

Gender-based Inequalities in Health literacy among an Iranian Kurd Population: Results of a Community Survey

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Research

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Abstract

Background

Health literacy, as a social determinant of health, has a decisive role in providing different populations with healthcare services in an equal manner. Our aim in this study was to investigate the contribution of socio-demographic factors to functional health literacy (FHL) in a population of Iranian adults and identify differences in the contribution of these factors across genders.

Methods

This community-based cross-sectional study was conducted in 2015 to 2016 in Sanandaj, Iran. Multistage cluster sampling was employed to recruit 1000 people older than 18 (response rate = 89.2%) from 35 urban and 10 rural health care centers. Test of functional health literacy in adults (TOFHLA) was used to assess FHL. In order to measure inequality in FHL, concentration index decomposition was used.

Results

In total, 869 respondents (response rate: 86.9%) with a mean age (standard deviation; SD) of 33.68 (13.0) completed TOFHLA questionnaire. More than half of participants were women (57.5%). Participants demonstrated an average TOFHLA score of 51.9. Women demonstrated slightly higher TOFHLA scores (52.2 [SD: 0.46]) compared to men (50.7 [SD: 0.4]). However, the concentration index for gender was 10.9% suggesting gender contributed only moderately to TOFHLA scores. Comparatively, 54.3% of TOFHLA differences were attributed to geographic location. Among women, place of residence, monthly income, age, education level and being head of household contributed to 43%, 32%, 13%, 11.5% and 11% of FHL inequality, respectively. Among men, however, place of residence (45.2%), size of household (15.1%) and monthly income (13.5%) contributed most to inequality in FHL.

Conclusions

Although gender was not the strongest contributing factor for FHL inequalities, poor FHL was mostly concentrated among men. Different factors were attributed to FHL inequality by gender, as discussed inside. Understanding these differences may assist in identifying and targeting interventions towards men and women with low levels of FHL. Our findings shed light the critical role of social determinants of health (SDH) in promoting the health literacy of populations, particularly in developing countries like Iran.

Background

Health literacy (HL) is defined as the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course [1, 2]. HL has been considered as a determinant of health in clinical settings, public health, and contemporary society [2]. Addressing HL barriers has been highlighted as a population level strategy for health promotion [3, 4]. Low HL among individuals, patients and the wider community is contributed to poor health outcomes [5, 6]. However, addressing HL barriers in the delivery of health information and services has the potential to improve health outcomes for those with poorer HL abilities [7].

HL is a multidimensional concept that consists of seven dimensions of functional health literacy (FHL), factual and procedural knowledge, awareness, attitude and critical and affective dimensions [8]. Abilities related to reading, writing and numeracy are essential parts of FHL for effective daily function [9]. FHL is made up of two parts. The first is 'numeracy skills', the ability to understand and act on numerical directions given by the healthcare provider. The second is 'comprehension' referring to the ability to read and understand the printed medical information, for example, patient rights and responsibilities written on the insurance or informed consent forms [1]. In the literature, low HL and health disparities are considered as two significantly

intertwined public health challenges [10, 11], in a way that a significant overlap is reported in socio-demographic characteristics of those who are at risk for low HL and health disparities [10].

HL disparities have also been observed between men and women [12, 13]. Some population groups demonstrate lower FHL, including older adults, individuals with lower education levels, those living in rural communities and economically disadvantaged individuals [13, 14]. In terms of gender, women have demonstrated a higher level of HL than men in understanding medical forms, directions on medication bottles, and written information offered by healthcare providers [13], and also engagement in preventive health behaviors [15]. Therefore, gender may be associated with HL [16]. Previous research suggests higher education level, adequate income and having a consistent place to receive care with significant positive effects on HL among women [13].

Although in the Middle East and North African (MENA) region countries a number of studies have been carried out to investigate HL measures [17–20], among older adults and patients with chronic diseases [18], as well as the determination of HL [21], few studies have previously investigated the contribution of different socio-demographic factors to HL, and the associations between gender and HL in the region. Also, a majority of previous studies has only investigated the associations between socio-demographic characteristics and HL. So, there is lack of efforts in quantifying the differences in HL by the factors like gender, age and place of residence. From 2015 to 2016, a community survey was conducted to investigate the level of FHL and its associated factors in Sanandaj, Iran. In a previously published paper, urban-rural differences in the FHL and its determinants was reported [21]. Analyzing the data for that paper, a question arose for us that “were there gender inequalities in the FHL in this population?” In this manuscript, we tried to answer to this question through quantifying the disparities within HL by the factors (education, gender, income, age, and place of residence) that are indicative of health disparities. The following questions guided our study: 1) what socio-demographic factors may be contributed to FHL in the population of Sanandaj, Iran? 2) What differences may be in the contribution of these factors across genders?

Methods

Design and setting

As mentioned above, this study was part of a cross sectional study investigating urban–rural differences in HL and its determinants in Iran. A detailed description of the research can be found in the project report [21]. The study was conducted from September 2015 to March 2016 in healthcare centers (HCCs) in Sanandaj, the center of Kurdistan province, western Iran. Although about 97% of inhabitants are from the Kurd ethnic group- an ancient Iranian ethnicity- with Kurdish language, a majority of the population in the County can understand and speak fluent Persian, the official language of the country. The population under study was the people older than 18 covered by the healthcare system in urban and rural areas of the County. According to the structure of primary healthcare system in Iran, there are health houses in each village and rural health centers which cover 1200 and 7000 inhabitants, respectively. HCCs provide primary and secondary healthcare services in Iran. Similar to the rural health-houses and health centers, the health posts and health centers in urban areas provide their populations with primary healthcare services [22].

Participants and sampling

Multistage cluster sampling was employed to recruit 1000 people older than 18 years from 35 urban and 10 rural HCCs. Assuming a rate of 55% for adequate FHL [23], and 0.95 confidence level, the sample size was calculated using the formula $n = Z^2PQ/d^2$ [24], where (the prevalence of FHL = 0.55), $Q = 0.45$ and $d = 0.04$. In order to consider the design effect variance inflation factor, the sample size was multiplied by 1.5 ($n = 892$). Finally, anticipating a non-response rate of 10% (Final sample size= Effective sample size / (1- non response rate anticipated)), the final sample size was set to ~992 which was rounded to 1000.

Based on the health records of population in the HCCs, twenty-three individuals were randomly selected from each center and were then contacted by the healthcare providers of the HCCs via phone call and invited to participate in the study (the response rate = 89.2%). In the case of accepting the invitation, the participants were set an appointment in locales convenient to them.

Data collection

At the time of appointments, the trained interviewers referred to the locales, and collected data applying TOFHLA (Test of Functional Health Literacy in Adults) questionnaire. Data were collected through face-to-face interviews ensuring participants who may experience difficulties in reading health information and completing questionnaires were still able to participate. This data collection method helped us to ensure participants with diverse HL needs to not be inadvertently excluded. At the beginning of the interview sessions, the interviewers explained to the participants the purpose of the study and their rights as participants, and all those participated in the study signed an informed consent form.

Measurements

Data were collected applying the following instruments:

Socio-demographic Characteristics Form. Participants were asked to report their age, marital status (married/single), educational status, current occupation, the number of family members living in the home, whether they (parent in the household) were the head of household (the main income earner) (Yes/No), having one or more hospitalization in the previous 10 years (Yes/No), having one or more chronic diseases (Yes/No) and monthly household income.

TOFHLA

We used the Persian version [23] of the full-length TOFHLA questionnaire to assess the FHL of participants. The TOFHLA consists of two parts; (i) reading comprehension (50-item) in which some questions are asked about preparation for an upper gastrointestinal series, the patient rights and responsibilities section of a medical application form, prescription container labels and discharge instructions, and (ii) numerical ability (17-item) in using actual hospital forms and labeled prescription vials. It tests a patient's ability to comprehend directions for taking medicines, monitoring blood glucose, keeping clinic appointments, and obtaining financial assistance. Patients are presented with cue cards or labeled prescription bottles and asked to respond to oral questions regarding information about the cards or bottles [25]. Scores for the TOFHLA range from 0 to 100 and are categorized as; 0 to 59 inadequate, 60 to 74 marginal and 75 to 100 adequate FHL [26].

Data analysis

Analyses of descriptive characteristics (mean, standard deviation and frequency) were undertaken by gender. Independent t-tests and chi-square tests were used to identify gender differences in sociodemographic characteristics. Splitting data by gender and adjusting for sociodemographic factors, stepwise backward regression was used to estimate the relationships between socio-demographic variables (as explanatory variables) and TOFHLA scores (as outcome variables). In the regression analysis, we used collinearity diagnostics test to test for multicollinearity, which represented the variance inflation factor (VIF)[27]. In both the tests for FHL among men and women, the VIF factors were from 1 to 5. We found some multicollinearities, but as the factors did not exceed 10, so we consider them to be acceptable for our further analysis.

Concentration index decomposition

There are a number of methods used to measure socioeconomic inequalities in health. A common approach, namely the Concentration Index Decomposition (CID), involves comparing two different groups (in this case, men and women) on the basis of an outcome measure (in this case, FHL). Interpretation is based on the rate ratio or the rate difference of the outcome variable between the two groups. When percentiles are used, the ratio or difference often refers to quintiles. Although relatively easy to construct and interpret, the rate ratio and rate difference methods mask the extent of the inequality between the two groups. Alternatively, it is possible to use concentration indices to measure inequality in one variable over the distribution of another [28]. CID has previously been used to measure socioeconomic-related health inequality in different populations [28, 29]. In the present study, a concentration index (CI) was used to assess the inequalities in FHL (as outcome variable) between different socio-demographic groups (age, marital status, educational status, occupation, number of family members, being the head of the household, having a history of hospitalization for at least one time in the previous 10 years, experience of suffering from a chronic disease and monthly income). CI is a way to quantify the socioeconomic inequality of health by taking into account

every individual's level of health and every individual's rank in the socioeconomic domain [30]. All analyses were performed using Stata v. 13 (Stata Corp, Texas, USA).

Results

The data on 869 respondents were included into statistical analysis. Participant characteristics are shown in Table 1. The mean (\pm SD) age of participants was 33.68 (\pm 13.0), ranging from 18 to 98 years. More than half of participants were men (57.3%), and 84.8% of participants had adequate FHL. Nearly two-thirds were married (62%) and 68.6% reported an education level of high school or greater.

Table 1
Socio-economic and underlying characteristics of the respondents

Variable	n (%) / mean (SD) n = 869	Male n (%) / mean (SD) n = 369	Female n (%) / mean (SD) n = 500	p-value
Age, yrs.*	33.68 (\pm 13.0)	33.92 (\pm 13.3)	33.44 (\pm 12.5)	0.60
Size of household*	4.27 (\pm 2.0)	4.34 (\pm 2.0)	4.18 (\pm 2.0)	0.29
Education level*	No formal education	141 (16.2)	64 (12.9)	< 0.001
	Elementary	125 (14.3)	80 (16.2)	
	High school	97 (11.1)	59 (11.9)	
	Pre-university/diploma	210 (24.1)	143 (28.9)	
	University degree	292 (33.4)	149 (30.1)	
Marital Status*	Married	528 (62.0)	299 (61.3)	0.59
	Unmarried	323 (38.0)	189 (38.7)	
Head of Household*	Yes	342 (39.6)	305 (61.7)	< 0.001
	No	521 (60.4)	189 (38.3)	
History of Hospitalization*	Yes	209 (24.2)	111 (22.4)	0.14
	No	653 (75.8)	385 (77.6)	
With chronic disease*	Yes	72 (8.3)	35 (7.1)	0.11
	No	791 (91.7)	461 (92.9)	
Geographic location	Rural	489 (56.3)	300 (60.0)	0.010
	Urban	380 (43.7)	200 (40.0)	
Monthly household income*	< 300,000	196 (26.3)	93 (21.3)	< 0.001
	300,000 to 500,000	264 (35.5)	147 (33.7)	
	\geq 500,000	284 (38.2)	196 (45.0)	
TOFHLA score	51.9 (0.43)	50.7 (0.4)	52.23 (0.46)	< 0.001
Significant p-values shown in bold, determined by chi-square or t-test as appropriate; *Indicates missing data				

Using chi-square and t-tests, differences between male and female participants were observed in education level, likelihood of being the 'head of household', geographic location and income. Compared to men (mean = 50.7 ± 0.4), women (mean = 52.23 ± 0.46) demonstrated a greater level of TOFHLA score ($p < 0.001$).

All sociodemographic variables displayed in Table 1 were included in a regression model to determine associations with TOFHLA scores. Using a Backward Stepwise Regression approach, variables demonstrating a p-value > 0.2 were removed, leaving the final model displayed in Table 2. As presented in Table 2, older age ($\beta -0.17$ [95%CI (-0.21- -0.13)], being the head of household ($\beta 3.62$ [95%CI (3.44 - 3.89)], rural location ($\beta 1.80$ [95%CI 1.67-1.93]) and lower monthly income ($\beta 2.11$ [95%CI 1.99-2.23]) were associated with lower levels of FHL in women. Similarly, rural location ($\beta 2.21$ [95%CI 2.12-2.34]) and lower monthly income ($\beta 2.22$ [95%CI 2.13-2.34]) were also associated with lower FHL in men. Greater size of household ($\beta -0.93$ [95%CI -0.99- -0.86]) and having ≥ 1 chronic condition ($\beta -3.56$ [95%CI -3.71- -3.45]) were associated with lower TOFHLA score in men, but not women.

Table 2: Factors associated with TOFHLA score among male and female participants

Variable Name	Female*		Male**	
	β Coefficient (95% Confidence Interval)	P-value	β Coefficient (95% Confidence Interval)	P-value
Age	-0.17 (-0.21 - -0.13)	<0.001	-0.07 (-0.11-0.03)	0.12
Head of household	-	-	-0.93 (-0.99- -0.86)	<0.001
Marital Status	-	-	2.20 (2.03-2.41)	0.10
Size of Household	3.62 (3.44 - 3.89)	0.04	-	-
Level of Education	-	-	1.84 (1.67-1.99)	0.08
Number of chronic conditions	-	-	-3.56 (-3.71- -3.45)	0.04
Geographic location	1.80 (1.67-1.93)	<0.001	2.21 (2.12-2.34)	<0.001
Monthly income	2.11 (1.99-2.23)	<0.001	2.22 (2.13-2.34)	<0.001

*R-squared: 0.19; **R-squared: 0.20; those that were not reported had P-value > 0.2 and were not included in the final regression model.

As illustrated in Figure 1, part A (x-axis shows cumulative percentage of FHL and y-axis shows the cumulative population proportion), the majority of higher scores for FHL is placed under the line of equality, showing that the higher levels of HL are more prevalent among women.

The decomposition of inequality in HL is presented in Table 3. In the total population, 54.3% of FHL inequality was attributed to geographic location. The contribution of gender, age, size of household, and being head of household were 10.9%, 11%, 12.5%, and 16.7%, respectively.

Table 3: Decomposing Inequalities in Health literacy among an Iranian Kurd Population

Variable Name	Elasticity	Concentration Index	Contribution	Contribution (%)
Age	-.21415972	-.0193148	.00413645	11
Size of household	.02251563	.17169435	.00386581	10.9
Education level	-.18215007	-.02432816	.00443138	12.5
Marital Status	.06474684	.0306539	.00198474	5.6
Head of Household	.06279967	.00194113	.0001219	.003
History of Hospitalization	.07288442	.08115433	.00591489	16.7
With chronic disease	.066603	.00122529	.00008161	.02
Geographic location	-.24917026	-.00112544	.00028043	.07
Monthly household income	.22309934	.08626815	.01924637	54.3
	.2686311	-.01285406	-.003453	-9.7

The gender-based differences in the decomposition of FHL inequality are shown in Table 4. Among women, age, education level, head of household, place of residence and monthly income contributed to 32%, 11.5%, 11%, 43% and 13% of FHL inequality, respectively. Also, the greatest contributing factors to the inequality were age and place of residence. Among men, however, size of household (15.1%), place of residence (45.2%) and monthly income (13.5%) were attributable to FHL inequality, and the greatest inequality was attributed to place of residence.

Table 4: Decomposing Inequalities in Functional Health literacy by gender among an Iranian Kurd Population

Variable Name	Female				Male			
	Elasticity	Concentration Index	Contribution	Contribution (%)	Elasticity	Concentration Index	Contribution	Contribution (%)
Age	-.32365022	-.05985552	.01937225	32.8	-.15835058	-.01549298	.00245332	03.6
Size of household	-.09323548	-.00618405	.00057657	00.97	-.2338878	-.04313318	.01008832	15.1
Education level	.07010873	.09677956	.00678509	11.5	.04968551	.05083235	.00252563	03.7
Marital Status	.00213926	.0359609	.00007693	00.13	.36652046	-.00389641	-.00142812	-02.1
Head of Household	.37896595	.01724928	.00653689	11	-.22164007	-.0049915	.00110632	01.6
History of Hospitalization	.01893105	.0042644	.00008073	00.13	.19502218	.0091931	.00179286	02.6
With chronic disease	-.06145641	.01359243	-.00083534	-01.41	-.4246012	.00092304	-.00039192	-0.005
Geographic location	.20995173	.12307978	.02584081	43.8	.23915177	.12575373	.03007423	45.2
Monthly income	.24672997	.03245904	.00800862	13.5	.29861645	.03680047	.01098923	16.5

Figure 1, parts B and C illustrate gender inequality in FHL among urban and rural participants, respectively. As figure 1 shows, the majority of higher scores for FHL is placed under the line of equality, showing that among both urban and rural participants the higher levels of FHL are more prevalent among women.

As 54% of inequality in FHL were attributed to the place of geographic location, we chose to perform a further analysis to investigate the decomposition of inequality in FHL by this variable. Table 5 shows the decomposition of FHL by geographic location. For residents of urban areas, a majority of the FHL inequality was attributable to gender (26.9%), marital status (17.7%), head of household (-16.9%) and monthly income (-41.8%). Among rural inhabitants, in contrast, size of household (20.4%), head of household (40.5%) and monthly income (-16.5%) were the greatest contributing factors to FHL inequality. Also, monthly income (in all respondents) and head of household (in rural participants only) contributed to FHL, inversely.

Table 5: Decomposing Inequalities in Functional Health literacy by place of residence among an Iranian Kurd Population

Variable Name	Urban				Rural			
	Elasticity	Concentration Index	Contribution	Contribution (%)	Elasticity	Concentration Index	Contribution	Contribution (%)
Age	.14162154	-.02803752	-.00397072	-14.77	-.2780881	-.00575269	.00159975	4.32
Sex	.42768268	.1696193	.07254324	26.98	-.01911816	.17136951	-.00327627	- 8.91
Size of household	-.05429083	.01142551	-.0006203	-02.31	-.20325079	-.03675944	.00747139	20.45
Education level	.2793313	.01345078	.00375722	13.91	.06169862	-.00931566	-.00057476	- 1.51
Marital Status	.34785649	.01373948	.00477937	17.72	.01795015	-.02166294	-.00038885	- 1.06
Head of Household	-.54058015	.08452889	-.04569464	-16.97	.20350718	.07293269	.01484233	40.52
History of Hospitalization	.84622306	.00362503	.00306759	11.46	.04221882	.00041671	.00001759	0.04
With chronic disease	-.07650152	-.00212005	.00016219	00.62	-.36227497	-.00655104	.00237328	6.48
Monthly income	.81703175	-.01376995	-.01125049	-41.81	.27480418	-.0215846	-.00593154	-16.19

Discussion

The aim of this study was to investigate the contribution of sociodemographic characteristics to FHL scores across gender in an Iranian Kurd population. Women in our study demonstrated a higher average in FHL scores than men. However, our results showed that the concentration index for gender (contribution: 10.9%) did not explain the highest variance for inequalities in HL, and instead, geographic location (rural/urban) played the greatest role in contributing to inequality in FHL. Our results showed that to successfully remove disparities in HL, there is a need to improve the HL of men and rural inhabitants by about 11% and 54%, respectively. Among women, place of residence, age, monthly income, education level, and head of household were the factors affecting the FHL inequality. In contrast, among men, place of residence, sizes of household and monthly income were attributable factors to FHL inequality. We, also, found that various sociodemographic factors were contributed differently to FHL depending on geographic location.

In accordance with the present results, previous studies have demonstrated greater levels of FHL in women, compared to men [12, 13]. However, some studies find either no [31] or partial [10] differences in HL by gender. A study of HL in Korean adults suggested that the higher HL in women was associated with a higher level of education and having a consistent place to receive care [13], which is similar to those found in our study. Although we found geographic location, age and monthly income with greater contribution to FHL, compared to gender, our findings still confirms those reported by Lee et al., who suggested gender differences in HL as an international phenomenon [13]. Fleary et al., in a previous study emphasized that one general HL intervention for all groups in a society may not take effect [10]. Therefore, while designing gender-specific HL promotion intervention programs, healthcare providers and health promotion specialists should take into account the most disparate groups within the factors with high contribution to disparities in HL [10]. In other words, in such gender-specific interventions, there should be a great focus on clear communication criteria particularly for those who inhabited in rural areas, are the head of household, and with lower monthly income and education level.

Our study indicated that lower income was associated with poorer FHL. These results are consistent with previous research which established a relationship between low HL and income inequalities [3, 32]. Previous studies have also shown that lower income may negatively affect HL and thus increase the risk of poor health outcomes [5]. Research has demonstrated that disadvantaged social and socioeconomic conditions may not only be contributed to low HL, but HL may also mediate the relationship between social disadvantage and poor health outcomes [33]. Previous studies showed consistently lower levels of HL among minor ethnicities, compared to other people with the same educational attainment, income, gender and age [34]. Furthermore, low income and low educational attainment are intertwined [35]. A lower income can limit educational

opportunities and a lower level of education may similarly limit economic opportunities; therefore both are associated with inequality of HL and difficulties in understanding health information. People with lower levels of education/income are more likely to have stressors that make practicing HL difficult [36]. Thus, health policymakers and stakeholders are suggested to plan for improving health outcomes in disadvantaged groups within the population through clear communication of health information in ways that meet the needs of those with inadequate FHL. Such planning needs deliberate and consistent efforts to weave the best practices of communication into the culture of the community. In the planning process, the policymakers should take into account the continual evaluation of HL promotion practices in terms of effectiveness and efficacy through community surveys. Literature shows associations between lower HL and poorer health outcomes and lower use of healthcare services [37], as well as misunderstanding discharge instructions or unintentional medication discrepancies [38]. So, they should also hold the health practitioners and healthcare providers across the healthcare system accountable for the providers' role in advancing health communication excellence.

In the present study, geographic location played the most critical role in contributing to inequality in FHL. For rural inhabitants, head of household and size of household were contributed to the inequality in FHL, and among urban residents, monthly income and gender were mostly attributable to FHL inequality. In the initial paper derived from the project reporting the urban–rural differences in HL and its determinants [21], we concluded that the differences found in FHL by geographic location may originate from the disparities in the number of family members, educational status, monthly income, and history of contact with the healthcare system between urban and rural areas. Previous research has also demonstrated geographic location as an effective factor on FHL [18]. Playing the role of a source for many influential factors on FHL, geographic location seems to be a basic social determinant with great influence on HL. This outstanding determinant perpetuates the disparities in many social determinants of health such as income [5], and the number of family members [39]. Although family size is still with lack of evidence to be considered as a proxy for poor socioeconomic status, our results in the present study shed light to the associations between gender, education, family size, SES, and HL. Based on the findings, we can assume that parents with poor education status in the MENA region families are not well empowered to take control over their fertility mode, which may result in a higher number of family members. As a result, the SES of the family may be weakened and the provision of opportunities to promote HL become less possible. This presumption may be happened with a more severity in the rural areas located in the remote/agricultural settings- where men mainly work outdoors as either farmers or ranchers with lack of access to both general and HL promotion programs. Such assumptions should be focused with more details in the future studies. Despite such remarkable disparities in HL and its determinants, healthcare services to urban-rural populations in many MENA region countries, like Iran, are still delivered with a lack of attention in equity considerations [40]. Although some contemporary efforts are made by the Iranian government to promote general literacy within the society, there are still remarkable gender-based disparities in health and wellbeing between the urban and rural inhabitants [18]. In order to decrease such disparities, promoting the level of internet use through increasing the level of internet accessibility and internet use skills as well as HL education through social and mass media campaigns are recommended. As local mass media (radio and television) in the most of rural areas in MENA region are with a suitable coverage, and considering that the rural inhabitants are with a positive attitude and inclination toward using such media, implementing HL promotion programs and campaigns with a focus on radio and television may be an effective approach to improve gender-specific disparities in the FHL and its associates among the inhabitants.

This study presented a novel analysis of HL that indicated the relative contribution of a range of sociodemographic factors to FHL. Moreover, it was the first study to examine gender differences in FHL within a MENA setting. However, the research had some limitations. Considering the cross-sectional design of the study, we are unable to determine causal relationships from the findings. We collected data through face to face interview. Moreover, due to the nature of interview, a risk of underreporting by participants is possible. Finally, the use of a unidimensional HL tool that does not capture the broad range of skills and resources that make up HL also limits the study. Further research is required to investigate the broad range of HL abilities and resources, such as having good social support and relationships with healthcare providers, to develop interventions to engage groups with inadequate FHL in healthcare and health management.

Conclusion

Although gender was not the strongest contributing factor for FHL inequalities, poor FHL was mostly concentrated among men. Instead, geographic location (rural/urban) played the most remarkable role in contributing to inequality in FHL. As discussed inside, different factors were attributed to FHL inequality by gender, which should be considered while designing strategies aiming at the provision of skills to promote accessibility and application of health information and communication with the healthcare delivery system. Our findings shed light the critical role of social determinants of health (SDH) in promoting the HL of populations, particularly MENA region countries, like Iran. Our findings on the quantified disparities within HL by the determinants seem to be beneficial in informing health policymakers on needs-based resource allocation for reducing HL disparities within the populations. The findings also suggest a reorientation in the delivery of healthcare services with a focus on planning gender-specific and geographical location-based HL promotion programs. Also, health policy makers and health promotion specialists should try to alleviate such inequalities in FHL in disadvantaged groups through clear communication of health information via popular mass media like local radio and television channels.

Abbreviations

HL
Health literacy
FHL
functional health literacy
TOFHLA
Test of functional health literacy in adults
HCCs
health care centers
CID
Concentration Index Decomposition

Declarations

Ethics Approval and consent to participate

Ethics approval was obtained from the Committee in the Research Affairs of Islamic Azad University-Sanandaj Branch, Iran (Ethics Code: 92/2311241).

Consent for publication

Not applicable.

Availability of data and materials

Data and materials are available per request.

Competing Interest

The authors declare that they have no competing interests.

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Authors' contributions

HN, HM, and SHS have been the leading authors on this study and have participated in all steps and the writing process. RM, SH, and KK conducted data analysis, helped in data collection and drafting and completing the manuscript. AI, FS, SA and PSS have participated in data collection and manipulation and supported the leading authors in all steps of the writing process. All authors read and approved the final manuscript.

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References

1. Baker DW. The meaning and the measure of health literacy. *J Gen Intern Med.* 2006;21:878–83.
2. Sørensen K, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health.* 2012;12:80.
3. Hosking SM, et al. Health literacy in a population-based sample of Australian women: a cross-sectional profile of the Geelong Osteoporosis Study. *BMC Public Health.* 2018;18:876.
4. Nutbeam D. Health literacy as a population strategy for health promotion. *Japanese Society of Health Education Promotion.* 2017;25:210–22.
5. Berkman ND, et al. Health literacy interventions and outcomes: an updated systematic review. *Evid Rep Technol Assess (Full Rep).* 2011;199:941.
6. Nutbeam D. The evolving concept of health literacy. *Soc Sci Med.* 2008;67:2072–8.
7. Rowlands G, et al. Health literacy and the social determinants of health: a qualitative model from adult learners. *Health Promot Int.* 2017;32:130–8.
8. Frisch A-L, et al. Defining and measuring health literacy: how can we profit from other literacy domains? *Health Promot Int.* 2012;27:117–26.
9. Kobayashi LC, et al. Aging and functional health literacy: a systematic review and meta-analysis. *Journals of Gerontology Series B: Psychological Sciences Social Sciences.* 2016;71(3):445–57.
10. Fleary SA, Ettienne R. Social disparities in health literacy in the United States. *HLRP: Health Literacy Research Practice.* 2019;3(1):e47–52.
11. Meyer PA, Yoon PW, Kaufmann RB. Introduction: CDC Health Disparities and Inequalities Report-United States, 2013. *MMWR supplements.* 2013;62(3):3–5.
12. Clouston SAP, Manganello JA, Richards M. A life course approach to health literacy: the role of gender, educational attainment and lifetime cognitive capability. *Age Ageing.* 2017;46:493–9.
13. Lee HY, Lee J, Kim NK. Gender differences in health literacy among Korean adults: do women have a higher level of health literacy than men? *Am J Men's Health.* 2015;9:370–9.
14. Easton P, Entwistle VA, Williams B. How the stigma of low literacy can impair patient-professional spoken interactions and affect health: insights from a qualitative investigation. *BMC Health Serv Res.* 2013;13:319.
15. Von Wagner C, et al. Functional health literacy and health-promoting behaviour in a national sample of British adults. *Journal of Epidemiology Community Health.* 2007;61:1086–90.
16. Sun X, et al. Determinants of health literacy and health behavior regarding infectious respiratory diseases: a pathway model. *BMC Public Health.* 2013;13:261.
17. Al-Jumaili AA, Al-Rekabi MD, Sorofman B. Evaluation of instruments to assess health literacy in Arabic language among Iraqis. *Research in Social Administrative Pharmacy.* 2015;11(6):803–13.
18. Mahmoodi H, et al., *A Systematic Review and Meta-Analysis of Health Literacy in the Iranian Population: Findings and Implications.* Shiraz E-Medical Journal, 2019. **20.**

19. Nair SC, et al. Assessing health literacy in the eastern and middle-eastern cultures. *BMC Public Health*. 2016;16(1):831.
20. Wikkeling-Scott LF, Ajja RJY, Rikard RV. Health literacy research in the Eastern Mediterranean Region: An integrative review. *International journal of public health*. 2019;64(4):523–33.
21. Golboni F, et al., *Urban–rural differences in health literacy and its determinants in Iran: A community-based study*. *Australian Journal of Rural Health*, 2018. 26.
22. Tabrizi JS, Pourasghar F, Nikjoo RG. Status of Iran's primary health care system in terms of health systems control knobs: a review article. *Iranian journal of public health*. 2017;46:1156.
23. Tehrani Banihashemi S-A, et al. Health literacy and the influencing factors: a study in five provinces of Iran. *Strides in development of medical education*. 2007;4(1):1–9.
24. Chow S-C, Wang H, Shao J. *Sample size calculations in clinical research*. 2007.
25. Parker RM, et al. The test of functional health literacy in adults. *J Gen Intern Med*. 1995;10:537–41.
26. Marques SRL, Lemos SMA. Health literacy assessment instruments: literature review. *Audiol Commun Res [Internet]*. 2017;22:e1757.
27. Motulsky H. *Intuitive biostatistics: a nonmathematical guide to statistical thinking*. USA: Oxford University Press; 2014.
28. O'Donnell O, et al. conindex: Estimation of concentration indices. *The Stata journal*. 2016;16:112–38.
29. Moradzadeh R, et al. Economic inequalities amongst women with osteoporosis-related fractures: an application of concentration index decomposition. *Health promotion perspectives*. 2016;6:190–5.
30. Fleurbaey M, Schokkaert E. Unfair inequalities in health and health care. *J Health Econ*. 2009;28:73–90.
31. Paasche-Orlow MK, Wolf MS. Promoting health literacy research to reduce health disparities. *Journal of health communication*. 2010;15(S2):34–41.
32. Tang C, et al. Examining income-related inequality in health literacy and health-information seeking among urban population in China. *BMC Public Health*. 2019;19:221.
33. O'donnell O, et al., *Analyzing health equity using household survey data: a guide to techniques and their implementation*. 2007.
34. Rikard RV, et al. Examining health literacy disparities in the United States: a third look at the National Assessment of Adult Literacy (NAAL). *BMC Public Health*. 2016;16:975.
35. Rose PR. *Health disparities, diversity, and inclusion*. 2017.
36. McCray AT. Promoting health literacy. *J Am Med Inform Assoc*. 2005;12(2):152–63.
37. Berkman ND, et al. Low health literacy and health outcomes: an updated systematic review. *Ann Intern Med*. 2011;155(2):97–107.
38. Lindquist LA, et al. Relationship of health literacy to intentional and unintentional non-adherence of hospital discharge medications. *J Gen Intern Med*. 2012;27(2):173–8.
39. Ishikawa H, Kiuchi T. Association of health literacy levels between family members. *Frontiers in public health*. 2019;7:169.
40. Peabody JW, et al, "*Improving the Quality of Care in Developing Countries.*" *In Disease Control Priorities in Developing Countries, second edition, edited by Jamison D T, Breman J G, Measham A R, Alleyne G, Claeson M, Evans D B, Jha P, Mills A, Musgrove P, editors*. 2006, World Bank: Washington, DC.

Figures

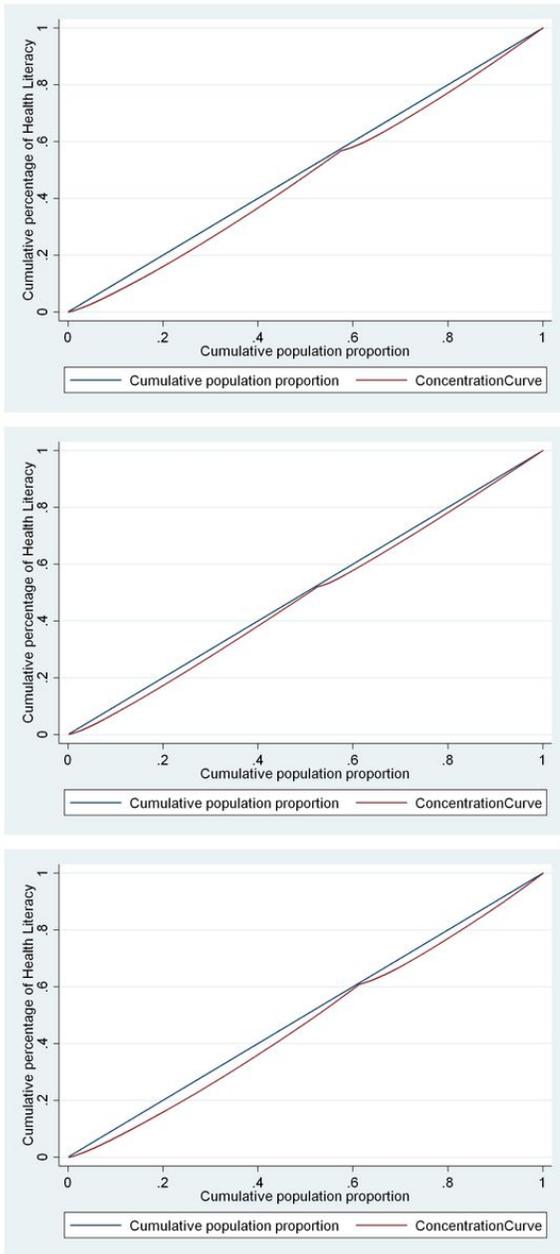


Figure 1

The line is exactly 45° show the equity line, and other curve show concentration curve. Part A: Concentration curves of health literacy (y-axis) and cumulative population proportion (x-axis) in Sanandaj. Concentration index = 0.05 (CI 95%: 0.04, 0.06; p-value = 0.001), which means that the higher score for functional health literacy is concentrated among women; Part B: Gender inequality among urban participants; Concentration index = 0.04 (CI 95%: 0.03, 0.04; p-value = 0.044), which means that, in urban inhabitants, the higher score for functional health literacy is concentrated among women; Part C: Gender inequality among rural participants; Concentration index = 0.06 (CI 95%: 0.05, 0.06; p-value = 0.001), which means that, in rural inhabitants, the higher score for functional health literacy is concentrated among women. [CI stands for Concentration Index].