Original Article

Decomposing Socioeconomic Inequality in Health Literacy in Iran: A Concentration Index Approach

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Abstract

Background: Health literacy is a major factor for health promotion and well-being. In spite of several researches on health literacy, information on the subject of the status of health literacy in Asian countries such as Iran is inadequate. Therefore, this study aimed to assess the inequality of health literacy in an Iranian population and its influencing factors. **Methods:** In this cross-sectional study, 736 families were selected by cluster random sampling. A validated questionnaire was used to measure the health literacy of participants. Socioeconomic status (SES) was calculated by asset-based approach, and principal component analysis (PCA) was performed to estimate the families' SES. Concentration index and curve were used to measure SES inequality in health literacy, and after that decomposed into its determinants. The data were analyzed by Stata software. **Results:** The mean age of the participants was 34.81 years (standard deviation = 5.98 years). The value of concentration index for health literacy equals 0.2292 (95% confidence interval = 0.168–0.283), and this value indicates that there is inequality in distribution of health literacy in Iran and the inequality disfavors the poor. **Conclusions:** The results of this study revealed that there is inequality in distribution of health literacy in Iran, and people of higher economic status in Iran enjoy from better health literacy levels.

Keywords: *Healthcare disparities, health literacy, health status disparities, socioeconomic factors*

Introduction

Health literacy is one of the aspects of society assessment where its effective factors are a reliable tool for health planner.[1] Health literacy is the ability of an individual to earn, interpret, and understand primary information and health service needed for suitable decision.[2] According to the importance of health literacy, the World Health Organization introduced it as health determinant.[3] The studies show that irregular and arbitrary use of drugs, failure to follow physician's orders, unfavorable blood glucose control, and low health knowledge are more prevalent in individuals with low health literacy.[4,5]

Berkman *et al*.[6] in a systematic review of 111 studies concluded that poor health literacy is related to worse health outcomes (more hospitalizations, greater use of emergency care, higher mortality rates, etc.) and inferior use of healthcare services (lower influenza vaccine and mammography screening, etc.). The probable concentration of literacy health in some socioeconomic status (SES) groups is the hypothesis of this study.

Many studies have evaluated the effective factors on health literacy. Gender, education levels, location, and SES are some of these factors.[1,7] SES is expressed as an important factor in health literacy.[8,9] Also, some studies showed that health literacy increased with increase in economic status of household.[1,10] The results of some studies show that SES is an important factor in health status. However, other studies showed SES is not a basic determinant factor in health literacy, but it can be have a fascinating role in health literacy alongside important factors such as education levels.

However, notwithstanding several researches regarding health literacy, information on the subject of the status of health literacy in Asian countries such as Iran is inadequate.[11-13] While several studies have demonstrated the prevalence of poor health literacy across the world, there are limited studies regarding its determinants.

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The number of studies assessing the socioeconomic inequality in health literacy with concentration index (CI) and decomposition approach is limited. Therefore, this study aimed to assess the inequality of health literacy in an Iranian population and its influencing factors.

Methods

Sampling and population

This study is a cross-sectional, population-based study that was conducted on people over 18 years of age in Arak city by referring to homes by trained interviewers.

Initially, a community appraisal team was formed. There seems to be a maximum of 5% nonresponse rate in the population. Given the use of random cluster sampling, by calculating the effect size of 2.1, a sample size of 730 was determined and 37 cluster heads were considered. Given that all Arak households have household records in health centers, using this household case, 37 cluster heads were randomly selected. Then, by referring to these cluster heads, one man or woman from the household was selected randomly. The interview of other 19 households was conducted from the right side of this house with an individual over 18 years of age in each house.

Data gathering and questionnaire

Data collection was done in four parts; the first part included demographic information such as age, sex, and place of residence. The second part included SES. Household economic status was measured using an "asset-based" method; participants were asked for information on household assets and housing.

The third part included self-rated health (SRH) that was measured by two different questions with Likert scale. (1) SRH-5; how would you rate your general health status? With reply alternatives "very good, quite good, neither good nor poor, quite poor, and poor." However, as coefficients of alternatives were close to each other in the regression analysis, this SRH was grouped and divided into two categories of bad (poor and quite poor, neither good nor bad) and good (very good, quite good). (2) SRH-age; how would you assess your general health status compared with that of others of your own age? With reply alternatives "Much better, slightly better, neither better nor worse, slightly worse and much worse." The reliability and validity of these questions are assessed in other studies.[14-16]

The fourth part also included the health literacy questionnaire of Montazeri *et al*., with the reliability confirmed by Cronbach's alpha coefficient of 0.72–0.89 and also validity confirmed by experts according to an original article. The questionnaire was used to measure the reading ability and health-related concepts and evaluate the health literacy of the community members in five areas including comprehension (questions 1–6), reading skills (questions 7–10), evaluation of health-related topics (questions 11–17), accessing,[17-20] and health-related factors' decision-making (questions 22–33). Likert scale was used to score the questions from 1 to 5, so the total score would be 33 (minimum)–165 (maximum); the scores were also evaluated based on the average and levels of health literacy. A score below 50% indicates inadequate literacy level, 50.1–66 indicates not quite enough literacy level, 66.1–84 indicates adequate literacy level, and 84.1–100 indicates excellent literacy level.[21]

The following explanatory factors were considered as probable determinants of inequality in health literacy in Iran: age, gender, education, occupation, economic status, chronic disease history, and level of SRH. Education level was categorized into three levels of prediploma, diploma (end of high school), and academic level.

Statistical analysis

Principal component analysis (PCA) was used to measure the economic status of selected households from which participants were chosen. Asset variables that were used in PCA were as follows: laptop, freezer, dishwashing machine, vacuum cleaner, handicraft carpet, private cars, three-dimensional TV, side-by-side refrigerator, smart phone, microwave, the number of rooms in their residence, and the total area of residence (in meters). Economic status was then categorized into five quintiles, ranging from the poorest to the richest.

Using a Persian valid questionnaire, health literacy score was measured for each participant. As there is no standardized cut-off point for health literacy questionnaire used, the median of its scores among participants was used as the cut-off point to transform the variable into a binary variable of high and low levels of health literacy. The reason for transforming the variable into a dichotomous one is that the range of scores obtained for health literacy was narrow enough not to allow for subsequent linear analyses of associations.

CI approach was used to measure inequality in health literacy in Iran.[22-24] It is constructed by a concentration curve (CC) that illustrates the distribution of a health literacy (*Y*-axis) against economic status (*X*-axis). Economic status is cumulatively ranked ranging from the poorest person/household to the richest. In fact, the curve shows within what economic quintiles the health is mostly

concentrated. If health literacy is equally distributed across the economic groups, the curve will be a 45° line called "equality line." Otherwise, the curve will lie above or below the equality line showing the existence of inequality in distribution of health literacy. CI value is the area between equality line and CC. In case of equality, CC and equality line coincide and CI is zero. If CC lies above (below) the equality line, it indicates that health literacy is highly concentrated among people of lower (higher) economic status and CI will take a negative (positive) value.[23] The value of CI ranges from −1 to +1.

After depiction of CC and measurement of CI, the researcher can go further and decompose CI to understand what variables contribute to the inequality in health literacy.[24] To do this, following Wagstaff *et al*.,[24] one can assume that there is a regression model linking health literacy variable Y to a set of k determinants (Xk):

$$\gamma i = \propto + \sum_{k} \beta_k x_{ki} + \varepsilon_i \quad (1)$$

Where i means ith individual, bk denotes the coefficients, and εi is an error term. Given the relationship between Yi and Xki in Equation (2), the CI for y can be written as follows:

$$CI = \sum_{k} \left(\frac{\beta_k \bar{x}_k}{\mu} C_k + \frac{GC_\varepsilon}{\mu} \right) = C\gamma + \frac{GC_\varepsilon}{\mu} \quad (2)$$

Where μ is the mean of y, $\bar{x}k$ is the mean of Xk, Ck is the CI for Xk (defined exactly like CI), and in the last term GC (residual) is the generalized CI for εi.

Equation (2) consists of two components: (1) an explained component and (2) an unexplained component. The first component is made up of two constituents: elasticity and CI of regressors. The second component, the unexplained part, is the part of the inequality that cannot be explained by systematic variation in the determinants across economic groups. To decompose, the values of all the included variables in Equation (2) should be calculated. First, the coefficients (βk) of the explanatory variables are calculated. To do this, a regression analysis using an appropriate regression model must be conducted. In this study, taking binary nature of health literacy, logistic regression was used to calculate the coefficients of explanatory variables. In the second step, the means of health literacy (μ) and each determinant ($\bar{x}k$) are calculated. Now that all the variables in Equation (2) are calculated, one can reveal the contribution of each determinant to inequality by multiplying the elasticity of each determinant by its CI $\left(\frac{\beta k \, \bar{x}k}{\mu} \right) C_k$. This is absolute contribution of each determinant to the measured inequality. Taking the absolute contribution, one can note that the contribution to inequality is the result of two factors: (1) a marginal effect of each determinant to the health variable and (2) the distribution of the determinant based on economic status. In the last step, to calculate the percentage contribution, the absolute contribution of each determinant is divided by the CI of the health variable $\left(\frac{\beta k \, \bar{x}k}{\mu} \right) C_k$/CI. The contribution of an X variable to the measured inequality in health literacy can be either positive or negative. Positive contribution shows that the variable would add to the inequality in health literacy and vice versa.

Results

Table 1 illustrates descriptive features of the participants. As it can be seen from the table, the mean of the age of participants was 34.81 years (standard deviation = 5.98 years). About 63% of people were unemployed, and most of them were women. More than two-third of participants were women. Almost all the participants were married. Around one-third of people had low levels of education. Interestingly, more than 70% of participants rated their health status as good. Almost half of the participants had a favorable level of health literacy.

Figure 1 depicts CC for health literacy. As it illustrates, the curve is below the equality line and indicates that people of higher economic status in Iran enjoy from better health literacy levels. In other words, this indicates that there is inequality in distribution of health literacy in Iran and the inequality disfavors the poor. The value of CI for health literacy equals 0.2292 (95% confidence interval = 0.168–0.283).

Table 2 shows the logistic regression analysis results for health literacy and its determinants. As the table illustrates,

Table 1: Demographic features of participants in the study of health literacy in Iran

Variable		Frequency (mean)	Percent
Age		34.81*	-
Employment status	Unemployed	466	63.92
	Employed	263	36.07
Education level	Prediploma	202	27.11
	Diploma	309	41.48
	Academic	234	31.41
Marital status	Married	710	97
	Single	22	3
Gender	Female	539	72.64
	Male	203	13.63
Economic status	Poorest	140	20.11
	Poor	139	19.97
	Middle	140	20.11
	Rich	138	19.82
	Richest	139	19.97
Self-rated health	Bad	200	27.51
	Good	527	72.48
Chronic disease history	Yes	99	13.63
	No	627	89.36
Health literacy	Low	349	49.87
	High	350	50.13

*As age was a continuous variable, the mean of age is reported

Table 2: Logistic regression analysis results for health literacy in Iran

Variable		Coefficient	*P*	95% Confidence interval	
				Low	High
Age		0.0016	0.946	−0.0462	0.0495
Employment status	Unemployed	−0.6744	0.091	−1.45	0.1082
	Employed	-	-	-	-
Education level	Prediploma	−1.845	0.000	−2.681	−1.009
	Diploma	−0.6518	0.032	−1.248	−0.0554
	Academic	-	-	-	-
Marital status	Married	−0.8128	0.324	−2.426	0.801
	Single	-	-	-	-
Gender	Female	0.3507	0.409	−0.4824	1.183
	Male	-	-	-	-
Economic status	Poorest	−1.953	0.000	−2.915	−0.9917
	Poor	−1.415	0.001	−2.258	−0.5718
	Middle	−1.603	0.000	−2.4	−0.8053
	Rich	−1.018	0.016	−1.848	−0.1889
	Richest	-	-	-	-
Self-rated health	Bad	−0.7355	0.020	−1.355	−0.1159
	Good	-	-	-	-
Chronic disease history	Yes	0.4157	0.282	−0.3415	1.172
	No	-	-	-	-

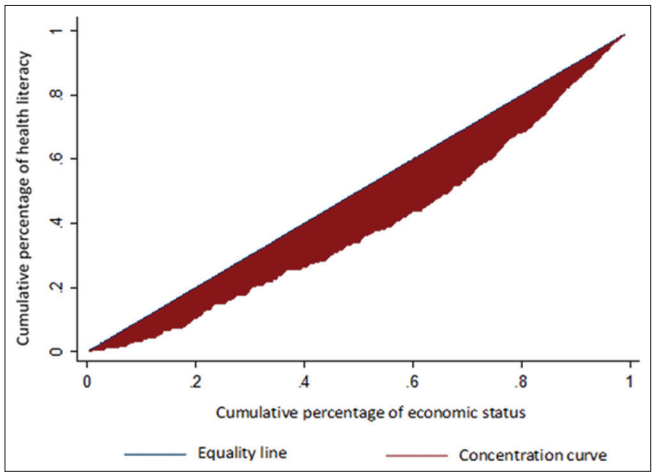

Figure 1: Concentration curve of health literacy in Iran

education status, economic status, and SRH had significant relationships with health literacy level.

Table 3 illustrates the results for decomposition of inequality in health literacy. As it can be seen from the table, more than 60% of inequality in health literacy was explained by economic status. Education level could explain around 30% of observed inequality. Occupational status also explained around 6% of the inequality. The rest of the variables had a weak positive or negative contribution to inequality.

Discussion

To the best of our knowledge, few studies have evaluated socioeconomic inequality in health literacy. This study was the first study of socioeconomic inequality in health literacy in Iran using a CI and decomposition approach. Using the decomposition approach helps identify the sources of socioeconomic inequality in health literacy and promotes effective policymaking.

The results of this study showed a direct correlation between the education and economic level and health literacy. The prevalence of high health literacy was significantly lower in individuals with suboptimal self-reported health when compared with their counterparts with optimal self-reported health. The CI was +0.229 in our study, indicating inequality in the distribution of health literacy. The positive value of this index shows the concentration of high health literacy in people with a good economic level. The health literacy had a negative correlation with prediploma and diploma levels of education, that is, belonging to these groups of education led to lower levels of health literacy. The same kind of association was also observed for bad level of SRH, as those who belonged to this group had significantly lower levels of health literacy. The health literacy had a negative correlation with all groups of socioeconomic except for the richest one. Nevertheless, the relationship gradually lost its strengths by moving from the poorest group upward.

Similar to our findings, the results of a systematic review showed that low health literacy is associated with low levels of health, including self-reported health.[25] Furuya *et al.* also showed lower levels of health literacy in people with lower education. Moreover, the score of health literacy was lower in unemployed people in this study,[26] which is consistent with our results. Since disadvantage groups in terms of health literacy also have an impaired health status, it is logical to conclude that inequality in health literacy contributes to inequality in health.

Table 3: Decomposition of inequality in health literacy in Iran

Variable		Coefficient	Mean	Elasticity	Ck	Absolute contribution	Percent contribution
Age		0.0016	34.81	0.0191	0.0035	0.000	0.000
Employment status	Unemployed	−0.6744	0.6392	−0.144	0.0767	0.011	**6**
	Employed	-	0.3607	-	-	-	-
Education level	Prediploma	−1.845	0.2711	−0.1671	0.2704	0.0452	**26**
	Diploma	−0.6518	0.4148	−0.0903	0.1085	0.0098	**5.6**
	Academic	-	0.3141	-	-	-	-
Marital status	Married	−0.8128	0.97	−0.2633	0.0064	−0.0016	−1
	Single	-	0.3	-	-	-	-
Gender	Female	0.3507	0.7264	0.085	0.0083	−0.0007	**−0.41**
	Male	-	0.1363	-	-	-	-
Economic status	Poorest	−1.953	0.2011	−0.1312	0.6647	0.0872	**50**
	Poor	−1.415	0.1997	−0.0943	0.4843	0.0457	**26**
	Middle	−1.603	0.2011	−0.1077	0.0693	0.0074	**4**
	Rich	−1.018	0.1982	−0.0674	0.4004	−0.027	**−16**
	Richest	-	0.1997	-	-	-	-
Self-rated health	Bad	−0.7355	0.2751	−0.0675	0.0059	−0.0004	**−0.23**
	Good	-	0.7248	-	-	-	-
Chronic disease history	Yes	0.4157	0.1363	0.0189	0.0165	−0.0003	**−0.18**
	No	-	0.8936	-	-	-	-
Sum						**0.1763**	**100**
Residual						**0.0529***	

*Measured CI − explained CI = residual; 0.2292 − 0.1763 = 0.0529

Decomposition of inequality in our study showed that the economic status, education level, and occupation had a positive contribution to inequality. In total, 30% of the changes in this inequality result from education level, and the contribution of economic status is about 60%. The effect of each variable to the distribution of health literacy results from the marginal effect of the variable and its distribution in different economic strata.[27] The positive contribution of education and occupation shows that the marginal effect of these variables along with the effect of their distribution according to the economic status increases the socioeconomic inequality. One of the possible reasons for this finding is that high school diploma and prediploma and also unemployment are more prevalent in people with a low economic status (negative Ck); on the other hand, these factors are some causes of low health literacy.[24]

Although the strong and weak points of a socioeconomic indicator change according to the research question[28] and there are controversies as to which indicator is more appropriate,[29] due to reasons such as ease of measurement and little changes in income fluctuations,[28] asset-based measures are one of the recommended socioeconomic indicators in low- and middle-income countries. In this study, we applied PCA to the household assets to provide an indicator of the wealth index to assess the economic status.

Methodological considerations and limitations

Our study had some limitations and considerations that should be borne in mind for interpretation of the results. Although the SES of people is measured with assessment of current and life-course SES[30] however, there is more emphasis on the measurement of life-course SES in inequality studies;[30] similar to many other inequality studies, we used the first approach (measurement of the current status). Since this research was a cross-sectional study, causal interpretation of the results should be made with caution. Also, women comprised a high percentage of the participants, which could affect the results.

Conclusions

Health literacy is inequitably distributed in the Iranian population. High levels of health literacy are seen in people with a good economic status. The education level and household's economic status had the highest contribution to this inequality. Considering the effect of health literacy inequality on health inequalities, social gradient in health literacy is one of the factors that should be taken into account in policies aiming at reduction of inequalities in health.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Tehrani A, Amirkhani M A, Haghdoost A, Alavian S, Asgharifard H, Baradaran H, *et al*. Health literacy and the influencing factors: A study in five provinces of Iran. Strides Dev Med Educ 2008;4:e58326.
2. Nielsen-Bohlman L, Panzer AM, Kindig DA. Health Systems. Health literacy: A prescription to end confusion. Wshington, DC: National Academies Press (US); 2004.
3. WHO. Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health: Commission on Social Determinants of Health Final Report. Geneva: World Health Organization; 2008.
4. Peerson A, Saunders M. Health literacy revisited: What do we mean and why does it matter? Health Promot Int 2009;24:285-96.
5. Sudore RL, Mehta KM, Simonsick EM, Harris TB, Newman AB, Satterfield S, *et al*. Limited literacy in older people and disparities in health and healthcare access. J Am Geriatr Soc 2006;54:770-6.
6. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and health outcomes: An updated systematic review. Ann Int Med 2011;155:97-107.
7. von Wagner C, Knight K, Steptoe A, Wardle J. Functional health literacy and health-promoting behaviour in a national sample of British adults. J Epidemiol Community Health 2007;61:1086-90.
8. Tang C, Wu X, Chen X, Pan B, Yang X. Examining income-related inequality in health literacy and health-information seeking among urban population in China. BMC Public Health 2019;19:221.
9. Wikkeling-Scott LF, Ajja RJY, Rikard RV. Health literacy research in the Eastern Mediterranean Region: An integrative review. Int J Public Health 2019;64:523-33.
10. Ghanbari S, Majlessi F, Ghaffari M, Mahmoodi Majdabadi M. Evaluation of health literacy of pregnant women in urban health centers of Shahid Beheshti Medical University. Daneshvar 2012;19:1-12.
11. Duong TV, Aringazina A, Baisunova G, Nurjanah, Pham TV, Pham KM, *et al*. Measuring health literacy in Asia: Validation of the HLS-EU-Q47 survey tool in six Asian countries. J Epidemiol 2017;27:80-6.
12. Golboni F, Nadrian H, Najafi S, Shirzadi S, Mahmoodi H. Urban-rural differences in health literacy and its determinants in Iran: A community-based study. Aust J Rural Health 2018;26:98-105.
13. Mohammadi Z, Tehrani Banihashemi A, Asgharifard H, Bahramian M, Baradaran HR, Khamseh ME. Health literacy and its influencing factors in Iranian diabetic. Med J Islam Repub Iran 2015;29:566-71.
14. Eriksson I, Unden AL, Elofsson S. Self-rated health. Comparisons between three different measures. Results from a population study. Int J Epidemiol 2001;30:326-33.
15. Chandola T, Jenkinson C. Validating self-rated health in different ethnic groups. Ethn Health 2000;5:151-9.
16. Babones SJ. The consistency of self-rated health in comparative perspective. Public Health 123:199-201.
17. Elder C, Barber M, Staples M, Osborne RH, Clerehan R, Buchbinder R. Assessing health literacy: A new domain for collaboration between language testers and health professionals. Lang Assess Q 2012;9:205-24.
18. Sebaratnam DF, Frew JW, Davatchi F, Murrell DF. Quality-of-life measurement in blistering diseases. Dermatol Clin 2012;30:301-7, ix.
19. Williams M, Parker R, Baker D, Coates W, Nurss J. The impact of inadequate functional health literacy on patients' understanding of diagnosis, prescribed medications, and compliance. Acad Emerg Med 1995;2:386.
20. Paasche-Orlow MK, Parker RM, Gazmararian JA, Nielsen-Bohlman LT, Rudd RR. The prevalence of limited health literacy. J Gen Intern Med 2005;20:175-84.
21. Montazeri A, Tavousi M, Rakhshani F, Azin SA, Jahangiri K, Ebadi M, *et al*. Health Literacy for Iranian Adults (HELIA): Development and psychometric properties. Payesh J 2014;13:589-99.
22. van Doorslaer E, Koolman X, Jones AM. Explaining income-related inequalities in doctor utilisation in Europe. Health Econ 2004;13:629-47.
23. Wagstaff A, Paci P, van Doorslaer E. On the measurement of inequalities in health. Soc Sci Med 1991;33:545-57.
24. Wagstaff A, van Doorslaer E, Watanabe N. On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in Vietnam. J Econom 2003;112:207-23.
25. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and health outcomes: An updated systematic review. Ann Inter Med 2011;155:97-107.
26. Furuya Y, Kondo N, Yamagata Z, Hashimoto H. Health literacy, socioeconomic status and self-rated health in Japan. Health Promot Int 2013;30:505-13.
27. Morasae EK, Forouzan AS, Majdzadeh R, Asadi-Lari M, Noorbala AA, Hosseinpoor AR. Understanding determinants of socioeconomic inequality in mental health in Iran's capital, Tehran: A concentration index decomposition approach. Int J Equity Health 2012;11:18.
28. Howe LD, Galobardes B, Matijasevich A, Gordon D, Johnston D, Onwujekwe O, *et al*. Measuring socio-economic position for epidemiological studies in low-and middle-income countries: A methods of measurement in epidemiology paper. Int J Epidemiol 2012;41:871-86.
29. Duncan GJ, Daly MC, McDonough P, Williams DR. Optimal indicators of socioeconomic status for health research. Am J Public Health 2002;92:1151-7.
30. Chittleborough CR, Taylor AW, Baum FE, Hiller JE. Monitoring inequities in self-rated health over the life course in population surveillance systems. Am J Public Health 2009;99:680-9.