

Exploring Health Literacy in Patients with Chronic Diseases in Chongqing, China in 2018: A Cross-Sectional Study

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Abstract

Background: Improving health literacy is the key to chronic disease prevention and improved interventions. However, little is known about the status of health literacy and its influencing factors in patients with chronic diseases. Accordingly, this study aimed to explore the different aspects and factors influencing health literacy among patients with chronic diseases in Chongqing, China.

Methods: A cross-sectional survey was conducted in areas of Chongqing using the 2018 National Questionnaire on Health Literacy of Residents administered to 27,336 patients with chronic diseases. The research investigated the prevalence and factors of health literacy in patients with chronic diseases in Chongqing, China using χ^2 tests and logistic regression analysis.

Results: Among the participants ($n = 27,336$), 51.3% were males and 48.7% were females. Only a small number of patients with chronic diseases were health literate (21.6%). Regression analyses indicated that inadequate health literacy was associated with rural area residents (OR: 0.92), minorities (OR: 1.31), farmers (OR: 1.18), nonlocal registered permanent residents (OR: 1.05), and patients with self-rated unhealthy status (OR: 1.80). Patients with chronic diseases aged 25–34 (OR = 1.18) and 35–44 (OR = 1.18) were more likely to have health literacy than patients with chronic diseases aged 65–69. Illiterate or slightly literate patients (OR = 0.10) were less likely to have health literacy than patients who were in the junior college or had a bachelor's degree or above. Patients with an average annual household income of less than 3,000 yuan (OR = 0.65) were all less likely to have health literacy than patients with an average annual household income of more than 15,000 yuan.

Conclusions: Health literacy of patients with chronic conditions remains at a low level and varies significantly with their demographic and sociological characteristics. Therefore, developing and adopting appropriate health promotion programs would be necessary to improve the health literacy of all patients with different types of chronic diseases.

1. Introduction

Chronic diseases have become a major public concern and are a threat to people's health in the 21st century. Characterized to have long-course of duration and typically slow development, chronic diseases usually include heart diseases, stroke, cancer, chronic respiratory diseases, and diabetes [1]. Chronic diseases account for the increasing numbers of deaths worldwide [2] and have overtaken infectious diseases as the leading cause of mortality worldwide [3]. The World Health Organization (WHO) reported that 63% of all deaths are due to chronic diseases [1]. Premature mortality caused by chronic diseases accounts for 80% and is concentrated in low- and middle-income countries [3]. In China, chronic diseases have become the main cause of death among Chinese residents, and the prevalence rate is on the rise. From 2003 to 2013, the growth rate of chronic diseases among rural residents was 70.7% and that of urban residents was 28.3% according to the number of patients [4]. In 2012, the number of deaths caused by chronic diseases among Chinese residents accounted for 86.6% of all deaths [5]. In addition, chronic diseases were difficult to cure, consequently causing a heavy financial burden to individuals, families, and society, and even reduced the quality of life [6-8]. Moreover, chronic diseases were often overlooked and important contributory risk factors for cancer [9].

Chronic disease prevention and improved interventions pose a complex and long-term challenge. Many risk factors exist for chronic diseases. Conditions, such as musculoskeletal disorders [10]; sedentary behavior [11]; and failing to meet fruits, vegetables, and sugar-sweetened beverage recommendations [12] may increase the risk of chronic diseases. However, the existing chronic disease management programs have failed to adequately meet the most critical needs of patients [13]. Health literacy means "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain good health"[14]. Improving health literacy is the key to chronic disease prevention and improved interventions. Health literacy should be assessed and addressed in adults with chronic conditions for intervention or self-management [15, 16]. Another study suggested that low levels of health literacy were major barriers for a number of patients to attempt managing their chronic illnesses [13]. Therefore, evaluating the level and influencing factors of health literacy among patients with chronic diseases is extremely necessary.

Thus far, studies exist on the correlation between health literacy and health outcomes in patients with related chronic diseases [16-19]. However, little is known about the status of health literacy and its influencing factors in patients with chronic diseases. Accordingly, this study aimed to explore the different aspects and influencing factors of health literacy among patients with chronic diseases in Chongqing, China. The findings of this study will provide a reference for designing health education and health promotion programs for patients with chronic diseases.

2. Materials And Methods

2.1. Ethical Approval

The study protocol was approved by the Ethics Committee, Chongqing Medical University. Written informed consent was obtained from all participants.

2.2. Study Design

A cross-sectional survey was carried out from July 2018 to September 2018 in Chongqing, China. From different areas and on different economic levels, a multi-stage stratified sampling was used to randomly select 234 investigation sites (including street offices and towns) from 19 districts and 20 counties in Chongqing, China. Six investigation sites were randomly selected for each district or county. Two communities or villages were randomly selected for each street office and town, respectively. Seventy families were randomly selected in each community or village. One inhabitant from each family aged 15–69 years was extracted using the Kish table method for investigation. A combination of a face-to-face interview and self-administered questionnaire was adopted in the questionnaires. The informed consent of all respondents was obtained. A total of 27,336 patients with chronic diseases completed this survey after excluding the missing data. These participants self-reported being diagnosed with chronic diseases, including hypertension, heart disease, hyperlipidemia, cerebrovascular diseases (e.g., stroke, cerebral infarction, cerebral thrombosis, etc.), diabetes mellitus, malignant tumors, depression/anxiety, chronic obstructive pulmonary disease, bronchial asthma, interstitial lung disease, and sleep-disorder-related breathing problems.

2.3. Questionnaires

The 2018 National Questionnaire on Health Literacy of Residents was adopted in the study. This questionnaire was based on the knowledge, attitudes, and practices (KAP) model and “Chinese citizens’ health literacy-basic knowledge and skills (Trial)” [20]. The questionnaire included four sections as follows:

(1) Demographic and socioeconomic characteristics

Sex (male/female), registered permanent residence (local/ nonlocal), residence (urban/rural), age (15–24 years old/25–34 years old/35–44 years old/45–54 years old/55–64 years old/65–69 years old), nationality (Han nationals/minorities), marital status (unmarried/married), educational level (illiterate or slightly literate; primary school; secondary school; high school/vocational high school/technical secondary school; junior college/bachelor’s degree or above), vocation (farmer/not farmer), the annual average family income (< 3,000 yuan/3,000–4,999 yuan/5,000–9,999 yuan/10,000–14,999 yuan/≥ 15,000 yuan) and self-rated health status (healthy/neutral/unhealthy).

(2) Health literacy

This questionnaire consisted of 50 items. The correct answers to the true or false questions (8 items), single choice questions (23 items), and multiple choice questions (15 items) were assigned 1, 1, and 2 points, respectively. Therefore, the total score of the questionnaire was 66. According to the score, the overall level of health literacy was categorized into two levels of performance using the 80% or more of the total score of the questionnaire as the cut-off points, namely, basic health literacy (scores of ≥ 53) and lack of health literacy (scores of < 53). Moreover, 50 items were divided into three aspects or six categories of health literacy.

(3) Three aspects of health literacy

In this questionnaire, 50 items were divided into three aspects of health literacy, including basic knowledge and ideas (22 items), healthy lifestyle and behavior (12 items), and health skills (16 items). The total scores of basic knowledge and ideas (28 points), healthy lifestyle and behavior (22 points), and health skills (16 points) were more than 22, 18, and 13 points, respectively, which were judged to have basic health literacy. Health literacy can be divided into two classified variables, namely, health literacy and non-health literacy.

(4) Six categories of health literacy

In this questionnaire, 50 items were divided into six categories of health literacy, including scientific health view (8 items), prevention and control of infectious diseases (6 items), prevention and treatment of chronic diseases (9 items), safety and first aid (10 items), primary care (11 items), health information (6 items), and public health problems in China. The total scores of scientific health view (11 points), prevention and control of infectious diseases (7 points), prevention and treatment of chronic diseases (12 points), safety and first aid (14 points), primary care (14 points), health information (8 points) were more than 9, 6, 10, 11, 11, and 6 points, respectively, which were judged

to have basic health literacy. Health literacy can be divided into two classified variables, namely, health literacy and inadequate health literacy.

2.4. Internal Validity

The overall level of the health literacy among 27,336 patients with chronic diseases in Chongqing, China was assessed by evaluating the internal consistency reliability and the Kuder-Richardson-20 (KR-20) was 0.922. The basic knowledge and ideas, healthy lifestyle and behavior, and health skills demonstrated acceptable internal consistency, with a KR-20 of 0.836, 0.773, and 0.775, respectively. The scientific health view, prevention and control of infectious diseases, prevention and treatment of chronic diseases, safety and first aid, primary care, and health information demonstrated acceptable internal consistency, with a KR-20 of 0.676, 0.506, 0.669, 0.737, 0.684, and 0.606, respectively.

2.5. Data Analysis

All data analyses were conducted using statistical software (IBM SPSS version 23.0; SPSS Inc., Chicago, IL, USA). The demographic and socioeconomic characteristics of patients with chronic diseases were calculated using descriptive statistics, including frequency and percentage. The means of χ^2 tests were used to analyze the differences among categorical variables. Logistic regression analysis was employed to evaluate factors affecting health literacy among patients with chronic diseases. A two-sided test was performed to check all statistics, and p-value < 0.05 was regarded to have statistical significance.

3. Results

3.1 Demographic and Socioeconomic Characteristics of Patients with Chronic Diseases

This survey included 27,336 patients with chronic diseases. Among these respondents, 14,023 (51.3%) were males and 1,289 (48.7%) were females. A total of 27,336 persons included 24,801 (90.7%) Han nationals and 2,535 (9.3%) were minorities. All the respondents were between 15 to 69 years old and included 15–24 (6.0%), 25–34 (11.2%), 35–44 (15.7%), 45–54 (31.9%), 55–64 (22.2%), and 65–69 (13.1%). Most respondents (66.3%) completed primary and junior secondary education. Moreover, 30.6% of the participants came from urban areas, and 69.4% of the participants came from rural areas; 96.2% were local registered permanent residents, and 3.8% were nonlocal registered permanent residents; 90.7% were Han nationals, and 9.3% were minorities; 15.2% were unmarried, and 84.8% were married; 90.7% were Han nationals, and 9.3% were minorities; 60.5% were farmers, and 39.5% were non-farmers. The annual average family income of the respondents was between 5,000 and 10,000 (28.2%) or > 15,000 (28.6%). Among the respondents, 71.9% thought they were in a healthy condition, 25.9% thought they were in a neutral condition, and 2.2% thought they were in an unhealthy condition (see Table 1).

Table 1. The demographic and sociological characteristics of patients with chronic diseases in Chongqing, China (n = 27336).

Variables	n	%
Gender		
Male	14023	51.3
Female	13313	48.7
Registered permanent residence		
Local	26292	96.2
Nonlocal	1044	3.8
Type of residence		
Urban	8374	30.6
Rural	18962	69.4
Age (year)		
15~24	1631	6.0
25~34	3056	11.2
35~44	4282	15.7
45~54	8722	31.9
55~64	6072	22.2
65~69	3573	13.1
Nationality		
Han nationals	24801	90.7
Minorities	2535	9.3
Marital status		
Unmarried	4146	15.2
Married	23190	84.8
Education level		
Illiterate or slightly literate	2961	10.8
Primary school	9580	35.0
Junior middle school	8554	31.3
Senior High School / Vocational High School / Technical Secondary School	3747	13.7
Junior College / Bachelor's degree or above	2494	9.1
Occupation		
Non farmers	10795	39.5
Farmers	16541	60.5
The annual average family income(yuan)		
<3000	4172	15.3
3000-4999	2884	10.6

5000-9999	7722	28.2
10000-14999	4749	17.4
≥15000	7809	28.6
Self-rated health status		
Healthy	19653	71.9
Neutral	7078	25.9
unhealthy	605	2.2

3.2 Health literacy of Patients with Chronic Diseases

Table 2 shows the overall level of health literacy, three aspects of health literacy, and six categories of health literacy among patients with chronic diseases based on sex, registered permanent residence, residence, age, nationality, marital status, educational level, vocation, the annual average family income, and self-rated health status. The overall level of health literacy among patients with chronic diseases was 21.6%, that is, 21.6% of the respondents had basic health literacy. Among the respondents, 31.1% had basic health literacy in the dimension of basic knowledge and ideas, 22.6% had basic health literacy in the dimension of healthy lifestyle and behavior, and 24.2% had basic health literacy in the dimension of health skills. Among the three aspects of health literacy, the proportion of patients with chronic diseases who had basic health literacy in the “healthy lifestyle and behavior” dimension is the lowest. In addition, 34.1% of the respondents had basic health literacy in the dimension of scientific health view, 21.6% had basic health literacy in the dimension of prevention and control of infectious diseases, 23.1% had basic health literacy in the dimension of prevention and treatment of chronic diseases, 51.4% had basic health literacy in the dimension of safety and first aid, 26.7% had basic health literacy in the dimension of primary care, and 28.2% had basic health literacy in the dimension of health information. Among the six categories of health literacy, the proportion of patients with chronic diseases who had basic health literacy in the “prevention and control of infectious diseases” dimension is the lowest and in the “prevention and treatment of chronic diseases” dimension is the second lowest.

Table 2. Health literacy status of patients with chronic diseases in Chongqing, China.

Variables	A1	A2	A3	B1	B2	B3	B4	B5	B6	Overall
Gender										
Male	30.9	22.7	23.7	33.3#	21.7	22.7	51.7	26.7	27.7#	21.5
Female	31.4	22.4	24.7	34.9#	21.4	23.6	51.0	26.7	28.8#	21.7
Registered permanent residence*										
Local	30.6	22.3	23.7	33.6	21.4	22.6	50.8	26.4	27.7	21.2
Nonlocal	45.2	28.8	36.3	45.7	25.3	35.9	65.2	35.4	41.9	32.1
Type of residence*										
Urban	38.3	27.1	32.0	41.6	26.1	29.3	56.2	31.5	36.3	28.2
Rural	27.9	20.5	20.7	30.8	19.5	20.4	49.2	24.6	24.6	18.7
Age (year)*										
15~24	48.0	34.9	39.3	47.6	32.7	36.7	71.6	38.0	44.0	35.4
25~34	48.7	34.5	40.4	49.8	31.3	35.0	68.9	40.1	43.8	36.3
35~44	40.2	28.2	30.7	41.9	26.2	28.9	61.3	32.3	35.3	28.3
45~54	28.8	20.7	21.6	32.2	20.5	20.9	50.1	25.5	25.7	19.5
55~64	22.4	17.0	17.3	27.0	16.6	17.7	41.9	20.6	21.2	14.8
65~69	17.9	13.9	13.8	21.8	13.5	14.7	34.5	16.8	17.0	11.6
Nationals*										
Han	31.7	23.0	24.6	34.9	21.9	23.8	51.6	27.3	28.7	22.2
Minorities	25.2	17.8	20.2	26.4	17.9	16.6	49.0	21.3	23.6	21.6
Marital status*										
Unmarried	35.0	26.1	28.5	38.1	24.3	26.7	55.3	29.5	32.1	25.0
Married	30.4	21.9	23.4	33.4	21.1	22.5	50.7	26.2	27.5	21.0
Education level*										
Illiteracy or little literacy	9.5	7.8	6.3	13.4	7.4	8.3	24.5	9.5	9.2	4.8
Primary school	18.5	14.2	12.7	22.5	15.0	14.1	38.6	18.1	16.9	10.9
Junior middle school	35.4	25.2	27.8	38.4	24.6	25.8	58.2	29.6	30.9	24.8
Senior High School / Vocational High School / Technical Secondary School	50.9	35.7	41.3	53.0	33.2	37.0	72.0	40.9	46.8	37.7
Junior College / Bachelor degree or above	61.1	43.3	51.3	60.1	35.7	45.7	78.0	49.0	56.9	47.8
Occupation*										
Non farmers	22.5	16.6	15.4	25.7	16.7	16.0	42.4	20.6	19.4	14.2
Farmers	44.4	31.7	37.7	47.0	28.9	34.1	65.2	36.1	41.7	33.0
The annual average family income(yuan)*										
<3000	20.4	14.6	15.1	24.1	15.8	15.6	39.6	18.3	17.6	12.5
3000~5000	23.9	17.6	17.6	27.3	18.0	16.4	43.4	21.4	21.3	15.2

5000~10000	25.6	19.1	18.2	27.8	18.0	18.8	46.5	23.5	22.0	16.8
10000~15000	32.4	23.9	25.3	35.2	23.5	23.4	54.4	27.7	29.5	22.7
>15000	44.2	31.2	36.7	47.5	28.4	33.9	63.6	35.7	41.8	32.9
Self-rated of health status*										
Healthy	35.0	25.8	27.7	38.0	24.6	26.5	56.0	30.0	32.0	25.0
Neutral	21.7	14.6	15.6	24.4	14.0	15.0	40.0	18.9	18.9	13.2
unhealthy	15.4	11.4	9.8	21.2	10.7	10.4	32.7	12.4	12.6	8.4

Notes: (1) A1: basic knowledge and ideas; (2) A2: healthy lifestyle and behavior; (3) A3: health skill; (4) B1: scientific health view; (5) B2: prevention and control of infectious diseases; (6) B3: prevention and treatment of chronic diseases; (7) B4: safety and first aid; (8) B5: primary care; (9) B6: health information; (10) Overall: overall level of the health literacy; (11) *: statistical significance ($p < 0.05$); (12) #: statistical significance ($p < 0.05$).

Table 2 shows the statistically significant differences found between registered permanent residence, residence, age, nationality, marital status, educational level, vocation, the annual average family income, self-rated health status, and the overall level of health literacy ($p < 0.05$). No significant difference was observed between gender and the overall level of health literacy ($p \geq 0.05$). The holding rate of health literacy of patients with chronic diseases aged more than 65 years old was the lowest in all age groups, whereas the holding rate of health literacy of patients with chronic diseases aged between 25 and 34 years old was the highest ($p < 0.001$). The holding rate of health literacy among patients with chronic diseases from rural areas was lower than that of patients from urban areas ($p < 0.001$). The holding rate of health literacy of patients who were Han nationals was higher than that of patients who were minorities ($p < 0.001$). The holding rate of health literacy of married patients was statistically lower than that of unmarried patients ($p < 0.001$). The holding rate of health literacy of patients who were farmers was lower than that of patients who were non-farmers ($p < 0.001$). The holding rate of health literacy of participants from the local registered permanent residence was lower than that of patients from nonlocal registered permanent residence ($p < 0.001$). Patients with an average annual household income of less than 3,000 had the lowest rate of health literacy in all income groups, whereas those with more than 15,000 had the highest rate of health literacy ($p < 0.001$). The holding rate of health literacy of participants who were in the junior college or had a bachelor's degree or above was the highest in all educational level groups, whereas the holding rate of health literacy of illiterate or slightly health literate participants was the lowest ($p < 0.001$). The holding rate of health literacy of participants with self-rated good health was the highest in all health status groups, whereas the holding rate of health literacy of participants who self-rated as unhealthy was the lowest ($p < 0.001$).

3.3 Logistic Regression Model to Identify Factors Affecting the Level of Health Literacy in Different Dimensions

Several factors were viewed in the modeling of the effects of the overall level of health literacy among Chinese patients with chronic diseases, including registered permanent residence, residence, age, nationality, marital status, educational level, vocation, the annual average family income, and self-rated health status (see Table 3).

Table 3. Logistic regression model for identifying factors that affect health literacy among patients with chronic diseases in Chongqing, China.

Variables	A1	A2	A3	B1	B2	B3	B4	B5	B6	Overall
	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]
Registered permanent residence										
Local	0.95 (0.828,1.087)	1.14 (0.989,1.324)	1.04 (0.906,1.198)	1.05 (0.914,1.196)	1.23 (1.057,1.426)	0.88 (0.768,1.014)	0.90(0.777,1.031)	1.02 (0.887,1.170)	0.98 (0.853,1.121)	1.05 (0.907,1.210)
					*					
Nonlocal	1	1	1	1	1	1	1	1	1	1
Type of residence										
Urban	0.88 (0.827,0.945) *	0.89 (0.826,0.953) *	0.95 (0.881,1.013)	0.92 (0.865,0.984) *	1.02 (0.949,1.095)	0.91 (0.848,0.976) *	0.74(0.690,0.784) *	0.88 (0.826,0.946) *	0.95 (0.886,1.013)	0.92 (0.857,0.991) *
Rural	1	1	1	1	1	1	1	1	1	1
Age (year)										
15~24	1.25 (1.062,1.465) *	1.14(0.956,1.347)	1.07 (0.903,1.272)	1.04 (0.888,1.213)	1.30 (1.092,1.543) *	1.13 (0.958,1.346)	1.45 (1.242,1.695) *	1.06 (0.901,1.250)	1.13 (0.961,1.333)	1.15 (0.960,1.373)
25~34	1.30 (1.142,1.473) *	1.17 (1.024,1.346) *)	1.18 (1.030,1.354) *	1.21 (1.066,1.361) *	1.25 (1.093,1.440) *	1.05 (0.917,1.204)	1.39 (1.232,1.560) *	1.21 (1.059,1.371)	1.13 (0.996,1.291)	1.18 (1.024,1.365) *
35~44	1.34 (1.191,1.501) *	1.17 (1.035,1.332) *	1.12 (0.984,1.269)	1.23 (1.104,1.376) *	1.21 (1.067,1.376) *	1.10 (0.973,1.249)	1.43 (1.294,1.585) *	1.16 (1.030,1.304) *	1.16 (1.027,1.302) *	1.18 (1.032,1.350) *
45~54	1.11 (1.002,1.236) *	1.03 (0.920,1.157)	0.99 (0.884,1.116)	1.09 (0.990,1.204)	1.10 (0.979,1.232)	0.97 (0.866,1.086)	1.21 (1.106,1.316) *	1.09 (0.980,1.212)	1.03 (0.921,1.141)	1.03 (0.913,1.169)
55~64	0.97 (0.869,1.083)	0.97 (0.860,1.094)	0.94 (0.834,1.065)	1.01 (0.916,1.123)	1.00 (0.885,1.127)	0.96 (0.849,1.076)	1.06 (0.971,1.163)	0.98 (0.880,1.100)	0.98 (0.873,1.092)	0.93 (0.812,1.056)
65~69	1	1	1	1	1	1	1	1	1	1
Nationals										
Han	1.24 (1.119,1.367) *	1.25 (1.119,1.397) *	1.08 (0.965,1.198)	1.33 (1.205,1.464) *	1.20((1.070,1.334) *	1.37 (1.227,1.541) *	1.02 (0.933,1.112)	1.27 (1.145,1.409) *	1.11 (0.998,1.224)	1.31 (1.169,1.479) *
Minorities	1	1	1	1	1	1	1	1	1	1
Marital status										
Unmarried	0.88 (0.802,0.960) *	0.97 (0.881,1.067)	0.92 (0.831,1.007)	0.97 (0.893,1.060)	0.96 (0.874,1.060)	0.91 (0.828,1.002)	0.90 (0.826,0.974) *	0.94 (0.857,1.028)	0.88 (0.806,0.968) *	0.88 (0.794,0.970) *
Married	1	1	1	1	1	1	1	1	1	1
Education level										
Illiteracy or little literacy	0.11 (0.092,0.130) *	0.17 (0.144,0.208) *	0.13 (0.108,0.158) *	0.17 (0.146,0.200) *	0.23 (0.188,0.274) *	0.19 (0.163,0.234) *	0.15 (0.129,0.176) *	0.15 (0.127,0.180) *	0.15(0.121,0.172) *	0.10 (0.077,0.118) *

Primary school	0.21 (0.184,0.235) *	0.30 (0.266,0.344) *	0.25 (0.216,0.278) *	0.29 (0.255,0.323) *	0.45 (0.392,0.507) *	0.31 (0.278,0.357) *	0.25 (0.223,0.288) *	0.29 (0.255,0.326) *	0.25 (0.222,0.283) *	0.20 (0.176,0.299) *
Junior middle school	0.43 (0.389,0.481) *	0.53 (0.479,0.595) *	0.52 (0.472,0.583) *	0.53 (0.475,0.586) *	0.72 (0.643,0.803) *	0.56 (0.501,0.622) *	0.48 (0.429,0.542) *	0.50 (0.446,0.551) *	0.46 (0.412,0.509) *	0.46 (0.413,0.513) *
Senior High School / Vocational High School / Technical Secondary School	0.72 (0.648,0.801) *	0.77 (0.694,0.858) *	0.76 (0.680,0.839) *	0.83 (0.742,0.916) *	0.96 (0.859,1.069) *	0.77 (0.694,0.858) *	0.78 (0.688,0.877) *	0.76 (0.681,0.840) *	0.74 (0.666,0.822) *	0.72 (0.651,0.804) *
Junior College / Bachelor degree or above	1	1	1	1	1	1	1	1	1	1
Occupation										
Non farmers	1.13 (1.046,1.213) *	1.14 (1.057,1.241) *	1.47 (1.355,1.586) *	0.18 (1.098,1.267) *	1.08 (0.992,1.166) *	1.33 (1.226,1.438) *	1.22 (1.141,1.313) *	1.08 (1.001,1.166) *	1.29 (1.198,1.393) *	1.18 (1.082,1.276) *
Farmers	1	1	1	1	1	1	1	1	1	1
The annual average family income(yuan)										
<3000	0.68 (0.615,0.752) *	0.71 (0.634,0.791) *	0.71 (0.635,0.791) *	0.69 (0.623,0.755) *	0.84 (0.753,0.937) *	0.73 (0.652,0.810) *	0.72 (0.658,0.789) *	0.75 (0.677,0.833) *	0.63 (0.569,0.700) *	0.65 (0.579,0.731) *
3000~5000	0.77 (0.689,0.856) *	0.82 (0.728,0.922) *	0.78 (0.693,0.877) *	0.75 (0.677,0.834) *	0.90 (0.798,1.010) *	0.71 (0.630,0.810) *	0.77 (0.701,0.853) *	0.85 (0.757,0.946) *	0.74 (0.663,0.828) *	0.74 (0.656,0.842) *
5000~10000	0.79 (0.727,0.853) *	0.86 (0.788,0.936) *	0.75 (0.688,0.818) *	0.73 (0.672,0.784) *	0.85 (0.776,0.924) *	0.79 (0.726,0.862) *	0.83 (0.767,0.892) *	0.91 (0.834,0.982) *	0.72 (0.667,0.785) *	0.79 (0.719,0.859) *
10000~15000	0.90 (0.829,0.980) *	0.96 (0.881,1.054) *	0.91 (0.835,0.996) *	0.86 (0.794,0.934) *	1.02 (0.935,1.120) *	0.86 (0.787,0.941) *	0.96 (0.888,1.046) *	0.95 (0.874,1.037) *	0.88 (0.808,0.957) *	0.92 (0.837,1.005)
>15000	1	1	1	1	1	1	1	1	1	1
Self-assessment of health status										
Healthy	1.52 (1.207,1.926) *	1.56 (1.202,2.022) *	1.82 (1.373,2.409) *	1.27 (1.036,1.565) *	1.69 (1.297,2.204) *	1.77 (1.351,2.319) *	1.46 (1.219,1.753) *	1.80 (1.397,2.306) *	1.75 (1.362,2.253)*	1.80 (1.335,2.430) *
Neutral	1.21 (0.955,1.536) *	1.09 (0.835,1.42) *	1.36 (1.022,1.810) *	0.98 (0.792,1.206) *	1.14 (0.871,1.495) *	1.253 (0.951,1.650) *	1.13 (0.935,1.353) *	1.38 (1.068,1.777) *	1.30 (1.009,1.684) *	1.28 (0.945,1.738)

Notes: (1) A1: basic knowledge and ideas; (2) A2: healthy lifestyle and behavior; (3) A3: health skill; (4) B1: scientific health view; (5) B2: prevention and control of infectious diseases; (6) B3: prevention and treatment of chronic diseases; (7) B4: safety and first aid; (8) B5: primary care; (9) B6: health information; (10) Overall: overall level of the health literacy; (11) OR: odds ratio, CI: confidence intervals; (12)*: statistical significance ($p < 0.05$).

Patients with chronic diseases aged 25–34 (OR = 1.18, 95% CI [1.02–1.36]) and 35–44 (OR = 1.18, 95% CI [1.03–1.35]) were more likely to have an overall level of health literacy than patients aged 65–69. Patients from rural areas were less likely to have a level of health literacy than patients from urban areas (OR = 0.92, 95% CI [0.86–1.00]). Patients who were Han nationals were more likely to have a level of health literacy than patients who were minorities (OR = 1.31, 95% CI [1.17–1.48]). Married patients were more likely to have a level of health literacy than unmarried patients (OR = 0.88, 95% CI [0.80–0.97]). Illiterate or slightly literate patients (OR = 0.10, 95% CI [0.08–0.12]), those with primary education (OR = 0.20, 95% CI [0.18–0.23]), secondary education (OR = 0.46, 95% CI [0.41–0.51]), and high school or vocational high school or technical secondary school education (OR = 0.72, 95% CI [0.65–0.80]) were less likely to have an overall level of health literacy than patients who were in junior college or with bachelor’s degree or above. Patients who were non-farmers were more likely to have a level of health literacy than patients who were farmers (OR = 1.18, 95% CI [1.08–1.28]). Patients with an average annual household income of less than 3,000 yuan (OR = 0.65, 95% CI [0.58–0.73]), between 3,000 yuan and 4,999 yuan (OR = 0.74, 95% CI [0.66–0.84]), and between 5,000 yuan and 9,999 yuan (OR = 0.79, 95% CI [0.72–0.86]) were all less likely to have an overall level of health literacy than patients with an average annual household income of more than 15,000 yuan. Participants from the local registered permanent residence were more likely to have a level of health literacy than patients from nonlocal registered permanent residence (OR = 1.05, 95% CI [0.91–1.21]). Patients with self-rated health were more likely to have a level of health literacy than patients who self-rated as unhealthy (OR = 1.80, 95% CI [1.33–2.43]).

4. Discussion

The knowledge of the level of health literacy among patients with chronic diseases is a piece of critically significant information to ensure patients’ health management, education, and promotion. However, few studies have explored the level of health literacy and its influencing factors in patients with chronic diseases. Therefore, this study used the 2018 National Questionnaire on Health Literacy of Residents to analyze in detail the level of health literacy among patients with chronic diseases in three aspects and six categories and its influencing factors.

As indicated in this survey, the overall level, three aspects, and six categories of the health literacy among patients with chronic diseases were limited, and the total level of health literacy among them was less than 22.0%. A study on health literacy among patients with chronic cardiovascular diseases in the city of Juiz de Fora found that less than half (49.3%) of the chronic cardiovascular patients had adequate functional health literacy [21]. The total level of health literacy among patients with chronic diseases in China may be lower than those in other countries. This explanation must consider the content and standards of health literacy assessment tools in different studies. Moreover, the current study found that the proportion of patients who had basic health literacy in the “healthy lifestyle and behavior” dimension was lower than the “basic knowledge and ideas” dimension. A research study on smoking-related knowledge, attitudes, and behaviors among young adult male smokers found that respondents have better health knowledge; however, that particular knowledge did not necessarily translate into healthy behavioral outcomes [22]. Thus, the transformation of patients’ health behavior may be a long-term process. In the future, determining effective strategies to transform existing health knowledge into healthy behaviors should be emphasized through health education for patients. In addition, among the six categories of health literacy, the proportion of patients with chronic diseases who had basic health literacy in the “prevention and control of infectious diseases” dimension is the lowest and in the “prevention and treatment of chronic diseases” dimension is the second lowest. In other words, the level of disease prevention and control literacy in patients with chronic diseases was still limited. Previous findings demonstrated that self-management efficacy among patients with related chronic diseases was positively correlated to health literacy [17]. These results may suggest that patients with the chronic diseases may have insufficient knowledge of chronic disease to achieve self-management. Therefore, focusing on improving the level of disease prevention and control literacy among patients with chronic diseases is recommended in the future.

This survey showed no significant difference between gender and the overall level of health literacy. A study on health literacy of an elderly diabetics group also showed that it was insignificant [23]. However, another study indicated that difference was significant between gender and health literacy [21]. Therefore, the association between gender and the overall level of health literacy among patients with chronic diseases may vary. Other studies are needed to further validate this relationship.

The association between education and health literacy levels was the primary focus of this study, that is, health literacy is associated with educational level. This result is consistent with the survey on health literacy in familial hypercholesterolemia showing educational level-related variations in health literacy [24]. The participants with higher education possibly had additional learning opportunities and thus, additional knowledge. The relationship between age and health literacy level was also observed in this study, that is, low health literacy is associated with the elderly. A previous study on the assessment of health literacy among patients in the primary healthcare centers has also found this relationship [25]. Poor educational conditions and situation in the past possibly explain the elderly's low level of health education, which was also mentioned in a related study [21]. Notably, a previous study showed that the prevalence of chronic diseases increased with increasing age among those with relatively low education [26]. Therefore, the sooner one obtains health education the better it may be.

This study determined that married patients were more likely to have health literacy than unmarried patients. The study also indicated that patients from the local registered permanent residence were more likely to have higher health literacy level than patients from the nonlocal registered permanent residence. The high accessibility to health education for participants who were married and from the local registered permanent residence was possibly due to their relative stability. Further studies are needed to determine the causes of these phenomena.

The associations between the overall level of health literacy and rural residents, farmers, and low annual average family income among patients with chronic diseases were noted. The level of economic development in rural areas is lower than that in urban areas. Farmers are relatively low-income groups in rural areas. Previous studies showed that the related health benefits and services of economically disadvantaged groups were less likely to be accessed than those of economically affluent groups [27, 28]. Therefore, the income level is possibly one of the economic determinants linked to health literacy among patients with chronic diseases [24].

This study is the first to explore the relationship between self-rated health status and health literacy level in patients with chronic diseases. Our study observed the relationship between self-rated health status and health literacy level, and high health literacy was generally associated with good health. Self-rated healthy participants would possibly acquire further knowledge and skills to improve their health status. Further studies are needed to determine the causes of this relationship. Moreover, our study also indicated that patients who were Han nationals were more likely to have a higher health literacy level than patients who were minorities. China has the characteristics of minority groups not found in other countries. No evidence currently exists to explain this relationship, which consequently requires further exploration.

A few suggestions were put forward to improve the health literacy levels in patients with chronic diseases to meet the self-care demands of patients. First, the improvement of health literacy among patients with chronic diseases should be strengthened, especially disease prevention and control literacy. Second, determining strategies to effectively transform existing health knowledge into healthy behaviors should be emphasized through health education for patients. Third, developing and adopting appropriate health promotion programs are necessary to improve the health literacy of patients with chronic diseases. The latter includes the elderly, minorities, farmers, rural area residents, people who had lower educational level, who had low annual average family income, and were nonlocal registered permanent residents. In addition, when communicating with patients with chronic diseases, the medical staff should pay attention to the differences among the communication objects to ensure adequate and effective communication.

The limitations of the current research should also be recognized. First, the causality cannot be obtained in cross-sectional surveys. Second, this questionnaire was conducted via a self-assessment method, including the question "Do you have a confirmed chronic disease by the doctor?" This evaluation may be subjective and may cause data bias. Third, this research was conducted in Chongqing, China. Thus, these results may not be representative of other parts in China or the entire country or even the world.

5. Conclusions

Among patients with chronic diseases in Chongqing, China, inadequate health literacy was observed in approximately four-fifths of the respondents, especially in terms of "healthy behavior and lifestyle" and "disease prevention and control." Inadequate health literacy was associated with a lower educational level, aged 65–69 years, those living in rural areas, those who are minorities and farmers, those with low annual average family income, are nonlocal registered permanent residents, and those with self-rated unhealthy status. Therefore, developing and adopting appropriate health promotion programs are necessary to improve the health literacy of all patients with different types of chronic diseases.

Abbreviations

WHO: World Health Organization

KAP: knowledge, attitudes, and practices

Declarations

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Consent for publication: This study have obtained written consent to publish from the participant to report individual data.

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