied to examine differences between groups, and finally, a one-way ANOVA analysis was conducted. Microsoft Excel 2021 was used for data organization and processing, and SPSS 27.0 was used for statistical analysis. A P-value <0.05 was considered statistically significant.

RESULTS

As shown in Table 1, of the 374 students who participated in the study, 60.2% (n=225) were males

TABLE 1. Demographic Information of Participants

		n	%
Gender	Female	149	39.8
	Male	225	60.2
Age (years)	11	89	23.8
	12	71	19.0
	13	98	26.2
	14	116	31.0
Grade	5	86	23.0
	6	78	20.9
	7	97	25.9
	8	113	30.2
Family status	Nuclear family	223	59.6
	Extended family	151	40.4
Regular nutrition	Yes	275	73.5
	No	99	26.5
Total		374	100.0

TABLE 2. ANOVA Test Results Between Scale and Subscales According to Participants' Age Variable

Scale and subscales	Age	n	Mean	SD	t	P-value
Harmful consumption	11 age	89	9.49	1.94	0.025	0.995
	12 age	71	9.42	2.12		
	13 age	98	9.44	2.15		
	14 age	116	9.42	1.94		
Packaging reading	11 age	89	6.30	1.46	1.169	0.321
	12 age	71	6.50	1.57		
	13 age	98	6.16	1.54		
	14 age	116	6.11	1.43		
Beneficial consumption	11 age	89	6.67	1.32	1.517	0.210
	12 age	71	6.85	1.26		
	13 age	98	6.58	1.29		
	14 age	116	6.92	1.25		
Interaction	11 age	89	8.68	1.70	0.570	0.635
	12 age	71	8.69	1.72		
	13 age	98	8.45	1.74		
	14 age	116	8.76	1.88		
Total	11 age	89	31.15	3.10	1.212	0.305
	12 age	71	31.47	3.00		
	13 age	98	30.65	2.69		
	14 age	116	31.22	3.02		

SD, Standard deviation.

and 39.8% (n=149) were females. Age distribution revealed that 31.0% (n=116) were 14 years old, 26.2% (n=98) were 13 years old, and 30.2% (n=113) were in 8th grade and 25.9% (n=97) were in 7th grade. In terms of family structure, 59.6% (n=223) of the participants lived in nuclear families and 40.4% (n=151) in extended families. When examining regular eating habits, 73.5% (n=275) of the students ate regularly, while 26.5% (n=99) had irregular eating habits.

Table 2 shows no differences among students in different age groups regarding the food and nutrition literacy scale and its subscales. In the harmful consumption subscale, the means of all age groups show very close values (11 years old: mean=9.49, 12 years old: mean=9.42, 13 years old: mean=9.44, 14 years old: mean=9.42), and there is no statistically significant difference between the groups (P=0.995). In the packaging reading subscale, the 12-year-old

group has the highest mean (6.50), but the difference between the age groups is not significant (P=0.321). In the beneficial consumption subscale, the mean (6.92) of the 14-year-old group is higher than the other age groups, but this difference is not statistically significant (P=0.210). In the interaction subscale, similar means are observed between the age groups (11 years old: mean=8.68, 12 years old: mean=8.69, 13 years old: mean=8.45, 14 years old: mean=8.76), and the difference between them is not significant (P=0.635). Although the 12-year-old group has the highest mean (31.47) in the total scale, the difference between the age groups is not statistically significant (P=0.305).

Table 3 shows the differences between male and female students in terms of the food and nutrition literacy scale and its scales. In the interaction subscale, the mean (8.75) of female students was higher than

TABLE 3. T-Test Results Between Scale and Subscales According to the Gender Variable of Participants

Scale and subscales	Gender	n	Mean	SD	t	P-value
Harmful consumption	Female	149	9.39	2.04	-0.443	0.763
	Male	225	9.48	2.02		
Packaging reading	Female	149	6.29	1.41	0.446	0.158
	Male	225	6.22	1.56		
Beneficial consumption	Female	149	6.78	1.23	0.201	0.671
	Male	225	6.75	1.33		
Interaction	Female	149	8.75	1.64	0.882	0.048
	Male	225	8.59	1.86		
Total	Female	149	31.21	2.85	0.537	0.921
	Male	225	31.04	3.04		

SD, Standard deviation. Statistically significant P-value is shown in bold.

that (8.59) of male students ($P=0.048$) suggesting significant difference, but other subscales these differences were not statistically significant ($P>0.05$).

Table 4 shows the differences between students at different grade levels in terms of the food and nutrition literacy scale and its subscales. In all subscales, the means across all grade levels were no statistically significant differences ($P>0.05$). Table 5 presents the differences between students living in nuclear and extended families in terms of the food and nutrition literacy scale and its subscales. In the harmful consumption sub-dimension, the mean (9.48) of students living in nuclear families was found to be higher than those (9.39) living in extended families, and this difference did not reach statistically significant ($P=0.05$). Table 6 shows no differences between students based on regular eating status in terms of the food and nutrition literacy scale and its subscales. There was no statistically significant difference in the means of all subscales based on the presence or absence of nutritional regulation ($P>0.05$).

DISCUSSION

This study was conducted to investigate the food and nutrition literacy levels of middle school children. No differences were observed among students in different age groups according to the age variable. These findings are similar to our findings in Zeng *et al.* [12],

who reported that the age variable was not significant in a cross-sectional study in Chongqing, and in Ashoori *et al.* [13], who reported that the food and nutrition literacy status and associated factors in Iranian high school students. The results of Samruayruen and Kitreerawutiwong [14], who reported the definition and components of food and nutrition literacy among middle school students: a qualitative study, and the results of Doustmohammadian *et al.* [15], who reported low food and nutrition literacy (FNLIT): an obstacle to dietary diversity and nutritional adequacy in school-age children, yielded similar results.

In an examination of food and nutrition literacy in middle school children, differences were found between genders, but no statistically significant results were obtained. Pathan *et al.* [16], in their study on the relationship between nutrition literacy and nutritional status in Thai high school students and their differences by gender, found different results between genders, but no statistically significant results were obtained. Doustmohammadian *et al.* [17] in their study on food and nutrition literacy and its determinants in primary school children in Iran, no significant results were obtained based on gender. Koca and Arkan's study [18] on the relationship between nutrition literacy and eating habits in adolescents and the influencing factors also showed parallelism with our findings. Similarly, Delbosq *et al.* [19] in their study on adolescent nutrition: The role of health literacy,

TABLE 4. ANOVA Test Results Between Scale and Subscales According to Participants' Class Variable

Scale and subscales	Grade	n	Mean	SD	t	P-value
Harmful consumption	5. grade	86	9.48	1.98	0.033	0.992
	6. grade	78	9.38	2.16		
	7. grade	97	9.46	2.08		
	8. grade	113	9.45	1.95		
Packaging reading	5. grade	86	6.28	1.45	0.925	0.429
	6. grade	78	6.47	1.53		
	7. grade	97	6.16	1.59		
	8. grade	113	6.13	1.44		
Beneficial consumption	5. grade	86	6.69	1.35	1.526	0.207
	6. grade	78	6.82	1.28		
	7. grade	97	6.58	1.28		
	8. grade	113	6.94	1.25		
Interaction	5. grade	86	8.63	1.69	0.671	0.570
	6. grade	78	8.74	1.72		
	7. grade	97	8.45	1.80		
	8. grade	113	8.78	1.86		
Total	5. grade	86	31.07	3.08	1.201	0.309
	6. grade	78	31.42	3.03		
	7. grade	97	30.66	2.81		
	8. grade	113	31.30	2.95		

SD, standard deviation.

TABLE 5. T-Test Results Between the Scale and Its Subscales According to the Family Status Variable of the Participants

Scale and subscales	Family Status	n	Mean	SD	t	P-value
Harmful consumption	Nuclear family	223	9.48	2.13	0.437	0.050
	Extended family	151	9.39	1.85		
Packaging reading	Nuclear family	223	6.16	1.56	-1.255	0.093
	Extended family	151	6.36	1.40		
Beneficial consumption	Nuclear family	223	6.78	1.32	0.495	0.633
	Extended family	151	6.72	1.24		
Interaction	Nuclear family	223	8.66	1.78	0.149	0.942
	Extended family	151	8.63	1.76		
Total	Nuclear family	223	31.10	2.88	-0.030	0.262
	Extended family	151	31.11	3.08		

SD, standard deviation.

TABLE 6. T-Test Results Between Scale and Subscales According to Participants' Regular Eating Variable

Scale and subscales	Regular nutrition	n	Mean	SD	t	P-value
Harmful consumption	Yes	275	9.43	2.02	-0.219	0.491
	No	99	9.48	2.06		
Packaging reading	Yes	275	6.36	1.49	2.466	0.835
	No	99	5.93	1.50		
Beneficial consumption	Yes	275	6.79	1.27	0.767	0.488
	No	99	6.68	1.35		
Interaction	Yes	275	8.77	1.74	2.234	0.532
	No	99	8.31	1.81		
Total	Yes	275	31.36	2.91	2.779	0.572
	No	99	30.40	3.01		

SD, standard deviation.

family, and socio-demographic variables found that gender had no effect on food and nutrition literacy.

According to our research findings, the effect of the food and nutrition literacy scale and its sub-dimensions at different grade levels was not found to be statistically significant. In the study of Jung *et al.* [20], which investigated the effect of a school-based nutrition education program on healthy nutritional literacy and healthy food choices in primary school children, the findings were different from our results. It was found that as the grade level increased and that children who received nutrition education acquired healthier habits regarding nutrition. Unlike this study, Chung *et al.* [21] conducted a study on reading and understanding food and nutrition labels and nutritional behaviors of middle and high school female students, it was concluded that the grade level of the students did not affect their nutritional behaviors and knowledge levels. The results of the study titled Nutrition Able: A new tool to improve and assess the nutritional literacy of middle school children by Bolte *et al.* [22] found that nutritional literacy and food consumption did not affect grade variable. McCaughtry *et al.* [23] and the results of the study on the effects of constructivist-oriented nutrition education on the nutritional knowledge, self-efficacy, and behavior of urban middle school students are parallel to our findings that the children's class status variable was not effective in the mediation analysis results of nutritional literacy and dietary diversity in the effect of

socioeconomic status on intelligence in school-aged children in Xuyong County by Qian *et al.* [24].

It was found that there was no significant difference in terms of the food and nutrition literacy scale and its sub-dimensions according to the results of nuclear family and extended family structures. Amin *et al.* [25] reported on the status and determinants of food and nutrition literacy in primary school students in Egypt: a community nurse-led design study. It was determined that family structure had no effect on children's nutritional knowledge level. Bookari [26] also showed similar results in a cross-sectional exploratory study on food literacy among Saudi parents of adolescent children aged 10-19. The results of Anderson and Falkenberg [27] on the role and status of food and nutrition literacy in the Canadian school curriculum and Li *et al.* [28] on the relationship between family nutrition environment and food and nutrition literacy in Chinese school-aged children showed different results from our findings. It was concluded that as the family's knowledge level about nutrition increases, children's eating habits become balanced and adequate. Xu *et al.* [29] The results of the study "Effects of parental food education on children's food literacy: The mediating role of parent-child relationship and learning motivation" also argue that families have a supportive role in food and nutrition literacy.

From our findings, it was concluded that there was no statistically significant difference according to

regular eating status in terms of food and nutrition literacy scale and its subdimensions. This finding of ours; According to the results of the study conducted by Hoteit *et al.* [30] on the status and relationships of food and nutrition literacy among parent-adolescent dyads: Findings from 10 Arab countries, it was found that the relationship between regular eating habits of adolescents and food and nutrition literacy was correlated in some countries but did not affect it in other countries. Pathan *et al.* [14] concluded that the relationship between nutrition literacy and nutritional status in Thai high school students and differences by gender did not differ according to gender and nutritional status. The results of a study conducted by Jiang and Mao [31] on the cognitive abilities of middle school students in Beijing, China in 2020 and the application of food nutrition labels are also similar to our findings. Hashemzadeh *et al.* [32] nutrition literacy and eating habits in children from food insecure and food insecure households: A cross-sectional study and Hoteit *et al.* [33] found that regular and balanced nutrition has a significant effect on food and nutrition literacy, unlike our findings in the results of the food literacy and healthy nutrition study in childhood and adolescence.

Strengths and Limitations

This study, which examines the food and nutrition literacy levels of middle school-aged children, will contribute to determining their nutritional habits, daily quality of life, and health levels. The study included middle school-aged children. The study results can only be generalized to the sample group in question.

CONCLUSION

The food and nutrition literacy levels of middle school children are crucial for their nutritional habits and will continue to be important in later developmental stages. Certain factors directly or indirectly influence children's food and nutrition literacy. Our research results indicate that age, gender, grade, family status, and nutritional status do not affect middle school children's food and nutrition literacy, but they do create significant differences within themselves. Further studies and research are recommended to examine the impact of different variables.

Ethics Approval and Consent to Participate

The study was approved by the Cyprus Science University Ethics Committee (Decision no: 2025/01.002, Date: 21.01.2025). All procedures performed during data collection, review of patient records, and study implementation complied with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its subsequent amendments. To avoid any ethical violations within the scope of the research, a consent form was obtained from the middle school children and an informed consent form was obtained from their parents.

Data Availability

All data generated or analyzed during this study are included in this published article. The data that support the findings of this study are available on request from the corresponding author, upon reasonable request.

Authors' Contribution

Study Conception: ÇMH, MZA, SC, DDK; Study Design: ÇMH; Supervision: MZA, Funding: SC; Materials: SC; Data Collection and/or Processing: DDK; Statistical Analysis and/or Data Interpretation: ÇMH; Literature Review: ÇMH; Manuscript Preparation: ÇMH; Writer: ÇMH; and Critical Review: ÇMH.

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The author(s) declare that no artificial intelligence-based tools or applications were used during the preparation process of this manuscript. The all content of the study was produced by the author(s)

in accordance with scientific research methods and academic ethical principles.

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