Evaluation of Nutrition Knowledge Level of Primary School Teachers in a Province in the Central Anatolian Region of Türkiye: A Cross-Sectional Research

Türkiye'nin Orta Anadolu Bölgesindeki Bir İldeki İlkokul Öğretmenlerinin Beslenme Bilgisi Düzeyinin Değerlendirilmesi: Kesitsel Araştırma

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ABSTRACT Objective: The aim of this study is to evaluate the nutritional knowledge (NK) level of teachers and the factors associated with it. **Material and Methods:** This is a cross-sectional study conducted in the 2022-2023 academic year among primary school teachers and school counsellors working in a city in the Central Anatolian region of Türkiye. The dependent variable is NK level and the independent variables are sociodemographic factors, Food Choice Test (FCT) and Chew Health Literacy Scale (CHLS). Chi-square test, Kruskal-Wallis test and Spearman correlation test were used for data analysis. **Results:** The mean age of 578 teachers was 44.25 (7.77) years and 72.5% of them were female. Among the teachers, 10.7% had inadequate, 18.5% had low, 42.8% had moderate and 28.0% had high level of NK. High levels of NK were significantly more prevalent among female than male. According to the FCT, the 3 most important factors affecting food choice were natural content, health, and sensory properties, with ethical concerns being the least important determinant. A weak positive correlation was found between the FCT and natural, health content and CHLS. **Conclusion:** One in 4 teachers was found to have inadequate or low levels of NK. To improve teachers' NK, it would be beneficial to address the sub-fields to food choices, such as natural ingredients, health, and health literacy.

Keywords: Diet; food; nutrition; health literacy;
food preferences

ÖZET Amaç: Bu çalışmanın amacı, öğretmenlerin beslenme bilgisi (BB) düzeyini ve ilgili faktörleri değerlendirmektir. **Gereç ve Yöntemler:** Türkiye'nin Orta Anadolu bölgesindeki bir şehirde çalışan ilkokul öğretmenleri ve okul rehber öğretmenlerinde 2022-2023 eğitim öğretim yılında gerçekleştirilmiş bir kesitsel araştırmadır. Bağımlı değişken BB düzeyi, bağımsız değişkenler ise sosyodemografik faktörler, Besin Seçim Testi (BST) ve Chew Sağlığı Okuryazarlığı Ölçeği'dir (CSOYÖ). Veri analizi için ki-kare testi, Kruskal-Wallis testi ve Spearman korelasyon testi uygulanmıştır. **Bulgular:** 578 öğretmenin ortalama yaşı 44,25 (7,77) yıl olup %72,5'i kadındır. Öğretmenlerin %10,7'si yetersiz, %18,5'i düşük, %42,8'i orta ve %28,0'ı yüksek BB düzeyine sahiptir. Yüksek BB seviyeleri kadınlarda erkeklerden önemli ölçüde daha yaygındı. BST'ye göre, gıda seçimini etkileyen en önemli 3 faktör doğal içerik, sağlık ve duyusal özelliklerdi; etik kaygılar ise en az önemli belirleyiciydi. BST ile doğal, sağlık içeriği ve CSOYÖ arasında zayıf bir pozitif korelasyon bulundu. **Sonuç:** Dört öğretmenden birinin yetersiz veya düşük BB seviyelerine sahip olduğu bulundu. Öğretmenlerin BB'sini geliştirmek için, doğal içerikler, sağlık ve sağlık okuryazarlığı gibi gıda seçimlerine ilişkin alt alanları ele almak faydalı olacaktır.

Anahtar Kelimeler: Diyet; gıda; beslenme; sağlık okuryazarlığı;
besin seçimleri

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Although nutrition is essential for good health at all stages of life, it is particularly important for children. This is primarily because the nutritional habits children develop during their growth and development tends to persist throughout their lives.[1] Children aged 6-14, during the primary school years, consciously begin to integrate into community life for the first time. This school-age period, characterized by rapid growth and development and the formation of lifelong behaviors, is crucial for establishing healthy dietary habits.[2]

In Türkiye, there is a high incidence of underweight and obesity, iron deficiency anemia, iodine deficiency, other vitamin and mineral deficiencies, dental caries, and chronic diseases related to obesity among school-aged children and adolescents, all of which stem from poor nutrition. Childhood malnutrition is a major risk factor for diseases such as heart disease, hypertension, and obesity in later life.[1] According to the Childhood Obesity Survey, the prevalence of obesity among primary school children was 8.3% in 2013, rising to 9.9% in 2016. High rates of nutrition-related issues are now reported in many countries, primarily due to poor dietary quality and quantity, as well as lack of nutritional information.[3,4]

Child nutrition is closely linked to environmental conditions, the socioeconomic status of the family, and the education a child receives. The most significant contributions to nutrition education come from the family at home and from teachers at school. Therefore, it is essential for teachers to have solid knowledge of nutrition and to effectively convey this knowledge to their students by modeling healthy behaviors.[4] Teachers interact frequently with children throughout the day, making them important role models for most students. Consequently, teachers should be well-informed to provide accurate nutrition information to students.[5] Studies have shown that nutrition education programs are effective in increasing nutrition knowledge, which tends to rise with higher levels of education.[4,6] Additionally, individuals with adequate nutritional knowledge are often more mindful of their food choices.[7] Furthermore, individuals with high health literacy are expected to possess extensive nutrition knowledge and to make healthier food choices.[6,7]

Because there is no standardized measurement for assessing nutritional knowledge levels, and because individuals cannot translate this knowledge into a lifestyle even if they have sufficient knowledge, better designed studies are needed to assess the relationship between nutritional knowledge levels and food choices.[1] There are many factors related to nutritional knowledge levels, such as health, mood, conformity, sensory appeal, natural content, price, weight control, familiarity and ethical concerns that influence food choices. On the other hand, health literacy is the cognitive and social ability to access, understand and use information needed to protect and improve health and is one of the most important determinants of healthy eating among healthy lifestyle behaviors.[6] Improving the health literacy of teachers, who are the main protagonists of the education sector expected to accompany the health sector, is very important for them and for society.[6] Teachers serve as a link between school-age children and the health system, the education system and health issues. Teachers' health literacy can be seen as the equivalent of students' health literacy. While students are consumers of health information in the classroom, teachers are providers of health information.[8]

In this study, it was aimed to evaluate the nutritional knowledge levels and related factors of classroom teachers and counsellors working in primary education level.

MATERIAL AND METHODS

The study is a cross-sectional survey conducted among primary school teachers and counselors working at the primary level in a province in the Central Anatolian Region of Türkiye during the 2022-2023 academic years. The sample size for the study was calculated to be 241 (95% confidence interval, 5% margin of error) based on the number of primary school teachers and counselors working in one of the central districts of Eskişehir (n=1,045), using the frequency of adequate nutrition knowledge level as 71.39%.[9] Schools were categorized as clusters based on their socioeconomic status (low, medium, or high), and since a cluster sampling method was used, the design effect was set at "2", which increased the

sample size to 482. The necessary ethical and administrative approvals were obtained for the study

DATA COLLECTION

The questionnaire form prepared for data collection included questions about sociodemographic factors that may be related to nutrition (age, gender, marital status, employment duration, body mass index (BMI), nutrition education status, etc.), Nutrition Knowledge Scale (NKS), Food Choice Test (FCT) and Chew's Health Literacy Scale (CHLS). The questionnaires were completed by the participants within 10-15 minutes.

Nutrition Knowledge Scale

The scale was developed by Öngün Yılmaz et al. in 2021, with a Cronbach's alpha value of 0.851. In our study, the Cronbach's alpha value was calculated as 0.735. This scale, designed to assess the nutrition knowledge of adults, includes items related to food and nutrition information, food preparation and cooking methods, and the relationship between nutrition and health. The scale consists of 31 items in total, and the items, which are formatted as a 5-point Likert scale, are scored from 4 to 0 based on responses ranging from "strongly agree" to "strongly disagree". Items that represent misinformation about nutrition knowledge are scored in reverse. As the score increases, nutrition knowledge is assumed to increase.[10]

Food Choice Test

The FCT is a 36-item survey designed to assess intrinsic and extrinsic food attributes that motivate consumers' food choices. The scale uses a 4-point Likert scale, ranging from "not very important" to "very important". Developed by Steptoe et al. in 1995, its Turkish validity and reliability were established by Dikmen et al. in 2016.[11,12] The scale consists of 9 subfields: "health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern". The Cronbach's alpha for the scale was reported as 0.89 and was calculated as 0.947 in this study. In the FCT evaluation, the scores for each sub-fields are ranked from highest to lowest, helping to identify which factors are most important to individuals in food selection.

Chew's Health Literacy Scale

It was developed by Chew et al. in 2004 to assess health literacy in a short time frame.[13] The Turkish validity and reliability of the scale were conducted by Eyüboğlu and Schulz in 2015. The scale consists of 3 5-point Likert-type questions, ranging from "1=never" to "5=always". The higher the score obtained from the scale, the lower the level of health literacy.[14] In this study, the Cronbach's alpha value was calculated as 0.678.

The World Health Organization criteria, which have been used in numerous studies in our country, were applied to evaluate BMI. According to these criteria, a BMI under 18.50 kg/m² is considered underweight, 18.50-24.99 kg/m² is considered normal, 25.00-29.99 kg/m² is considered overweight, and 30.00 kg/m² or above is considered obese.[15]

DATA ANALYSIS

The data obtained were analyzed using the SPSS version 15.0. Descriptive statistics were presented as means, standard deviations, and medians for numerical variables, and as frequencies and percentages for categorical variables. The Kolmogorov-Smirnov test was used to assess the normality of the data. The chi-square test, Kruskal-Wallis test, and Spearman correlation test were applied for data analysis. A statistical significance level of $p < 0.05$ was accepted. The study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained for the study (date: December 5, 2022; no: 2022-308).

RESULTS

The mean age of the 578 teachers was 44.25 (7.77) years, with 72.5% (n=419) of them being female. The median (minimum-maximum) score for the NKS was 94.0 (32.0-124.0), and the mean score was 94.0 (13.2). Among the teachers, 10.7% had inadequate, 18.5% had low, 42.8% had moderate, and 28.0% had high levels of nutritional knowledge. The distribution of teachers in the study group according to their nutritional knowledge levels is shown in Figure 1.

The study found that the frequency of high nutritional knowledge levels, as indicated by the NKS, was higher in females than in males (p=0.007). A

	NKS n (%)[a]				Test statistics
Sociodemographic factors	Inadequate	Low	Middle	High	p value[b]
Age groups					
25-34	7 (10.4)	10 (14.9)	27 (40.4)	23 (34.3)	0.408
35-44	23 (9.8)	48 (20.4)	97 (41.3)	67 (28.5)	
45-54	23 (10.3)	45 (20.2)	96 (43.0)	59 (26.5)	
55 and upper	9 (17.0)	4 (7.5)	27 (50.9)	13 (24.6)	
Gender					
Male	22 (13.8)	25 (15.7)	81 (50.9)	31 (19.6)	0.007
Female	40 (9.5)	82 (19.6)	166 (39.6)	131 (31.3)	
Marital status					
Single	5 (12.2)	5 (12.2)	20 (48.8)	11 (26.8)	0.786
Married	53 (10.6)	95 (19.0)	214 (42.9)	137 (27.5)	
Divorced	4 (10.5)	7 (18.5)	13 (34.2)	14 (36.8)	
Status of receiving nutrition education					
No	32 (10.4)	54 (17.6)	146 (47.6)	75 (24.4)	0.074
Yes	30 (11.1)	53 (19.6)	101 (37.3)	87 (32.0)	
BMI					
Under weight	0 (0.0)	1 (10.0)	5 (50.0)	4 (40.0)	0.857
Normal	35 (10.4)	67 (19.8)	142 (42.0)	94 (27.8)	
Over weight	23 (13.1)	29 (16.5)	77 (43.8)	47 (26.6)	
Obese	4 (7.4)	10 (18.5)	23 (42.6)	17 (31.5)	
Working time (year)					
15 and under	14 (9.8)	33 (23.1)	53 (37.1)	43 (30.0)	0.264
16-25	39 (10.3)	65 (17.2)	174 (46.0)	100 (26.5)	
26 and upper	9 (15.8)	9 (15.8)	20 (35.1)	19 (33.3)	

TABLE 1: Comparison of the scores obtained by the teachers in the study group based on sociodemographic and related characteristics

[a]Row percentil; [b]Chi-square test. NKS: Nutrition Knowledge Scale

comparison of the scores obtained by the teachers in the study group based on sociodemographic and related characteristics are presented in Table 1.

According to the NKS, the three most important factors affecting food choice were found to be natural content, health, and sensory properties, while the least important determinant was ethical concerns. The distribution of the scores obtained by the teachers in the study group across the NKS sub-fields is presented in Table 2.

Among the teachers in the study group, those with inadequate nutritional knowledge had lower scores than those with high nutritional knowledge in the health sub-field of food selection. Teachers with a moderate level of nutritional knowledge scored lower in the suitability sub-field compared to those with low and high levels of nutritional knowledge.

TABLE 2: Distribution of the scores obtained by the teachers in the study group across the NKS sub-fields

FCT Sub-fields	$\bar{X}$(SD)	Median (minimum-maximum)
1.Health	3.3 (0.6)	3.3 (1.0-4.0)
2.Mood	2.9 (0.7)	3.0 (1.0-4.0)
3.Convenience	2.9 (0.7)	3.0 (1.0-4.0)
4.Sensory appeal	3.0 (0.7)	3.0 (1.0-4.0)
5.Natural content	3.5 (0.7)	3.7 (1.0-4.0)
6.Price	2.9 (0.8)	3.0 (1.0-4.0)
7.Weight control	2.9 (0.7)	3.0 (1.0-4.0)
8.Familiarity	2.9 (0.7)	3.0 (1.0-4.0)
9.Ethical concern	2.8 (0.8)	3.0 (1.0-4.0)

FCT: Food choice test; SD: Standard deviation

On the other hand, teachers with inadequate nutritional knowledge scored lower in the natural ingredients sub-field compared to those with low, moderate, and high levels of nutritional knowledge. A

TABLE 3: Comparison of the scores obtained by the teachers in the study group according to their level of nutritional knowledge in the NKS sub-fields

	NKS Median (minimum-maximum)				Test statistics
FCT Sub-fields	Inadequate	Low	Middle	High	p value[a]
1.Health	3.1 (1.0-4.0)	3.3 (1.2-4.0)	3.3 (1.2-4.0)	3.5 (1.7-4.0)	0.014
2.Mood	2.8 (1.0-4.0)	3.3 (1.2-4.0)	3.0 (1.0-4.0)	3.0 (1.0-4.0)	0.448
3.Convenience	2.9 (1.0-4.0)	3.0 (1.0-4.0)	2.8 (1.0-4.0)	3.0 (1.0-4.0)	0.047
4.Sensory appeal	3.0 (1.0-4.0)	3.0 (1.5-4.0)	3.0 (1.3-4.0)	3.3(1.0-4.0)	0.330
5.Natural content	3.3 (1.0-4.0)	3.7 (1.7-4.0)	3.7 (1.0-4.0)	4.0 (1.0-4.0)	<0.001
6.Price	3.0 (1.0-4.0)	3.0 (1.0-4.0)	3.0 (1.0-4.0)	3.0 (1.0-4.0)	0.658
7.Weight control	3.0 (1.0-4.0)	3.0 (1.0-4.0)	3.0 (1.0-4.0)	3.0 (1.0-4.0)	0.761
8.Familiarity	3.0 (1.0-4.0)	3.0 (1.3-4.0)	3.0 (1.0-4.0)	3.0 (1.0-4.0)	0.162
9.Ethical concern	3.0 (1.0-4.0)	3.0 (1.0-4.0)	3.0 (1.0-4.0)	2.8 (1.0-4.0)	0.475

[a]Kruskal-Wallis test. NKS: Nutrition Knowledge Scale; FCT: Food choice test

TABLE 4: Comparison of CHLS scores of teachers in the study group according to their nutritional knowledge levels

	NKS Median (minimum-maximum)				
	Inadequate	Low	Middle	High	Test statistics p value[a]
CHLS	6.0 (3.0-10.0)	5.0 (3.0-13.0)	5.0 (1.0-13.0)	5.0 (1.0-12.0)	0.001

[a]Kruskal-Wallis test. NKS: Nutrition Knowledge Scale; CHLS: Chew Health Literacy Scale

weak positive correlation was found between the NKS and the health (r=0.146; p<0.001) and natural content (r=0.171; p<0.001) sub-fields. The comparison of the scores obtained by the teachers in the study group according to their level of nutritional knowledge in the NKS sub-fields are shown in Table 3.

The median (minimum-maximum) score (1.0-15.0) and mean of the teachers' CHLS were 5.0 (1.0-15.0) and 5.4 (2.0), respectively. In the study group, teachers with a high level of nutritional knowledge were found to have higher health literacy compared to those with inadequate, low, and moderate levels of nutritional knowledge. A weak negative correlation was found between the NKS and CHLS (r=-0.160; p<0.001). The comparison of the scores obtained from the CHLS according to the nutritional knowledge levels of the teachers in the study group is shown in Table 4.

DISCUSSION

After the family, the school is the child's 2nd social environment during the period of growth and devel-opment. Teachers, who are the closest educators to children, have an important role to play in protecting their health and helping them to acquire the right habits at school. In order for teachers to fulfill this role, they must 1st have adequate knowledge of nutri-tion and be able to implement appropriate practices.[5] The aim of this study was to determine the level of nutritional knowledge of primary school teachers and counsellors working in primary schools and to iden-tify the factors associated with a food selection test and health literacy.

In the study, 10.7% of the teachers had inade-quate nutrition knowledge, while 18.5% had a low level of nutrition knowledge. In a study analyzing the nutrition knowledge levels of primary school teach-ers, it was reported that 71.4% of the teachers had in-adequate nutrition knowledge.[16] In another study conducted by Songür et al. 13.5% of the teachers were found to have inadequate nutritional knowl-edge.[17] Other studies conducted with teachers also found inadequate knowledge levels.[19-22] In our study, the low level of nutritional knowledge among teach-

ers is consistent with the findings in the literature. The reasons for teachers' low nutrition knowledge levels may be attributed to both individual and structural factors, including the educational system, the social environment, and personal circumstances.

In the study, it was found that the frequency of high nutritional knowledge according to the NKS was higher in women than in men. Similarly, previous studies have reported that women tend to have higher levels of nutritional knowledge.[23-25] However, in the study conducted by Batmaz, it was found that men had higher basic nutrition knowledge than women.[26] The higher level of nutritional knowledge in women compared to men may be attributed to the fact that women often have more responsibilities related to food supply and preparation within the family, gender role expectations, and cultural factors.

In the study, the most influential factors in the food choices of teachers were found to be natural content, health, and suitability. A study conducted by Çağıl in women reported that the most important factors in food selection were weight control, health, and suitability, and it was found that there was a relationship between nutritional literacy and the food selection test's price sub-field and total score.[27] In the study conducted by Kresić et al. it was reported that nutritional knowledge had an impact on food choices.[28] Yapılan bir çalışmada besin seçimleri ile beslenme bilgileri eğitim ile arttığı ve birbirine yaklaştığı birldirilmiştir.[29] Although it is expected that higher levels of nutritional knowledge would influence food choices, it can be argued that factors such as social structure and economic status in the societies where the research was conducted may also play a significant role in this regard.

Recent studies suggest that nutrition knowledge may play a small but important role in the adoption of healthier eating habits. In this study, a weak positive correlation was found between the NKS and health, one of the sub-fields of the FCT. Among the teachers in the study group, those with inadequate nutritional knowledge had lower scores in the health sub-field of food selection compared to those with high nutritional knowledge. Similarly, Kolodinsky et al. reported that an increased level of knowledge was positively associated with healthier eating habits.[30] For many people, health is a key factor in food choice, which is generally linked to good dietary habits. However, individuals may prefer unhealthy foods for reasons such as believing healthy foods are tasteless or not realizing the harm of unhealthy choices. In this context, improving health literacy enhances individuals' ability to make healthier food choices.[31,32] The results of this study align with the existing literature.

Appropriateness in food choice is important for individuals due to various factors, such as time constraints, difficulty in food preparation, the convenience of ready-to-eat foods, dislike of shopping, aversion to food preparation, and eating alone.[33,34] In this study, teachers with an intermediate level of nutritional knowledge placed less importance on suitability when selecting foods. This result may be attributed to different interpretations of suitability as nutritional knowledge levels increase or decrease.

The study found that teachers with inadequate nutritional knowledge scored lower in the natural content sub-field compared to those with low, medium, and high levels of nutritional knowledge. Adding flavorings, colorings, and preservatives to foods, altering the organoleptic properties of foods, and increasing their nutritional value can disrupt their naturalness.[35]

One study reported that increasing awareness of food additives enhances natural preferences in food choices.[36] Nowadays, people tend to prefer organic foods, believing they have healthier and more natural content.[35] In line with this, in our study, those with inadequate nutritional knowledge may be less concerned with the natural content of food due to reasons such as a lack of understanding about the conditions under which food naturalness is compromised and the importance of natural content.

Health literacy and nutrition literacy have been reported to be significantly negatively associated with harmful food choices.[37] In the study group, it was found that teachers with a high level of knowledge had a higher level of health literacy compared to those with inadequate, low, and medium levels of knowledge. A weak negative correlation was found

between the NKS and CHLS. Many studies have emphasized the importance of health literacy in maintaining a certain level of quality of life, with healthy eating being a key component of healthy lifestyle behaviors.[38,39] Additionally, dietary habits have been reported to play a crucial role in explaining differences in health literacy between individuals.[40] As individuals increase their overall health knowledge, they may, as expected, also exhibit higher levels of nutritional knowledge.

LIMITATIONS

The study has several strengths and limitations. It was conducted with primary school teachers and counselors in 1 province in the central region of Anatolia. Therefore, while it provides valuable information about the province, the findings cannot be generalized. The cross-sectional design also presents a limitation. Future studies should involve a larger sample to improve the generalizability of the results.

CONCLUSION

One in four teachers in the study was found to have inadequate or low nutritional knowledge. To improve teachers' knowledge of nutrition, it would be benefi-cial to address factors important in food choices, such as natural ingredients, health, and health literacy, together. Training for teachers is crucial as it impacts not only students but also families and society. Programs aimed at enhancing both health literacy and nutrition knowledge should be organized. These trainings should focus particularly on sub-fields such as health, suitability, and natural ingredients, which are key factors influencing food choices. Further studies with larger sample sizes are needed.

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