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

Hassan Mahmoodi

Kurdistan University of Medical Sciences <https://orcid.org/0000-0002-1234-9037>

Rahmatollah Moradzadeh

Arak University of Medical Sciences

Abedin Iranpour

Kerman University of Medical Sciences

Fatemeh Shahi

Tabriz University of Medical Sciences

Somayeh Azimi

Tabriz University of Medical Sciences

Pershang Sharifi Saqqezi

Kurdistan University of Medical Sciences

Khadijeh Keshavarzian7

Tabriz University of Medical Sciences

Shayesteh Shirzadi

Tabriz University of Medical Sciences

Sarah Hosking

Deakin University School of Medicine

Haidar Nadrian (✉ haidarnadrian@gmail.com)

<https://orcid.org/0000-0003-3129-2475>

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Abstract

Background Health literacy (HL) as a social determinant of health has a determinant 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 through home-based interviews. Test of functional health literacy in adults (TOFHLA) was used to assess FHL. In order to measure inequality in FHL, a concentration index decomposition was used.

Results Participants included 869 respondents (57.5% women) with a mean age of 33.68 year. 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, being head of household, and 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 This research suggests sociodemographic characteristics contributed differently to FHL inequality depending on gender. Understanding these differences may assist in identifying and targeting interventions towards men and women with low levels of FHL. Furthermore, work by health policy makers and health promotion specialists to address these contributing social factors may help to alleviate inequalities in health literacy.

Background

Health literacy is defined as the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use health information and services impacts the ability to make decisions about health (1). This concept has been considering a key determinant of health in clinical settings, public health and contemporary society (2). Addressing health literacy barriers has been highlighted as a population level strategy for health promotion (3)(4–6). Low health literacy among individuals, patients and the wider community contributes to poor health outcomes (7,8). However, addressing health literacy barriers in the delivery of health information and services has the potential to improve health outcomes for those with poorer health literacy abilities (9).

Health literacy is multidimensional concept that consist of seven dimensions of functional health literacy (FHL), factual and procedural knowledge, awareness, a critical dimension, an affective dimension and attitude (10). Abilities related to reading, writing and numeracy are essential parts of FHL for effective daily

function (11). FHL is made up of two parts. The first is 'numeracy skills', the ability to understand and act on numerical directions given by the health care 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 (12).

Health literacy disparities have been observed between men and women (13,14). Some population groups demonstrate lower functional health literacy, including older adults, individuals with lower education levels, those living in rural communities and economically disadvantaged individuals (15,16). In terms of gender, women have demonstrated with a higher level of health literacy than men in understanding medical forms, directions on medication bottles, and written information offered by health care provider (16), and also engagement in preventive health behaviors (17). Therefore, gender may be associated with health literacy (18). Previous research suggests higher education level, adequate income and having a consistent place to receive care with significant positive effects on health literacy among women (13).

Although a limited number of studies have been carried out to investigate health literacy measures (19), among older adults and patients with chronic diseases (20), as well as the determination of health literacy within the Iranian population (21), few studies have previously investigated the contribution of different socio-demographic factors to health literacy, and the associations between gender and health literacy in this population. Therefore, the main aim of this study was to investigate the contribution of socio-demographic factors to functional health literacy in a population of Iranian adults and identify differences in the contribution of these factors across genders.

Methods:

This study is part of a cross sectional study investigating urban–rural differences in health literacy and its determinants in Iran. A detailed description of the research can be found in the project report (21). This study was conducted September 2015 to March 2016 in health care centers (HCCs) in Sanandaj, at the center of Kurdistan province in the west of Iran. According to the structure of PHC 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 health care services in Iran. In urban areas health posts and health centers provide similar services as health-houses and rural health center (22,23). Multistage cluster random 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 functional health literacy (FHL) based on the results of a previous study (21), 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) (25), $Q = 0.45$ 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, assuming a non-response rate of 10%, the sample size was set to 1000. Twenty-three individuals were randomly selected from each HCC based on the health records of the population and were invited to participate in the study.

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 to ensure participants with diverse health literacy needs were not 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. In the case of accepting the invitation, the participants were set an appointment in locales convenient to them. In total, 892 respondents agreed to participate in the study (response rate = 89.2%). The main reasons for nonparticipation among respondents were reported to be lack of time, unwillingness to participate in any research project and health problems. Data on the outcome variable (functional health literacy questionnaire) provided by 23 participants were incomplete (more than 5% missing data), which were then excluded from data analysis. All those who participated in the study provided informed consent.

Sociodemographic characteristics 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 disease (Yes/No) and monthly household income.

Health literacy

We used the Persian version (25) of the Test of Functional Health Literacy in Adults (TOFHLA) questionnaire to assess the functional health literacy of participants. The TOFHLA consists of two parts; (i) reading comprehension (50-item) and (ii) numerical ability (17-item) (12). 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 functional health literacy (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 and TOFHLA scores. Missing data were filled applying linear interpolation.

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, functional health literacy). 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 (27). CID has previously been used to measure socioeconomic-related health inequality in different populations (28–30). In the present study, a

concentration index (CI) was used to assess the inequalities in health literacy 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 measures the socioeconomic inequality of health by taking into account every individual's level of health and every individual's rank in the socioeconomic domain (31). All analyses were performed using Stata v13 (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 functional health literacy. Nearly two-thirds were married (62%) and 68.6% reported an education level of high school or greater.

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 $\pm$ 0.4), women (mean = 52.23 $\pm$ 0.46) demonstrated a greater level of TOFHLA score ($p < 0.001$).

Please insert table1 here

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 (β -0.17 [95%CI (-0.21- -0.13)]), being the head of 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 in women. Similarly, 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 also associated with lower FHL in men. Greater size of 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 men, but not women.

Please insert Table 2 here

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

Please insert Figure 1 here

The decomposition of inequality in health literacy is presented in Table 3. In the total population, 54.3% of functional health literacy 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.

Please insert table 3 here

The gender-based differences in the decomposition of functional health literacy inequality are shown in Table 4. Among women, age, education level, head of household, place of residence and monthly income were 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.

Please insert table 4 here

Figures 2 and 3 illustrate gender inequality in FHL among urban and rural participants, respectively. As Figures 2 and 3 show, 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 the women.

Please insert Figures 2 and 3 here

As 54% of inequality in FHL may be 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 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. Monthly income in all participants and head of household in rural participants had a negative contribution to FHL.

Please insert table 5 here

Discussion

The aim of this study was to investigate the contribution of sociodemographic characteristics to functional health literacy scores across gender in an Iranian Kurd population. Women in our study demonstrated higher average functional health literacy 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 health literacy. Instead, geographic location (rural/urban), being head of household, size of household and age played greater roles in contributing to inequality in functional health literacy. Among women, place of residence, age, monthly income, education level, and head of household were the factors affecting the FHL inequality, respectively. In contrast, among men, place of residence, sizes of household and monthly income were attributable factors to FHL inequality, respectively. Finally, we investigated the contribution of sociodemographic characteristics to inequalities in functional health literacy between

urban and rural populations and determined different sociodemographic factors contributed differently to functional health literacy depending on geographic location.

In accordance with the present results, previous studies have demonstrated greater levels of functional health literacy in women, compared with men (13,32). A study of health literacy in Korean adults suggested that the higher health literacy in women was associated with a higher level of education and having a consistent place to receive care (13). The current study also found education level contributed to the higher health literacy scores observed in women. However, geographic location, age and monthly income were all greater contributors to functional health literacy in the current study.

This study indicated lower income was associated with poorer functional health literacy. These results are consistent with previous research which has established a relationship between low health literacy and income inequalities (4,33). Previous studies have also shown that lower income may negatively affect health literacy and thus increase the risk for poor health outcomes (8). Research has demonstrated that disadvantaged social and socioeconomic conditions not only contribute to low health literacy, but health literacy may also mediate the relationship between social disadvantage and poor health outcomes (34). Previous studies showed consistently lower levels of health literacy among minorities, compared to other people with the same educational attainment, income, gender and age (35,36). Furthermore, low income and low educational attainment are intertwined (37). 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 health literacy and difficulties in understanding health information. The current study suggests a relationship between income and education level and functional health literacy in Iranian adults. Thus, it may be possible to improve health outcomes in disadvantaged groups within this population by communicating health information in ways that meet the needs of those with inadequate functional health literacy.

In the present study, geographic location played the most critical role in contributing to inequality in FHL. For urban residents, the inequality in FHL was mostly attributable to monthly income and gender, and among rural inhabitants, head of household and size of household were the factors with the greatest contribution to FHL inequality. In the initial paper derived from the project reporting the urban–rural differences in health literacy 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 health care system between urban and rural areas. Previous research has also demonstrated geographic location as an effective factor on FHL (20). 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 health literacy. This outstanding determinant perpetuates the disparities in many social determinants of health such as income (38), and the number of family members (39). Despite such remarkable disparities in HL and its determinants, healthcare services to urban-rural populations in many developing countries are still delivered with a lack of attention in equity considerations (40). Therefore, health policymakers are emphasized to take into account the role of geographical location while developing health promotion policies and programs for their populations.

Strengths and limitations: This study presented a novel analysis of health literacy that indicated the relative contribution of a range of sociodemographic factors to functional health literacy. Moreover, it is the first study to examine gender differences in functional health literacy within an Iranian population. Despite the strengths of our study, the research does have some limitations. Considering the cross-sectional design of the study, we are unable to determine causal relationships from the findings. The use of a unidimensional health literacy tool that does not capture the broad range of skills and resources that make up health literacy also limits the study. Further research is required to investigate the broad range of health literacy abilities and resources, such as having good social support and relationships with healthcare providers, to develop interventions to engage groups with inadequate functional health literacy in healthcare and health management.

Conclusion: Although gender was not the strongest contributing factor for FHL inequalities, poor functional health literacy was mostly concentrated among men. Instead, geographic location (rural/urban) played the most remarkable role in contributing to inequality in FHL. Among women, place of residence, age, monthly income, education level, and head of household were the factors affecting the FHL inequality, respectively. In contrast, among men, place of residence, size of households and monthly income were attributing factors to FHL inequality, respectively. Our findings shed light the critical role of social determinants of health (SDH) in promoting the health literacy of populations, particularly in a developing country like Iran. The findings also suggest a reorientation in the delivery of healthcare services with a focus on gender- and geographical location-based differences in health determinants. Health policy makers and health promotion specialists should try to address these contributing factors with the hope to alleviate such inequalities in functional health literacy.

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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Tables

Table 1. Socio-economic and underlying characteristics of the respondents

ble		n (%) / mean (SD) n=869	Male n (%) / mean (SD) n=369	Female n (%) / mean (SD) n=500	p-value
		33.68 (±13.0)	33.92(±13.3)	33.44(±12.5)	0.60
sehold*		4.27 (±2.0)	4.34(±2.0)	4.18(±2.0)	0.29
vel*	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)	
us*	Married	528(62.0)	299(61.3)	229 (63.1)	0.59
	Unmarried	323(38.0)	189(38.7)	134(36.9)	
sehold*	Yes	342(39.6)	305(61.7)	37(10.0)	<0.001
	No	521(60.4)	189(38.3)	332(90.0)	
ospitalization*	Yes	209(24.2)	111(22.4)	98(26.8)	0.14
	No	653(75.8)	385(77.6)	268(73.2)	
: disease*	Yes	72(8.3)	35(7.1)	37(0.3)	0.11
	No	791(91.7)	461(92.9)	330(89.9)	
location	Rural	489(56.3)	300(60.0)	189(51.2)	0.010
	Urban	380(43.7)	200(40.0)	180(48.8)	
sehold 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)	
ore		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

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
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.

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

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

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

Figures

Figure 1

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). The line is exactly 45° show the equity line, and other curves show concentration curves, which means that the higher score for functional health literacy is concentrated among women [CI stands for Concentration Index].

Figure 2

Gender inequality among urban participants; Concentration index = 0.04 (CI 95%: 0.03, 0.04; p-value = 0.044). The line is exactly 45° show the equity line, and other curve show concentration curve, which means that, in urban inhabitants, the higher score for functional health literacy is concentrated among women [CI stands for Concentration Index].

Figure 3

Gender inequality among rural participants; Concentration index = 0.06 (CI 95%: 0.05, 0.06; p-value = 0.001) The line is exactly 45° show the equity line, and other curve show concentration curve, which means that, in rural inhabitants, the higher score for functional health literacy is concentrated among women [CI stands for Concentration Index].

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