

ORIGINAL ARTICLE

Health literacy and its association with utilization of preventive health services among adults in Saudi Arabia: a cross-sectional study

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ABSTRACT

Background: Health literacy (HL) is one of the important indicators of individual health and healthcare services. Poor HL leads to poor health outcomes and underuse of preventive healthcare. Preventive health services can improve health outcomes of individuals, as such services help in the early identification and management of diseases. Nonetheless, utilization of such health services remains suboptimal in several regions, and the role of HL in the utilization of preventive health services has not been investigated before.

Aim: To assess the correlation between HL and the use of preventive health services in Saudi Arabia.

Methods: This was a cross-sectional study that was conducted on adults in the National Medical Care in Saudi Arabia via questionnaire between the period from-----to------. The questionnaire investigated the demographics of the participants and their literacy regarding healthcare, disease prevention, health promotion, utilization of preventive health services, and health-related behaviors.

Results: A total of 210 individuals were recruited; sufficient HL was reported among 87.6%. HL levels were influenced by gender, marital status, education, employment, and monthly income ($P < 0.001$). The most utilized preventive service was blood glucose screening (75.2%). HL was linked with undergoing blood glucose screening ($P < 0.01$), seasonal influenza vaccine ($P < 0.001$), and participation in disease screening programs ($P < 0.001$).

Conclusion: The majority of Saudi adults have sufficient HL, which in turn was linked with utilization of preventive health services, where all or the large majority of subjects who used different preventive services reported sufficient HL.

Keywords: Health literacy, preventive health services, utilization, association

Introduction

The World Health Organization (WHO) defines health literacy (HL) as the social skills and cognitive skills that determine the motivation and ability of an individual to gain access to, understand, and use information in ways to enhance and maintain good health [1]. HL has become one of the important predictors of individual health and healthcare service [2]. Adequate HL has been linked with effective utilization of preventive services, improved medication adherence, and better overall health outcomes [3].

In Saudi Arabia, the reformation of healthcare services has accelerated under the Saudi Vision 2030, which emphasizes patient-centered care and strengthens preventive services [3]. Preventive health services have a vital role in improving the quality of life (QOL),

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reducing the burden of non-communicable diseases (NCDs), and promoting the overall well-being [4].

Preventive services include blood pressure screening, immunization, dietary counseling, health education, drug misuse counseling, and screening for cancer through X-ray or mammogram [5]. The Saudi Ministry of Health (MOH) has established preventive clinics to enhance the awareness of the population regarding several conditions such as obesity, diabetes, breast cancer, and smoking, and their success is expected to reduce the consequences of such conditions [6]. Literature in Saudi Arabia focused on assessing HL among individuals [7], but not the role of HL in using preventive health services. One Saudi study, conducted on 1,057 young Saudi adults, found that only 34% and 39% of respondents were classified as having advanced and intermediate knowledge, respectively [3]. However, the study did not report the use of preventive health services. Another Saudi study from Jeddah enrolled 250 university hospital visitors, and it was found that 71% of the participants received counseling services for either smoking, physical activity, weight, diet, or sleeping. More than one-half (58%) underwent screening services, including breast cancer, colon cancer, diabetes, hypertension, or weight management. The utilization of preventive services for diabetes and breast screening was significantly linked with female gender, whereas males tended to use smoking and weight-related counseling more than females [6]. However, the study did not report the role of HL regarding using such services. Therefore, this study was conducted to assess the correlation between HL and the use of preventive health services in Saudi Arabia.

Methods

Designs, settings and subjects

This research was a cross-sectional that was conducted in Saudi Arabia using a questionnaire that was distributed to the patients attended to the National Medical Care, Saudi Arabia between the period from-----to-----. The study was conducted on adults living in Saudi Arabia of both genders. On the other hand, those younger than 18 years and individuals from outside Saudi Arabia were excluded.

Data collection and scoring

The data were collected using a structured, self-administrated questionnaire developed by the researcher after reviewing related literature. It included three parts; one investigated the demographics, the second investigated HL, and the third assessed utilization of preventive health service.

Health literacy assessment and scoring

HL was assessed across three domains: healthcare, disease prevention, and health promotion. The 16-item European Health Literacy Survey Questionnaire (HLS-EU-Q16) is an established instrument covering these domains and the competencies of accessing,

understanding, appraising, and applying health information [8].

Each item was scored according to the recommended procedure. The four options were very easy, fairly easy, fairly difficult, and very difficult - were dichotomized into easy (score = 1) and difficult (score = 0). The 16 item scores were summed to produce a total score ranging from 0 to 16. Scores of 0-8 indicated inadequate HL, 9-12 indicated problematic HL, and 13-16 indicated sufficient HL. In our study, participants were classified as having problematic or sufficient HL; no participant had inadequate HL, as no score was less than nine.

Preventive health service utilization and health-related behaviors

Service utilization was assessed using questions on blood glucose screening, cholesterol screening, seasonal influenza vaccination, visits to healthcare facilities for preventive screening, participation in disease-detection programs, and receipt of health education or counseling from healthcare professionals. Responses were recorded as yes or no.

Pilot study

A pilot study was conducted among 25 eligible participants using the draft questionnaire. The pilot assessed the clarity, comprehensibility, and feasibility of the questions. Internal consistency was assessed using Cronbach's alpha, with a value of at least 0.70 considered an acceptable conventional threshold for group-level research, where appropriate. The Cronbach's alpha for the questionnaire was 0.79.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics, version 26. Categorical variables were summarized as frequencies and percentages. Continuous variables were summarized as means and standard deviations when approximately normally distributed; otherwise, medians and ranges were used. The data were described using appropriate descriptive statistics. Associations between health-literacy category and socio-demographic characteristics, preventive-service utilization, and health-related behaviors were assessed using Pearson's chi-square test when expected cell counts were adequate. Fisher's exact test was used when contingency-table cell counts were sparse. A p -value <0.05 was considered significant.

Results

A total of 210 Saudi individuals were recruited; the mean $\pm$ SD of the age was 41.1 ± 13.8 years. Males represented more than one-half of the total participants, 111 (52.9%), and the largest proportion of the subjects were widowed, 78 (37.1%). The largest proportions of the participants had a bachelor's degree, 73 (34.8%), and a diploma, 70 (33.3%). More than one-half of the subjects were employed 114 (54.3%) and the largest proportion



reported a monthly income of $\geq 15,000$ SAR and none had chronic disease, as shown in Table 1.

Regarding HL, the largest proportions of the participants stated easy regarding finding information about treatment for health problems 111 (52.9%), knowing where to obtain medical help 163 (77.6%), understanding what the doctor explains 93 (44.3%), and the instructions provided by healthcare professionals 111 (52.9%), using medical information 93 (44.3%) and following the health instructions 137 (65.2%), Table 2.

Table 1. Demographics of the participants.

Variable	Category	n	%
Age (years)	Mean $\pm$ SD*	41.1 $\pm$ 13.8	
Gender	Male	111	52.9
	Female	99	47.1
Nationality	Saudi	210	100.0
Marital status	Widowed	78	37.1
	Married	66	31.4
	Divorced	66	31.4
Educational level	Bachelor's degree	73	34.8
	Diploma	70	33.3
	Intermediate	41	19.5
	Postgraduate	26	12.4
Employment status	Employed	114	54.3
	Unemployed	70	33.3
	Retired	26	12.4
Monthly income (SAR)	<5,000	41	19.5
	5,000–9,999	52	24.8
	10,000–14,999	47	22.4
	$\geq 15,000$	70	33.3
Chronic disease	No	210	100.0

The HL regarding disease prevention demonstrated that the largest proportions reported that it is easy to find information about disease prevention 111 (52.9%), easy to evaluate the reliability of the health information 119 (56.7%), easy to make decisions to protect themselves from diseases 85 (40.5%), and easy to understand information related to preventive health screenings 93(44.3%). There were 117 (55.7%) who reported that it is very easy to understand health warnings related to diseases, Table 3.

The literacy regarding health promotion revealed that the largest proportions reported that it is very easy to find information about a healthy lifestyle, 117 (55.7%), and to identify daily behavior that affects health, 91 (43.3%). More than one-half of the participants reported that it is easy to understand information related to nutrition and physical activity 111 (52.9%) and to make decisions to improve their health based on available information 137 (65.2%), as shown in Table 4.

The utilization of preventive health services among our participants revealed that the most used services included blood glucose screening, 158 (75.2%), followed by the early disease detection program, 132 (62.9%), then receiving the seasonal influenza vaccine, 114 (54.3%). Less than one-half of the subjects reported visiting a clinic or health center for preventive screening, 99 (47.1%), and receiving health counseling or education from a healthcare provider, 91 (43.3%). Cholesterol screening was the least utilized service 47 (22.4%), Table 5.

The largest proportion of the participants reported less than once a year as the frequency of routine medical check-ups, 99 (47.1%). The main source of health information was physicians and healthcare providers, 117 (55.7%), and more than one-half of the subjects, 114 (54.3%), reported a low level of trust in health information from the internet. Less than one-half of our subjects, 99 (47.1%), reported regular physical activity, and more than one-half reported current smoking, 111 (52.9%); however, more than one-half, 140 (66.7%), rated their self-general health as very good, as shown in Table 6.

Table 2. Participants' responses to healthcare health literacy.

Healthcare health literacy item	Very Easy n (%)	Easy n (%)	Difficult n (%)
Finding information about treatments for health problems that concern you	99 (47.1)	111 (52.9)	0 (0.0)
Knowing where to obtain medical help when needed	47 (22.4)	163 (77.6)	0 (0.0)
Understanding what your doctor explains about your health condition	73 (34.8)	93 (44.3)	44 (21.0)
Understanding the instructions provided by healthcare professionals	99 (47.1)	111 (52.9)	0 (0.0)
Determining whether you need to seek another medical consultation	73 (34.8)	137 (65.2)	0 (0.0)
Using medical information to make decisions about your health	73 (34.8)	93 (44.3)	44 (21.0)
Following the health instructions provided by healthcare professionals	47 (22.4)	137 (65.2)	26 (12.4)



Table 3. Participants' responses to disease prevention health literacy.

Disease prevention health literacy item	Very easy <i>n</i> (%)	Easy <i>n</i> (%)	Difficult <i>n</i> (%)
Finding information about disease prevention	99 (47.1)	111 (52.9)	0 (0.0)
Understanding health warnings related to diseases	117 (55.7)	93 (44.3)	0 (0.0)
Evaluating the reliability of the health information you receive	47 (22.4)	119 (56.7)	44 (21.0)
Making decisions to protect yourself from diseases based on available information	73 (34.8)	85 (40.5)	52 (24.8)
Understanding information related to preventive health screenings	91 (43.3)	93 (44.3)	26 (12.4)

Table 4. Participants' responses to health promotion health literacy.

Health promotion health literacy item	Very easy <i>n</i> (%)	Easy <i>n</i> (%)	Difficult <i>n</i> (%)
Finding information about healthy lifestyles	117 (55.7)	67 (31.9)	26 (12.4)
Understanding information related to nutrition and physical activity	73 (34.8)	111 (52.9)	26 (12.4)
Identifying daily behaviors that affect your health	91 (43.3)	67 (31.9)	52 (24.8)
Making decisions to improve your health based on available information	47 (22.4)	137 (65.2)	26 (12.4)

Table 5. Utilization of preventive health services among the study participants.

Item	Yes, <i>n</i> (%)	No, <i>n</i> (%)
Blood glucose screening	158 (75.2)	52 (24.8)
Cholesterol screening	47 (22.4)	163 (77.6)
Received the seasonal influenza vaccine	114 (54.3)	96 (45.7)
Visited a clinic or health center for preventive screening	99 (47.1)	111 (52.9)
Participated in an early disease detection program	132 (62.9)	78 (37.1)
Received health counseling or education from a healthcare provider	91 (43.3)	119 (56.7)

The overall level of HL was problematic among 12.4%, and it was sufficient among 87.6%. The levels of HL were significantly affected by the demographics of the subjects; higher proportions of sufficient literacy were reported among females, the widowed, those with a bachelor's degree, the employed, and those reporting the highest monthly income ($P < 0.001$), Table 7.

The investigation for the association between HL levels and the types of preventive services utilized by the participants revealed a significant association. Higher proportions of those who reported sufficient literacy also reported using blood glucose service ($P < 0.01$), seasonal influenza vaccine, and disease screening program ($P < 0.001$). All participants who reported cholesterol screening and receiving health education from a healthcare provider reported sufficient literacy ($P < 0.001$). Also, all subjects who reported physicians as the source of information, no trust in health information from the internet, no regular activity, and never underwent routine medical check-ups, non-smokers,

and all those who reported good health status reported sufficient literacy ($P < 0.001$), Table 8.

Discussion

There was no previous study that reported the association between HL and the use of preventive health services; therefore, we conducted this study among the Saudi population. It was stated that substantial percentages of populations showed inadequate or marginal levels of HL [3]. In our study, the majority of the subjects experienced sufficient HL (87.6%), whereas a very small percentage (12.4%) exhibited problematic HL, indicating some gaps in their literacy.

In contrast to our findings, a study from the USA revealed very low HL, where only 12% of adults were proficient in HL, whereas in Canada, 60% of adults are proficient in HL [9]. Our findings were superior to those reported from the USA and Canada.

The findings of a previous national survey revealed that almost 46% of adults exhibited inadequate HL [7].



Table 6. Health-related behaviors and sources of health information among the study participants.

Variable	Category	n	%
Frequency of routine medical check-ups	Less than once a year	99	47.1
	More than once a year	26	12.4
	Never	85	40.5
Primary source of health information	Physician or healthcare provider	117	55.7
	Internet	67	31.9
	Ministry of Health	26	12.4
Level of trust in health information obtained from the Internet	Low	114	54.3
	Moderate	70	33.3
	No trust	26	12.4
Regular physical activity (≥ 150 minutes/week)	Yes	99	47.1
	No	111	52.9
Current smoking status	Yes	111	52.9
	No	99	47.1
Self-rated general health status	Very good	140	66.7
	Good	70	33.3

Table 7. Associative factors of adequate literacy among the groups.

Variable	Category	Problematic n (%)	Sufficient n (%)	P-value
Gender	Female	0 (0.0)	99 (100.0)	<0.001
	Male	26 (23.4)	85 (76.6)	
Marital status	Widowed	0 (0.0)	78 (100.0)	<0.001
	Married	26 (39.4)	40 (60.6)	
	Divorced	0 (0.0)	66 (100.0)	
Educational level	Bachelor's degree	0 (0.0)	73 (100.0)	<0.001
	Diploma	26 (37.1)	44 (62.9)	
	Postgraduate	0 (0.0)	26 (100.0)	
	Intermediate school	0 (0.0)	41 (100.0)	
Employment status	Unemployed	26 (37.1)	44 (62.9)	<0.001
	Retired	0 (0.0)	26 (100.0)	
	Employed	0 (0.0)	114 (100.0)	
Monthly income	<5,000 SAR	0 (0.0)	41 (100.0)	<0.001
	5,000–9,999 SAR	26 (50.0)	26 (50.0)	
	10,000–14,999 SAR	0 (0.0)	47 (100.0)	
	$\geq 15,000$ SAR	0 (0.0)	70 (100.0)	

Another national study reported that a considerable proportion of adults experienced intermediate or basic HL [10]. Also, our findings were better than the previous Saudi studies that claimed inadequate HL among the population. However, such variations may be attributed

to several factors, including characteristics of the study population, study design, and the tools used for the assessment of HL.

Other studies from Riyadh and Jeddah have found varying rates of HL prevalence depending on the



Table 8. Association between preventive health practices and health literacy level among the participants.

Variable	Category	Problematic Health Literacy n (%)	Sufficient Health Literacy n (%)	P-value
Blood glucose screening	No	0 (0.0)	52 (100.0)	<0.01
	Yes	26 (16.5)	132 (83.5)	
Cholesterol screening	No	26 (16.0)	137 (84.0)	0.002
	Yes	0 (0.0)	47 (100.0)	
Seasonal influenza vaccination	No	26 (27.1)	70 (72.9)	<0.001
	Yes	0 (0.0)	114 (100.0)	
Visited a healthcare facility for preventive screening	No	0 (0.0)	111 (100.0)	<0.001
	Yes	26 (26.3)	73 (73.7)	
Participated in a disease screening program	No	26 (33.3)	52 (66.7)	<0.001
	Yes	0 (0.0)	132 (100.0)	
Received health education/counseling from a healthcare provider	No	26 (21.8)	93 (78.2)	<0.001
	Yes	0 (0.0)	91 (100.0)	
Frequency of routine medical check-ups	Less than once per year	26 (26.3)	73 (73.7)	<0.001
	More than once per year	0 (0.0)	26 (100.0)	
	Never	0 (0.0)	85 (100.0)	
Primary source of health information	Internet	26 (38.8)	41 (61.2)	<0.001
	Physician/Healthcare provider	0 (0.0)	117 (100.0)	
	Ministry of Health	0 (0.0)	26 (100.0)	
Trust in health information obtained from the Internet	Low	26 (22.8)	88 (77.2)	<0.001
	Moderate	0 (0.0)	70 (100.0)	
	None	0 (0.0)	26 (100.0)	
Regular physical activity (≥ 150 minutes/week)	No	0 (0.0)	111 (100.0)	<0.001
	Yes	26 (26.3)	73 (73.7)	
Current smoking status	No	0 (0.0)	99 (100.0)	<0.001
	Yes	26 (23.4)	85 (76.6)	
Self-rated health status	Good	0 (0.0)	70 (100.0)	<0.001
	Very good	25 (18.0)	114 (82.0)	

assessment tool adopted [11, 12]. This indicates that the tool may affect the actual prevalence of HL. Additionally, such variations in findings may be related to variations in other factors such as study populations and sampling techniques. This necessitates the establishment of a study involving the entire Saudi population in the Kingdom to determine the exact prevalence of HL.

Several factors have repeatedly emerged as significant predictors of HL, including educational attainment, socioeconomic status, age, and place of residence [13]. In our study, we found that HL was influenced by several demographics, including gender, marital status, educational level, employment status, and monthly income. Additionally, we found that sufficient literacy

was significantly more commonly reported by females, the widowed, those with a bachelor's degree, the employed, and those reporting the highest monthly income. Individuals with low HL were found in previous research to be more likely to have a lower financial status [14].

In a national survey, it was found that inadequate or limited HL determinants included lower education, lower income, marital status, older age, and regional variations [7]. A previous Saudi study revealed that multivariate analysis showed that the total score of HL was linked with monthly income and regions of Saudi Arabia, as well as having diabetes [3].



The management and preventive programs have been developed to improve patient care, reduce disease spread, and reduce associated risks [15]. In our study, the most used preventive services were screening for blood glucose, participation in early disease detection programs, and receiving seasonal influenza. Cholesterol screening was reported by a small proportion of the subjects, although cholesterol is known to be associated with chronic illnesses such as cardiovascular diseases and dyslipidemia. However, this can be attributed to the fact that none of our participants had any chronic disease, and they may not have received information regarding the importance of cholesterol screening. A previous Saudi study enrolled visitors of a university hospital revealed that more than half (58%) had undergone screening services, including breast cancer, colon cancer, diabetes, hypertension, or weight management [6]. In our study, less than one-half of the subjects visited the healthcare facilities for preventive screening services.

It was stated that those with lower education and income are particularly vulnerable and often exhibit difficulty in understanding medical instructions, navigating the healthcare system effectively, and evaluating health information sources [3]. In our study, a small proportion of our subjects reported intermediate school as the lowest educational level. This may explain our findings, where more than one-half of the subjects adopted physicians as the primary source of information and reported low trust in information from the internet. Such findings suggest that the subjects trust physicians more than the internet and can understand information from physicians rather than the internet.

In Saudi Arabia, it was indicated that gaps in knowledge persist regarding chronic illness awareness and management [16]. It was discovered that subjects with limited HL were more prone to skip required health screening tests and under trust preventive health care [17]. This was in agreement with our findings, as we found that all subjects who did not screen for cholesterol, did not receive the influenza vaccine, and did not participate in the disease screening program reported problematic HL. It was demonstrated that regardless of educational status, the individuals face some HL issues, such as being unfamiliar with medical terms and their mechanisms [14].

Conclusion

Our study revealed that the majority of Saudi adults have sufficient HL, and the level of HL was potentially affected by the demographics of the participants. There were several preventive health services used by the adults, and the most used one was for screening blood glucose, whereas the least used one was screening for cholesterol. Utilization of different preventive health services was found to be associated with sufficient HL, indicating the importance of HL among the population

in the prevention and management of diseases via utilization of preventive health services.

Limitations, Strengths, and Recommendations

The limitation of this study was the small sample size and the sample was non-randomized. However, the strengths of this study included the presentation of findings that were not reported in previous studies such as the correlation between HL and utilization of preventive health service and investigation of several items, including the factors related to HL and the level of HL, where previous research generally focused on one item or two and no previous research reported the correlation between HL and preventive health service utilization. Therefore, further studies including a larger sample size and the whole Kingdom are highly recommended.

List of Abbreviations

HL	Health literacy
MOH	Ministry of Health
NCDs	Non-communicable diseases
WHO	World Health Organization

Conflict of interest

None.

Funding

None.

Consent to participate

Participants who were admitted to the National Medical Care Center provided consent before participation.

Ethical approval

This study obtained approval from the Care IRB committee. All data were fully anonymized.

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References

1. World Health Organization. Shanghai declaration on promoting health in the 2030 agenda for sustainable development. *Health Promot Int*. 2017;32(1):7–8. <https://www.who.int/publications/i/item/WHO-NMH-PND-17.5>. Accessed 4 July 2026.



2. McCaffery KJ, Holmes-Rovner M, Smith SK, Rovner D, Nutbeam D, Clayman ML, et al. Addressing health literacy in patient decision aids. *BMC Med Inform Decis Mak*. 2013;13(SUPPL. 2):S10. <https://doi.org/10.1186/1472-6947-13-S2-S10>.
3. Alsuheybi BMS, AlHusseini N, Alkhalidi AR, Alzaidi RJ. Health literacy among a young adult sample of the Saudi Population: a Cross-sectional study. *Rev Diabet Stud*. 2026; 22(S1):92–105. <https://doi.org/https://doi.org/10.70082/635ywh26>.
4. Peker Ş, Topuzoğlu A, Hıdıroğlu S, Tanrıöver Ö. Understanding the utilization of preventive health services for non-communicable diseases: a qualitative study with community members and family physicians. *BMC Prim Care*. 2025;26(1):261. <https://doi.org/10.1186/s12875-025-02958-z>.
5. Yarifard K, Abdi Z, Jaafari-pooyan E. Factors affecting the utilization of preventive health services by middle-aged population: a scoping review. *Iran J Public Health*. 2025;54(3):554. <https://doi.org/10.18502/ijph.v54i3.18248>.
6. Al Ghamdi MA, Al Raddadi RM, Althomali OW, Bazaid AS. Utilization of preventive care services at a University Hospital in Saudi Arabia. *Health Scope*. 2021; 10(4):e119996. <https://doi.org/10.5812/jhealthscope.119996>.
7. Almubark R, Basyouni M, Alghanem A, Althumairi N, Alkhamis D, Alharbi LS, et al. Health literacy in Saudi Arabia: implications for public health and healthcare access. *Pharmacol Res Perspect*. 2019;7(4):e00514. <https://doi.org/10.1002/prp2.514>.
8. Sørensen K, Van den Broucke S, Pelikan JM, Fullam J, Doyle G, Slonska, Z, et al. Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). *BMC Public Health*. 2013;13: 948. <https://doi.org/10.1186/1471-2458-13-948>.
9. Nesari M, Olson JK, Nasrabadi AN, Norris C. Registered Nurses' knowledge of and experience with health literacy. *Health Lit Res Pract*. 2019;3(4):e268–e279. <https://doi.org/10.3928/24748307-20191021-01>.
10. Abdel-Latif MMM, Saad SY. Health literacy among Saudi population: a cross-sectional study. *Health Promot Int*. 2019;34(1):60–70. <https://doi.org/10.1093/heapro/dax043>.
11. Alkhalidi TM, Al-Jumaili AA, Alnemer KA, Alharbi K, Al-Akeel ES, Alharbi MM, et al. Measuring the health literacy level of Arabicspeaking population in Saudi Arabia using translated health literacy instruments. *Pharm Pract*. 2018;16(3):1223. <https://doi.org/10.18549/PharmPract.2018.03.1223>.
12. Alamari A, Alkwaari M. Assessing the level of health literacy among adult visitors in the primary health care setting of National Guard Health Affairs, Jeddah, Saudi Arabia. *IJIR*. 2017;3(10):645–54.
13. Garcia-Codina O, Juvinyà-Canal D, Amil-Bujan P, Bertran-Noguer C, Gonzalez-Mestre MA, Masachs-Fatjo E, et al. Determinants of health literacy in the general population: results of the Catalan health survey. *BMC Public Health*. 2019;19(1):1122. <https://doi.org/10.1186/s12889-019-7381-1>.
14. Centers for disease control and prevention. Understanding health literacy. 2021. <https://www.cdc.gov/healthliteracy/learn/Understanding.html>. Accessed July 2026.
15. Reynolds R, Dennis S, Hasan I, Slewa J, Chen W, Tian D, et al. A systematic review of chronic disease management interventions in primary care. *BMC Fam Pract*. 2018;19(1):11. <https://doi.org/10.1186/s12875-017-0692-3>.
16. Aldhabaan W, Abdulrahman MA, Asiri MY, Alshabab MQ, Alshahrani MY, Alnakhli GR, et al. Assessment of knowledge regarding cataract among Saudi adult population in Assir Region, Saudi Arabia. *Cureus*. 2022;14(12):e32703. <https://doi.org/10.7759/cureus.32703>.
17. Scott TL, Gazmararian JA, Williams MV, Baker DW. Health literacy and preventive health care use among Medicare enrollees in a managed care organization. *Med Care*. 2002;40(5):395–404. <https://doi.org/10.1097/00005650-200205000-00005>.

