JOURNAL OF NUTRITION FASTING AND HEALTH

Nutrition Literacy and Healthy Lifestyle among University Employees in Iran: A Cross-Sectional Study at Mashhad University of Medical Sciences

Fatemeh Sedghi[1, 2], Mahdi Dehbashi[3], Mohammad Moghzi[3], Nooshin Peyman[1, 2], Elham Charoghchian Khorasani[1, 2*]

1. Social Determinant of Health Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.
2. Department of Health Education and Health Promotion, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran.
3. International Convention Center for Health Martyrs, Mashhad University of Medical Sciences, Mashhad, Iran.

ARTICLEINFO

Article type:
Research Paper

Article History:
Received: 03 Aug 2025
Accepted: 20 Sep 2025

Keywords:
Health literacy
Nutrition
Healthy lifestyle
Employee

ABSTRACT

Introduction: Nutrition literacy is an influential factor in choosing healthy eating behaviors and lifestyles. The aim of this study was to assess the nutrition literacy, healthy lifestyle and related factors in the employee of the International Conference Center of Health Martyrs of Mashhad University of Medical Sciences, in Iran.

Methods: In this descriptive-analytical study, data were collected from 113 employees working at the International Health Martyrs Conference Center through a census. The data collection tools included the Evaluation Instrument of Nutrition Literacy for Adults (EINLA) and the Healthy Lifestyle Questionnaire (HLQ). The study was conducted between 2023 and 2024, and the collected data were analyzed using SPSS version 24.0. Statistical methods employed for analysis included the independent sample t-test, one-way ANOVA, Spearman's and Pearson's correlation coefficients, and simple/multiple linear regression.

Results: The average age of the participants was 37.3 years (SD = 7.8). Most employees had moderate nutrition literacy, with significantly higher scores among females and those with higher education levels. Nutrition literacy was inversely correlated with age (P = 0.028), but showed no significant association with overall lifestyle scores. However, healthier lifestyles were associated with lower BMI and younger age.

Conclusion: The results underscore the importance of implementing tailored nutrition education programs, particularly for male employees and those with lower educational attainment. Furthermore, the lack of a significant association between nutrition literacy and lifestyle suggests that effective promotion of healthy behaviors in workplace settings may require comprehensive, multifaceted approaches that extend beyond knowledge dissemination alone.

► Please cite this paper as:
Sedghi F, Dehbashi M, Moghzi M, Peyman N, Charoghchian Khorasani E. Nutrition Literacy and Healthy Lifestyle among University Employees in Iran: A Cross-Sectional Study at Mashhad University of Medical Sciences. J Nutr Fast Health. 2025; 1-. DOI: 10.22038/JNFH.2025.90141.1593.

Introduction

Nutrition literacy is a fundamental aspect of health that significantly influences lifestyle and eating habits (1). Having nutrition literacy means possessing the knowledge and practical abilities to seek out and evaluate nutrition information, together with the capacity to apply it in making informed decisions about diet (2). This multifaceted concept extends beyond basic nutrition knowledge, encompassing practical skills like meal planning, interpreting nutrition information, and making informed food choices (3). Research indicates that nutrition literacy directly impacts the quality of dietary patterns and overall health (4).

Factors such as tobacco use, alcohol intake, insufficient physical activity, and inadequate nutrition contribute directly to negative health outcomes (5). Individuals with low socioeconomic status often exhibit higher rates of obesity, smoking, alcohol consumption, and physical inactivity compared to the general population (5-7). Numerous studies have explored the interconnections between excess body weight, various lifestyle factors, and health literacy (HL) levels worldwide, generally indicating that obesity and unhealthy lifestyle behaviors are associated with lower

* *Corresponding authors:* Elham Charoghchian Khorasani, Department of Health Education and Health Promotion, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran.Phone:09157008108, Email: CharoghchianE@mums.ac.ir.

HL levels (8-11). Some research specifically links low HL to obesity, unhealthy dietary patterns, and sedentary behavior (8,11), while others highlight associations between HL and limited physical activity, fruit and vegetable consumption, alcohol intake, and smoking (9). In terms of nutrition literacy (NL), fewer studies have investigated its impact on body weight and lifestyle factors. For example, a U.S. study using the Nutrition Literacy Assessment Tool (NLit) showed that NL predicts adherence to healthy or unhealthy dietary patterns (12), and research in Taiwan using an 8-item nutrition-related scale found that higher NL levels were associated with healthier eating behaviors(13). Although NL is an individual factor, it is shaped by socioeconomic variables, which must be considered in the context of diverse population realities (14). Moreover, the work environment significantly influences eating behavior and overall health (15), as work routines and group dynamics can affect NL. Limited food options and the predominance of mental activities often result in poor dietary choices (16), a problem especially pronounced among service workers, where job-related stress and workplace conditions exacerbate unhealthy eating habits and lifestyles(17).

Global studies consistently show that low NL levels correlate with unhealthy behaviors, including excessive fast-food consumption, reduced physical activity, and weight gain (18-20). Evidence from developed countries highlights that service workers frequently adopt poor dietary patterns due to demanding work schedules, limited healthy food options, and job-related stress (21,22). In Iran, although several studies have investigated NL in the general population, little is known about workplace-specific contexts, particularly among staff in residential welfare centers and service facilities. This occupational group faces unique challenges such as long working hours, irregular shifts, and restricted access to nutritious meals, all of which may negatively influence their nutrition literacy and lifestyle behaviors.

The main objective of this research is to examine the association between nutrition literacy and lifestyle among employees of the International Conference Center of Health Martyrs at Mashhad University of Medical Sciences. In particular, it aims to evaluate levels of nutrition literacy, determine common lifestyle behaviors, and investigate how these two factors are related within this group. The findings are expected to provide valuable insights for health policymakers to design workplace-based interventions and training programs tailored to the needs of service center staff. Moreover, these results can serve as a foundation for future workplace-oriented research in similar Iranian settings. Ultimately, this study is an important step toward improving the quality of working life and reducing nutrition-related health risks in this vulnerable occupational group.

Methods

Study Design and Sampling

This descriptive cross-sectional research was carried out between September 2022 and January 2023 at Mashhad University of Medical Sciences. The study targeted all staff members employed in the Welfare and Tourism Services Complex (Shohadaye Salamat) of the University. Given the relatively small and uniform population, a census sampling method was applied, encompassing all 130 employees. Of these, 113 individuals completed the questionnaire, resulting in a response rate of 86.9%, although some variables contained missing values (for instance, educational status was reported by 108 participants). The inclusion criteria required participants to be literate and willing to take part, while exclusion criteria involved incomplete responses or study withdrawal. Following the provision of written informed consent, clarification of research objectives, and assurance of confidentiality, questionnaires were distributed among the staff.

Data Collection Tools

Data for this study was collected using a three-part questionnaire comprising demographic information, a nutrition literacy questionnaire, and a Lifestyle Questionnaire.

Demographic and background information included age, gender, education, number of children, type of employment, body mass index, blood pressure, work history, history of illness, participation in nutrition-related training courses, and source of nutrition information. To measure blood pressure and BMI, a trained health expert assessed blood

pressure using a calibrated digital sphygmomanometer, which has been validated in previous studies and is widely used in clinical and research settings. Participants were seated and rested for at least five minutes before measurement, following standard protocols. Weight and height were assessed using a calibrated digital scale and a stadiometer, with participants measured in light clothing and without shoes. Body mass index (BMI) was determined by dividing weight in kilograms by the square of height in meters (kg/m^2). Blood pressure was also recorded, as it is a key clinical indicator strongly linked to nutrition, body weight, and lifestyle, and therefore relevant for examining its association with nutrition literacy. These standardized methods provided accurate and valid measurements, in line with common clinical and research protocols.

The EINLA questionnaire, developed by Cesur et al. in Turkey(23) and adapted by Hemmati et al. for Iran(24), measures nutrition literacy with a validated internal consistency (Cronbach's alpha: 0.73). It includes 35 statements across five sections: general nutrition knowledge (10 questions), reading comprehension (6), food group identification using pictures (10), understanding food units (3), and calculating/reading food labels (6). Scores range from 0-35, with three literacy levels: limited (≤11), moderate (12-24), and adequate (≥25).

The third section of the questionnaire focuses on questions related to a healthy lifestyle, designed to assess lifestyle habits. Its content validity was confirmed by experts, and its internal consistency, with a Cronbach's alpha of 82%, was verified in the study conducted by Mohammadi Zaidi et al(9). This questionnaire consists of 52 items, each with four response options: never, sometimes, often, and always. It evaluates six dimensions of a health-promoting lifestyle: nutrition, physical activity, spiritual growth, health responsibility, interpersonal relationships, and stress management. Each item is scored on a scale of 1 to 4, resulting in a total score ranging from 52 to 208. Additionally, separate scores can be calculated for each dimension.

Data Analysis

For data analysis, quantitative variables were presented as mean ± standard deviation, while qualitative variables were reported as frequency and percentage. The Kolmogorov–Smirnov test was applied to assess normality. Based on the distribution, correlations between quantitative variables were evaluated using either Pearson's or Spearman's tests. The relationship of nutrition literacy and lifestyle with binary qualitative variables was analyzed using the independent t-test or Mann–Whitney test, whereas categorical variables with more than two groups were compared using one-way ANOVA or the Kruskal–Wallis test.

Result

The study population had a mean age of 37.3 years (±7.8) with participants ranging from 21 to 60 years old. The mean, standard deviation, and range of body mass index, systolic blood pressure, diastolic blood pressure, Work Experience, Nutrition Literacy Score and Lifestyle Score are presented in Table 1. According to the results of Table 2, among the employees participating in the research, 5.88 percent (equivalent to 100 people) were male, 1.89 percent (98 people) were married, 8.39 percent had a diploma education, and 3.38 percent had two children. The majority of employees (1/97%) were corporate employees. 42.5% of employees had a normal body mass index. Also, 90% of them were healthy and free of disease. 56.5% had experience of training in health centers or related training courses in the field of nutrition and food safety. 45.1% of employee received information on nutrition and food through doctors and health workers.

The results showed that none of the employee had sufficient nutrition literacy and the nutrition literacy of the majority of them (97.3%) was at an average level.

Table 1. Descriptive Analysis of Study Variables

Variable	Mean ± SD	Range
Age (years)	37.33 ± 7.82	21-60
Body Mass Index (kg/m^2)	25.73 ± 4.41	17.71-38.86
Systolic BP (mmHg)	120.89 ± 20.89	10-199
Diastolic BP (mmHg)	77.48 ± 17.38	10-96
Work Experience (years)	10.27 ± 7.31	1-27
Nutrition Literacy Score	17.43 ± 3.28	9-23
Lifestyle Score	130.15 ± 23.36	66-202
Variable	**Category**	**Frequency (%)**
Gender	Male	100 (88.5%)
	Female	13 (11.5%)
Marital Status	Married	98 (89.1%)
	Single	12 (10.9%)
Education Level	Primary school	10 (9.3%)
	Middle school	23 (21.3%)
	High school	10 (9.3%)
	Diploma	43 (39.8%)
	Associate degree	10 (9.3%)
	Bachelor's degree	10 (9.3%)
	Master's degree	1 (0.9%)
	PhD	1 (0.9%)
Number of Children	0	14 (14.9%)
	1	18 (19.1%)
	2	36 (38.3%)
	3	22 (23.4%)
	4	3 (3.2%)
	5	1 (1.1%)
BMI Category	Underweight (<18.5)	1 (0.9%)
	Normal (18.5-24.9)	48 (42.5%)
	Overweight (25-29.9)	40 (35.4%)
	Obese (≥30)	17 (15.0%)
Employment Type	Contractual	101 (97.1%)
	Temporary	1 (1.0%)
	Permanent	2 (1.9%)
Chronic Conditions	Hypertension	1 (1.3%)
	Diabetes	1 (1.3%)
	Dyslipidemia	5 (6.3%)
	Cardiovascular disease	1 (1.3%)
	None	72 (90.0%)
Nutrition Training	Received training	61 (56.5%)
	No training	47 (43.5%)
Health Information Sources	Friends/acquaintances	7 (7.4%)
	Family members	5 (5.3%)
	Healthcare providers	51 (53.7%)
	Social media	13 (13.7%)
	TV/Radio	3 (3.2%)
	Newspapers/Magazines	3 (3.2%)
	Educational brochures	11 (11.6%)
	Multiple sources	2 (2.1%)
Nutrition Literacy	Inadequate (score ≤11)	3 (2.7%)
	Moderate (score 12-25)	110 (97.3%)
	Adequate (score ≥25)	0 (0.0%)

Note: The total number of participants was 113. Due to missing data, the number of valid responses differs across variables.

The correlation analysis revealed several significant findings regarding the relationships between nutrition literacy, lifestyle factors, and health indicators among employees (Table2). No statistically significant association was observed between nutrition literacy and systolic blood pressure (P=0.632) or diastolic blood pressure (P=0.422). However, a significant inverse correlation was found between nutrition literacy and age (r=-0.210, P=0.028), indicating that older employees tended to have lower levels of nutrition literacy. No significant relationship was detected between nutrition literacy and work experience (P=0.312).

Table 2. Correlation Analyses between Nutrition Literacy, Lifestyle, and Health Indicators

Variables Correlated	Correlation Coefficient	P-value
Nutrition Literacy with:		
• BMI	0.034£	0.731
• Systolic BP	-0.047£	0.632
• Diastolic BP	-0.078£	0.422
• Age	-0.210£	0.028*
• Work experience	-0.110£	0.312
Lifestyle with:		
• Age	-0.266£	0.005**
• Work experience	-0.181£	0.095
• BMI	-0.249¥	0.010*
BMI with:		
• Systolic BP	0.138£	0.167
• Diastolic BP	0.139£	0.165

Table Notes: BMI = Body Mass Index; BP = Blood Pressure; ¥ Pearson Correlation; £ Spearman Correlation; *Significant at P < 0.05; ** Significant at P < 0.01

Regarding lifestyle factors, a significant inverse correlation emerged between healthy lifestyle practices and age (r=-0.266, P=0.005), suggesting that younger employees maintained better lifestyle habits. Lifestyle scores showed no significant association with work experience (P=0.095). Importantly, a significant inverse relationship was observed between body mass index (BMI) and lifestyle scores (r=-0.249, P=0.010), demonstrating that employees with healthier lifestyles tended to have lower BMI values .Notably, the analysis found no significant correlations between BMI and either systolic (P=0.167) or diastolic blood pressure (P=0.165) among the study participants.

Table 3. Comparative Analysis of Nutrition Literacy and Lifestyle Scores across Demographic Variables

Variable	Category	Nutrition Literacy Mean±SD (Median)	Lifestyle Score Mean±SD (Median)	Statistical Significance
Gender	Male	17.16±3.18 (18)	129.79±24.09 (132.5)	Nutrition: Z=2.687** (P=0.007)
	Female	19.54±3.43 (21)	132.92±17.29 (141)	Lifestyle: Z= NS (P=0.672)
Marital Status	Married	17.35±3.20 (18)	130.01±24.31 (132.5)	Nutrition: Z= NS (P=0.200)
	Single	18.25±4.00 (20)	131.33±15.47 (132)	Lifestyle: t= NS (P=0.855)
Education	<Diploma	16.37±3.38 (17)	129.91±23.30 (132)	Nutrition: H=13.564** (P=0.001) Lifestyle:F= NS (P=0.536)
	Diploma	17.81±3.04 (19)	128.63±26.70 (129)	
	>Diploma	19.41±2.54 (20)	135.41±16.08 (136)	
BMI Category	Normal	17.69±3.07 (18.5)	133.25±20.32 (136.5)	Nutrition: H= NS (P=0.242) Lifestyle: H= NS (P=0.168)
	Overweight	16.98±3.13 (17)	123.88±27.42 (124.5)	
	Obese	18.12±3.43 (19)	128.12±19.08 (132)	
Training	Received	16.72±3.28 (17)	129.62±25.02 (133)	Nutrition: t= -2.564* (P=0.012) Lifestyle: t= NS (P=0.776)
	Not received	18.30±3.02 (19)	130.89±19.82 (132)	

*NS: Not Significant (P>0.05); *P<0.05; **P<0.01; Tests used: Independent t-test (t); Mann-Whitney U (Z); Kruskal-Wallis (H); ANOVA (F).

The regression analysis revealed no significant association between nutrition literacy and lifestyle scores in either the unadjusted model (β=1.185, p=0.078) or the adjusted model controlling for demographic and health-related variables (β=1.919, p=0.217). The crude model explained only 2.8% of the variance in lifestyle scores (R^2=0.028), which increased to 13.7% in the adjusted model (Table4). None of the included covariates showed significant associations with lifestyle scores in the adjusted model, with all p-values >0.05. The largest coefficients were observed for male gender (β=21.791) and absence of disease (β=9.216), though neither reached statistical significance.

Table 4. Association between Nutrition Literacy and Lifestyle: Unadjusted and Adjusted Regression Models

Variable	Category	Model 1 (Crude)		Model 2 (Adjusted)*	
		β (SE)	p-value	β (SE)	p-value
Nutrition Literacy		1.185 (0.669)	0.078	1.919 (1.553)	0.217
Age		-	-	1.044 (1.087)	0.332
Work experience		-	-	-1.291 (0.963)	0.178
Gender	Male (Ref: Female)	-	-	21.791 (19.801)	0.272
Marital status	Married (Ref: Single)	-	-	3.523 (15.757)	0.822
Education	<Diploma	-	-	-2.717 (14.941)	0.855
	Diploma	-	-	0.995 (14.964)	0.940
	>Diploma (Ref)	-	-	-	-
Number of children	None	-	-	-6.917 (18.294)	0.703
	<2 children	-	-	-0.040 (18.273)	0.998
	2 children	-	-	0.298 (18.269)	0.979
	>2 children (Ref)	-	-	-	-
Disease status	No disease (Ref: Disease)	-	-	9.216 (12.485)	0.461
Training experience	Received (Ref: Not received)	-	-	4.441 (12.250)	0.714
Model Fit	R^2	0.028		0.137	

*Model 2: adjusted for age, work experience, gender, and marital status, and education, number of children, disease status, and training experience.
B: Unstandardized regression coefficient; SE: Standard Error; Ref: Reference category; R^2: Coefficient of determination.

Discussion

In this study, we evaluated the levels of nutrition literacy and healthy lifestyle, as well as the factors affecting them, among the employees of the Health Martyrs Complex of Mashhad University of Medical Sciences. In examining the results related to nutrition literacy, it was found that most participants had an average level of nutrition literacy, which was somewhat consistent with the findings of other similar studies in Iran that reported average to sufficient nutrition literacy in the majority of participants (26, 27). In our study, BMI, blood pressure, and work experience did not show a significant relationship with nutrition literacy, while gender, occupation, education level, and educational experience were significantly associated with it. Regarding lifestyle, only age and body mass index were found to have a significant effect. We included blood pressure measurement because it is a key clinical outcome strongly influenced by dietary behaviors such as salt intake, weight control, and overall lifestyle. Although no significant association was found in our study, its assessment provided a broader understanding of health indicators potentially related to nutrition literacy.

Another notable result was the negative association between age and nutrition literacy. Previous studies have identified age as a key predictor of nutrition literacy, with scores tending to decline among older adults, particularly those over 65 years, which may be linked to reduced physical abilities such as impaired vision, cognitive decline, and memory problems (26–28). In contrast, within the 15 to 56 age range, higher levels of nutrition knowledge are often reported as age increases, likely due to accumulated learning and educational experiences (14, 29). These findings emphasize the need for educational interventions tailored to the specific needs of different age groups.

Examining gender differences showed that women have higher nutrition literacy. This finding can be justified by the theory of gender roles. According to Johnson's (2018) study, women have more motivation and opportunity to acquire nutrition information due to their traditional responsibilities in family nutrition management (5). This issue reveals the need to pay special attention to nutrition education programs for men.

The observed positive association between education level and nutrition literacy in this study is consistent with findings from previous research (30–32). UNESCO (2022) has also reported that higher educational attainment enhances the ability to critically evaluate health-related information (33). This underscores the value of implementing adult literacy initiatives in workplace settings. Another key outcome of the present study was that individuals with higher education were more capable of accessing nutritional information, interpreting it accurately, and applying it effectively in decision-making.

Numerous studies have highlighted education level as a major determinant of nutritional awareness and behavior (34–35), likely due to greater exposure to scientific resources, attendance at professional meetings, and engagement in educational discussions, particularly as schooling advances. In contrast, adults with lower health literacy often rely more heavily on non-scientific information channels such as television, social media, blogs, or celebrity platforms rather than professional medical sources, a pattern that may pose risks to public health (36–37).

The unexpected finding of the present study was the negative effect of nutrition education on the level of nutrition literacy. This result may be related to several factors: firstly, according to the study of Hasani (2020), the low quality of trainings and the mismatch of content with the real needs of employees can have the opposite effect(38). Second, Sweller's (2018) cognitive load theory explains that presenting complex information regardless of the audience's level of understanding can lead to confusion(30).

In terms of lifestyle, the findings of this study showed that despite the average level of nutrition literacy, this variable was not a predictor of a healthy lifestyle. This result is justifiable with Bronfenbrenner's(1979)socio-ecological model, which emphasizes the influence of environmental and organizational factors on health behaviors(39). Systematic study in this area shows that work environment changes (such as easy access to healthy foods and exercise space) had a greater impact on improving employees' lifestyles than mere training programs(40).

No significant association was found between body mass indices and nutritional health literacy level in this study, while body mass index was associated with lifestyle. There are different results in different studies on the relationship between nutrition literacy and body mass indicators. In Ramazani et al.'s study, only students' nutritional awareness was significantly associated with thinness, overweight, and obesity(41), and in a study of New Zealand nursing students, it was found that nutrition literacy was significantly associated with other measures of learning(42). In Iran, the nutrition literacy variable was directly related to obesity(43). It seems that other factors and variables affecting the body mass profile should be evaluated in the studies to obtain accurate and reliable results.

However, the negative relationship between body mass index and a healthy lifestyle in this study is a finding that has been confirmed by several epidemiological studies. According to the World Health Organization (WHO, 2018) report, overweight and obesity are one of the main barriers to adopting health-oriented behaviors(44). This highlights the importance of integrated weight loss programs in the workplace.

Strengths and limitations

Our study also has limitations that we adhere to. The lack of random sampling and the limited number of samples in the population of a complex that entered the study were our most important challenges in interpreting the results. You should also note that the tools we use are subjective and we rely on self-report results.

Limitations

This study has several limitations that should be acknowledged. First, multivariable analyses were not performed due to the limited number of variables collected and the descriptive design of the study. As a result, potential confounding factors could not be fully controlled. Second, while the effect size (R^2) was reported, the relatively small and context-specific sample may limit the generalizability of the findings to broader populations. Future studies with larger and more diverse samples are needed to confirm and expand these results. Third, although the instrument used in this study provided a validated overall score of nutrition literacy, the subscale analyses were not performed because the subscales have not been fully validated in the Iranian context. Further research should focus on exploring the role of specific subscales in relation to healthy lifestyle outcomes.

Conclusion

Our findings indicated that most employees of the Martyrs of Health Complex demonstrated a moderate level of nutrition literacy, which was significantly associated with age, gender, and educational attainment. Assessing nutrition literacy across various population groups is

important for identifying individuals with limited skills in this area, thereby enabling the development of targeted educational programs aimed at promoting healthier dietary behaviors and ultimately enhancing nutritional well-being.

Declarations

Ethical Considerations

This research was part of a project approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran (Approval Code: IR.MUMS.FHMPM.REC.1402.112). All procedures were carried out in accordance with the principles of the Helsinki Declaration. Participant confidentiality was fully maintained, and written informed consent was obtained prior to enrollment.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Conflict of Interest

The authors declared no conflict of interest.

Acknowledgments

The authors sincerely thank the staff of the Shohadaye Salamat Complex at Mashhad University of Medical Sciences for their valuable cooperation and participation.

References

1.Chilón-Troncos RF, García-Salirrosas EE, Escobar-Farfán M, Millones-Liza DY, Villar-Guevara M. Predicting willingness to consume healthy brand foods using the theory of planned behavior: the role of nutritional literacy. Frontiers in Nutrition. 2024;11:1353569.

2.Alpat Yavaş İ, Guney-Coskun M, Saleki N, Sezer Karataş FE, Keskin E. Nutrition literacy and its relationship with diet quality and quality of life among white-collar employees: a study from Türkiye. BMC Public Health. 2024;24(1):3478.

3.Mortaş H, Navruz-Varlı S, Çıtar-Dazıroğlu ME, Bilici S. Can unveiling the relationship between nutritional literacy and sustainable eating behaviors survive our future?. Sustainability. 2023;15(18):13925.

4.Demirer B, Yardımcı H. Nutritional literacy levels of university academic and administrative staff: A cross-sectional study from Turkey. Nutrition and Health. 2025;31(1):147-54.

5.D FARHUD D. Impact of lifestyle on health. Iranian Journal of Public Health. 2015;44(11):1442.

6.Collins SE .Associations between socioeconomic factors and alcohol outcomes. Alcohol Research: Current Reviews. 2016;38(1):83.

7.Stalsberg R, Pedersen AV. Are differences in physical activity across socioeconomic groups associated with choice of physical activity variables to report?. International Journal of Environmental Research And Public Health. 2018;15(5):922.

8.Levin-Zamir D, Baron-Epel OB, Cohen V, Elhayany A. The association of health literacy with health behavior, socioeconomic indicators, and self-assessed health from a national adult survey in Israel. Journal of health communication. 2016;21(sup2):61-8.

9.Oo WM, Khaing W, Mya KS, Moh MM. Health literacy-is it useful in prevention of behavioral risk factors of NCDs. Int J Res Med Sci. 2015;3(9):2331-6.

10.Tavousi M, Mohammadi S, Sadighi J, Zarei F, Kermani RM, Rostami R, et al. Measuring health literacy: A systematic review and bibliometric analysis of instruments from 1993 to 2021. PloS One. 2022;17(7):e0271524.

11.Geboers B, Reijneveld SA, Jansen CJ ,de Winter AF. Health literacy is associated with health behaviors and social factors among older adults: Results from the LifeLines Cohort Study. Journal of Health Communication. 2016;21(sup2):45-53.

12.Taylor MK, Sullivan DK, Ellerbeck EF, Gajewski BJ ,Gibbs HD. Nutrition literacy predicts adherence to healthy/unhealthy diet patterns in adults with a nutrition-related chronic condition. Public Health Nutrition. 2019;22(12):2157-69.

13.Lee C-K, Liao L-L, Lai I-J, Chang L-C. Effects of a healthy-eater self-schema and nutrition literacy on healthy-eating behaviors among Taiwanese college students. Health Promotion International. 2019;34(2):269-76.

14.Bahramfard T, Salehi SO, Toori MA, Pourmahmoudi A, Jowshan M, Parvin S, et al. Nutritional literacy status and its related factors in students of Yasuj university of medical sciences. Clinical Nutrition and Hospital Dietetics. 2020;40(4):55-62.

15.Chaves CdS, Camargo JT, Zandonadi RP, Nakano EY, Ginani VC. Nutrition literacy level in Bank employees: the case of a large Brazilian company. Nutrients. 2023;15(10):2360.

16.Naicker A, Shrestha A, Joshi C, Willett W, Spiegelman D. Workplace cafeteria and other multicomponent interventions to promote healthy eating among adults: A systematic review. Preventive Medicine Reports. 2021;22:101333.
17.Mekonen EG, Workneh BS, Ali MS, Abegaz BF, Alamirew MW, Terefe AA. Prevalence of work-related stress and its associated factors among bank workers in Gondar city, Northwest Ethiopia: A multi-center cross-sectional study. International Journal of Africa Nursing Sciences. 2022;16:100386.
18.Koca B, Arkan G. The relationship between adolescents' nutrition literacy and food habits, and affecting factors. Public Health Nutrition. 2021;24(4):717-28.
19.Qi Q, Sun Q, Yang L ,Cui Y, Du J, Liu H. High nutrition literacy linked with low frequency of take-out food consumption in chinese college students. BMC Public Health. 2023;23(1):1132.
20.Manna A, Vidgen H, Gallegos D. Examining the effectiveness of food literacy interventions in improving food literacy behavior and healthy eating among adults belonging to different socioeconomic groups-a systematic scoping review. Systematic Reviews. 2024;13(1):221.
21.De Sousa AFL, Paim RTT. Food habits of different worker categories: An integrative review. Revista Brasileira de Medicina do Trabalho. 2023;20(4):624.
22.Li L, He J, Ouyang F, Qiu D, Li Y, Luo D, et al. Sociodemographic disparity in health-related behaviours and dietary habits among public workers in China: a cross-sectional study. BMJ Open. 2021;11(8):e047462.
23.Cesur B, Koçoğlu G, Sümer H. Evaluation instrument of nutrition literacy on adults (EINLA) A validity and reliability study. Integr Food Nutr Metab. 2015;2(1):127-30.
24.Hemati M, Akbartabar Toori M, Shams M, Behroozpour A, Rezaei A. Measuring nutritional literacy in elementary school teachers in Yasuj: A cross-sectional study. Armaghane Danesh. 2018;23(1):124-33.
25.Mohammadi Zeidi I, Pakpour Hajiagha A, Mohammadi Zeidi B. Reliability and validity of Persian version of the health-promoting lifestyle profile. Journal of Mazandaran University of Medical Sciences. 2011;20(1):102-13.
26.Michou M, Panagiotakos DB, Lionis C, Costarelli V. Sex and age in relation to health and nutrition literacy levels in a sample of Greek adults. International Journal of Health Promotion and Education. 2020;58(5):229-41.
27.Mirzaei A, Ramezankhani A, Taheri Tanjani P, Ghaffari M, Jorvand R, Bazyar M, et al . The Effectiveness of Health Literacy Based Educational Intervention on Nutritional Outcomes of Elderly. Salmand: Iranian Journal of Ageing 2020; 15 (3) :324-37.
28.Patel P ,Panaich S, Steinberg J, Zalawadiya S, Kumar A, Aranha A, et al. Use of nutrition literacy scale in elderly minority population. The Journal of nutrition, health and aging. 2013;17(10):894-7.
29.Sharifnia F, Ghaffari M, Rakhshanderou S. Nutritional literacy measurement among Iranian elderly population. Journal of Advanced Biomedical Sciences. 2022.
30.Kirschner PA, Sweller J, Kirschner F, Zambrano R J. From cognitive load theory to collaborative cognitive load theory. International Journal of Computer-Supported Collaborative Learning. 2018;13:213-33.
31.Zhang J, Li D, Yan J, Yang J, Sun J, Liu Y, et al. Factors influencing nutrition literacy in patients of colorectal cancer: a cross-sectional study. Frontiers in Nutrition. 2025;12:1526388.
32.Yarmohammadi P, Morowatisharifabad MA, Rahaei Z, Khayyatzadeh SS, Madadizadeh F. Nutrition literacy and its related demographic factors among workers of Taraz Steel company, Chaharmahal and Bakhtiari, Iran. Frontiers in Public Health. 2022;10:911619.
33.Hanemann U, Robinson C. Rethinking literacy from a lifelong learning perspective in the context of the Sustainable Development Goals and the International Conference on Adult Education. International Review of Education. 2022;68(2):233-58.
34.Kuczmarski MF, Adams EL, Cotugna N, Pohlig RT, Beydoun MA, Zonderman AB, et al. Health literacy and education predict nutrient quality of diet of socioeconomically diverse, urban adults. Journal of Epidemiology and Preventive Medicine. 2016;2(1):13000115.
35.Delbosq S, Velasco V, Vercesi C, Lombardia GRH, Vecchio LP. Adolescents' nutrition: the role of health literacy, family and socio-demographic variables. International Journal of Environmental Research and Public Health. 2022;19(23):15719.
36.Al Tell M, Natour N, Alshawish E, Badrasawi M. The relationship between nutrition literacy and nutrition information seeking attitudes and

healthy eating patterns among a group of palestinians. BMC Public Health. 2023;23(1):165.
37.Svendsen K, Torheim LE, Fjelberg V, Sorprud A, Narverud I, Retterstøl K, et al. Gender differences in nutrition literacy levels among university students and employees :a descriptive study. Journal of Nutritional Science. 2021;10:e56.
38.Hassani B, Amani R, Haghighizadeh MH, Araban M. A priority oriented nutrition education program to improve nutritional and cardiometabolic status in the workplace: a randomized field trial. Journal of Occupational Medicine and Toxicology. 2020;15:1-9.
39.Borkowski N, Meese KA. Organizational behavior, theory, and design in health care: Jones & Bartlett Learning; 2021.
40.Marin-Farrona M, Wipfli B, Thosar SS, Colino E, Garcia-Unanue J, Gallardo L, et al. Effectiveness of worksite wellness programs based on physical activity to improve workers' health and productivity: a systematic review. Systematic Reviews. 2023;12(1):87.
41.Ramezani Y, Mousavi SGA, Bidgoli MS. Comparing knowledge ,attitude and nutritional performance and its relationship with body mass index (BMI) of first and fourth year Kashan university students (2009). Jundishapur Journal of Health Sciences. 2012;4(2):47-55.
42.Mearns GJ, Chepulis L, Britnell S, Skinner K. Health and nutritional literacy of New Zealand nursing students. Journal of Nursing Education. 2017;56(1):43-8.
43.Gholabi F, Mohammad Baqer AA, Aghayari Hir T, Akram H. Association between nutrition literacy and diet with obesity. Payesh (Health Monitor).2019; 18(4):393-404.
44.WHO. Obesity and overweight: Key facts. World Health Organization; 2018.