



Evaluation of the Validity and Reliability of the Persian Version of Short Food Literacy Questionnaire for Adults

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| ARTICLE INFO | ABSTRACT |
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| Article type: Research Paper | Introduction: food literacy emerges as a subset of health literacy, focusing on individuals' capacity to receive, comprehend, and utilize nutritional information for their dietary choices. This study aims to evaluate the validity and reliability of the Persian version of the short food literacy (SFL) questionnaire for adults. |
| Article History: Received: 29 Dec 2024 Accepted: 02 Jun 2025 | Methods: The study employed the short Swedish food questionnaire, which underwent a forward and backward translation process, review by experts, proofreading, and finalization. The target language questionnaire was subjected to content validation through Lawshe's content validation ratio (CVR) by presenting it to a panel of 10 nutrition experts. Also, it was evaluated by a team of experts including Persian literature, public health, and nutrition sciences professors. Internal consistency reliability, and descriptive analysis of data were conducted. |
| Keywords: Health literacy Food literacy Nutrition literacy Validity Questionnaire | Results: The final Persian questionnaire comprised 16 questions in three areas of functional, interactive, and critical. The Cronbach's alpha coefficient was 0.7, and the correlation between the areas were statistically significant at an acceptable level. The Intra-class Correlation Coefficient (ICC) for the questionnaire items ranged from 0.61 to 0.85, demonstrating moderate to good reliability. |
| | Conclusion: The Persian version of the SFL questionnaire is a valid and reliable tool for assessing food literacy in adults. |

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Introduction

Personal desires and preferences play a significant role in the selection of healthy food, those are influenced by food behaviors, lifestyle, and nutritional knowledge (1, 2). In today's world, which is inundated with diverse and at times intricate and contentious information regarding food and health, making the most appropriate choice is challenging, thus highlighting the importance of food literacy (1, 3).

Food literacy encompasses the ability of individuals to access and analyze information about food, their knowledge, and skills in comprehending the nature of food and its significance for the body, and ultimately taking action based on this knowledge (4). Food literacy appears to have a broader and more intricate connotation, as it involves factors such as culture,

social issues, and personality in an individual's food choices (1).

Non-communicable diseases (NCDs) are caused by a combination of physiological, environmental, behavioral, and lifestyle factors, including poor nutrition, lack of physical activity, and tobacco and alcohol use (5). These diseases are a significant global health concern, contributing to 41 million deaths annually, with 71% of all global fatalities attributed to NCDs. The impact is particularly severe among individuals aged 30 to 70, with over 15 million deaths occurring in this age group yearly. Low- and middle-income countries are disproportionately affected by NCD, large proportion of NCD deaths (77% of NCD-related deaths and 85% of premature deaths) are occurring in these countries where resources for prevention and treatment may be limited (5, 6). Most NCD-related deaths (80%) are linked to

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conditions like obesity, diabetes, high blood pressure, Metabolic syndrome, and certain cancers, all of which are influenced by dietary and nutritional choices (5, 6).

Consequently, food literacy is regarded as a critical element in public health and a viable strategy for addressing a range of public health issues, from NCDs to environmental sustainability and a lack of knowledge about healthy eating is one of challenges in improper nutrition habits (6, 7). The fundamental principles of food literacy are established at a young age and are closely tied to the parents' literacy level and the culture of society. Children develop their food preferences by observing the eating behaviors of others, especially their parents. The development of relational competencies is also influenced by social interactions, which are facilitated by social learning through observing and imitating others' behaviors and socialization through internalization of societal norms (8). Furthermore, studies in the field of improving nutritional behavior indicate that nutrition education, particularly at a young age and in schools, is the primary solution for modifying undesirable eating behaviors and managing the aforementioned adverse effects (9).

The assessment of food literacy can be done using a variety of tools that measure different aspects of food-related knowledge, behavior, and skills (10). The short food literacy questionnaire, which was developed by Krause et al. in Switzerland and evaluates functional and interactive factors related to food literacy and the ability to choose the best healthy food is introduced as the first practical, comprehensive, and short-validated questionnaire for assessing nutrition-specific health literacy among the adult population (2, 11,12).

This research aimed to evaluate the validity and reliability of the Persian version of the short food literacy questionnaire for adults.

Materials and Methods

This study validated a self-evaluation of a nutrition-specific health literacy questionnaire among adults in Persian. The validation process of the Nutrition-specific health literacy questionnaire to Persian was instituted from the original version of the instrument in English and consisted of 5 phases. Phase 1: Prepare a Nutrition-specific health literacy Questionnaire;

Phase 2: Translation flow (translation, back translation, and forward translation); Phase 3: Content validity; Phase 4: Face validity; and Phase 5: Reliability assessment. The process of questionnaire validation is shown in Figure 1.

Phase 1: In the first step, the Nutrition-specific health literacy defining, nutrition literacy, and food literacy and their core elements were captured by relevant literature and expert opinion. Through the searching databases, among a few questionnaires that assess nutrition-specific health literacy, the researcher administered the Swedish Short Food Literacy (SFL) Questionnaire for adults for validation in Persian (11,12).

Phase 2: The second step consisted of the standardized translation procedure. In the process of transforming the original questionnaire into the target language, the forward translation method was used as a method to maximize the quality of the translation, beyond the simple word-for-word conversion process (12,13). Forward translation of the original English version was presented to one independent professional translator.

The two translated versions were reviewed by researchers and prepared for backward translation. This preliminary version was given to another expert translator to formulate the questionnaire back into English. Backward translation involves translating the first draft of the translated version of the assessment, back into the original language (11, 12,13). This translated version was compared with the original version, considering using the same words or the semantic equivalence.

The panel of experts' review was carried out by two nutritionists, one methodologist, and one Specialist in Persian literature. They independently compared each question of the Persian version with the original questionnaire to comment on erroneous translations, cultural adaptations, and idiomatic expressions, and avoid any misunderstandings. After discussion, the four reports were merged into one single report.

This flow led to preparing the target language questionnaire version1 which comprised 16 self-assessment questions (similar to the original SFL questionnaire) with a 5-point response category (never, rarely, sometimes, usually, always, or from very low to very high).

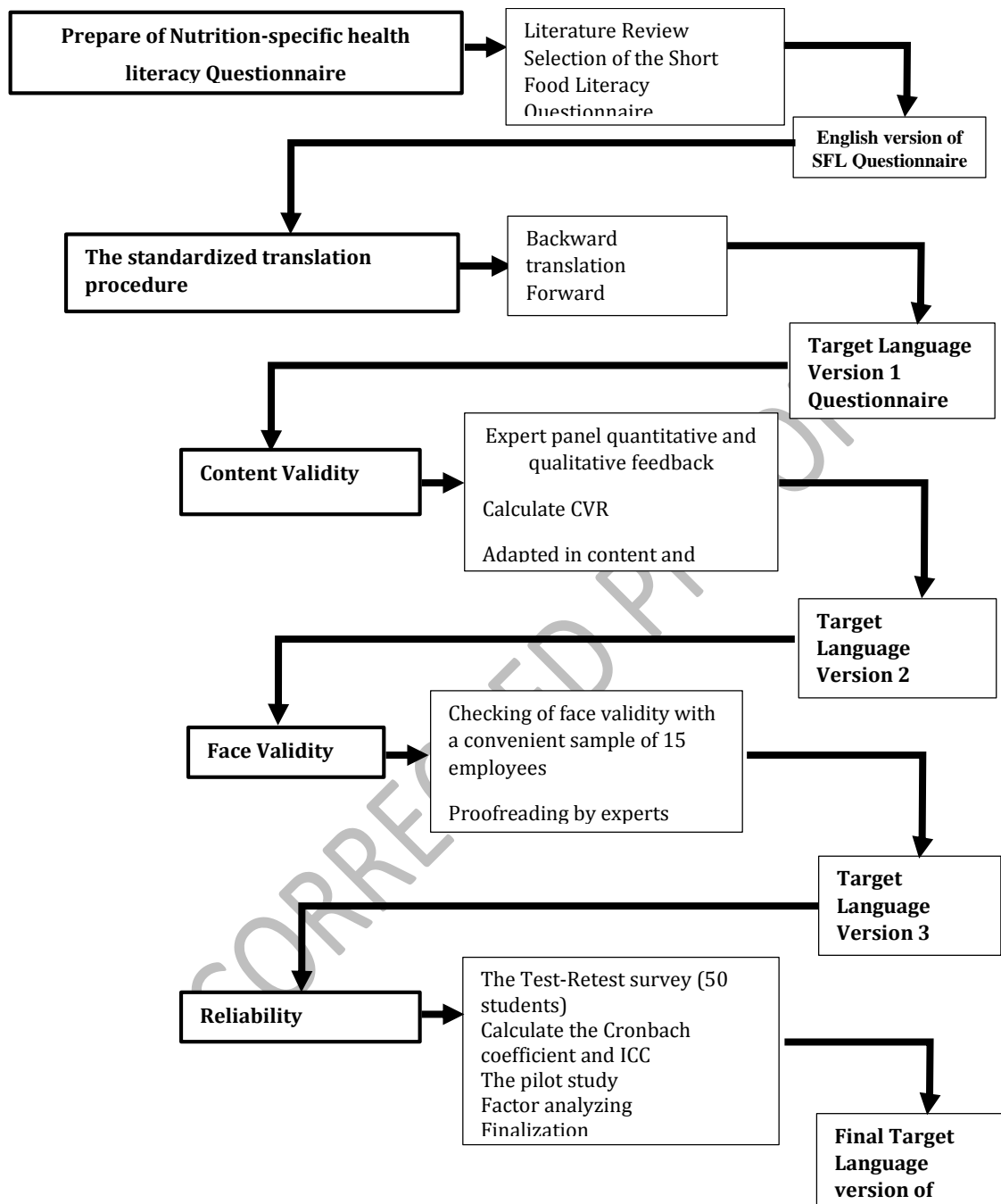


Figure 1. Flowchart of validation steps performed with their respective results and changes.

Phase 3: Content validity included expert panel quantitative and qualitative feedback. Fifteen nutrition professionals from different two medical schools were invited to the experts' panel, of them 10 persons participated, and provided qualitative feedback on the clarity and

content of the questionnaire. Lawshe content validity ratio (CVR) was used to assess the validity of each item and the overall questionnaire to determine the degree to which the tool captures components of the nutrition-specific health literacy construct. CVRs were

calculated by scores that experts rated to each question whether it is essential, useful but not essential, or not necessary(13). Depending on the final sample size of the expert panel (10 experts), a minimum CVR of 0.62 is required for an item to be valid, meaning 81% agreement for approving the question is essential(13, 14,15). Each item was retained when it had a valid CVR, if the CVR was not valid but was supported by experts' qualitative feedback. This phase resulted in the target language questionnaire version2.

Phase 4: In the fourth phase, to assess the face validity of the questionnaire, a convenient sample of 15 employees (57% female, aged 21–69) with several educational backgrounds (nine with higher education and six with a lower level of education) completed a version of the questionnaire to verify the understanding the questions and the corresponding answers. The participants were invited to express the problems they had in answering the questions. Adjustments were made as a result of a discussion with two external experts about the degree of understanding and suggested using better terms that could have been applied. Few modifications were made to flow and clarity and after proofreading the target language questionnaire version3 is finalized.

Phase 5: The test-retest study was undertaken for the reliability assessment of the questionnaire. In reliability assessments, calculated statistics determine whether a collection of items consistently measures the same characteristic.

The questionnaire was administered to fifty medical students who were undergoing community medicine rotation, with an average age of 21.4 years and 46.4% being female. The students were asked to complete the SFL questionnaire twice, two weeks apart, to assess the test-retest reliability. The Wilcoxon test was used to compare the scale scores and establish the reliability. Additionally, the Interclass correlation coefficient (ICC) and Cronbach's Alpha coefficient were calculated to measure the agreement between the test-retest scores (16,17).

The acceptable values of Cronbach alpha range from 0.70 to 0.95, and a low value could indicate poor inter- item correlation, heterogeneous constructs, or a low number of questions (15, 16, 17). For construct validity, a pilot study was

conducted with 200 medical students, and exploratory factor analysis using principal components and the Varimax rotation method was performed (16, 17). Items with factor loading of 0.2 and above were grouped into 1 factor and domains were constructed. The analysis was conducted using IBM SPSS Statistics 21.0; Armonk, NY: IBM Corp. and a p-value lower than 0.05 was considered statistically significant.

Result

The SFL questionnaire is introduced as the first practical, comprehensive, and short-validated questionnaire for assessing nutrition-specific health literacy among the adult population, comprising 16 questions that represent the main forms of health literacy (HL) for application in public health(2, 11). The translated SFL questionnaire was evaluated for content validity by the experts panel using Lawshe's Content Validity Ratio (CVR) for the validity of each item and the overall questionnaire. Each question was retained when it had valid CVR, if CVR were not valid but were supported by experts' qualitative feedback, it included semantic equivalence, extended explanation, or set new questions. The original questionnaire in some items was expressed as a second-person question (13 items) and in some items as a first-person sentence (3 items). In target language version 1 questionnaires after the expert panel review, all items were rewritten as first-person sentences, this manner was more acceptable in Persian versions of different HL questionnaires. Table 1 compares the original SFL questionnaire items and adapted items in the Persian version, regarding three forms of Nutrition-specific health literacy.

Also, in the original questionnaire, the respondents answered through a four or five-point Likert scale (very bad to very good, disagree strongly to agree strongly, very difficult to very easy, very hard to very easy, or never to always), but in the Persian version, based on the recommendation of the panel of experts and the preference of the participants to avoid confusing the participants, all items were designed on a five-point Likert scale (very low to very high, or never to always).

Table 1 presents the item sets in Nutrition-specific Health Literacy categorized into functional, interactive, and critical skills based on the results of factor analysis. Functional nutrition

HL is the basic skill related to the ability to understand information about healthy nutrition, nutritional recommendations, and nutrition labeling on food, to make healthy choices, and also the ability to prepare a balanced meal with available resources(2, 11, 12). Interactive HL is a more advanced skill for cognitive and interpersonal communication skills, related to the ability to adjust obtained nutritional

information to one's situation, talking, and helping friends and family with nutritional issues(1, 18, 19). Critical HL as the top advanced skill is the ability to assess nutritional information from different sources, evaluate nutritional information, distinguish between healthy and less healthy options, and understand nutrition and health-related topics in the larger societal context (11,12, 14,18).

Table 1. Comparison of the original SFL questionnaire items and adapted version, regarding three forms of Nutrition-specific health literacy.

| Nutrition-specific HL themes | | Forms of Nutrition-specific HL |
|--|--|--------------------------------|
| Original Short Food Literacy Questionnaire | Adaption Persian Version of Short Food Literacy Questionnaire | |
| 1 When I have questions on healthy nutrition, I know where I can find information on this issue. | 1 When I have questions on healthy nutrition, I know where I can find information on this issue. | Critical |
| 2 In general, how well do you understand the following types of nutritional information? | 2 In general, I can understand the following types of nutritional information: | |
| 3 -Nutrition information leaflets | 3 -Nutrition information leaflets or booklets | Functional |
| 4 -Oral recommendations regarding nutrition from professionals. | 4 -Oral recommendations regarding nutrition from professionals | Functional |
| 5 -Food label information | 5 -Food label information | Functional |
| 6 -TV or radio program on nutrition | 6 -TV or radio program on nutrition | Functional |
| 7 -Nutrition advice from family members or friends | 7 -Nutrition advice from my family members or friends | Functional |
| 8 How familiar are you with the Swiss Food Pyramid? | 8 I am familiar with the Food Pyramid | Functional |
| 9 I know the official Swiss recommendations about fruit and vegetable consumption. | 9 I know the official recommendations about fruit and vegetable consumption. | Functional |
| 10 I know the official Swiss recommendations about salt intake. | 10 I know the official recommendations about salt intake. | Functional |
| 11 Think about a usual day: how easy or difficult is it for you to compose a balanced meal at home? | 11 It is easy for me to compose a balanced meal at home on a usual day | Functional |
| 12 In the past, how often were you able to help your family members or a friend if they had questions concerning nutritional issues? | 12 In the past, I was able to help my family members or a friend if they had questions concerning nutritional issues | Interactive |
| 13 There is a lot of information available on healthy nutrition today. How well do you manage to choose the information relevant to you? | 13 There is a lot of information available on healthy nutrition today. I can manage to choose the information relevant to me | Interactive |
| 14 How easy is it for you to judge if media information on nutritional issues can be trusted? | 14 It is easy for me to judge whether media information on nutritional issues can be trusted | Critical |
| 15 Commercially often relate foods with health. How easy is it for you to judge if the presented associations are appropriate or not? | 15 Commercially often relate foods with health. It is easy for me to judge if the presented associations are appropriate or not. | Critical |
| 16 How easy is it for you to evaluate if a specific food is relevant for a healthy diet? | 16 It is easy for me to evaluate if a specific food is relevant for a healthy diet | Critical |
| 17 How easy is it for you to evaluate the longer-term impact of your dietary habits on your health? | 17 It is easy for me to evaluate the longer-term impact of my dietary habits on my health. | Critical |

The validity assessment of the Persian version of the SFL Questionnaire is displayed in Table 2, including Content Validity determined by expert panel results, Test-Retest reliability, Inter-Item

reliability from a test-retest survey, and Confirmatory factor analysis results from a pilot study.

Table 2. Content Validity, Test-Retest Reliability, Inter-item Reliability, and results of factor analysis of the Persian version of the SFL Questionnaire

| Item | Content Validity (CVR)* | Test-Retest Reliability | | | Factor Loading |
|--|-------------------------|--------------------------|--------------------------|------------------|----------------|
| | | Time 1 Mean score(SD) | Time 2 Mean score(SD) | ICC** P-value | |
| When I have questions on healthy nutrition, I know where I can find information on this issue. | 0.8 | 4.1±0.5 | 4.1±0.1 | 0.63, 0.02 | 0.85 |
| In general, I can understand the following types of nutritional information: | | | | | |
| -Nutrition information leaflets or booklets | 0.6 | 3.7±0.1 | 3.6±0.3 | 0.69, 0.001 | 0.83 |
| -Oral recommendations regarding nutrition from professionals | 1 | 4.6±0.4 | 4.5±0.1 | 0.72, 0.01 | 0.75 |
| Food label information | 0.8 | 4.3±1 | 4.5±0.1 | 0.61, 0.05 | 0.77 |
| TV or radio programs on nutrition | 0.6 | 3.9±0.5 | 3.8±0.3 | 0.72, 0.09 | 0.74 |
| -Nutrition advice from my family members or friends | 0.6 | 3.7±0.7 | 4.0±0.3 | 0.65, 0.01 | 0.69 |
| I am familiar with the Food Pyramid | 0.8 | 3.5±0.5 | 3.4±0.5 | 0.69, 0.01 | 0.76 |
| I know the official recommendations about fruit and vegetable consumption. | 0.8 | 3.6±0.7 | 3.4±0.8 | 0.80, 0.003 | 0.87 |
| I know the official recommendations about salt intake. | 1 | 3.6±0.4 | 3.5±0.6 | 0.78, 0.01 | 0.61 |
| It is easy for me to compose a balanced meal at home on a usual day | 0.4 | 3.7±0.8 | 3.9±0.6 | 0.65, 0.04 | 0.71 |
| In the past, I was able to help my family members or a friend if they had questions concerning nutritional issues | 0.4 | 3.5±0.8 | 3.7±0.7 | 0.71, 0.008 | 0.68 |
| There is a lot of information available on healthy nutrition today. I can manage to choose the information relevant to me | 1 | 4.1±0.3 | 4.1±0.4 | 0.69, 0.03 | 0.77 |
| It is easy for me to judge whether media information or Commercials on nutritional issues can be trusted | 0.8 | 3.9±0.1 | 3.8±0.2 | 0.61, 0.05 | 0.85 |
| Commercials often relate foods with health. It is easy for me to judge if the presented associations are appropriate or not. | 0.4 | 3.5±0.2 | 3.4±0.4 | 0.62, 0.05 | 0.85 |
| It is easy for me to evaluate if a specific food is relevant for a healthy diet | 1 | 4.0±0.1 | 4.0±0.1 | 0.72, 0.006 | 0.80 |
| It is easy for me to evaluate the longer-term impact of my dietary habits on my health. | 1 | 4.2±0.1 | 4.0±0.2 | 0.85, 0.02 | 0.84 |

*Content validity Ratio, ** Intra class Correlation Coefficient

The questionnaire demonstrated a Cronbach alpha coefficient of 0.85, with the functional, critical, and interactive domains showing values of 0.73, 0.70, and 0.75 respectively, indicating an acceptable level of reliability. The Intraclass Correlation Coefficient (ICC) for questionnaire items ranged from 0.61 to 0.85, signifying moderate to good reliability. ICC values below 0.5 indicate poor reliability, 0.5 to 0.75 indicate moderate reliability, 0.75 to 0.9 indicate good reliability, and values above 0.9 indicate excellent reliability (14). Additionally, the results of the confirmatory factor analysis (CFA) confirmed that the validated tool aligned with the model consisting of three constructs. To assess the accuracy of self-assessment in individuals' nutrition knowledge, researchers

included 11 statements of the food pyramid recommendations in true and false format as an appendix at the end of the questionnaire (items 17-26) as shown in Table 3.

The descriptive analysis of the response distribution showed an acceptable variance within the scales. In eleven of the 19 items, the answers were distributed among all the response categories, and in six items, only three of the five response categories were selected. Also, the time spent to complete the SFL questionnaire (18 questions about food Literacy and 8 about knowledge of Iranian food pyramid recommendation). was checked that the mean completion time was 11 minutes, from 7 to 20 minutes.

Table 3. Items from food pyramid recommendations for evaluation of the accuracy of self-assessment in people's nutrition knowledge

| | Item | Answer |
|----|--|--|
| 1 | Every day, I use some kind of sweet snacks (like cake, chocolate, soft drinks) and/or salty snacks (like chips, Popcorn, Pretzels). | Never Rarely Sometimes Usually Always |
| 2 | During the week, I use fast food such as pizza, sandwiches, and fried chicken. | Never Rarely Sometimes Usually Always |
| 3 | The appropriate consumption of dairy products is 2 servings per day (each serving is approximately the size of a glass of milk, or a cup of yogurt, or a can of cheese matches). | True- False or I don't know |
| 4 | The minimum amount of suitable consumption of fruits is 2 units per day (each unit is the size of a medium apple) | True- False or I don't know |
| 5 | The minimum amount of suitable consumption of vegetables is 3 units per day (each unit is the size of a handful). | True- False or I don't know |
| 6 | The proper consumption of bread and cereals is about 3 to 6 portions per day (each portion is the size of a palm of bread, or a spatula of rice or pasta) | True- False or I don't know |
| 7 | It is better to get at least half of the daily calories (energy) needed by the body from bread, cereals, rice or pasta. | True- False or I don't know |
| 8 | The daily limit of sugar and sugary substances is about 6 sugar cubes for women and about 9 sugar cubes for men. | True- False or I don't know |
| 9 | The proper consumption of oil and fat is about 2 to 3 tablespoons per day. | True- False or I don't know |
| 10 | The daily limit of salt consumption is one teaspoon. | True- False or I don't know |
| 11 | The appropriate consumption of protein products such as red meat, chicken, fish, eggs and legumes is 100 to 150 grams per day. | True- False or I don't know |

Discussion

This study aimed to validate the Persian version of the Short Food Literacy (SFL) Questionnaire for adults, highlighting the growing importance of food literacy as a subset of nutritional health literacy. Limited health literacy hinders individuals' ability to make informed health decisions and follow medical advice, ultimately compromising personal and family health outcomes (19). The findings demonstrated that the adapted questionnaire is both valid and reliable for use in Persian-speaking adult populations.

Questionnaire validation is a multifaceted process that requires a rigorous approach to ensure content, construct, and criterion validity while also examining reliability parameters such as internal consistency and stability over time (17, 20).

In this study, the forward-backward translation approach and expert panel review ensured semantic, idiomatic, experiential, and conceptual equivalence, which are considered essential criteria for high-quality translation and cross-cultural adaptation (21).

Converting all items to first-person format enhanced clarity and respondent engagement—a modification aligned with evidence demonstrating that self-referential framing improves comprehension and reliability in health literacy assessments (22). This adaptation process prioritized first-person

statements over second-person questions to foster self-reflection and engagement, a strategy proven to strengthen data quality in self-reported tools, though exceptions may apply for sensitive topics (22, 23).

Likewise, standardizing all Likert scale responses to a consistent five-point format simplified the instrument for users and improved psychometric robustness—a recommendation frequently emphasized in cross-cultural survey design (24).

In this research Test-retest analysis as a reliability assessment tool, was used to measure the same concept over time and on consistent subjects (13). The results of the Test-retest analysis showed that the questionnaire provides consistent results when used at different times. The Cronbach's alpha coefficient for the questionnaire was 0.85, and the correlation between the areas had an acceptable significant level.

This study reported that the Persian version of the SFL, like the Swiss and Turkish versions of the SFL questionnaire, has an appropriate Cronbach's alpha coefficient and an acceptable ICC (2,12, 18). The intraclass correlation coefficients for the statistical components were moderate to good, with none reporting excellent ICCs. This variability in participants' circumstances may have contributed to the ICC values (25). However, the low ICC values may be due to a Ceiling and floor effect in some participants' scores (26). The results showed in

factor analysis, only three items of the questionnaire had low factor loading values (0.69, 0.61, 0.68), and other items had higher values.

This study also contributes to a growing body of literature emphasizing the need for concise, practical instruments in public health nutrition research. The 16-item SFL is efficient and user-friendly, effectively capturing nutrition-specific health literacy while minimizing respondent fatigue. The short-form questionnaires are more applicable in clinical and community settings, although researches reported that response burden depended more on content relevance and complexity than questionnaire length, as complex short forms may be more demanding than simple long ones (27).

The results align with existing research highlighting the importance of culturally adapted tools for evaluating food literacy in diverse populations, a translated measurement instrument should be understandable in a cultural context different from the original environment, but not lose its measurement properties (28, 29). Systematic assessment of functional food literacy as a subset of health literacy levels enables policymakers to develop targeted interventions that improve health communication and ensure proper understanding of health status and guidelines(19).

One limitation of this study was the relatively small sample size for conducting factor analysis. Although the KMO value indicated sampling adequacy, it is recommended that future studies replicate the analysis with a larger sample to ensure more robust results.

Conclusion

The Persian version of the SFL Questionnaire is a reliable, valid, and culturally adapted instrument for measuring adult food literacy. It is expected to facilitate targeted public health interventions, inform nutrition education programs, and support academic research in food and health literacy domains within Persian-speaking populations.

However, it is necessary to conduct more studies on more heterogeneous populations with the use of more detailed and specialized questionnaires to confirm validity and reliability and finally use it at the comprehensive and management level.

Declarations

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Authors' Contributions

LJ and AMK contributed to the research design, performed statistical analysis drafted and revised the manuscript; MN contributed to the research design and finally revised the manuscript. SS contributed statistical analysis and drafted the manuscript. All authors reviewed and approved the final draft of the manuscript.

Conflict of Interest

The authors stated no conflicts of interest.

Ethical Approval

The study protocol received approval from the Ethics Committee of Mashhad University of Medical Sciences, Iran (IR.MUMS.REC.4022637).

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Informed Consent

The sample was selected after obtaining consent and providing necessary explanations.

References

1. Silva P, Araújo R, Lopes F, Ray S. Nutrition and food literacy: framing the challenges to health communication. *Nutrients*. 2023;15(22):4708.
2. Durmus H, Gökler ME, Havlioglu S. Reliability and validity of the Turkish version of the short food literacy questionnaire among university students. *Prog. Nutr.* 2019;21:333-8.
3. Silva P. Food and nutrition literacy: Exploring the divide between research and practice. *Foods*. 2023;12(14):2751.
4. Truman E, Lane D, Elliott C. Defining food literacy: A scoping review. *Appetite*. 2017. 116: 365-71.
5. Bhattacharya S, Heidler P, Varshney S. Incorporating neglected non-communicable diseases into the

- national health program—A review. *Frontiers in Public Health*. 2023;10:1093170.
6. Ghalibaf, M.B., M. Gholami, and N. Mohammadian. Stability of Food Security in Iran; Challenges and Ways Forward: A Narrative Review. *Iran J Public Health*, 2022. 51(12): 2654-63.
7. Farivar F, Heshmat RA, Azemati B, Abbaszadeh Ahranjani SH, Keshtkar AA, Sheykholeslam R, Nadim A. Understanding knowledge about, general attitudes toward and practice of nutrition behavior in the Iranian population. *Iranian Journal of Epidemiology*. 2009 Sep 10;5(2):11-8.
8. Ares G, De Rosso S, Mueller C, Philippe K, Pickard A, Nicklaus S, van Kleef E, Varela P. Development of food literacy in children and adolescents: implications for the design of strategies to promote healthier and more sustainable diets. *Nutrition Reviews*. 2024;82(4):536-52.
9. Briggs M, Safaii S, Beall DL. Position of the American dietetic association, society for nutrition education, and American school food service association-nutrition services: An essential component of comprehensive school health programs. *Journal of the Academy of Nutrition and Dietetics*. 2003;103(4):505.
10. Yoo H, Jo E, Lee H, Park S. Development of a food literacy assessment tool for healthy, joyful, and sustainable diet in South Korea. *Nutrients*. 2022;14(7):1507.
11. Krause CG, Beer-Borst S, Sommerhalder K, Hayoz S, Abel T. A short food literacy questionnaire (SFLQ) for adults: Findings from a Swiss validation study. *Appetite*. 2018;120:275-80.
12. Krause C, Sommerhalder K, Beer-Borst S. Nutrition-specific health literacy: development and testing of a multi-dimensional questionnaire. *Ernahrungs Umschau*. 2016;63(11):214-20.
13. Guttersrud O, Dalane J, Pettersen S. Improving measurement in nutrition literacy research using Rasch modelling: examining construct validity of stage-specific 'critical nutrition literacy' scales. *Pub Health Nutr*. 2014. 17(4): 877-83.
14. Kennedy LG, Kichler EJ, Seabrook JA, Matthews JI, Dworatzek PD. Validity and reliability of a food skills questionnaire. *Journal of Nutrition Education and Behavior*. 2019;51(7):857-64.
15. Tavakol M, Wetzel A. Factor Analysis: a means for theory and instrument development in support of construct validity. *Int J Med Educ*. 2020. 11: 245-7.
16. Raouf Ghahramani S, EmadzadehA, Shamaeian Razavi N, Jarahi L, Moharari F. Social anxiety of online learners: A case study of Mashhad University of Medical Sciences using the social anxiety scale in electronic learning environments (SASE). *Future of Medical Education Journal*, 2024; 14(3): 10-5.
17. Zavar A, Jarahi L, Alimoradi B, Khosravi N. The alcohol use disorders identification test (AUDIT): reliability and validity of the Persian version. *Asia Pacific Journal of Medical Toxicology*. 2015;4(1):37-42.
18. Krause C, Sommerhalder K, Beer-Borst S, Abel T. Just a subtle difference? Findings from a systematic review on definitions of nutrition literacy and food literacy. *Health promotion international*. 2018;33(3):378-89.
19. Jarahi L, Asadi R, Hakimi HR. General health literacy assessment of Iranian women in Mashhad. *Electronic Physician*. 2017 ;9(11):5764.
20. Epstein J, Santo RM, Guillemin F. A review of guidelines for cross-cultural adaptation of questionnaires could not bring out a consensus. *Journal of Clinical Epidemiology*. 2015;68(4):435-41.
21. Nguyen TH, Paasche-Orlow MK, Kim MT, Han HR, Chan KS. Modern measurement approaches to health literacy scale development and refinement: overview, current uses, and next steps. *Journal of health communication*. 2015;20(sup2):112-5.
22. Ahmadi, E. Self-Reflection with Non-First-Person Language: Moving Away from Oneself and Controlling One's Feelings, Thoughts, and Behaviors. *Journal of Social Work Research*, 2022; 9(32): 1-33.
23. Choifer A. A new understanding of the first-person and third-person perspectives. *Philosophical Papers*. 2018;47(3):333-71.
24. Rokeman NR. Likert measurement scale in education and social sciences: explored and explained. *EDUCATUM Journal of Social Sciences*. 2024;10(1):77-88.
25. Vaitkeviciute, R., L.E. Ball, and N. Harris, The relationship between food literacy and dietary intake in adolescents: a systematic review. *Public Health Nutr*, 2015. 18(4): p. 649-58.
26. Mehta S, Bastero-Caballero RF, Sun Y, Zhu R, Murphy DK, Hardas B, Koch G. Performance of intraclass correlation coefficient (ICC) as a reliability index under various distributions in scale reliability studies. *Statistics in medicine*. 2018;37(18):2734-52.
27. Rolstad S, Adler J, Rydén A. Response burden and questionnaire length: is shorter better? A review and meta-analysis. *Value in Health*. 2011;14(8):1101-8.
28. Ortiz-Gutiérrez S, Cruz-Avelar A. Translation and cross-cultural adaptation of health assessment tools. *Actas Dermo-Sifiliográficas (English Edition)*. 2018;109(3):202-6.
29. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quinonez HR, Young SL. Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Frontiers in Public Health*. 2018;6:149.