

Cervical Cancer Literacy in Women of Reproductive Age and Its Related Factors

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Abstract Cancer health literacy, which is the ability to search, understand, and use health information to make appropriate health decisions, plays an important role in the use of preventative and screening information. The present study aims to evaluate cervical cancer health literacy in women of reproductive age and its related factors. In this cross-sectional study, 231 women of reproductive age who referred to health centers of Khuzestan Province, Iran, were selected via convenience sampling. A valid and reliable measure was employed to collect information about various dimensions of cervical cancer health literacy, including having access to, reading, understanding, appraising, using, and communicating it. The data collected were analyzed using SPSS 16. Data analysis was conducted by independent sample *t* test, one-way ANOVA, Spearman's correlation, chi-square, and linear regression. The participants' average health literacy score was 97.88 ± 12.7 (from 135 points), and 47.2% of the participants had limited health literacy. Health literacy was associated with education, employment, income, searching, mothers' and young friends'

counseling, and duration of the study time ($p < 0.05$). In linear regression model, there was a significant association between income ($p = 0.011$), searching ($p = 0.01$), study time ($p = 0.009$), and young friends' counseling ($p = 0.002$) and cervical cancer literacy scores. In this study, no significant association was observed between age and health literacy. This study indicated that the cervical cancer literacy in women of reproductive age was not at good levels. Health workers should pay more attention to groups who are at greater risk of having low health literacy. Moreover, targeting and tailoring educational interventions with respect to different levels of cervical cancer literacy might increase cervical cancer screening.

Keywords Cervical cancer · Health literacy · Reproductive age · Prevention

Introduction

Cervical cancer is one of the most common causes of death from cancer in women worldwide. Approximately 500,000 new cases of cancer all over the world are identified per year, about 79% of which occur in developing countries [1, 2]. Two thirds of these cases are diagnosed in advanced stages where the survival rate of these patients is very low [3]. South-central Asia (Iran located in this region) has the highest incidence of cervical cancer (19.3/100000) and the highest rate of mortality compared to the incidence rate (MIR 65%) [4]. Based on the national reports in 2009 in Iran, the number of people with cervical cancer increased from 1.86 per thousand people in 2004 to 2.17 per thousand people in 2008 [5].

Cancer of the cervix is a preventable and detectable cancer at an early stage due to a long pre-invasive period, the availability of organ for sampling, the existence of valid screening

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test, and the possibility of effective treatment of precancerous lesions [6]. According to the results, almost half of the cervical cancers diagnosed are related to women who have never been screened. Moreover, 10% of cancers occur in women who have not been screened in the last 5 years [7]. Pap smear is a screening test for early detection of cervical cancer in women and is considered as a healthy and health-promoting behavior [8]. The screening test should be done every 3 years in women who are sexually active [9]. Despite the impact of a screening program on early detection and cancer treatment, a large number of people at risk do not participate in screening programs [10]. Poor adherence to cancer screening is associated with low health literacy [11]. Health literacy is one of the most important factors in the use of preventative screening information [12].

The World Health Organization (WHO) at the Fifth World Conference on Health Promotion in Mexico introduced health literacy as cognitive and social skills which determine individuals' motivation and ability to access, understand, and use the information in order to maintain health promotion [13, 14].

Patients with limited health literacy skills are less likely to be knowledgeable about how to control cancer and misunderstand cancer susceptibility and early detection [11, 15]. These patients have a weak understanding of cancer prediction [16], need screening [17], and are less engaged in attempting to prevent cancer [18]. Therefore, cancer is detected at an advanced stage in patients with limited literacy skills [19] who are not sufficiently involved in cancer treatment [20, 21]. These patients need more information about their health, but ask doctors few questions [22].

A considerable amount of literature on the demographic characteristics of different walks of life and the impact of demographic characteristics on health literacy has been published. These studies have been conducted by Diviani et al. in Sweden [23], Hee Yun Lee et al. in Korea [24], and Sedighe Shariatinia et al. in Iran [25]. No studies focusing on cervical cancer health literacy have been found in the literature. Therefore, the present research examines the impact of health literacy on patients' participation in cancer screening programs and the relationship between demographic variables such as education, employee, and socioeconomic status and health literacy.

Considering the important role of health literacy in patients' adopting preventive behaviors and cancer screening, this study investigates cervical cancer health literacy and its related factors in women of reproductive age due to low health literacy among women in Khuzestan Province, Iran [26] and the high incidence and mortality rate of cervical cancer in Asia and Iran [4]. The results of this study might be used to design and develop targeting and tailoring health education programs to inform women of reproductive age.

Materials and Methods

Research Design and Sampling

In this cross-sectional study, 231 samples were collected from women of reproductive age who referred to the East Ahvaz health centers in 2016. The sample size was determined based on rule of thumb and eight persons per question [27]. In the current study, the samples were selected via convenience sampling from four health centers in the East of Ahvaz (centers 1, 8, 11, and 15) based on the population of each center.

Inclusion Criteria

The inclusion criteria for this research included the Iranian, married women who were aged between 15 and 49, capable of reading and writing, and willing to participate in the research. The exclusion criteria, however, included the patients' unwillingness to continue participating in the study.

Measurement Tool

To measure the cervical cancer health literacy, a questionnaire was designed and used. The questionnaire was designed based on the framework of the Iranian health literacy questionnaire [26] and the specialists' viewpoints and by using papers pertinent to health literacy and cervical cancer [23, 24, 28–31]. The above-mentioned questionnaire consisted of two parts: "demographic information" and "questions about health literacy." In the first part, demographic information such as age, education, job, socioeconomic status, length of marriage, reproductive history, history of cancer in family, and the use of media such as time allocated to the study, watching health-oriented programs on TV, and using the Internet was evaluated. In the second part, different aspects of health literacy were assessed by 27 five-choice questions. The questions included five accessibility skill questions (score range of 5 to 25), four reading skill questions (score range of 4 to 20), five understanding skill questions (score range of 5 to 25), five assessment skill questions (score range of 5 to 25), and eight questions about decision-making skill and using information (score range of 8 to 40). The total score achieved was in the range of 27 to 135. According to the scale considered and the scores achieved, the participants' health literacy was divided into four groups such as adequate, average, not very adequate, and inadequate groups. The two groups of not very adequate and inadequate were considered as limited health literacy. Furthermore, according to a range of health literacy scores, the patients were categorized in three groups such as limited health literacy (scores less than 99), average (scores between 99 and 106), and adequate (scores higher than 107) [26].

Validity and Reliability

The validity of the questionnaire was approved by ten experts in midwifery and health education. In order to conduct qualitative content analysis, experts' comments on the accuracy of Persian grammar, using appropriate words and scoring, and placing items in their proper place were employed. In quantitative content analysis, experts' opinions on aspects of simplicity, clarity, relevance, and necessity of each item were evaluated in order to calculate the content validity index (CVI) and the content validity ratio (CVR), respectively. Finally, the validity of the questionnaire was approved (CVR = 1, CVR = 1). In the next step, to reduce and remove inappropriate items and determine the importance of each item, a questionnaire was completed by 20 women of reproductive age (these 20 women did not belong to the samples) and items were amended according to their comments. The internal consistency of the questionnaire was investigated using Cronbach's alpha, and the reliability of the questionnaire was 0.706. It took 10 min to complete the questionnaire by participants. The period of gathering data by the questionnaire lasted for 3 months from January 2017 to April 2017.

Statistical Analyses

Data analyses were done using SPSS v. 16. Descriptive statistics were used to provide diagrams, mean, and standard deviation. Spearman's correlation test was employed to examine the relationship between the variables, and independent sample *t* test and one-way ANOVA were employed to compare the means. Linear regression was used to show health literacy predictors.

Research Ethics

In this study, we attempted to strictly adhere to the principles of Ethics for Medical Research. Accordingly, we primarily obtained an ethical approval for the study from the Ethics Committee of the Ahvaz Jundishapur University of Medical Sciences with the number of IR.AJUMS.REC1395.214. At the onset of the study, informed consent was obtained from the participants. Therefore, the purpose of the project was explained, and voluntary participation, non-payment, confidentiality of information, and commitment to uphold all ethic principles of the research were emphasized. The plan was adopted with the number of 95,095 at the Ahvaz Jundishapur University of Medical Sciences.

In this paper, cervical cancer health literacy is written as health literacy.

Results

In this research, 231 women of productive age (aged between 19 and 49) with an average age of 33.83 ± 6.7 years and average number of children of 1.84 completed the questionnaires by the self-report method. In terms of education level, 31.7% of the participants had college education and 48.9% had high school diploma, while the rest had secondary school diploma. Moreover, 84.4% of the participants were housewives. 76.6% of the participants had low or adequate income, and 15.2% were not covered by any insurance. The average age of marriage in the participants was 21.21 years, and the average length of marriage was 12.5 years. 46.1% of the participants had not done Pap smear, while 30.6% had done it once.

The participants' average health literacy score was 97.88 ± 12.7 out of 135 points. The lowest and the highest scores were 29 and 125, respectively. 37.2% of the participants (109 persons) had limited health literacy, 26.0% (60 persons) had average health literacy, and 26.8% (62 persons) had adequate health literacy.

Evaluating the association between the demographic variables and health literacy levels and using statistic tests demonstrated that there was a statistically significant difference ($p < 0.05$) between the average health literacy scores in different education, employment, insurance, and income groups. Moreover, chi-square test showed that the highest percentage of adequate health literacy was observed in groups having college education (38%), higher income (38.9%), and complementary insurance cover (35.6%). On the other hand, the maximum percentage of inadequate health literacy was associated with the participants having secondary school diploma degree (68.1%) and low income (56.2%) and those who were housewives (51.5%) and were not covered by any insurance (Table 1).

This study also assessed the effects of information sources on health literacy. According to the evaluation conducted, 81.4% of the participants spent less than 1 h per day studying. The average time allocated to reading and watching health-oriented programs on TV was 33.93 and 53.96 min per day, respectively. Table 2 illustrates the relationship between the variables related to information sources and health literacy.

The independent sample *t* test showed a significant difference ($p = 0.004$) between health literacy and time spent reading per day. In addition, the chi-square test demonstrated that 52.7% of the participants, who spent less than 1 h reading, had limited health literacy, and the maximum percentage of health literacy (53.6%) was associated with the participants who spent approximately 2–3 h reading.

The independent sample *t* test showed a significant difference between health literacy scores in the participants who benefited from their mothers' ($p = 0.005$) and young friends' counseling ($p = 0.018$) about the importance of cervical cancer

Table 1 Comparison of mean scores of health literacy and demographic characteristics of women of reproductive age

	Health literacy			Adequate health literacy N (%)	Average health literacy N (%)	Limited health literacy N (%)	p value***
	N (%)	M ± SD	p value				
Total	231 (100)	97.89 ± 12.7		62 (26.8)	60 (26.0)	109 (47.2)	
Age (years)							
18–24	13 (5.6)	95.23 ± 14.69	0.072**	3 (23.1)	2 (15.4)	8 (61.5)	0.020
25–30	67 (29)	97.03 ± 14.03		15 (22.4)	23 (34.3)	29 (43.3)	
31–39	104 (45)	100.16 ± 11.89		38 (36.5)	24 (23.1)	42 (40.4)	
40–49	47 (20.3)	94.77 ± 11.71		6 (12.8)	60 (26.0)	109 (47.2)	
Employment status							
Employment	35 (15.2)	103.37 ± 11.10	0.006*	14 (40.0)	13 (37.1)	8 (22.9)	0.007
Unemployed	196 (84.8)	96.90 ± 12.84		48 (24.5)	47 (24.0)	101 (51.5)	
Education							
Under diploma	47 (20.3)	94.49 ± 10.46	0.002**	5 (10.6)	10 (21.3)	32 (68.1)	0.001
Diploma	113 (48.9)	96.76 ± 13.86		30 (26.5)	26 (23.0)	57 (50.4)	
College	71 (30.70)	102.04 ± 11.40		27 (38.0)	24 (33.8)	20 (28.2)	
Income							
Low income	48 (20.8)	95.04 ± 11.28	0.016**	8 (16.7)	13 (27.1)	27 (56.2)	0.031
Sufficient income	120 (55.8)	97.22 ± 13.57		33 (26.6)	30 (23.3)	66 (51.2)	
Good income	54 (23.4)	101.96 ± 11.25		21 (38.9)	17 (31.5)	16 (29.6)	
Insurance status							
No insurance	35 (15.2)	92.51 ± 16.39	0.014**	5 (14.3)	9 (25.7)	21 (60.0)	0.175
Basic insurance	151 (65.4)	98.28 ± 11.7		41 (27.2)	43 (28.5)	67 (44.4)	
Supplementary insurance	45 (19.5)	100.69 ± 12.11		16 (35.6)	8 (17.8)	21 (46.7)	

*Statistical analysis: one-way ANOVA, significant level ($p < 0.05$)

**Statistical analysis: independent sample *t* test, significant level ($p < 0.05$)

***Statistical analysis: chi-square, significant level ($p < 0.05$)

Table 2 Relationship between the use of information sources and the average rating health literacy

	Health literacy			Adequate health literacy N (%)	Average health literacy N (%)	Limited health literacy N (%)	p value**
	N (%)	M ± SD	p value*				
Web searching							
Yes	170 (73.6)	100.79 ± 10.85	0.001	58 (34.1)	47 (27.6)	65 (38.2)	0.001
No	61 (26.4)	89.75 ± 14.26		4 (6.6)	13 (21.3)	44 (72.1)	
Mothers' counseling							
Yes	79 (34.2)	100.92 ± 13.08	0.009	34 (43.0)	15 (19.0)	30 (38.0)	
No	152 (65.8)	96.30 ± 12.38		28 (14.8)	60 (26.0)	79 (52.0)	
Friends' counseling							
Yes	146 (63.2)	99.66 ± 11.80	0.005	42 (28.8)	42 (28.8)	62 (42.5)	
No	85 (36.8)	94.82 ± 13.8		20 (23.5)	18 (21.2)	47 (55.3)	
Study time							
Less than 1 h	188 (81.4)	96.74 ± 13.07	0.004	42 (22.3)	47 (25.10)	99 (52.7)	
More than 1 h	43 (18.6)	102.89 ± 10.17		20 (46.5)	13 (30.2)	10 (23.3)	
TV time							
Less than 1 h	162 (70.1)	97.33 ± 12.27	0.342	38 (23.5)	45 (27.8)	79 (48.8)	
More than 1 h	69 (29.9)	99.17 ± 13.96		24 (34.8)	15 (21.7)	30 (43.5)	

*Statistical analysis: Independent sample *t* test, significant level ($p < 0.05$)

**Statistical analysis: chi-square, significant level ($p < 0.05$)

screening. The chi-square test demonstrated that 43% of participants who benefited from their mothers' counseling had higher health literacy; however, 18.14% of the participants who did not benefit from counseling had high health literacy.

The results revealed that 73.6% of the participants in the present research had the ability to surf the Internet. Independent sample *t* test showed a significant relationship between the average health literacy score and the ability to surf the Internet ($p = 0.001$). Moreover, the chi-square test demonstrated that 72.1% of persons without the ability to surf the Internet had limited health literacy.

In order to anticipate the health literacy score, the variables such as education, job, insurance, time allocated to reading, mothers' and friends' counseling, and surfing the Internet, which had a significant relationship with health literacy in univariate tests, were entered into the regression model. Finally, variables such as the ability to surf the Internet ($p = 0.001$), time allocated to reading per day ($p = 0.009$), income status ($p = 0.011$), and benefit from young friends' counseling along with the following equation were predictors of the health literacy score:

$$\begin{aligned} \text{Health literacy} = & 109.60 + (\text{income} \times 2.63) \\ & + (\text{study time} \times 0.3) \\ & + (\text{friends' counseling} \times 4.77) \\ & + (\text{web searching} \times 9.62). \end{aligned}$$

Furthermore, to evaluate the effect of research variables on different aspects of health literacy, score mean difference and research variables were studied by statistical tests such as one-way ANOVA, Mann Whitney, Kruskal-Wallis, and independent sample *t* test. Table 3 presents the significant results.

The results showed that the majority of the variables are effective in decision-making, and the variable of ability to surf the Internet affects all aspects of health literacy ($p = 0.001$).

Discussion

To make appropriate health-promoting decisions, people should obtain information about health and evaluate its quality and validity. Therefore, people could play an important role in their health, family, and society, by analyzing the benefits and risks of the above-mentioned information [32]. Considering the importance of cervical cancer screening as a healthy and health-promoting behavior and the effects of health literacy on using preventative and screening information, this research is the first study in the field of cervical cancer health literacy on the women of productive age in Iran. In addition, this study evaluates the association between demographic variables and use of media and the cervical cancer health literacy.

The results showed that approximately half of the participants (47.2%) had limited health literacy, which is consistent with the results of the majority of studies in Iran [33–35] and other countries [29, 36]. Individuals with limited health literacy use less preventative and screening services, resulting in delayed cancer detection and subsequent identification of cancer at a more advanced stage. Therefore, to improve cervical cancer screening test, targeting and tailoring health education with respect to the levels of cervical cancer health literacy is suggested.

The findings of the current study showed a significant relationship between the participants' health literacy and their education level. In other studies, a relationship between education and health literacy was observed [25, 37–39]. Literacy affects and improves the rational thought and cognitive processing of information. People with higher literacy levels show better evaluation skill in terms of the quality and validity of the information obtained [40].

As observed in the results, no significant relationship between age and health literacy was noticed, which is consistent with the results of some other studies [41–43]. However, the majority of studies indicated that along with the increase in age, the average health literacy rate

Table 3 The effect of research variables on different aspects of health literacy

	Various dimensions of health literacy				
	Access	Reading	Understanding	Appraise	Use and communication
Income	0.006	NS	NS	NS	0.052
Web searching	0.001	0.034	0.018	0.001	0.001
Employment	NS	NS	0.023	0.003	0.012
Mothers' counseling	0.001	NS	0.030	NS	NS
Friends' counseling	0.002	NS	NS	NS	0.047
Education	NS	0.005	NS	0.001	0.001
Study time	NS	0.462	0.006	NS	0.032

Number signifies *P* value

NS not significant

decreased [44, 45]. This inconsistency may be due to the fact that the participants in the study were selected from the reproductive age (19–49 years). However, the maximum percentage of high health literacy level (61.3%) was observed in the age group of 31–39 years.

Furthermore, another finding of the current study was about the significant relationship between health literacy and job, which can be due to a higher education level and adequate income status of the participants employed, allowing them to have access to the educational media, including the Internet and educational books, as well as greater use of health services. This finding is consistent with the results of some other studies [18, 25, 46].

The results of this study as well as other studies [11, 33, 34] indicated a meaningful relationship between family income status and insurance coverage and health literacy score. Thus, as the family income decreased, the individuals' average inadequate health literacy increased. Economic situation plays a critical role in the demand for screening tests, and women should also be covered by health insurance to be encouraged to undergo screening [47].

The other variables whose effect on cervical cancer health literacy was studied are the accessibility status of information sources such as reading, watching health-oriented programs on TV, and surfing the Internet, and the benefit derived from parents' and young friends' counseling about the importance of cervical cancer screening.

Based on the findings of this study, there was a positive, significant relationship between the variables of reading per day and the ability to surf the Internet and the average health literacy score [29, 38], but there was no significant relationship between the variable of health-oriented television programs and health literacy [29]. However, the findings of our study differed from those of Eric I. Lubetkin's study [38]. This difference could be due to the lack of appropriate training programs compatible with the audience's need and the fact that the health education is generally conducted in the form of roundtables. The media such as television have considerable strength in creating priorities and how and what to think. The use of TV programs plays an important role in creating beliefs and perceptions of health and diseases and affects the health behavior [48].

In this research, a significant relationship was detected between health literacy score and mothers' and young friends' counseling. In Eric I. Lubetkin's study [38], relatives' and friends' counseling and help were associated with health literacy. The effectiveness of young friends' counseling as well as mothers giving advice to their girls to encourage them to do cancer screening shows the important role of culture, especially behavioral patterns in health promotion. It also shows the important role of adherence to healthy behaviors, which is consistent with the subjective norms within

the theory of planned behavior [49]. Thus, to improve cervical cancer screening, education based on subjective norms construct is recommended.

Limitations

One of the limitations of this study was the convenience sampling of women in the target communities. Although this method is useful for examining the relationships between different phenomena, the results cannot be generalized to the entire target population. In this study, in order to be more realistic, in addition to the appropriate sample size, the centers selected for sampling were comprehensive centers to which the participants referred from all parts of the city and could represent the population.

Another limitation of this study was self-reporting; the extent of this method has been mentioned in earlier behavioral studies [50–52], and the use of this method requires a precise tool design. In this research, a questionnaire was designed to pay attention to the content knowledge of health literacy and cervical cancer. The method of writing questions was considered from two aspects of observance of writing style and the target population. Furthermore, as recommended by measurement specialists [53], the qualitative and quantitative content validity was verified using both participants' and experts' opinions to ensure that the best content is created. After a preliminary exercise on a number of target groups, the initial analysis of the questions was done, and the necessary amendments were applied.

The questionnaires were confidential and unnamed and were completed using the Likert scale to resolve any bias in the responses.

Strong Point of the Study

One of the strong points of the current study is the use of a specific tool to measure the cervical cancer health literacy and screening behavior, while in other study, the tools evaluated the general health literacy [26].

Implication for Practice By focusing on health literacy issues, planners and policy makers in the field of health could increase the accessibility, quality, and safety of health care, decrease costs, and improve health and quality of life. The results of this study can be employed in different fields such as designing the training programs and interventions, which can fulfill women's needs in society, improve cancer screening promotion behavior, contribute to women's health promotion, reduce mortality and costs of cancer treatment, and design training packages containing health messages.

Conclusion

This study showed that the cervical cancer literacy in women of reproductive age was not at good levels. Health workers should pay more attention to groups who are at greater risk of having low health literacy. Moreover, targeting and tailoring educational interventions with respect to different levels of cervical cancer literacy increase cervical cancer screening.

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References

- Shanta V, Krishnamurti S (2000) Epidemiology of cancer of the cervix: global and national perspective. *Indian Med Assoc* 98(2):4
- Thakur A, Gupta B, Gupt A, Chauhan R (2015) Risk factors for cancer cervix among rural women of a hilly state: a case-control study. *Indian J Public Health* 59(1):45–48
- Collymore Y. Removing barriers to early detection key to cervical cancer prevention. Available from: <http://www.prb.org/Template.cfm>
- Chirk Jenn N, Chin Hai T, Nurdiana A, Wei Phin Tan, Hui Meng T. Relationships between cancer pattern country income and geographical region in Asia. *BMC Cancer*. 2015;15(613)
- Health IMo Tehran:Cancer Registration Office. *Iran Cancer Report* 2009. 2012
- Berek JS, Novaks. *Berek & Novak's gynecology*. 2012 ed. 41, editor. Lippincott Williams & Wilkins: London,2012
- Aminisani N, Armstrong BK, Canfell K (2012) Cervical cancer screening in Middle Eastern and Asian migrants to Australia: a record linkage study. *Cancer Epidemiol* 36(6):7
- Blesch KS, Prohaska TR (1991) Cervical cancer screening in older women. *Issues and interventions*. *Cancer Nurs* 14(3):7
- Karimi M, Shamsi M, Araban M, Gholamnia Z, Kasmai P (2011) Health beliefs and performance regarding Pap smear test in Zandieh City women's. *J Guilan Univ Med Sci* 20(80):42–48
- Hajjalizadeh K, Ahadi H, Jomehri F, Rahgozar M (2014) The role of health beliefs in predicting barriers to cervical cancer screening. *J Kerman Univ Med Sci* 21(5):416–425
- Davis TC, Williams MV, Marin E, Parker RM, J. G. (2002) Health literacy and cancer communication. *CA A Cancer Journal for Clinicians*, (52):15
- Tonhoms MD, Hoffman-Goetz L (2011) Application of the health literacy framework to diet-related cancer prevention conversations of older immigrant women to Canada. *Health Promot Int* 27(1):33–44
- Organization WH (1998) Division of Health Promotion, Education and Communications Health Education and Health Promotion Unit. *Health Promotion Glossary*, World Health Organization, Geneva
- Nutbeam D. (1998) *Health promotion glossary*. 349 p
- Price Haywood EG, Harden-Barríos J, Cooper LA (2014) Comparative effectiveness of audit-feedback versus additional physician communication training to improve cancer screening for patients with limited health literacy. *JGIM* 29(8):1113–1121
- Brewer NT, Tzeng JP, Lillie SE, Edwards AS, Peppercorn JM, Rimer BK (2009) Health literacy and cancer risk perception: implications for genomic risk communication. *Med Decis Mak* 29:9
- Dolan NC, Ferreira MR, Davis TC, Fitzgibbon ML, Rademaker A, Liu D et al (2004) Colorectal cancer screening knowledge, attitudes, and beliefs among veterans: does literacy make a difference? *J Clin Oncol* 22:6
- Lindau ST, Basu A, Leitsch SA (2006) Health literacy as a predictor of follow-up after an abnormal Pap smear: a prospective study. *Gen Intern Med* 21:6
- Bennett CL, Ferreira MR, Davis TC, Kaplan J, Weinberger M, Kuzel T et al (1998) Relation between literacy, race, and stage of presentation among low-income patients with prostate cancer. *J Clin Oncol* 16(9):3101–3104
- Cox K (2002) Informed consent and decision-making: patients' experiences of the process of recruitment to phases I and II anti-cancer drug trials. *Patient Educ Couns* 49:8
- Kathleen M. Mazor, Douglas W. Roblin, Andrew E. Williams, Sarah M. Greene, Bridget Gaglio, Terry S. Field, et al. Health literacy and cancer prevention: two new instruments to assess comprehension. *PMC*. 2013;88(1)
- Katz MG, Jacobson TA, Veledar E, Kripalani S (2007) Patient literacy and question-asking behavior during the medical encounter: a mixed-methods analysis. *J Gen Intern Med* 22:6
- Nicola D, Schulz PJ (2014) Association between cancer literacy and cancer-related behaviour: evidence from Ticino, Switzerland. *Public Health Res* 3(2):92–97
- Hee Yun Lee, Taeho Greg Rhee, Nam Keol Kim. (2015) Cancer literacy as a mediator for cancer screening behaviour in Korean adults. *Health and Social Care in the Community*
- Shariatini S, Fararouei M, Karimzadeh Shirazi K, Shams M (2015) Assessment of HIV/AIDS literacy in 15–49 years old people in Yasuj and its related factors. *Armaghane-danesh, Yasuj Univ Med Sci J (YUMSJ)* 19(12):12
- Montazeri A, Tavousi M, Rakhshani F, Azin AS, Jahangiri K, Ebadi M (2014) Health literacy for Iranian adults (HELIA): development and psychometric properties. *J Iranian Inst Health Sci Res* 13(5): 589–600
- Jasemzadeh M, Jaafarzadeh N, Khafaei MA, Malehi AS, Araban M (2016) Predictor of pregnant women's self-care behavior against air pollution: an explanation based on the extended parallel process model (EPPM). *Electron Phys* 8(9):2871–2877
- Machi Suka, Takeshi Odajima, Masayuki Kasai, Ataru Igarashi, Hirono Ishikawa, Makiko Kusama, et al. (2013) The 14-item health literacy scale for Japanese adults (HLS-14). *Environ Health Prev Med*
- Morris NS, Field TS, Wagner JL, Cutrona SL, Douglas RW (2013) The association between health literacy and cancer-related attitudes, behaviors, and knowledge. *J Health Commun* 18:223–241
- Dumenci L, Matsuyama R, Riddle DL, Cartwright LA, Perera RA, Siminoff LA (2014) Measurement of cancer health literacy and identification of patients with limited cancer health literacy. *J Health Commun* 19(02):205–224
- Maria H, Itria A, Azevedo G, Christovam AM, Rama CH, Coelho P (2015) Annual national direct and indirect cost estimates of the prevention and treatment of cervical cancer in Brazil. *Clinics* 70(40):289–295
- Howard K. Koh (2010) *National Action Plan to Improve Health Literacy*. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion
- Rezaee Esfahrood Z, Haerian ardekani A, Rahmanian M, Ghaffari Targhi M (2015) A survey on health literacy of referred diabetic patients to Yazd Diabetes Research Center. *Scientificresearch school of publichealthYazd* 15(3):176–187
- Reisi M, Mostafavi F, Hasanzadeh A, Sharifirad GH (2011) The relationship between health literacy, health status and healthy behaviors among elderly in Isfahan. *Health Systems Research* 7(4):1–12

35. Ghanbari S, Majlessi F, Ghaffari M, Mahmoudi MM (2011) Survey on health literacy of pregnant women in health centers of Shahid Beheshti University of Medical Sciences. *Med J* 19:1–13
36. Sentell T, Braun KL, Davis J, Davis T (2015) Health literacy and meeting breast and cervical cancer screening guidelines among Asians and whites in California. *SpringerPlus* 4(432):1–9
37. Peyman N, Abdollahi M (2016) The relationship between health literacy and self-efficacy physical activity in postpartum women. *J Health Lit* 1(1):6–13
38. Lubetkin EI, Zabor EC, Isaac K, Brennessel D, Kemeny MM, Hay JL (2015) Health literacy, information seeking, and trust in information in Haitians. *Am J Health Behav* 39(3):441–450
39. David HH, Julie G, Parker RM (2005) The impact of low health literacy on the medical costs of Medicare managed care enrollees. *Am J Med* 118(4):371–377
40. Christina Zarcadoolas, Andrew F. Pleasant, David S. Greer (2006) *Advancing Health Literacy*. 1, editor: Jossey-Bass
41. Lindau ST, Tomori C, Lyons T, Langseth L, Bennett CL, Garcia P (2002) The association of health literacy with cervical cancer prevention knowledge and health behaviors in a multiethnic cohort of women. *Am J Obstet Gynecol* 186(5):938–943
42. Cavanaugh KL, Wingard RL, Hakim RM, Eden S, Ayumi S, Wallston KA et al (2010) Low health literacy associates with increased mortality in ESRD. *Clin Epidemiol* 21:1979–1985
43. Rafiezadeh Gharrehtapeh S, Tabarsy B, Hassanjani S, Razavi M, Amjady M, Hojjati H (2014) Relationship between the health literacy with self-efficacy of the diabetic patient's type 2 referred to Gorgan city clinic in 2014. *Nurs Diabetes Nurs Midwifery Zabol* 3(2):30–43
44. Khosravi A, Ahmadzadeh K, Arastoopoor S, Tahmasbi R (2015) Health literacy levels of diabetic patients referred to shiraz health centers and its effective factors. *Health Inf Manag* 12(2):194–205
45. Afshari M, Khazaei S, Bahrami M, Merati H (2014) Investigating adult health literacy in Tuyserkar City. *J Educ Comm Health* 1(2):48–45
46. Mollakhalili H, Papi A, Sharifirad G, Zare Farashbandi Z, Hasan Zadeh H (2014) A survey on health literacy of inpatients educational hospitals of Isfahan University of Medical Sciences. *Health Inf Manag* 11(4):464–473
47. Awodele O, Adeyomoye AAA, Awodele DF, Kwashi V, Awodele IO, Dolapo DC (2011) A study on cervical cancer screening amongst nurses in Lagos University Teaching Hospital, Lagos. *Nigeria J Cancer Educ* 26(3):497–504
48. Araban M, Tavafian SS, Motesaddi ZS, Hidarnia A, Gohari MR, Lalue A, et al. (2013) Air pollution preventive behavior among pregnant women: a theory based study
49. Rimer BK, Glanz K. *Theory at a glance: a guide for health promotion practice*. 2005
50. Araban M, Baharzadeh K, Karimy M (2017) Nutrition modification aimed at enhancing dietary iron and folic acid intake: an application of health belief model in practice. *Eur J Pub Health* 27(3):582
51. Zamani-Alavijeh F, Araban M, Mohammadi V, Goodarzi F (2017) Development and psychometric evaluation of a new instrument to assess nutritional perceptions and behaviors of diabetic men. *Diabetes Metab Syndrome*
52. Glanz K, Rimer BK, Viswanath K (2008) *Health behavior and health education: theory, research, and practice*: John Wiley & Sons
53. Waltz CF, Strickland OL, Lenz ER. *Measurement in nursing and health research*: Springer Publishing Company; 2010