International Journal of Public Health Asia Pacific

Open Access: e-Journal
ISSN: 2822-0587(Online)

Relationship between Dietary Behaviours and Health Literacy among Elderly Population of Pokhara Metropolitan of Nepal

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ABSTRACT

Background: Health literacy, the ability to understand and use health-related information, is crucial for maintaining good health. Low health literacy poses significant challenges to maintaining optimal dietary behaviours of the elderly. Therefore, understanding the relationship between dietary behaviours and health literacy is important.

Objectives: This study aims to examine the relationship of dietary behaviours with health literacy of the elderly.

Methods: A community-based cross-sectional study was conducted among 239 elderlies in Pokhara Metropolitan from February 2023 to July 2023. Multistage sampling procedure was applied. The questionnaire included socio-demographic characteristics, five domains of the Health Literacy Questionnaire and dietary behaviour related questions. Multiple logistic regression was used to examine the associations.

Results: The proportion of people with low health literacy level across each of the domains were: (i) feeling understood and supported by healthcare providers (85.4%), (ii) having sufficient information to manage my own health (94.6%), (iii) social support for health (74.1%), (iv) ability to find the good health information (68.6%), and (v) understand the health information well enough to know what to do (78.2%), respectively. The overall health literacy among the elderly was found to be inadequate i.e., 74.9%. There was no significant association between being vegetarian vs non-vegetarian (AOR=0.60, 95% CI: 0.28-1.31) and health literacy. Participants who consumed fruits for less than 3 days a week and vegetables for less than 5 days a week were 1.85 times (AOR=1.85, 95% CI: 0.94-3.36) and 5.14 times (AOR=5.14, 95% CI: 2.17-12.21, p <0.001) more likely to have low health literacy as compared to participants who consumed fruits and vegetables more than 3 days and 5 days a week.

Conclusion: The study revealed that three-fourths of the elderly individuals had low health literacy. The study highlights implementing interventions for health literacy is essential to empower elderly individuals with the knowledge and skills needed for practicing sustainable dietary practices.

Keywords: Dietary behaviour, Elderly, Health literacy

1. Introduction

The World Health Organization recognizes health literacy as crucial in empowering individuals to make informed decisions about their health. The limited knowledge about health and chronic diseases puts them at risk of preventable illnesses and negative health outcomes [1]. However, higher levels of health literacy contribute to increased life expectancy, improved productivity, and the ability to pass on health information and behaviours to future generations [2,3]. Studies have shown that 54% of older adults in Nepal have inadequate health literacy [4].

Over the next three decades, the global number of older persons is projected to more than double, reaching over 1.5 billion persons in 2050 [5]. Studies have shown that inadequate health literacy is associated with unhealthy behaviours such as smoking, physical inactivity, and poor diet in the general population.[6]. The theoretical model of health promotion indicates that improving health literacy is a way to improve people's control and thereby change their dietary habits [7].

Because of the significant surge in growth of the elderly and prevalence of chronic disease, there is a compelling need for studies to address the limited information on the health literacy and dietary behaviour of the elderly which currently exists [8]. This study aims to understand the relationship of health literacy with dietary behaviours of the elderly.

2. Methods

2.1 Study Area

The study was conducted in a community setting among selected wards of Pokhara Metropolitan, Nepal.

2.2 Study Design

The study was cross-sectional analytical study.

2.3 Sample size and sampling

The target population were elderly population aged ≥ 60 years residing in Pokhara Metropolitan. The sample size for the study was adjusted to 239 elderly individuals using a finite population correction formula based on the population of individuals aged 60 years and above in the Pokhara Metropolitan.

The Pokhara Metropolitan City is sub-divided into 33 wards. In the first stage of the sampling, about one-third of total wards, i.e., 11 wards were selected randomly by lottery method. From each selected ward

proportionate sampling was carried to determine the appropriate sample size.

2.4 Data Collection

A detailed interview schedule was prepared for data collection. Data were collected by using Health Literacy Questionnaire (HLQ) [9] prepared in Nepali version for each of the elderly. It was measured by using five of the nine domains of the Health Literacy Questionnaire (HLQ). The five domains were chosen based on relevance in the local context of Nepal. HLQ domains that were included in the study are: 1) feeling understood and supported by healthcare providers (HPS): four items, 2) having sufficient information to manage my own health (HIS): four items, 3) social support for health (SS): five items, 4) ability to find the good health information (AE): five items and 5) understand the health information well enough to know what to do (UHI): five items.

WHO's STEPS instrument was adopted with necessary modification based on the objectives of the research to measure the dietary behaviours adopted by the elderly. The dietary behaviour was measured by different question which included the pattern of diet, intake of fruits and vegetables in a week and the type of oil used for cooking.

2.5 Data Analysis

Health literacy was measured by using five of the nine domains of the Health Literacy Questionnaire (HLQ). Participants were asked to indicate their level of agreement or difficulty on a scale ranging from strongly disagree to strongly agree for domains 1 to 3, and from always difficult to always easy for domains 4 to 5. The overall score for each domain was calculated by summing the item scores and dividing by the number of items in that specific domain. To determine the "high health literacy level," cut-off points were defined based on the upper quartile, while the lower two quartiles were considered as the "low health literacy level." This approach was applied to categorize all five HLQ domains, as there were no established standard cut-off values [10] whereas to calculate the overall health literacy level, standardization of the Likert scale scores was done.

The cut off points for the intake of fruits and vegetables was based on the mean value to identify individuals who are not meeting the minimum intake of fruits and vegetables.

Data were entered in Epi-Data version 3.1 and analysed in IBM SPSS version 22 software (SPSS Inc. Chicago IL, USA). Descriptive statistics were summarized as

frequency and percentage. Chi-Square test was used for establishing relationship for all included five domains of HLQ and dietary behaviours where all the independent variables that had $p<0.05$ were considered in multiple logistic regression analysis.

2.6 Ethical Clearance

The ethical approval was taken from the Institutional Review Committee (IRC) of Pokhara University (PU) (Ref. No. 147-079/080). Participants were fully informed regarding study objectives and written/ verbal consent was obtained before the initiation of the data collection. The participants were assured prior to the conduction of interview that they might not answer or even withdraw from the study if they find it very personal or sensitive for them to answer. No sort of coercion was applied to participants in the research process. Confidentiality of the data were fully maintained and collected data are used only for the research purpose.

3. Results

The research instrument used in sample of 239 achieved a response rate of 100% representing all retrieved interview schedule. Slightly more than half (54%) of the participants were male. Majority of the participants were the followers of Hindu religion i.e. (75.3%). The highest number of the participants, 39.7% of them were of the age group 60-69 years, where median age was 72 years, minimum age was 60 years, maximum age was 93 with Standard Deviation (SD) 8.7. Majority 57.7% of the participants were from joint families. Percentage of Brahmins among other ethnic groups was highest i.e. (39.7%) and 45.6% of the elderly were illiterate. Agriculture and business were the major household employments. Married individuals represent the highest percentage i.e., (67.4%) followed by widow/widower i.e., (28.9%). The average number of family size and household income were found to be 4 and USD 308 respectively (Table 1).

Table 1: Socio-demographic characteristics of the participants

Variables	Frequency (n=239)	Percentage (%)
Age in years		
60-69	95	39.7
70-79	84	35.1
80-89	48	20.1
90-99	12	5.1
Median (±SD)	72(± 8.7)	
Min:Max	60:93	

Variables	Frequency (n=239)	Percentage (%)
Gender		
Male	129	54
Female	110	46
Ethnicity		
Brahmin	95	39.7
Janajati	73	30.5
Chhetri	45	18.8
Dalit	24	10.1
Religious minorities	2	0.9
Religion		
Hindu	180	75.3
Buddhist	45	18.8
Christian	12	5.1
Muslim	2	0.8
Education level		
Illiterate	109	45.6
Informal	51	21.3
Basic	34	14.2
Secondary	29	12.2
Graduate	6	2.5
Post graduate and above	10	4.2
Marital status		
Married	161	67.4
Widow/widower	69	28.8
Separated	4	1.7
Single	3	1.3
Divorced	2	0.8
Employment status		
Agriculture	62	25.9
Business	62	25.9
Job	49	20.5
Retired	43	18.1
Foreign service	11	4.6
Daily labor	6	2.5
Unemployed	4	1.7
Foreign labor	2	0.8
Family type		
Nuclear	92	38.5
Joint	138	57.7
Extended	9	3.8
Family size		
≤4	131	54.8
>4	108	45.2
Mean= 4.36, Md= 4, Min=1, Max=13, SD= 2.15		
Monthly household income in USD		
≤262	115	48.1
>262	224	51.9
(Min:Max)	(2:1500)	
Mean(±SD)	308.64(±261.53)	

Table 2 presents the information regarding the dietary patterns of the participants. The majority (82%) of the participants were non-vegetarian. They consumed fruits and

vegetables with minimum not even a single day to maximum every 7 days a week with median of 3 days and 6 days in a week respectively. Only (36%) of the participants consumed fruits for more than 3 days in a week whereas (58.6%) consumed vegetables for more than 5 days in a week. Three quarters of the participants (74.5%) preferred sunflower oil for cooking.

Table 2: Dietary patterns of the participants

Variable	Frequency	Percentage (%)
Dietary pattern (n=239)		
Non-vegetarian	196	82
Vegetarian	43	18
Fruits consumption (n= 239)		
≤3 days	153	64
>3 days	86	36
Mean (±SD)	3.23(±2.03)	
Med (Min:Max)	3 (0:7)	
Vegetable consumption (n= 239)		
≤5 days	99	41.4
>5 days	140	58.6
Mean (±SD)	5.61(±1.59)	
Med (Min:Max)	6 (0:7)	
Oil type (n= 239)		
Sunflower oil	178	74.5
Mustard oil	47	19.7
Butter/ghee	9	3.7
Vegetable oil	5	2.1

Based on HLQ multi-dimensional scale, the proportion of people with low literacy level across the scales were: (i) HPS (85.4%), (ii) HIS (94.6%), (iii) SS (74.1%) (iv) AE (68.6%) and (v) UHI (78.2%) respectively. The mean scores for HLQ domains mean (SD) for HLQ domains were (a) HPS (2.50±0.83), (b) HIS (2.29±0.74), (c) SS (3.02±0.65), (d) AE (2.61±1.19) and (e) UHI (2.57±1.05) as presented in table 312. The overall health literacy score showed that 74.9% of the individuals had low health literacy scores and only 25.1% had high health literacy scores (Table 3).

Table 3: Health Literacy scores of the participants

Variable	Frequency (n=239)	Percentage (%)
Feeling understood and supported by healthcare providers (HPS)		
Low	204	85.4
High	35	14.6
Mean (±SD)	2.50(±0.83)	
Having sufficient information to manage my own health (HIS)		
Low	226	94.6
High	13	5.4
Mean (±SD)	2.29(±0.74)	

Social support for health (SS)		
Low	177	74.1
High	62	25.9
Mean (±SD)	3.02(±0.65)	
Ability to find the good health information (AE)		
Low	164	68.6
High	75	31.4
Mean (±SD)	2.61(±1.19)	
Understand the health information well enough to know what to do (UHI)		
Low	187	78.2
High	52	21.8
Mean (±SD)	2.57(±1.05)	
Total Health literacy score		
Low	179	74.9
High	60	25.1

Table 4 presents the results of a statistical analysis examining the relationship of overall health literacy level and socio-demographic variables. It suggests that age (<73 years) and being male were associated with higher odds of having adequate health literacy. The associations were statistically significant for both sex groups (AOR=0.29, 95% CI: 0.12-0.71, p 0.006) and education level AOR=11.36, 95% CI: 3.13-41.15, p <0.001) with health literacy. Disadvantaged individuals have higher percentage i.e., (88.5%) of inadequate health literacy compared to advantaged and relatively advantaged counterparts. Illiterate individuals were 11.36 times more likely to have inadequate health literacy compared to their literate counterparts. Participants with marital status other than being married (AOR=0.50), non-professional household occupations (AOR=1.81) and having nuclear family (AOR= 0.88) tend to have lower health literacy levels respectively. Family size does not appear to have a significant impact on health literacy level. On the other hand, higher monthly income is associated with a higher likelihood of having inadequate health literacy.

Table 4: Multiple logistic regression analysis of relationship of health literacy and socio-demographic variables

Variable	Health literacy level		UOR (95% CI)	AOR (95% CI)	p-value
	Inadequate n (%)	Adequate n (%)			
Age					
≤73	88 (67.2)	43(32.8)	1	1	0.14
>73	91(84.3)	17(15.7)	0.38(0.20-0.72)	0.55(0.24-1.24)	
Sex					
Male	80(62)	49(38)	1	1	0.006**

Female	99(90)	11(10)	0.18(0.08-0.37)	0.29(0.12-0.71)	
Ethnicity					
Advantaged	93(66.4)	47(33.6)	1		0.21
R. advantaged	63(86.3)	10(13.7)	3.87(1.11-13.57)	NI	
Disadvantaged	23(88.5)	3(11.5)	1.22(0.31-4.82)		
Religion					
Hindu	130(72.2)	50(27.8)	1	1	0.61
Non-hindu	49(83.1)	10(16.9)	0.53(0.25-1.13)	0.77(0.28-2.14)	
Educational level					
Literate	73(56.2)	57(43.8)	1	1	<0.001***
Illiterate	106(97.2)	3(2.8)	27.58(8.32-91.48)	11.36(3.13-41.15)	
Marital status					
Married	108(67.1)	53(32.9)	1	1	0.18
Others	71(91)	7(9)	0.20(0.09-0.47)	0.50(0.18-1.38)	
Household ES					
Non-Professionals	71(68.3)	33(31.7)	1	1	0.11
Professionals	108(80)	27(20)	1.86(1.03-3.36)	1.81(0.86-3.83)	
Family type					
Nuclear	61(66.3)	31(33.7)	1	1	0.81
Non-nuclear	118(80.3)	29(19.7)	0.48(0.27-0.88)	0.88(0.29-2.61)	
Family size					
≤4	95(72.5)	36(27.5)	1	1	0.57
>4	84(77.8)	24(22.2)	0.75(0.42-1.36)	1.37(0.46-4.08)	
Monthly income in USD					
>262	84(67.7)	40(32.3)	1	1	0.09
≤262	95(82.6)	20(17.4)	0.44(0.24-0.82)	0.51(0.24-1.11)	

NI: Not included

Table 5 presents the results of a statistical analysis examining the relationship between overall health literacy level with dietary behaviors. People eating fruit >3 days/week had 1.85 times higher odds of high health literacy of compared to those eating fruits ≤3 days/week (AOR=1.85, 95% CI 0.94-3.36). There was no significant association between being vegetarian vs non-vegetarian (AOR=1.57, 95% CI 0.77-3.23) and health literacy. People eating vegetables >5 days per week had 5.14 times higher odds of high health literacy compared to those eating vegetables ≤5 days/week (AOR=5.14, 95% CI 2.17-12.21, p <0.001).

Table 5: Relationship of overall health literacy with health status and dietary behaviors

Variables	Overall health literacy Low n (%)	High n (%)	UOR(CI)	AOR(CI)	p-value
Dietary pattern					
Vegetarian	29(67.4)	14(32.6)	1	1	
Non-vegetarian	150(76.5)	46(23.5)	0.64(0.31-1.30)	0.60(0.28-1.31)	0.20
Fruit intake					
>3days	51(59.3)	35(40.7)	1	1	
≤3 days	128(83.7)	25(16.3)	3.51(1.91-6.45)	1.85(0.94-3.36)	0.07
Vegetable intake					
>5 days	88(62.9)	52(37.1)	1	1	

Variables	Overall health literacy		UOR(CI)	AOR(CI)	p-value
	Low n (%)	High n (%)			
≤5 days	91(91.9)	8(8.1)	6.72(3.02-14.96)	5.14(2.17-12.21)	<0.001***

4. Discussion

The present study revealed the proportion of people with low literacy level across the scales to be: (i) HPS (85.4%), (ii) HIS (94.6%), (iii) SS (74.1%) (iv) AE (68.6%) and (v) UHI (78.2%) respectively. The overall health literacy score showed that 74.9% of the individuals had inadequate health literacy and only 25.1% had adequate health literacy. A recently published study among the community elderly in Central China in the COVID-19 Pandemic found 84.12% (519/617) of the participants scored less than 60 points, which indicated that the overall level of HL was low [11]. Overall, a higher proportion of people had low literacy in our study population when compared with studies from Iran (79.6%) [12], Ohio, Houstan (22.2%) [13], Nepal (>75%) [10] and China [8].

Likewise, a study among urban elderly East-German population in 2015 showed 4% of inadequate health literacy [14]. The higher estimate of low HL could be explained by having a limited number of informed and health-literate population, structure and accessibility of healthcare systems and the complexity of health information, including medical terminology and jargon.

Age showed inverse relationship and depicted the health literacy score across the age group more than 73 years to be low as: (88%), (98.1%), (74.1%), (76.1%), and (89.8%) for HL domains HPS, HIS, SS, AE and UHI respectively compared to people below 73 years. As aging is often accompanied by a natural decline in cognitive abilities, including memory, attention, and processing speed and also older adults who grew up in an era with limited access to education or had fewer opportunities for formal education may have lower baseline health literacy compared to younger generations. Similar findings were revealed by the studies where the mean functional health literacy scores across the age groups was 81.9, 75.6, 69.9, 60.8, and 48.6 for participants aged 65-69, 70-74, 75-79, 80-84, and 85 or older, respectively and mean S-TOFHLA scores declined 1.4 points (95% CI 1.3-1.5) for every year increase in age ($p<0.001$) [15] but a contrast finding was shown in population-based CARLA study among urban elderly East-German

population where health literacy was found to increase among men aged under 60 years from 36.1 (SD 6.8) to 39.0 (SD 6.2) among men aged over 80 years. Likewise, in women, the health literacy score increased from 35.1 (SD 7.8) among age groups under 60 years to 37.5 (SD 8.5) among age groups over 80 years [14].

We found that being female was a determinant of lower HL level across all the five domains of HL (HPS, HIS, SS, AE and UHI). As women in Nepalese societies have had limited access to education compared to men. In most cases, women have less autonomy and decision-making power regarding their own health resulting in lower levels of health literacy. So, promoting gender equality and empowering women can help bridge health literacy gap between genders and improve overall health outcomes. Similar findings were demonstrated in the studies conducted among urban elderly East-German population where there was a lower health literacy score among women compared with men (Diff = -1.4; 95 %CI: -2.2; -0.6) [14] and in rural Nepal where being female was associated with lower HL level across three domains of HL (HIS, AE, UHI). In contrast, the study conducted in Chicago among the elderly showed male participants compared to females (β=0.14) had lower health literacy [16].

The results of this study revealed Brahmin and Chhetri have lower odds of having low health literacy level compared to Janajati, Dalits and religious minorities. Likewise, a cross-sectional study conducted among multi-morbid COPD people in rural Nepal resembled with our findings showing low HL was associated with being Indigenous (AOR=2.27, 95%CI: 1.14-4.50) or Dalit (AOR=4.84, 95%CI: 1.57-14.83) [10]. Some other studies showed African American or black individuals had lower health literacy compared to white individuals [16, 17]. The issue of low health literacy rates among certain marginalized groups in Nepal is a complex one influenced by multiple factors. Discrimination and social stigma based on caste, ethnicity, or religion can also impact the healthcare-seeking behaviour of these communities and ethnic groups having limited access to education, healthcare services and economic opportunities can lead to lower overall health literacy rates.

Importantly, having no education was associated with low levels of HL as depicted in previous studies [8, 16, 17]. Elderly individuals with no education may face challenges in seeking and accessing reliable

health information and navigating healthcare systems. Moreover, it limits critical thinking skills necessary for evaluating health-related information and making informed decisions. Individuals with monthly household income of >USD 262 were found to have higher level of low HL compared to those with income <USD 262. In most cases the participants were not comfortable disclosing the income or financial status of the family. Furthermore, lower-income individuals often face more health challenges due to factors like limited access to healthcare, unhealthy living conditions, and higher rates of chronic diseases. As a result, they may be more motivated to acquire health literacy skills to manage their health conditions effectively. Higher-income individuals, who may have better overall health outcomes, may have less urgency to prioritize health literacy. While the other studies found that older adults with high-income level had high health literacy.[8, 18]

Two of the studies conducted in China show people with professional job (white collars) have higher level of health literacy than non-professional (farmer or blue-collar workers or laborers) [8, 19]. In our study having household occupation as employment and labor and business and trade was associated with low health literacy scores compared to agriculture. The availability and accessibility of health information can vary across different occupations. Individuals engaged in labor, business, or trade occupations might have lower levels of formal education compared to those in agriculture.

Our study revealed that higher health literacy was associated with increased fruit and vegetable intake but showed no significant association between health literacy and being vegetarian or non-vegetarian. This may be because those with high health literacy better understand nutritional recommendations, are more proactive in accessing health information, and feel higher self-efficacy in improving their diets. These findings align with a cross-sectional study conducted among Taiwanese College students where the functional eHealth literacy was negatively related to unhealthy food intake (beta=−0.11; p=0.01), and interactive eHealth literacy was positively related to balanced diet (beta=0.25; p<0.001) and consumer health (beta=0.15; p=0.02) [20].

Additionally, in a study among older adults, the difference regarding poor compliance with the guidelines for fruit and vegetable consumption between older adults with inadequate health literacy and those with

adequate health literacy was very small (OR=1.20, 95%CI: 0.74-1.95, p 0.46).

However, a closer look at the data revealed that inadequate health literacy was related to poor compliance with fruit and vegetable consumption guidelines in the intervention group, but to better compliance with fruit and vegetable consumption guidelines in the control group [21]. This suggests health literacy may play a role in improving dietary habits when education is provided.

Further, a study among low-income adults depicted adequate health literacy, as measured by the (Newest Vital Sign) NVS, was associated with eating the peels of fresh fruit more often (F=52.98, p <0.05) [22]. Together, these studies demonstrate that higher health literacy appears to empower individuals to make healthier dietary choices.

5. Conclusion

The findings indicated that a high proportion of the elderly i.e., more than two third had low levels of health literacy across all domains. Having age >73 years, being female, being from Janjati, Dalit and Muslim communities, non-Hindu religion, having no education, marital status, employment and having a monthly family income of more than USD 262 were associated with lower levels of health literacy. Findings suggest that healthier dietary habits are associated with higher levels of health literacy.

The study highlights the importance of improving health literacy among the elderly, as it can lead to better health outcomes and well-being of the elderly population in Nepal. Implementing interventions for health literacy is essential to empower elderly individuals with the knowledge and skills needed for practicing sustainable dietary practices.

Acknowledgement

Authors are thankful to School of Health and Allied Sciences, Pokhara University for providing an opportunity to perform this research work and Pokhara Metropolitan Health Section for granting permission to conduct research in the specified area. A special thanks goes to Ageing Nepal for providing Ageing Research Fellowship 2023 in support of the research.

References

[1] Budhathoki SS, Bhattachan M, Yadav AK, Upadhyaya P, Pokharel PKJTm, health. Eco-social and behavioural determinants of diarrhoea in under-five children of Nepal: a framework analysis of the existing literature. 2016;44:1-7.

[2] Ratzan SCJHpi. Health literacy: communication for the public good. 2001;16(2):207-14.
[3] Parker RM, Ratzan SJJohc. Re-enforce, not re-define health literacy—moving forward with health literacy 2.0. 2019;24(12):923-5.
[4] Shrestha A, Singh SB, Khanal VK, Bhattarai S, Maskey R, Pokharel PKJHHLR, et al. Health literacy and knowledge of chronic diseases in Nepal. 2018;2(4):e221-e30.
[5] UNDESA UJWPP. Department of Economic and Social Affairs, Population Division (2019). 2019.
[6] Friis K, Vind BD, Simmons RK, Maindal HTJJodr. The relationship between health literacy and health behaviour in people with diabetes: a Danish population-based study. 2016;2016.
[7] Buja A, Grotto G, Montecchio L, De Battisti E, Sperotto M, Bertoncello C, et al. Association between health literacy and dietary intake of sugar, fat and salt: A systematic review. 2021;24(8):2085-97.
[8] Liu Y-B, Liu L, Li Y-F, Chen Y-LJIjoer, health p. Relationship between health literacy, health-related behaviors and health status: A survey of elderly Chinese. 2015;12(8):9714-25.
[9] Osborne RH, Batterham RW, Elsworth GR, Hawkins M, Buchbinder RJBph. The grounded psychometric development and initial validation of the Health Literacy Questionnaire (HLQ). 2013;13(1):1-17.
[10] Yadav UN, Lloyd J, Hosseinzadeh H, Baral KP, Bhatta N, Harris MFJPO. Levels and determinants of health literacy and patient activation among multi-morbid COPD people in rural Nepal: Findings from a cross-sectional study. 2020;15(5):e0233488.
[11] Li P, Zhong J, Chen H, Qin T, Meng L. Current Status and Associated Factors of Health Information Literacy Among the Community Elderly in Central China in the COVID-19 Pandemic: A Cross-Sectional Study. Risk Manag Healthc Policy. 2022;15:2187-95.
[12] Reisi M, Javadzade SH, Mostafavi F, Sharifirad G, Radjati F, Hasanzade AJJoe, et al. Relationship between health literacy, health status, and healthy behaviors among older adults in Isfahan, Iran. 2012;1(1):31.
[13] Wolf MS, Gazmararian JA, Baker DWJAoim. Health literacy and functional health status among older adults. 2005;165(17):1946-52.
[14] Tiller D, Herzog B, Kluttig A, Haerting J. Health literacy in an urban elderly East-German population - results from the population-based CARLA study. BMC Public Health. 2015;15:883.
[15] Baker DW, Gazmararian JA, Sudano J, Patterson MJTJoGSBPS, Sciences S. The association between age and health literacy among elderly persons. 2000;55(6):S368-S74.
[16] Cho YI, Lee S-YD, Arozullah AM, Crittenden KSJSs, medicine. Effects of health literacy on health status and health service utilization amongst the elderly. 2008;66(8):1809-16.
[17] Howard DH, Sentell T, Gazmararian JAJJogim. Impact of health literacy on socioeconomic and racial differences in health in an elderly population. 2006;21:857-61.
[18] Baker DW, Gazmararian JA, Williams MV, Scott T, Parker RM, Green D, et al. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. 2002;92(8):1278-83.
[19] Yongbing L, Yanru W, Liang F, Yanli C, Liu L, Yanfei L, et al. The health literacy status and influencing factors of older population in Xinjiang. 2015;44(7):913.
[20] Yang SC, Luo YF, Chiang C-HJJomIr. Electronic health literacy and dietary behaviors in Taiwanese college students: cross-sectional study. 2019;21(11):e13140.
[21] Geboers B, de Winter AF, Luten KA, Jansen CJ, Reijneveld SAJJohc. The association of health literacy with physical activity and nutritional behavior in older adults, and its social cognitive mediators. 2014;19(sup2):61-76.
[22] Speirs KE, Messina LA, Munger AL, Grutzmacher SKJJohcftp, underserved. Health literacy and nutrition behaviors among low-income adults. 2012;23(3):1082-91.