Inadequate functional health literacy and its associated gender inequality among an ethnic population: A social survey

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ABSTRACT

Background and Objective: Our objective was to determine the frequency of inadequate functional health literacy (FHL) among adult Kurd population, and infer the contribution index of sociodemographic factors for FHL across gender.

Materials and Methods: In this cross-sectional study, multistage cluster sampling was employed to recruit 1000 people older than 18 years from 38 urban and 14 rural healthcare centers in Sanandaj, Iran. Data on FHL was collected from May to July 2019, through face-to-face interviews by using the validated Persian version of the Test of functional health literacy in adults (TOFHLA). The concentration index method was used to measure inequality in FHL.

Results: Overall, 869 respondents (response rate: 86.9%) with a mean age of 33.68 (±13.0) completed the TOFHLA questionnaire. The average TOFHLA score was 51.9, which was 52.2 (±0.46) among males and 50.7 (±0.40) among females, $p<0.001$. Among females, the place of residence, monthly income, age, education level, and being head of the household contributed to 43%, 32%, 13%, 11.5%, and 11% of FHL inequality, respectively. While, among males, the place of residence (45.2%), household size (15.1%), and monthly income (13.5%) contributed most to inequality in FHL.

Conclusion: FHL has disparities by gender and location. Males and rural people are at particular risk for poor FHL. For ease and better resolution of poor FHL, each population, gender, and area type should be considered as a stand-alone, which may help in identifying tailored interventions for males and females with low levels of FHL.

Paper Type: Research Article

Keywords: Health literacy, health disparity, inequality, gender

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Introduction

Functional health literacy (FHL) is a crucial assortment of one's capacity to adequately obtain, process, and utilize basic health information and healthcare services towards proper and timely health-related actions over the course of life (1, 2). In this sense, FHL require certain cognitive abilities (3) that may differ for different population groups such as adults, ethnic populations, socially disadvantaged people, etc., who are shown to have increased needs for health information and services to maintain their health and well-being. For instance, cognitive abilities such as verbal fluency, working memory, and reasoning are variable skills that may undergo decline as early as mid-adulthood even in the absence of dementia (4). Similarly, poor reading skills also affect one's health (5). The practical implication of this can be understood from a simple example of a study that showed that 46.0% of participants from different study sites did not understand simple directions such as "take two tablets by mouth twice daily" (6). There is an undisputed understanding that HL is critical for health status and outcomes, spanning control of chronic illnesses, understanding of disease prevention and health promotion behaviors, reduced hospitalizations, etc. (7). Poor HL is reported to result in an additional $69bn burden in health care costs annually in some populations (8). Thus, focus on HL is not critical for population health alone, but also for saving the nation's economic resources as well; esp. of those that are low-income. There is already a clear distinction between health literacy and functional health literacy, where the latter is considered one of the three dimensions of health literacy (functional, interactive, and critical) (9).

Overall, minority ethnic groups are considered to be at risk for poor FHL. For instance, in multi-ethnic populations, the frequency of inadequate FHL is seen to be high (10), the nature of which may vary with different ethnic groups. Ethnic groups are often considered to be at risk for poor FHL as culture shape patients' understanding and experiences of HL and the health system. For instance, in a study exploring HL experiences of Chinese patients living in the USA (11), cultural issues influenced access, understanding, and application of health information. Similar findings are seen in other populations (12) where HL could be heavily influenced by culture. Like other geographies, Middle-East and North Africa is also a multi-ethnic region. For instance, in Iran, there are only 50-60.0% of Persians alone, while the rest belongs to many other ethnic groups, including Kurds, Azerbaijanis Turks, Turkmen, etc. Of these, Kurds make the third largest group, after Persians and Turks.

Here in Iran, a number of studies have been carried-out to examine HL measures (13-17) among older adults and patients with chronic diseases (18-20). However, studies have failed to estimate the contribution index of different socio-demographic factors for FHL across gender (17, 21) even though HL disparities by gender are expected (22, 23). So, our objective was to estimate the contribution index of socio-demographic factors for FHL across gender among the Kurdish community in Sanandaj (Iran). We believe that our study will help to identify specific measures and interventions necessary to improve FHL and its associated outcomes among different ethnic groups.

Materials and Methods

Study design and setting

This cross-sectional study was conducted in 2019, in healthcare centers (HCCs) of Sanandaj

(Kurdistan province, Iran) where about 97.0% of inhabitants are of the Kurd ethnic group- an ancient Iranian ethnicity with the Kurdish language, although all understand and speak fluent Persian, the official language of the country. According to the structure of the 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 (24).

Sampling

To recruit our participants, we used multistage cluster sampling to recruit 1000 people older than 18 years from 38 urban and 14 rural HCCs. Assuming a frequency of 55.0% for adequate FHL (25), and 0.95 confidence level, the sample size was calculated using the formula n = Z2PQ/d2 (26). 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%, the final sample size was set to ~992 which was rounded to 1000. Inclusion criteria were being older than 18 years of age, living in Sanandaj County for at least 10 years, and being a consent to participate in the study. Exclusion criteria were being too old to answer the questionnaire, having obviously poor vision and hearing status, and discontinuance of participation due to any reason.

Procedure

Based on the health records of the 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. If the invitation was accepted, the participants were set an appointment in locales convenient to them. At the time of appointments, trained interviewers collected the required data using the Test of Functional Health Literacy in Adults (TOFHLA) questionnaire 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 need 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 participating in the study signed an informed consent form.

Materials and Instruments

Data were collected by applying two instruments. First, the sociodemographic characteristics form, for which the 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 the 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. Second, we used the full-length Persian TOFHLA (25) to assess the FHL of participants. 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 (27). 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 (28).

Data analysis

After approving the normality of data, using the Kolmogorov-Smirnov test, the 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 regression analysis, we used a collinearity diagnostics test to test for multicollinearity, which represented the variance inflation factor (VIF) (29). In both the tests for FHL among men and women, the VIF factors were from one to five. We found some multicollinearities, but as the factors did not exceed 10, so we consider them to be acceptable for our further analysis.

There are a number of methods used to measure socioeconomic inequalities in health. A common approach, namely the Concentration Index Decomposition 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 (30). Index decomposition has previously been used to measure socioeconomic-related health inequality in different populations (30, 31). 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 ten years, the 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 (32). All analyses were performed using Stata v. 13 (Stata Corp, Texas, USA).

Results

In total, 869 (86.9%, Table 1) individuals having a mean age of 33.68 (±13.0, range 18-98) years participated. More than half of our participants were females (57.3%). Nearly two-thirds were married (62%) and 68.6% reported an education level of at least high school. Using X2 and t-tests, differences between male and female participants were observed in education, being 'head of the household', geographic location and monthly income. Average TOFHLA score was 51.9, and in comparison to males, the females had higher average TOFHLA score (50.7± 0.4 vs. 52.23±0.46, $p<0.001$.

All sociodemographic variables displayed in Table 1 were included in a regression model to determine their association with TOFHLA scores.

Table 1: TOFHLA score, socio-economic and underlying characteristics of the respondents by gender

Variable		n (%)/mean (SD) n=869	Male n (%)/mean (SD) n=369	Female n (%)/mean (SD) n=500	p-value
Age, yrs.*		33.68 (±13.0)	33.92(±13.3)	33.44(±12.5)	0.60
Size of household*		4.27 (±2.0)	4.34(±2.0)	4.18(±2.0)	0.29
Education level*	No formal education	141(16.2)	64(12.9)	76(20.8)	<0.001
	Elementary	125(14.3)	80(16.2)	45(12.3)	
	High school	97(11.1)	59(11.9)	36(9.8)	
	Pre-university/ diploma	210(24.1)	143(28.9)	67(18.3)	
	University degree	292(33.4)	149(30.1)	142(8.8)	
Marital Status*	Married	528(62.0)	299(61.3)	229 (63.1)	0.59
	Unmarried	323(38.0)	189(38.7)	134(36.9)	
Head of Household*	Yes	342(39.6)	305(61.7)	37(10.0)	<0.001
	No	521(60.4)	189(38.3)	332(90.0)	
History of Hospitalization*	Yes	209(24.2)	111(22.4)	98(26.8)	0.14
	No	653(75.8)	385(77.6)	268(73.2)	
With chronic disease*	Yes	72(8.3)	35(7.1)	37(0.3)	0.11
	No	791(91.7)	461(92.9)	330(89.9)	
Geographic location	Rural	489(56.3)	300(60.0)	189(51.2)	0.010
	Urban	380(43.7)	200(40.0)	180(48.8)	
Monthly household income*	<300,000	196(26.3)	93(21.3)	103(33.4)	<0.001
	300,000 to 500,000	264(35.5)	147(33.7)	117(38.0)	
	≥500,000	284(38.2)	196(45.0)	88(28.6)	
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 a Backward Stepwise Regression approach, variables demonstrating a p-value > 0.2 were removed, leaving the final model as displayed in Table 2. As presented in Table 2, older age (β -0.17 [95%CI (-0.21- -0.13]), being head of the household (β 3.62 [95%CI (3.44 - 3.89]), rural location (β 1.80 [95%CI 1.67-1.93]) and lower monthly income (β 2.11 [95%CI 1.99-2.23]) were associated with lower levels of FHL among females. Also, rural location (β 2.21 [95%CI 2.12-2.34]) and lower monthly income (β 2.22 [95%CI 2.13-2.34]) were associated with lower FHL in males. The greater size of the household (β -0.93 [95%CI -0.99- -0.86]) and having ≥1 chronic condition (β -3.56 [95%CI -3.71- -3.45]) were associated with lower TOFHLA score in males, but not in females.

As illustrated in Figure 1, part A (the x-axis shows the cumulative percentage of FHL and the y-axis shows the cumulative population proportion), the majority of higher scores for FHL were seen to be present under the line of equality, inferring that higher levels of FHL are more prevalent among females.

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

	Female*		Male**	
Variable Name	**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
Size of household	-	-	-0.93 (-0.99- -0.86)	<0.001
Marital Status	-	-	2.20 (2.03-2.41)	0.10
Head of Household	3.62 (3.44 - 3.89)	0.04	-	-
Previous hospitalization	-	-	1.84 (1.67-1.99)	0.08
≥1 chronic condition	-	-	-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.

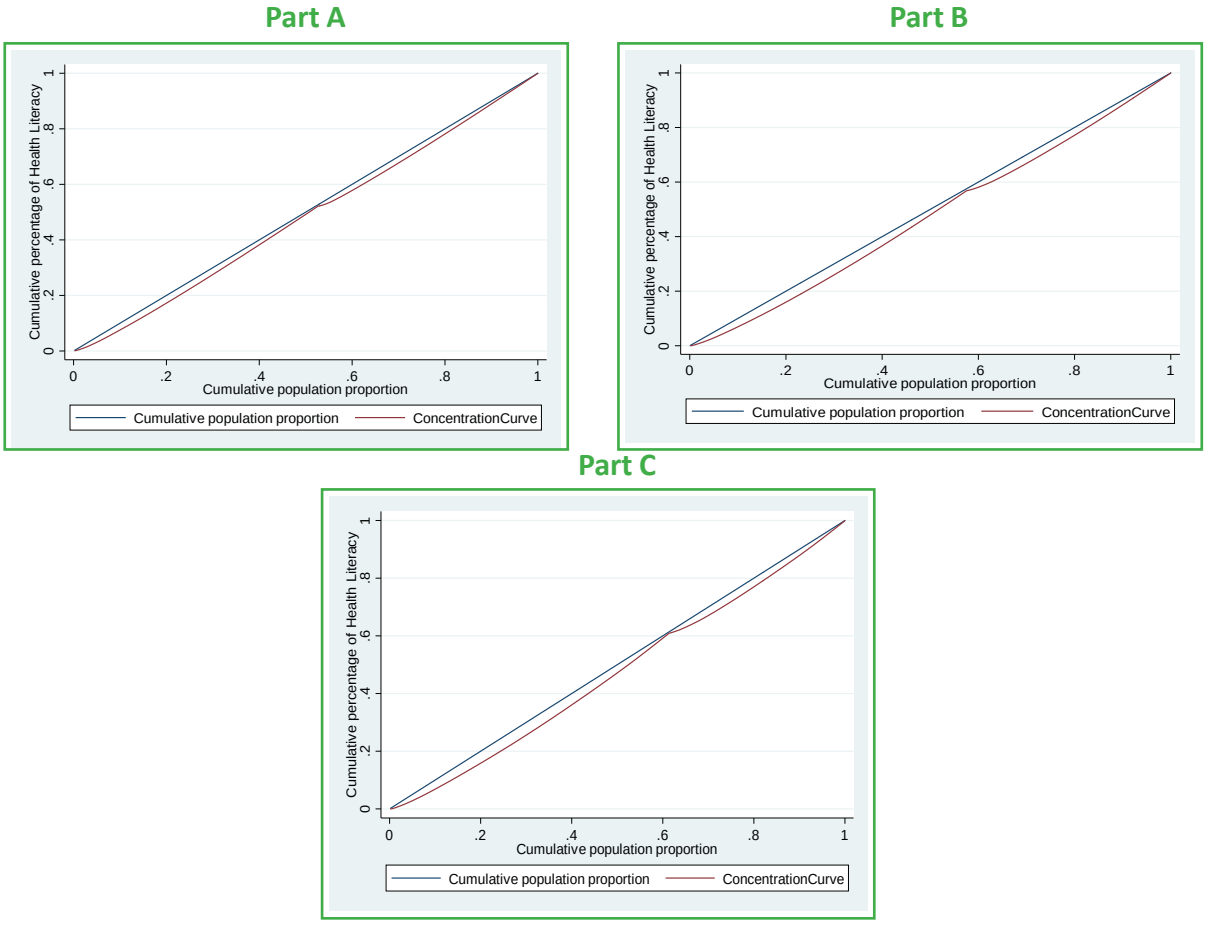

Figure 1. The line is exactly 45° show the equity line, and other curve show concentration curve. Part A: Concentration curves of health literacy (y-axis) and cumulative population proportion (x-axis) in Sanandaj. Concentration index = 0.05 (CI 95%: 0.04, 0.06; p-value = 0.001), which means that the 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].

The decomposition of inequality in FHL is presented in Table 3. Within an entire population, 54.3% of FHL inequality was attributed to geographic location. The contribution of gender, age, size of the household, and being head of the 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
Gender	.02251563	.17169435	.00386581	10.9
Size of household	-.18215007	-.02432816	.00443138	12.5
Education level	.06474684	.0306539	.00198474	5.6
Marital Status	.06279967	.00194113	.0001219	.003
Head of Household	.07288442	.08115433	.00591489	16.7
History of Hospitalization	.066603	.00122529	.00008161	.02
With chronic disease	-.24917026	-.00112544	.00028043	.07
Geographic location	.22309934	.08626815	.01924637	54.3
Monthly household income	.2686311	-.01285406	-.003453	-9.7

Gender-based differences in the decomposition of FHL inequality are shown in Table 4. Among females, the variables of the place of residence, age, monthly income, education, level and being head of the household contributed to 43.0%, 32.0%, 13.0%, 11.5%, and 11.0% of FHL inequality, respectively. Among males, however, place of residence (45.2%), size of the household (15.1%) and monthly income (13.5%) were attributable to FHL inequality.

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

	Female				Male			
Variable Name	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 (B-C) illustrates gender inequality in FHL across urban and rural participants, respectively. Here, the majority of higher scores for FHL were found under the line of equality, meaning the higher levels of FHL among females for both urban and rural areas. As 54% of FHL inequality was attributed to urban-rural location, we did further analysis to evaluate the decomposition of FHL inequality by this variable. Table 5 shows the decomposition of FHL by geographic location. For urban participants, the majority of FHL inequality was attributable to gender (26.9%), marital status (17.7%), head of household (-16.9%), and monthly income (-41.8%). Among rural participants, in contrast, being head of the household (40.5%), size of the household (20.4%), and monthly income (-16.5%) were significant contributing factors for FHL inequality. Overall, monthly income (for both rural and urban participants) and head of the household variables (for rural participants only) contributed inversely to FHL.

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

	Urban				Rural			
Variable Name	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

Our sample had more females than males, which was not pre-designed. However, having more female participants may at least help to drive out common by-default notions about females being more prone to inadequate access to healthcare in Muslim societies, as we had our participants from local HCCs. This participation difference across gender is also relevant because males are too often ignored from policy discussions and social protections, which so often focus on females instead (33-35). The WHO also states in its bulletin (92/8/13-132795) “the men’s health gap: men must be included in the global health equity agenda”. In our study as well, more males were unmarried and had a history of hospitalization as compared to females. Others have shown that marital status and health status are among the important predisposing factors for poor HL for males alone, even after controlling for other sociodemographic factors (23). This could be due to, for instance, male’s reliance on their spouse or partner for HL and other healthcare needs (36). In our study as well, having chronic conditions was a factor for poor FHL among males alone.

In our study, males had lower mean TOFHLA as compared to females. This FHL inequality pattern concurs well with many populations elsewhere;

suggestive of males as a widespread susceptible group and the role of factors beyond culture and sociodemographic. Better FHL among females could be due to many predisposing, enabling or needs factors. For instance, the undue bias of health care system towards female-oriented issues alone, or the female's traditional role of caring for the family (37), etc. For instance, per ONS-UK, there are more female GPs than males in the UK by about 25.0%. Similarly, females are more likely to complain about their health even when they are in better shape (34). Such reasons may provide females more opportunities for interacting with healthcare system and build their knowledge base for benefits. In our study also the contribution fraction of literacy on FHL was far higher for females than males. Similarly, it is also possible that a higher FHL among females could also be due to male-level factors; such as through reliance on their spouse or partner for HL and healthcare needs (36). So, the first system-environment-policy wisdom from our study is the obligation of taking a rational stance on health inequities to harmonize systems and policies as well as foci for research and intervention toward those who are more vulnerable. Such steps should, however, vary from population to population.

The mean TOFHLA score in our entire sample was of inadequate category, which harmonize well with other studies that had also had similar levels of inadequate HL (38) for both general and specific population groups. For instance, in Kurdish community, others have also found similar figures of inadequate HL as ours (39). These concurrences of our results with other studies corroborate our methods in general. Poor FHL is unfortunate as the link between FHL and health outcomes is indisputable4, and also because it is possible to modify FHL within short periods for health gains (40).

Often, minority groups are considered to be the ones at higher risk of inadequate FHL (10); however, it is not always true. For instance, a National Adult Literacy Survey in the US had shown that almost 90 million Americans scored below the minimum threshold of basic skills deemed necessary to survive in an industrialized society (41), and three decades later, these numbers have not changed. One reason that minority racial groups are considered by default to be at risk for poor FHL is that FHL is often considered as a patient attribute alone. But, in reality, it is not necessarily so. For instance, "Sometimes [doctors] come out with big words and I don't know what to make of it … they don't say stomach or belly, they say something else, abdominal … I don't understand that"(42). Therefore, a message said is not necessarily a message understood (6). Others have also shown that providers assume or overestimate their patient's FHL (43). There is harm in considering FHL as a patient attribute alone since that may imply that FHL is not malleable, and the responsibility for correcting poor FHL lies outside the healthcare system. In other cultures, patient's limited FHL was primarily related to language and interactional barriers (44). In our context, we recruited our participants from a specific ethnic group, but all fluently understand our national Persian language.

We noted that rural residence and low monthly income were associated with lower FHL among both males and females. However, their respective regression coefficients and contribution proportions were different between males and females, and were higher for males than females. This is yet another reason to surmise that males and females are not equal or identical genders for research and interventional needs. For example, the effect of poverty or rurality would be experienced differently by different

genders due to different effects of different risk/protective and mediating factors (45). Others have also emphasized that gender differences in HL are universal (23) and one general HL intervention for all groups in a society is unsuitable to take effect (46). Therefore, while designing gender-specific FHL promotion interventions, the health agencies should take into account the factors with most contribution to disparities in FHL (46).

Also, in our study, age and being the head of the household were related to lower FHL for females alone. Studies have shown that the community's knowledge and beliefs about health problems, their risk factors, treatments and sources of help may vary as a function of age (47). But since both males and females age differently, the effect of age on access, processing and uptake of health parameters would differ as well (48). Similarly, being the head of the household was associated with TOFHLA scores as in other studies (25), but for females alone. We cannot explain the effect of females as the head of the households through the usual criticism of Muslim societies being male-dominated since other cultural contexts systematically yield inadequate HL levels as well. Instead, female-headed households are often seen to have challenges related to income and poverty (45), so such households may reflect indirectly the effects of income and poverty on FHL. Also, studies have shown that the association between the type of education of the head of the household and poverty differs for males and females (45).

Similarly, having at least one chronic condition was strongly associated with lower FHL for males alone, and the contribution proportion was more for rural participants. This could possibly be explained through, for instance, the tendency of males to often make decisions about treatment in response to how much their health conditions are perceived to be impacting their ability to perform everyday tasks, as well as whether they have been ill previously and how severe their health conditions are (49). This differs from females. We did not enquire whether chronic diseases were physical or mental, but males in general are more prone to adverse health consequences than females (50) and are less likely to seek treatment (34). Also, one's adherence to positive masculine norms, such as self-reliance, predict lower HL. For instance, masculinity explain one's ability to find good health information; ability to actively engage with healthcare providers, and feeling understood and supported by healthcare providers (51). Masculine norms are more significant and rigid among rural than urban areas (52) and among the specific minority or ethnic groups (53). So, masculine norms could be one of the mediators and/or moderators of FHL for males (51).

For rural inhabitants, being the head of the household and size of the household contributed to inequalities in FHL, and among urban residents, monthly income and gender were mostly attributable to FHL inequality. These results match with other studies (14, 21) that show that differences in FHL by geographic location may originate from disparities in the number of family members, educational status, monthly income, and differences of healthcare system between urban and rural areas. This location determinant perpetuates the disparities in many social determinants of health such as income (54), number of family members (55), etc. For instance, those with poor education may not be well empowered to take control over their fertility mode, which may result in a higher number of family members. As a result, the socioeconomic status of the family may get weakened and the provisions of opportunities for adequate HL become less possible. Despite

remarkable disparities in FHL and its determinants, healthcare services in urban-rural areas are delivered without adequate attention to equity (56), and so is in Iran (14).

Limitations: This study was needed because it provides a novel analysis of the relative contribution of a range of sociodemographic variables for FHL across gender within MENA settings.. However, our study has a few limitations as well. For instance, HL is a multidimensional concept, and results may vary depending upon the nature of HL tasks or therapeutic scope according to the participants. It is, therefore, recommend for further studies assess HL using multidimensional instruments, like the HLQ (Health Literacy Questionnaire) (57), especially if it has been validated in Persian. As another limitation, we did not perform the recommended visual acuity test among respondents. However, the trained interviewers kept in mind the obviously poor vision and hearing status of the respondents as exclusion criteria. We did not look at many other factors that may mediate FHL, such as personality traits (58).

Conclusions

Our study provides significant take-home messages; including the pending need to rationalize the foci for research and interventions on health and harmonize systems-environment-policy towards males. FHL has disparities between males and females and rural and urban areas for both common and discrete reasons. For ease and better resolution of poor FHL, each population, gender, and area type should be considered as stand-alone.. HL must also be not considered as a patient attribute alone. Minority ethnic groups do not necessarily have a higher risk of having poor FHL; esp. in the absence of obvious interactional barriers.

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Availability of data and materials: The datasets used and analyzed during the current study is included in this article

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