

Turkish Adaptation of Nutritional Form for the Elderly: A Methodological Study

Yaşlılar için Beslenme Formu'nun Türkçeye Uyarlanması: Metodolojik Bir Çalışma

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ABSTRACT Objective: To establish the validity and reliability of the Nutrition Form for the Elderly (NUFFE), which is a new, inexpensive, useful, and easily applicable malnutrition assessment tool for the elderly. **Material and Methods:** The study was conducted on 150 individuals aged 65 and over living in the community. The questionnaire form containing NUFFE and Mini Nutritional Assessment (MNA) form, which was validated and reliable in Turkish, was used to evaluate sociodemographic characteristics, anthropometric measurements as data collection tool. NUFFE is a form consisting of 15 items and 3 answer options for each question. The scale was first translated from English to Turkish by experts, and then reverse translated by different experts. Being evaluated by 10 experts with the Davis technique, the validity, reliability and internal consistency and correlation between MNA of the applied form were evaluated. **Results:** The mean age of the participants was 70.68±5.39 years. The suitability of the sample size for factor analysis was tested with Kaiser-Meyer-Olkin and the value of 0.778. Due to the low factor loads in the explanatory factor analysis, three items (N6, N8, N14) were removed from the scale and the remaining 12-item were collected in two sub-dimensions. The Cronbach's alpha coefficient of NUFFE-TR was found to be 0.741. A negative correlation was found between NUFFE-TR and total MNA scores ($r=-0.778$; $p<0.05$). **Conclusion:** NUFFE-TR is a valid and reliable, simple, practical, and quick-to-apply form to assess the nutritional status of older adults living in Turkish society.

ÖZET Amaç: Yaşlı bireyler için yeni, ucuz, yararlı ve kolay uygulanabilir bir malnütrisyon değerlendirme aracı olan Yaşlılar İçin Beslenme Formu'nun [Nutrition Form for the Elderly (NUFFE)] geçerlilik ve güvenilirliğinin yapılması amaçlanmıştır. **Gereç ve Yöntemler:** Çalışmaya toplumda yaşayan 65 yaş ve üstü 150 birey dâhil edilmiş, veri toplama aracı olarak sosyodemografik özellikler, antropometrik ölçümler, Türkçe geçerlik ve güvenilirliği yapılan NUFFE ile Mini Nutrisyonel Değerlendirme [Mini Nutritional Assessment (MNA)] Formu'nun bulunduğu anket formu kullanılmıştır. NUFFE, 15 madde ve her soru için 3 cevap şıkkından oluşan bir formdur. Ölçeğin uzmanlar tarafından önce İngilizceden Türkçeye çevirisi yapılmış, sonrasında farklı uzmanlar tarafından ters çevirisi yapılmıştır. Davis tekniği ile 10 uzman tarafından değerlendirildikten sonra son şekli verilerek, uygulanan formun geçerlilik, güvenilirlik, iç tutarlılığı ve MNA ile arasındaki korelasyon değerlendirilmiştir. **Bulgular:** Katılımcıların yaş ortalaması 70,68±5,39'dur. Örneklem büyüklüğünün faktör analizine uygunluğu Kaiser-Meyer-Olkin ile test edilmiş ve bulunan 0,778 değeri örneklem sayısının yeterli olduğunu göstermiştir. Açıklayıcı faktör analizinde faktör yüklerinin düşük olması nedeniyle ölçekten 3 madde (N6, N8, N14) çıkarılmış ve kalan 12 madde, 2 alt boyutta toplanmıştır. On iki maddelik NUFFE-TR'nin Cronbach alfa katsayısı 0,741 bulunmuştur. NUFFE-TR ile toplam MNA puanları arasındaki negatif yönde bir korelasyon bulunmuştur ($r=-0,778$; $p<0,05$). **Sonuç:** NUFFE-TR, Türk toplumunda yaşayan yaşlı erişkinlerin beslenme durumunu değerlendirmek için geçerli ve güvenilir, basit, pratik ve hızlı uygulanabilecek bir formdur.

Keywords: Malnutrition; aged; validation studies; nutrition assessment; geriatric assessment

Anahtar Kelimeler: Malnütrisyon; yaşlı; geçerlilik çalışması; beslenme değerlendirmesi; geriyatrik değerlendirme

The population is getting older because of the prolongation of the average life expectancy and the decrease in birth rates to the developing economic and social living conditions in societies.¹ Türkiye has

a large and growing elderly population. In 2020, 9.5% of the population was over 65 years, similar to the world average.² Elderly population in Türkiye will increase by approximately 200% by 2040.

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Aging, biologically, refers to changes and deterioration in body functions because of damage to molecular and cellular dimensions throughout life.¹

Along with aging, problems such as the increased risk of chronic diseases, geriatric syndromes, multiple drug use, and risk of death arise.³ Malnutrition, which is often observed in the geriatric group, is a significant problem that affects the functional capacity of the elderly adults and negatively affects their ability to maintain their lives and lead a quality life.⁴ Several studies conducted in our country show that the prevalence of malnutrition (28-66.3%) and malnutrition risk (2.7-28%) varies depending on the city where the study was conducted, the malnutrition screening tool used, and the place where the elderly live.⁵⁻⁸ Detection of malnutrition in the initial period and applying adequate and qualified treatment prevent complications of diseases in elderly adults, accelerate their recovery, and make important contributions to the preservation of the functionality and quality of life of the elderly adults. Therefore, early diagnosis of malnutrition is critical.³

There are several screening tests used for nutritional assessment. The most used screening tests, whose validity and reliability have been tested, are Geriatric Nutritional Risk Index, Mini Nutritional Assessment (MNA) short and long forms, Subjective Global Assessment, Malnutrition Universal Screening Tool (MUST), Nutritional Risk Screening Test (NRS-2002).⁹⁻¹³ The European Society for Clinical Nutrition and Metabolism recommends the NRS-2002 for inpatients, MUST for outpatients, and the MNA screening test for geriatric patients in community-dwelling or nursing homes.¹⁴ Optimum malnutrition screening tools have been sensitive to personal and environmental factors and should be easily detected for all patients at risk of malnutrition and numerically scoreable.^{15,16}

The Nutritional Form for the Elderly (NUFFE) was created to evaluate older people's nutritional status in clinical nursing care, and it consists of fifteen questions without anthropometric measurements and any biochemical parameters. The validity and reliability of the NUFFE were made in many languages, and its validity and reliability in home-dwelling older

adults were again made by the scale owner, Söderhamn et al.¹⁷ A higher score from the NUFFE indicates a higher risk of malnutrition for community-dwelling older people at high risk of developing malnutrition.¹⁷⁻¹⁹ This research has been carried out to explore the validity and reliability of NUFFE, which was developed specifically for the elderly to facilitate the identification and followed-up by health professionals and individuals by translating it into Turkish.

MATERIAL AND METHODS

This methodological study was conducted between February and April 2022 as to ascertain validity and reliability of the Turkish version of NUFFE (NUFFE-TR). Sample size should be at least 5 or 10 times of question number in the NUFFE questionnaire.^{20,21} Therefore, one hundred fifty elderly individuals living in the community were included to conduct the validity and reliability of the scale.²² The inclusion criteria were as follows: being 65 years or older and a student of Akdeniz University Campus Tazelenme University which was established to enable individuals over the age of 65 to participate in social life and active aging, agreeing to contribute to the study after being informed and giving written consent.²³ Furthermore, individuals are excluded from the study if the investigator cannot obtain reliable data.

First, to adapt the scale to Turkish, Söderhamn, one of the authors who developed the scale, was contacted via e-mail, and necessary permissions were obtained for the scale to be adapted.^{18,19} The original nutrition form for the elderly, consisting of fifteen items, was prepared in Swedish. However, to the best of our knowledge, there is no expert in the field of Nutrition and Dietetics in our country who is fluent in Swedish and knows Swedish culture. So, we contacted the corresponding author again via e-mail, and permission was obtained to use the English version of the scale. The English version of the scale was also used in the work of Gao et al. and Sharifi et al.^{24,25} The study was performed in agreement with the Declaration of Helsinki, and the protocol was authorized by the Ethics Committee of Antalya Training and Research Hospital, University of Health Sciences, Türkiye (date: February 3, 2022, no: 3/17). All sub-

jects were informed and gave consent before the study.

Our survey form consisted of three parts. Firstly, participants' socio-demographic properties (gender, age, etc.) were taken. In the second part, the NUFFE questionnaire was evaluated, and in the third, the long form of MNA was applied. Moreover, we measured their body weight and height, upper mid-arm, and calf circumference.

NUFFE

The NUFFE has been explicitly established for the elderly and includes fifteen items which are; dietary history (two questions about weight changes and fluctuations in dietary food consumption), dietary assessment (nine questions about appetite, portion size, fruit and vegetable consumption, intake of cooked food, fluid intake, to need help with eating, gastrointestinal problems, dental and swallowing-related problems, and the effect of health status on food intake), general assessment (four questions about the presence of individual(s) accompanying food consumption, the possibility of obtaining food products, physical activity or exercise habits, the number of medications used). For each question, there are three question-specific answer options.

The most appropriate option is scored as "zero," the intermediate option as "one," and the unsuitable option as "two" points. The maximum score obtained from the original form is thirty points, and a greater score on the form implies a higher nutritional deficiency and malnutrition risk. NUFFE was translated into Hungarian, Norwegian, Chinese, and Persian in the literature and has been used in these countries by conducting validity and reliability tests.

The English form of NUFFE was interpreted into Turkish by five experts (including assistant professors, associated professors, and experts from English foreign languages) from the Faculty of Medicine, the Department of Nutrition and Dietetics, and the School of Foreign Languages. The Turkish translation was transformed into English (back translation) with three lecturers and two translators who did not see the original; these translations were compared with the scale's original, and the authors approved its compatibility.

Ten lecturers in the Nutrition and Dietetics Departments evaluated the content validity and intelligibility in terms of language and meaning according to the Davis technique.^{26,27} In this technique, questions were scored by experts to the relevance of the items as (1) not appropriate, (2) somewhat appropriate, (3) quite appropriate, and (4) very appropriate.²⁶ Moreover, the "scope validity index" was obtained by dividing the number of experts choosing the options (3) and (4) by the total number of experts. We amended the classification criteria for measuring the measurements of each element and completed the Turkish scale. From the experts' feedback, the scale's content validity was over 0.80. Pilot research was conducted with twenty people aged 65 and 65 plus aged, and participants' suggestions were taken. After the corrections, the final version of the form was created. After that, the NUFFE-TR was applied to one hundred fifty older adults who participated in Tazeleme University. A quarter of the elderly people who accepted to participate and filled out the answers completely (they were expected to forget the scale) were contacted again after fifteen days and asked to fill in the scale again, and the consistency of the scale was examined.

STATISTICAL EVALUATION

The IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, N.Y., USA) and Amos software, version 23.0 (Chicago: IBM SPSS) programs evaluated the data. The data presented with the number (n), percent (%), mean (\bar{X}), and standard deviation (SD) values. The parametric data Pearson correlation test made correlation calculations between numerical variables. When the p value <0.05 at the confidence level of 95%, results are typically considered statistically significant. The construct validity dimension examined whether the data obtained after the item analysis (15 items) were suitable for factor analysis and sample adequacy using Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) coefficient. "Reliability analysis" was used to test the reliability of the scales. "Confirmatory factor analysis (CFA)" by using the Amos program and "explanatory factor analysis (EFA)" was made for the construct validity of the scale. Pearson correlation

analysis was used for item-total score analysis. Furthermore, “Cronbach’s alpha coefficient” was calculated for internal consistency in determining the scale’s reliability level.

RESULTS

Fifty-two men and 98 women participated in the study. Participants’ ages ranged from 65-79 years, and the mean age was 70.68 ± 5.39 years. The participants’ most frequent medical diagnosis illnesses were hypertension 50%, diabetes 24%, and cardiovascular disease 18% (data not shown). While age, body weight and height and body mass index (BMI) were higher in older male than older women ($p < 0.05$), the mean BMI value was lower in older male than older women ($p = 0.022$). Other socio-demographics and characteristics of elderly people are seen in [Table 1](#).

KMO was used for factor analysis to analyze the suitability of sample size. We calculated the KMO value 0.778. If KMO is greater than 0.50, the sample size is sufficient for the data.²⁸ The results of the Bartlett Sphericity test were assessed, and the chi-square value obtained was appropriate [$\chi^2(66) = 424.745$; $p < 0.05$] ([Table 2](#)).

The 15-item of NUFFE-TR form was applied to 150 elderly adults. Principle of components analysis, varimax rotation, and EFA were performed on the collected data to determine the scale’s factorial structure and study’s validity. In the EFA, three items were removed from the scale (N6, N8, N14) due to their low

factor load, and the remaining 12 items were collected in 2 sub-dimensions. These factors clarify 43.331% of the overall variance. With multifactorial designs, variance above 40% is sufficient. Factor loads should be higher than 0.30, and the difference between the two load values in the factors should be at least 0.10.²⁹ The variance table explained regarding the factor analysis made on 12 items is shown in [Table 2](#).

The scale’s reliability was verified with the Cronbach alpha coefficient, and the Cronbach alpha coefficient for a 12-item scale was assessed at 0.741. The reliability coefficient varies between 0 and +1. If the reliability coefficient is close to 1, the reliability is high, and the internal consistency between the items is high. The reliability coefficients for the scale first and second factors were respectively 0.657 and 0.678, indicating the best reliability. The item-total correlations were higher than 0.20 and ranged between 0.266 and 0.576. The item-total correlations and the Cronbach’s alpha coefficients obtained depending on sub-factors are given in [Table 2](#).

When checking the correlation between the elements, the factor load of the elements is greater than 0.30, and all correlation relationships are significant ([Table 3](#)).

Consistent with the CFA, it was determined that the structural equation modeling results of the scale were significant at the $p = 0.001$ level and 12-item scale were linked to the scale structure of the two sub-dimensions. The model marks are shown in [Table 4](#), and the two-factor model compliance diagram is pre-

TABLE 1: Socio-demographic and characteristic variables in participants.

Variables	Male ($\bar{X} \pm SD$)		Female ($\bar{X} \pm SD$)		p values
	52 (34.7%)		98 (65.3%)		
Age (years)	72.17	±5.99	69.88	±4.90	0.029*
Body weight (kg)	77.42	±9.74	70.10	±10.85	0.001*
Body height (cm)	171.34	±6.92	159.06	±6.41	0.001*
Body mass index (kg/m ²)	26.36	±2.90	27.72	±4.01	0.022*
Marital status	(n)	(%)	(n)	(%)	
With spouse	41	78.8	53	54.1	0.003**
Without spouse	11	21.2	45	45.9	
Education	(n)	(%)	(n)	(%)	
≥12 years	27	51.9	39	39.8	0.154**
12 years <	25	48.1	59	60.2	

*Mann-Whitney U ($p < 0.05$); **Chi-square analyses ($p < 0.05$); SD: Standard deviation.

TABLE 2: Explanatory factor analysis results of Nutritional Form for the Elderly-TR (n=150).

Items*		Factors		Item-total scale correlation
		1	2	
12	Gastrointestinal problems	0.714		0.576
7	Possibility of obtaining food products	0.702		0.397
11	Fluid intake	0.592		0.364
15	Difficulty to eat owing to impaired health	0.574		0.502
9	Activity	0.495		0.266
4	Intake of cooked food	0.470		0.386
10	Tooth, mouth, and swallowing difficulties	0.456		0.335
2	Changes in dietary intake		0.758	0.562
1	Weight loss		0.700	0.485
5	Portion size		0.650	0.412
3	Appetite		0.570	0.478
13	Help with eating		0.516	0.340
	Reliability	0.657	0.678	0.741
	Variance explanation (%)	21.843	21.483	43.331

*Item-6 Intake of fruits and vegetables, Item-8 Company at meals and Item-14 Number drugs used were deleted; Kaiser-Meyer-Olkin=0.778; $\chi^2(66)=424.745$; Bartlett Sphericity test (p)=0.000.

TABLE 3: Results regarding the measurement model of the Nutritional Form for the Elderly-TR.

Factors	Items	Factor loads	Standard error	t values	p values
Factor 1	Gastrointestinal problems	0.708	-	-	-
	Possibility of obtaining food products	0.387	0.097	4.105	p<0.05
	Fluid intake	0.466	0.185	4.893	p<0.05
	Difficulty to eat owing to impaired health	0.681	0.127	6.771	p<0.05
	Activity	0.354	0.212	3.776	p<0.05
	Intake of cooked food	0.535	0.073	5.544	p<0.05
	Tooth, mouth, and swallowing problems	0.413	0.157	4.366	p<0.05
Factor 2	Changes in dietary intake	0.582	-	-	-
	Weight loss	0.643	0.233	5.119	p<0.05
	Portion size	0.426	0.157	4.448	p<0.05
	Appetite	0.813	0.159	5.955	p<0.05
	Help with eating	0.433	0.056	4.510	p<0.05

sented in Figure 1. While developing the model, the variables that reduced the fit were determined and a new covariance was created for those with high covariance among the residual values. The table shows that the accepted values for the adjustment index are provided in the subsequent adjustment index calculation.

CRITERION VALIDITY

The consistency among the MNA scale scores and total NUFFE-TR was checked with the Pearson correlation coefficient in Table 5. There is a statistically negative significant correlation between the validated scale and MNA Screening Score ($r=-0.647$, $p<0.05$),

moreover MNA Assessment Score ($r=-0.679$, $p<0.05$), and the total MNA Evaluation Score ($r=-0.778$, $p<0.05$).

As the points obtained from NUFFE-TR decrease, the total scores obtained from the MNA scale increase, or vice versa. Similarly, strong negative correlations were found among the total scores obtained from MNA and sub-dimensions from the NUFFE-TR.

DISCUSSION

Malnutrition, which is often observed in the geriatric age group, creates an important problem for

TABLE 4: The fit statistics of the NUFFE-TR according to confirmatory factor analysis.

	NUFFE-TR results	Cut-off criteria
CMIN/DF	2.314	≤5
GFI	0.881	≥0.80
AGFI	0.882	≥0.80
CFI	0.817	≥0.80
TLI	0.802	≥0.80
SRMR	0.080	≤0.10

NUFFE: Nutritional Form for the Elderly; CMIN/DF: Chi-square fit statistics/degree of freedom; GFI: Goodness-of-Fit Index; AGFI: Adjusted Goodness-of-fit Index; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; SRMR: Standardized root mean square residual.

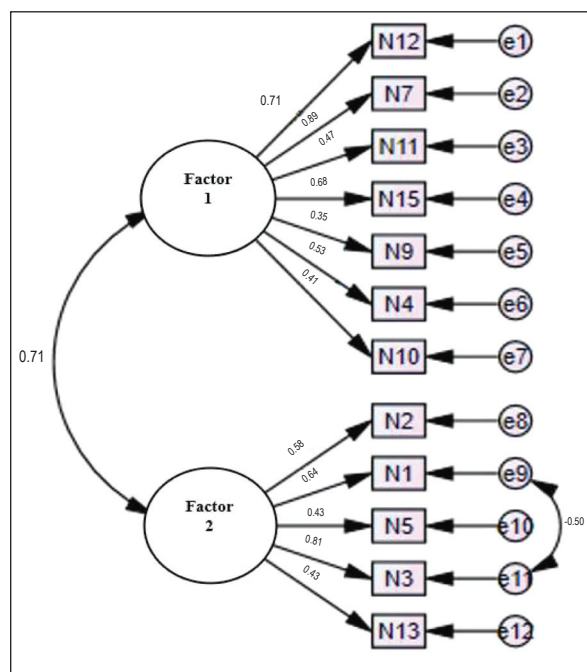


FIGURE 1: Confirmatory factor analysis of the Nutritional Form for the Elderly-TR and two-factor model compliance diagrams.

TABLE 5: The Pearson correlation of MNA and NUFFE-TR scores.

	NUFFE-TR	
	r value	p value
MNA screening score	-0.647	0.001*
MNA assessment score	-0.679	0.001*
Total MNA evaluation score	-0.778	0.001*

*p<0.05; MNA: Mini Nutritional Assessment; NUFFE: Nutritional Form for the Elderly.

the elderly to maintain their lives and lead a quality life, especially by affecting the functional ca-

capacity of the elderly. Malnutrition, together with inadequate and unbalanced nutrition and absorption problems in the elderly, is a determinant of morbidity and mortality.³⁰ Ideal malnutrition screening method should be inexpensive, fast, valid, reliable, consistent, applicable, sensitive enough to detect all patients at risk of malnutrition, and numerically scoreable.³¹

There is a need for a screening test that both elderly individuals and health professionals can apply to decide potential and current nutritional status and problems in elderly individuals living in the community, prevent individuals' nutritional status, and the negative consequences that may arise with it. The NUFFE, a nutritional screening tool, is a simple and helpful form for evaluating the risk of malnutrition in the elderly.^{18,19} The NUFFE was developed especially for elderly individuals as a malnutrition screening tool that did not contain any anthropometric measurements and biochemical parameters. It is a relatively shorter form than other screening tests and is advantageous in terms of being used by individuals and health professionals.^{24,25} There are Hungarian, Norwegian, Chinese, and Persian versions of the form in literature.^{24,25,32,33} As the score obtained from the NUFFE increases, individuals' malnutrition and nutritional deficiency increase. While the highest score obtained from the original 15-item scale was thirty, the highest score in the Turkish version was twenty-four because the scale items were reduced to 12-item.¹⁹ In comparison, Cronbach alpha values range between 0.62-0.77 among elderly adults in clinical care, and for community-dwelling elderly adults, the range from 0.65 and 0.71.^{17-19,24,32,33} We found that the 12-item NUFFE-TR Cronbach- α coefficient of 0.741. This Cronbach- α value is appropriate for indicating homogeneity consistent with the literature.^{17,24}

Because upper-middle arm and calf circumferences measurements were not included like MNA, using the NUFFE was simple.³³ Taking and evaluating anthropometric measurements, such as BMI, of elderly adults in the community may not be appropriate for individuals with malnutrition and other health problems. Only BMI assessment cannot evaluate muscle loss and distinguish overweight patients

who involuntarily weight loss and are not sensitive enough to recognize modest weight losses.³⁴ NUFFE might be favorable enough for short-term nutritional assessment because of its easy applicability among older people.

Under the 60⁺ Tazelenme University, established for the first time on the Akdeniz University Campus in Türkiye, for lifelong learning, elderly adults are provided educational opportunities and support in leading a healthier and more physically and mentally active life. The sample of Tazelenme University, the high level of education, the higher financial situation than the average of the general elderly population, and the better nutritional status of these individuals that received education within the scope of the Tazelenme University on nutrition and health may constitute a limitation for evaluating the nutritional status of the general population.

CONCLUSION

The NUFFE-TR has appropriate properties in terms of homogeneity and construction validity. NUFFE-TR is an inexpensive, rapid, valid, reliable, consistent, easily applicable, and sensitive scale that can evaluate the treatment of elderly adults in the community in primary care services for health profes-

sionals and individuals. However, it is recommended to assess the validity and reliability of NUFFE-TR in different populations.

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Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

REFERENCES

1. Samancı Tekin Ç, Kara F. Dünyada ve Türkiye'de yaşlılık [Aging in the world and Turkey]. *Uluslararası Bilimsel Araştırmalar Dergisi*. 2016;3(1):219-29. [\[Link\]](#)
2. TURKSTAT Turkish Statistical Institute. Elderly with Statistics. (accessed 23.01.2022). [\[Link\]](#)
3. Arioğlu S. Yaşlılarda Malnütrisyon Kılavuzu. Ankara: Akademik Geriatri Derneği; 2013. [\[Link\]](#)
4. Corcoran C, Murphy C, Culligan EP, Walton J, Sleator RD. Malnutrition in the elderly. *Sci Prog*. 2019;102(2):171-80. [\[Crossref\]](#) [\[PubMed\]](#)
5. Şahin H, Çiçek B, Yılmaz M, Ongan D, Kaya N, İnanç N. Kayseri ilinde yaşayan 65 yaş ve üzeri bireylerde beslenme durumu ve yaşam kalitesinin saptanması [Determining nutritional status and quality of life of 65 years and older individuals in Kayseri]. *Turkish Journal of Geriatrics*. 2013;16(3):322-9. [\[Link\]](#)
6. Balcı E, Şenol V, Eşel E, Günay O, Elmalı F. 65 yaş ve üzeri bireylerin depresyon ve malnütrisyon durumları arasındaki ilişki [The relationship between malnutrition and depression in people aged over 65 years]. *Türkiye Halk Sağlığı Dergisi*. 2012;10(1):37-43. [\[Link\]](#)
7. Ülger Z, Halil M, Kalan I, Yavuz BB, Cankurtaran M, Güngör E, et al. Comprehensive assessment of malnutrition risk and related factors in a large group of community-dwelling older adults. *Clin Nutr*. 2010;29(4):507-11. [\[Crossref\]](#) [\[PubMed\]](#)
8. Simsek H, Meseri R, Sahin S, Ucku R. Prevalence of food insecurity and malnutrition, factors related to malnutrition in the elderly: a community-based, cross-sectional study from Turkey. *European Geriatric Medicine*. 2013;4(4):226-30. [\[Crossref\]](#)
9. Hao X, Li D, Zhang N. Geriatric Nutritional Risk Index as a predictor for mortality: a meta-analysis of observational studies. *Nutr Res*. 2019;71:8-20. [\[Crossref\]](#) [\[PubMed\]](#)
10. Guigoz Y, Vellas B. The Mini Nutritional Assessment (MNA) for grading the nutritional state of elderly patients: presentation of the MNA, history and validation. *Nestle Nutr Workshop Ser Clin Perform Programme*. 1999;1:3-11; discussion 11-2. [\[Crossref\]](#) [\[PubMed\]](#)
11. Duerksen DR, Laporte M, Jeejeebhoy K. Evaluation of nutrition status using the subjective global assessment: malnutrition, cachexia, and sarcopenia. *Nutr Clin Pract*. 2021;36(5):942-56. [\[Crossref\]](#) [\[PubMed\]](#)

12. Koren-Hakim T, Weiss A, Hershkovitz A, Otrateni I, Anbar R, Gross Nevo RF, et al. Comparing the adequacy of the MNA-SF, NRS-2002 and MUST nutritional tools in assessing malnutrition in hip fracture operated elderly patients. *Clin Nutr.* 2016;35(5):1053-8. [[Crossref](#)] [[PubMed](#)]
13. Hersberger L, Bargetzi L, Bargetzi A, Tribolet P, Fehr R, Baechli V, et al. Nutritional risk screening (NRS 2002) is a strong and modifiable predictor risk score for short-term and long-term clinical outcomes: secondary analysis of a prospective randomised trial. *Clin Nutr.* 2020;39(9):2720-9. [[Crossref](#)] [[PubMed](#)]
14. Ye XJ, Ji YB, Ma BW, Huang DD, Chen WZ, Pan ZY, et al. Comparison of three common nutritional screening tools with the new European Society for Clinical Nutrition and Metabolism (ESPEN) criteria for malnutrition among patients with geriatric gastrointestinal cancer: a prospective study in China. *BMJ Open.* 2018;8(4):e019750. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
15. Reber E, Gomes F, Vasiloglou MF, Schuetz P, Stanga Z. Nutritional risk screening and assessment. *J Clin Med.* 2019;8(7):1065. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
16. Xu YC, Vincent JL. Clinical measurement properties of malnutrition assessment tools for use with patients in hospitals: a systematic review. *Nutr J.* 2020;19(1):106. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
17. Söderhamn U, Dale B, Sundsl K, Tomstad ST, Söderhamn O. Psychometric testing of the Norwegian version of the Nutritional Form For the Elderly among older home-dwelling people. *J Multidiscip Healthc.* 2012;5:121-8. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
18. Söderhamn U, Söderhamn O. Developing and testing the nutritional form for the elderly. *Int J Nurs Pract.* 2001;7(5):336-41. [[Crossref](#)] [[PubMed](#)]
19. Söderhamn U, Söderhamn O. Reliability and validity of the nutritional form for the elderly (NUFFE). *J Adv Nurs.* 2002;37(1):28-34. [[Crossref](#)] [[PubMed](#)]
20. Hayran M, Hayran M. Sağlık Araştırmaları İçin Temel İstatistik. Ankara: Art Ofset Matbacılık; 2018.
21. Erdoğan S, Nahçıvan N, Esin MN. Hemşirelikte araştırma: süreç, uygulama ve kritik. *Veri Toplama Yöntem ve Araçları ve Veri Toplama Araçlarının Güvenilirlik ve Geçerliliği.* 1. Baskı. İstanbul: Nobel Tıp Kitabevi; 2014. p.217-30.
22. Tavşancıl E. Tutumların Ölçülmesi ve SPSS ile Veri Analizi. 5. Baskı. Ankara: Nobel Yayınevi; 2014.
23. Akdeniz Üniversitesi kampüsü 60+ Tazelenme Üniversitesi [İnternet]. [Erişim tarihi: 15 Haziran 2022]. Üniversite Hakkında. Erişim linki: [[Link](#)]
24. Gao H, Söderhamn U, Zhang L, Cui HX, Liu K. Reliability and validity of the chinese version of the nutritional form for the elderly. *Public Health Nutr.* 2015;18(14):2559-64. [[Crossref](#)] [[PubMed](#)]
25. Sharifi F, Mirarefin M, Alizadeh-Khoei M, Nazari N, Najafi B, Fakhrzadeh H, et al. Psychometric properties of the Persian version of the nutritional form for the elderly (NUFFE) in nursing home residents. *Med J Islam Repub Iran.* 2018;32:105. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
26. Davis LL. Instrument review: getting the most from a panel of experts. *Applied Nursing Research.* 1992;5(4):194-7. [[Crossref](#)]
27. Almanasreh E, Moles R, Chen TF. Evaluation of methods used for estimating content validity. *Res Social Adm Pharm.* 2019;15(2):214-21. [[Crossref](#)] [[PubMed](#)]
28. Kalaycı Ş. SPSS Uygulamalı Çok Değişkenli İstatistik Teknikleri. Ankara: Asil Yayın Dağıtım; 2005. (Baskı sayısı eklenmelidir.)
29. Büyükoztürk Ş. Sosyal Bilimler İçin Veri Analizi El Kitabı İstatistik, Araştırma Deseni SPSS Uygulamaları ve Yorum. 2. Baskı. Ankara: Pegem Yayınları; 2002.
30. Rakıcıoğlu N. Yaşlılık döneminde malnütrisyonun saptanması. Gökçe Kutsal Y, editör. Geriatri Yaşlı Sağlığına Multidisipliner Yaklaşım. TEB Eczacılık Akademisi; 2009. p.115-20. [[Link](#)]
31. Tosun Taşar P, Şahin S. Nutrisyonel tarama yöntemleri ve değerlendirme [Nutritional screening methods and evaluation]. *Türkiye Klinikleri J Geriatr-Special Topics.* 2016;2(1):25-8. [[Link](#)]
32. Gombos T, Kertész K, Csikos A, Söderhamn U, Söderhamn O, Prohászka Z. Nutritional form for the elderly is a reliable and valid instrument for the determination of undernutrition risk, and it is associated with health-related quality of life. *Nutr Res.* 2008;28(2):59-65. [[Crossref](#)] [[PubMed](#)]
33. Söderhamn U, Flateland S, Jessen L, Söderhamn O. Norwegian version of the Nutritional Form for the Elderly: sufficient psychometric properties for performing institutional screening of elderly patients. *Nutr Res.* 2009;29(11):761-7. [[Crossref](#)] [[PubMed](#)]
34. Cook Z, Kirk S, Lawrenson S, Sandford S. Use of BMI in the assessment of undernutrition in older subjects: reflecting on practice. *Proc Nutr Soc.* 2005;64(3):313-7. [[Crossref](#)] [[PubMed](#)]