Health Literacy among Visitors of District Polyclinics in Almaty, Kazakhstan

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Abstract
Background: This study aimed to evaluate health literacy levels of patients in Almaty City, Kazakhstan and to identify socio-demographics and socio-economic factors related to their health literacy.

Methods: An international survey instrument HLS-EU-Q developed by the European Health Literacy Consortium was used in a cross-sectional study with 1000 citizens in the Almaty City at the age of 18 and over who visited the outpatient departments in the polyclinics between Feb and Oct 2014.

Results: There were 552 women and 446 men completed the survey, with mean ages as (41.8 ± 13.9) and (44.7 ± 15.2) yr old respectively, and women were significantly younger than men (P<0.001). Their general health literacy was (34.0 ± 8.6) for men and (33.49 ± 9.4) for women, without significant difference. In them, 15.5% or 30.0% were with inadequate or problematic health literacy. Multivariate linear regression analysis showed that higher general health literacy was positively and significantly associated with high self-assessed social status (B=3.86, P<0.001), ability to pay for medications (B=3.42, P<0.001), low frequency of watching health related TV programs (B=2.37, P<0.001), moderate community involvement (B=2.23, P=0.03).

Conclusion: Specific demographic and socio-economic determinants related to health literacy were identified the first time in Kazakhstan. This would facilitate programs to improve health outcomes in Kazakhstan.

Keywords: Health literacy, Health behavior, Determinants of health literacy, Kazakhstan

Introduction

Individuals’ characteristics and behaviors are the determinants of health among the social, economic, and physical environment (1). Among risk factors that are responsible for the differences between countries in the burdens of diseases tobacco, alcohol, high blood pressure, high cholesterol, overweight, low fruit and vegetable intake and physical inactivity (2). Thus, behavior changes towards healthier lifestyle and elimination of risky behavior are essential to reach better health outcomes of the population. Behavior change towards healthier lifestyle is recognized as the shared responsibility for individuals’ health, which depends significantly on their health literacy.

“Health literacy is linked to literacy and entails people’s knowledge, motivation, and competencies to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality
of life during the life course” (3). European Health Literacy Consortium (HLS-EU Consortium) developed a conceptual model that included main aspects of health literacy, capturing the dimensions of health literacy within health care, disease prevention, and health promotion settings (4). On the other hands, health literacy is being increasingly researched in the world (5-9). Associations of health literacy and health outcomes had been observed in different age groups in different countries. In general, worse health behaviors were observed in children with low literacy, while parents and caregivers with low literacy had less health knowledge, compared with parents with higher literacy (10-12). Adolescents with low health literacy were less likely to perceive good health status and less likely to exhibit health-promoting behaviors (13). The elderly with higher health literacy scores were significantly less likely to have risky behaviors and more likely to undergo health examinations regularly, report good self-rated health, and to access sufficient health information from multiple sources (5, 14). Individuals with higher levels of HL had better health and welfare, more actively participated in economic prosperity, and more contributed to the society (4). Thus, health literacy is important both at the individual and at the society levels.

At the same time, higher proportions with limited health literacy were observed among subgroups with financial deprivation, low social status, low education, or old age indicating the presence of a social gradient (15). Therefore, increasing levels of health literacy will promote development of more capacity of each individual in health behaviors, realization of shared responsibility for one’s health, individual’s development towards improving quality of life. At the society level, increasing health literacy will contribute to the development of equity and sustainability of changes in public health (16).

Relatively little is known about health literacy of population in Kazakhstan and it has not been measured with internationally validated instrument so far. The present study aimed to evaluate health literacy of the residents in Almaty city who visited outpatient clinics during the survey. The Health literacy research team of S Asfendiyarov Kazakh National Medical University (KazNMU) within the frames of the International project initiated by Asian Health Literacy Association (AHILA) conducted a survey using the conceptual-based comprehensive questionnaire HLS-EU-Q to evaluate different aspects of health literacy.

Materials and Methods

Study design and sampling
This cross-sectional study was conducted in Feb-Oct, 2014, inviting one each polyclinic in each district of all the 7 districts in the Almaty city. The trained interviewers recruited the participants over 18 yr old by randomly (mechanical sampling) enrollment of every second visitor out of those who visited the outpatient departments of these district polyclinics. Proportional sampling by different age groups were not conducted, while the subjects were invited in the survey when they visited the polyclinic, and their ages were proportional to the visitors to this polyclinic during the period, and further classified into different groups with 10 yr increment for further analysis. Among those who was invited to participate were not only individuals with some health problem but also those who came for the health check-up or for other non-treatment goals. The polyclinic - a primary healthcare organization- was chosen, as these were the key primary healthcare setting in Almaty.

Questionnaires
The instrument HLS-EU-Q47 was developed by the European Health Literacy Consortium (3, 16), and extended by Asian Health Literacy Association (AHILA) to 106 questions. This version of HLS EU-Q was validated on a population level in Taiwan and elsewhere (5, 6). The questionnaire was translated professionally into Kazakh and Russian using translation-back translation method.

Data collection
A target total 1000 individuals agreed to participate in the survey. The participants were asked to fill in the questionnaires anonymously with the assistance (if needed) of the trained interviewers-physicians and nurses in the polyclinics and the questionnaires were collected on site. Overall, 998 questionnaires were included in the analysis.

**Data analysis**

The HL indices were calculated as the General health literacy (GHL), healthcare health literacy (HC-HL), disease prevention health literacy (DP-HL), and health promotion health literacy (HP-HL) (3, 16). Calculation of the indices was performed by the formula:

\[ \text{Index} = (\text{mean} - 1) \times (50/3) \]  

(formula 1)

Where **Index** is the specific index calculated, **Mean** is the mean of all participating items for each individual, 1 is the minimal possible value of the mean (leading to a minimum value of the index of 0), 3 is the range of the mean, and 50 is the chosen maximum value of the new metric. An index value is obtained where 0 represents the lowest possible HL and 50 the highest possible HL (17).

Four levels of health literacy were defined as inadequate (0-25 points), problematic (25-33 points), sufficient (33-42 points), and excellent (>42-50 points). Inadequate and problematic HL yielded limited HL (33 points or less), sufficient and excellent HL yield satisfactory HL (>33-50 points) (16).

To investigate the level of health literacy of the participants, descriptive analyses were performed. To identify associations between health literacy and various factors, bivariate and multivariate linear regression models were used.

\[ Y = B_0 + B_1X_1 + B_2X_2 + \ldots + B_kX_k \]  

(formula 2)

While, **Y** is variation of dependent variables (Health literacy or health outcomes), \( B_0 \) = intercept, \( B_{1:k} \) = Change of **Y** when \( X_{1:k} \) change 1 unit or between reference group and testing group.

**Ethical approval**

The study was approved by Local Ethical Committee, S Asfendiyarov Kazakh National Medical university, Registration No 55.

**Results**

**Characteristics of the participants**

The mean age of women and men were 41.8 ± 13.9 and 44.7 ± 15.2 yr old, respectively. The personal and socio-demographic characteristics were shown in Table 1.

55.3% of them were female participants, 66.1% had University education and above. 68.24% replied “it was fairly easy” and 23.8% “very easy” to pay for medications. 49.0% self-assessed social status as middle and high, 36.6% rarely and 16.9% never watched health related TV programs. 51.7% reported none community involvement, 62.5% non-smokers, 58.1% self-assessed health “very good and excellent”, 55.4% none long-term illness, 23.8% with 6 or more visits to doctors in the last 12 months, and 50.6% with 3 to 5 visits.

All Pearson’s coefficients for the total sample were reasonably high (minimum was 0.73 for the correlation between HP-HL and HC-HL).

General health literacy (GHL) was 34.0 ± 8.6 for men and 33.5 ± 9.4 for women, the HC-HL 34.4 ± 9.2 for men and 33.5 ± 10.5 for women, DP-HL 34.2 ± 9.5 for men and 33.1 ± 10.5 for women, and HP-HL 33.5 ± 9.5 for men and 33.1 ± 9.9 for women. There was no statistically significant difference in health literacy level between men and women in the general HL and three sub-domains.

**Distribution of different levels of health literacy**

Out of all the study population, 15.5% had inadequate GHL, 30.0% had problematic GHL, 36.1% had sufficient GHL, and 18.5% had excellent GHL.
Table 1: Socio-demographics and characteristics of participants in Kazakhstan

| Characteristics                        | Men (N = 446)         | Women (N = 552)        | Overall (N = 998)       |
|----------------------------------------|-----------------------|------------------------|-------------------------|
|                                        | n                     | Percentage             | n                       | Percentage             | n                       | Percentage             |
| **Socio-demographics**                 |                       |                        |                          |                        |                          |                        |
| Age (yr)                               |                       |                        |                          |                        |                          |                        |
| 18-25                                  | 40                    | 9.13                   | 43                      | 8.16                   | 83                      | 8.60                   |
| 26-35                                  | 88                    | 20.09                  | 142                     | 26.94                  | 230                     | 23.83                  |
| 36-45                                  | 92                    | 21.00                  | 126                     | 23.91                  | 218                     | 22.59                  |
| 46-55                                  | 80                    | 18.26                  | 117                     | 22.20                  | 197                     | 20.41                  |
| 56-65                                  | 113                   | 25.80                  | 81                      | 15.37                  | 194                     | 20.10                  |
| > 65                                   | 25                    | 5.71                   | 18                      | 3.42                   | 43                      | 4.46                   |
| Educational attainment                 |                       |                        |                          |                        |                          |                        |
| Junior high school and below           | 76                    | 18.54                  | 60                      | 11.63                  | 136                     | 14.69                  |
| Senior high school                     | 93                    | 22.68                  | 85                      | 16.47                  | 178                     | 19.22                  |
| University and above                   | 241                   | 58.78                  | 371                     | 71.90                  | 612                     | 66.09                  |
| Ability to pay for medication          |                       |                        |                          |                        |                          |                        |
| Very difficult                         | 8                     | 2.03                   | 10                      | 2.12                   | 18                      | 2.08                   |
| Fairly difficult                       | 27                    | 6.84                   | 24                      | 5.10                   | 51                      | 5.89                   |
| Fairly easy                            | 282                   | 71.39                  | 309                     | 65.61                  | 591                     | 68.24                  |
| Very easy                              | 78                    | 19.75                  | 128                     | 27.18                  | 206                     | 23.79                  |
| Self-perceived social status           |                       |                        |                          |                        |                          |                        |
| Low                                    | 180                   | 50.28                  | 205                     | 51.64                  | 385                     | 50.99                  |
| Middle                                 | 109                   | 30.45                  | 99                      | 24.94                  | 208                     | 27.55                  |
| High                                   | 69                    | 19.27                  | 93                      | 23.43                  | 162                     | 21.46                  |
| Personal behaviors                     |                       |                        |                          |                        |                          |                        |
| Watch health-related TV                |                       |                        |                          |                        |                          |                        |
| Never                                  | 80                    | 20.89                  | 67                      | 13.81                  | 147                     | 16.94                  |
| Rarely                                 | 143                   | 37.34                  | 175                     | 36.08                  | 318                     | 36.64                  |
| Sometimes & Often                      | 160                   | 41.78                  | 243                     | 50.10                  | 403                     | 46.43                  |
| Community involvement                 |                       |                        |                          |                        |                          |                        |
| Never                                  | 189                   | 50.40                  | 228                     | 52.90                  | 417                     | 51.74                  |
| Rarely                                 | 53                    | 14.13                  | 61                      | 14.15                  | 114                     | 14.14                  |
| Sometimes                              | 32                    | 8.53                   | 44                      | 10.21                  | 76                      | 9.43                   |
| Often                                  | 101                   | 26.93                  | 98                      | 22.74                  | 199                     | 24.69                  |
| Health status                          |                       |                        |                          |                        |                          |                        |
| Self-reported health status            |                       |                        |                          |                        |                          |                        |
| Very poor & Poor                       | 39                    | 9.44                   | 35                      | 7.14                   | 74                      | 8.19                   |
| Satisfactory                           | 145                   | 35.11                  | 159                     | 32.45                  | 304                     | 33.67                  |
| Good                                   | 148                   | 35.84                  | 182                     | 37.14                  | 330                     | 36.54                  |
| Very good                              | 81                    | 19.61                  | 114                     | 23.27                  | 195                     | 21.59                  |
| Long-term illness                      |                       |                        |                          |                        |                          |                        |
| None                                   | 213                   | 52.59                  | 277                     | 57.83                  | 490                     | 55.43                  |
| One or more                            | 192                   | 47.41                  | 202                     | 42.17                  | 394                     | 44.57                  |
| Physical limitation related to health  |                       |                        |                          |                        |                          |                        |
| problem                                |                       |                        |                          |                        |                          |                        |
| Not at all                             | 193                   | 50.66                  | 249                     | 54.01                  | 442                     | 52.49                  |
| Limited                                | 188                   | 49.34                  | 212                     | 45.99                  | 400                     | 47.51                  |
| Health behaviors                       |                       |                        |                          |                        |                          |                        |
| Smoking status                         |                       |                        |                          |                        |                          |                        |
| Current smoker                         | 45                    | 12.23                  | 48                      | 10.48                  | 93                      | 11.26                  |
| Former smoker                          | 110                   | 29.89                  | 107                     | 23.36                  | 217                     | 26.27                  |
| Non-smoker                             | 213                   | 57.88                  | 303                     | 66.16                  | 516                     | 62.47                  |
| Frequencies of visiting doctors        |                       |                        |                          |                        |                          |                        |
| None                                   | 32                    | 8.65                   | 56                      | 12.81                  | 88                      | 10.90                  |
| 1-2 times                              | 54                    | 14.59                  | 65                      | 14.87                  | 119                     | 14.75                  |
| 3-5 times                              | 186                   | 50.27                  | 222                     | 50.80                  | 408                     | 50.56                  |
| 6 times and more                       | 98                    | 26.49                  | 94                      | 21.51                  | 192                     | 23.79                  |
| Accompany to see doctors               |                       |                        |                          |                        |                          |                        |
| None                                   | 129                   | 36.03                  | 157                     | 38.39                  | 286                     | 37.29                  |
| Sometimes                              | 201                   | 56.15                  | 200                     | 48.90                  | 401                     | 52.28                  |
| Often                                  | 28                    | 7.82                   | 52                      | 12.71                  | 80                      | 10.43                  |

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For HC-HL, 16.1% were inadequate, 31.1% problematic, 33.1% sufficient, and 19.7% excellent. In DP-HL, 16.2% were inadequate, 27.7% problematic, 33.7% sufficient, and 22.5% excellent. In HP-HL, 17.5% were inadequate, 26.4% problematic, 34.3% sufficient, and 21.8% excellent. In them, higher GHL was positively and significantly associated with high self-assessed social status ($B = 3.86, P < 0.001$), ability to pay for medications ($B = 3.42, P < 0.001$), rarely watching health related TV programs, as compared to the respondents who never watched health related TV programs ($B = 2.37, P < 0.001$), moderate community involvement ($B = 2.23, P = 0.03$).

Table 2: General health literacy associated with the socio-demographics and personal behaviors, by multivariate linear regression analysis.

| Predictors                                           | Men (n = 446) | Women (n = 552) | Overall (n = 998) |
|------------------------------------------------------|--------------|----------------|------------------|
|                                                      | B (95% CI)   | $\beta$        | $P$ value        | B (95% CI)   | $\beta$        | $P$ value        | B (95% CI)   | $\beta$        | $P$ value        |
| **Socio-demographics**                               |              |                |                  |              |                |                  |              |                |                  |
| Age with 10 yr increment                             | 0.66 (0.09, 1.22) | 0.12           | 0.02             | -0.13        | -0.02           | 0.74             | 0.41 (-0.05, 0.87) | 0.06           | 0.08             |
| Marital status                                       |              |                |                  |              |                |                  |              |                |                  |
| Not married (reference)                              |              |                |                  |              |                |                  |              |                |                  |
| Married, divorced, widow                             | 1.43 (-0.51, 3.37) | 0.08           | 0.15             | -0.92        | -0.04           | 0.44             | -0.01 (-1.51, 1.5) | 0.00           | 0.99             |
| Educational attainment                               |              |                |                  |              |                |                  |              |                |                  |
| Junior high school and below (reference)             |              |                |                  |              |                |                  |              |                |                  |
| Senior high school                                   | 0.84 (-1.55, 3.22) | 0.04           | 0.49             | 1.91         | 0.07            | 1.39 (-0.56, 3.34) | 0.06           | 0.16             |
| University and above                                 | 1.43 (-0.54, 3.4) | 0.09           | 0.15             | 1.32         | 0.06            | 1.08 (-0.52, 2.68) | 0.06           | 0.19             |
| Ability to pay for medication                        |              |                |                  |              |                |                  |              |                |                  |
| Fairly difficult & Very difficult                    |              |                |                  |              |                |                  |              |                |                  |
| Fairly easy                                          | 3.4 (0.91, 5.89) | 0.19           | 0.01             | 4.26         | 0.20            | 3.42 (1.21, 5.63) | 0.18           | <0.001            |
| Very easy                                            | 4.9 (1.93, 7.87) | 0.24           | <0.001           | 6.07         | 0.28            | 5.25 (1.94, 7.44) | 0.24           | <0.001            |
| Self-perceived social status                         |              |                |                  |              |                |                  |              |                |                  |
| Low (reference)                                      |              |                |                  |              |                |                  |              |                |                  |
| Middle                                               | -0.06 (-1.81, 1.69) | 0.00           | 0.95             | 2.52         | 0.11            | 1.31 (-0.09, 2.72) | 0.06           | 0.07             |
| High                                                 | 3.68 (1.77, 5.59) | 0.19           | <0.001           | 4.1          | 0.18            | 3.86 (2.41, 5.31) | 0.18           | <0.001            |
| Personal behaviors                                   |              |                |                  |              |                |                  |              |                |                  |
| Watch health-related TV                              |              |                |                  |              |                |                  |              |                |                  |
| Never (reference)                                    |              |                |                  |              |                |                  |              |                |                  |
| Rarely                                               | 2.32 (0.34, 4.3) | 0.14           | 0.02             | 2.77         | 0.14            | 2.37 (0.75, 3.99) | 0.13           | <0.001            |
| Sometimes & Often                                    | 1.27 (-0.67, 3.21) | 0.08           | 0.20             | 1.01         | 0.05            | 0.88 (0.7, 2.46)  | 0.05           | 0.28             |
| Community involvement                                |              |                |                  |              |                |                  |              |                |                  |
| Never (reference)                                    |              |                |                  |              |                |                  |              |                |                  |
| Rarely                                               | 4.32 (1.77, 6.87) | 0.16           | <0.001           | -1.13        | -0.04           | 0.41             | 0.96          | 0.03           | 0.31             |
| Monthly                                              | 0.96 (-1.8, 3.72) | 0.03           | 0.49             | 3.23         | 0.10            | 2.23 (0.22, 4.23) | 0.07           | 0.03             |
| Often (everyday, several times a week)               | 0.88 (-0.87, 2.63) | 0.05           | 0.32             | -1.8         | -0.08           | 0.10             | -0.45 (-1.82, 0.92) | -0.02 | 0.52             |

Abbreviation: CI, confidence interval.

*B, non-standardized coefficient; $\beta$, standardized coefficient.*
For men, higher GHL were positively and significantly associated with ability to pay for medications ($B =4.9, P <0.001$), rare community involvement ($B =4.32, P <0.001$), high self-assessed social status ($B =3.68, P <0.001$), rarely watching health related TV programs, as compared to the respondents who never watched health related TV programs ($B =2.32, P=0.02$), and age ($B =0.66, P=0.02$). For women, higher GHL was positively associated with ability to pay for medications ($B =6.07, P=0.01$), high ($B =4.1, P<0.001$) and middle ($B =2.52, P=0.03$) self-assessed social status, moderate community involvement ($B =3.23, P =0.03$), and rarely watching health related TV as compared to the respondents who never watched health related TV programs ($B =2.77, P=0.04$; Table 2).

With multivariate linear regression analyses, the GHL as a predictor and its associated factors as dependent variables, GHL was positively and significantly associated with self-perceived health status ($B =0.21, P<0.001$), doing exercises ($B =0.12, P<0.01$), but negatively with smoking ($B =-0.13, P<0.001$), physical limitation related to health problem ($B =-0.12, P<0.001$), long-term illnesses ($B =-0.08, P<0.01$), and frequency of visiting doctors ($B =-0.03, P<0.01$; Table 3). In men, GHL was negatively associated with long-term illness($B =-0.12, P<0.01$), smoking ($B =-0.12, P<0.01$), physical limitation related to health status ($B =-0.11, P<0.05$), but positively doing physical exercises ($B =0.11, P<0.01$). In women, their GHL was positively associated with self-perceived health status ($B =0.34, P<0.001$), but negatively with smoking ($B =-0.16, P<0.001$), physical limitation related to health problem ($B =-0.13, P<0.001$), having somebody to accompany them to visit a doctor($B =-0.07, P <0.05$), frequency of visiting doctors ($B =-0.05, P<0.001$; Table 3).

**Table 3:** General health literacy (as a predictor) and its associated factors (as dependent variables) via multivariate linear regression analyses

| Health Literacy Index With 10 Score Increments | Regression Coefficient b (95% CI)b |
|-----------------------------------------------|-----------------------------------|
|                                               | Men (n =446)                      |
| Health status                                |                                   |
| Self-perceived health status                  | $0.034 ($-0.13, 0.20)$            |
| Long-term illness                            | $-0.12 ($-0.18, -0.003)**         |
| Physical limitation related to health problem| $-0.11 ($-0.014, 0.001)*          |
| Smoking status                               | $-0.12 ($-0.016, -0.002)**        |
| Doing exercise                               | $0.11 ($0.000, 0.017)**           |
| Frequency of visiting doctors                | $-0.01 ($-0.02, 0.03)             |
| Accompanied to see doctors                   | $0.02 ($-0.05, 0.09)              |
|                                               | Women (n =552)                    |
| Health status                                | $0.34 ($0.19, 0.48)*****          |
| Long-term illness                            | $-0.05 ($-0.009, 0.002)**         |
| Physical limitation related to health problem| $-0.13 ($0.014, -0.003)**         |
| Smoking status                               | $-0.16 ($-0.016, -0.005)*****     |
| Doing exercise                               | $0.71 ($-0.004, 0.021)            |
| Frequency of visiting doctors                | $-0.05 ($-0.07, -0.03)*****       |
| Accompanied to see doctors                   | $-0.07 ($-0.13, -0.001)*          |
|                                               | Overall (n =998)                  |
| Health status                                | $0.21 ($0.11, 0.32)*****          |
| Long-term illness                            | $-0.08 ($-0.011, -0.002)**        |
| Physical limitation related to health problem| $-0.12 ($-0.012, -0.004)*****     |
| Smoking status                               | $-0.16 ($-0.016, -0.005)*****     |
| Doing exercise                               | $0.12 ($0.007, 0.025)**           |
| Frequency of visiting doctors                | $-0.03 ($-0.04, -0.01)**          |
| Accompanied to see doctors                   | $-0.02 ($-0.07, -0.03)            |

a Significant at *0.01<P<0.05; **0.001<P<0.01; ***P<0.001. Health literacy index range from 0 to 50.

b Non-standardized regression coefficient adjusted for age, gender (for overall sample), marital status, education, social status, and ability to pay for medication.

**Discussion**

The mean GHL in the study population was $34.0 \pm 8.6$ for men and $33.5 \pm 9.4$ for women, which was comparable with the studies from other countries (5, 18). The absence of association between gender and HL was comparable with the results from the European survey where gender had weak influence on the general health literacy (18).

Distribution of health literacy level in Kazakhstan was close to that in some European countries, e.g. Greece and Ireland (15). The proportion of respondents with inadequate and problematic health literacy was quite high (15.5% and 30.0%, respectively).

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respectively), yielding the proportion of respondents with limited HL equal to 45.5% (17). Different factors were found to be associated with health literacy (17-20). In the European survey, age was a predictor for health literacy with tendency for older groups to have lower health literacy (15, 17). In Dutch, adults with lower level of education, lower self-perceived social status, or male gender had lower health literacy (19). The health literacy study in Taiwan also identified negative association between age and health literacy(5). On the contrary, in this study, age was positively associated with health literacy exclusively in men. This could be explained in part by the society living experience, interactions with healthcare system, as well as knowledge related to health were heavily involved in health literacy. However, it is not clear similar factors did not play in women.

A positive association between age and health literacy regarding certain competencies, such as assessing health information, was found in some studies (19). Other studies demonstrated an increase of HL with age and a lower HL score among women compared with men (20). “Older age was also shown strongly associated with limited health literacy in reading comprehension, reasoning, and numeracy skills, while older age was weakly associated with limited health literacy in studies that measured health literacy as medical vocabulary” (2, 21).

On the other hands, higher GHL was positively associated with socioeconomic and behavioral factors, such as ability to pay for medications, high self-assessed social status, moderate community involvement, watching health related TV programs. This was consistent with the results from other studies and underscores the importance of social and economic wellbeing for health literacy (5, 18). In European survey, self-assessed social status and education were found to be important predictors for health literacy, but not in this study that education was not statistically significant associated with GHL, as also observed in the study in Taiwan (5, 18). The results suggested, for instance, receiving university education did not necessarily add to one’s knowledge and skills related to health decisions and satisfactory interaction with healthcare system.

Health literate people had been shown with better health outcomes, whereas low health literacy was associated with chronic diseases (14, 22). A positive and significant association between self-perceived health status and health literacy, and negative associations between health literacy and health-related factors as long-term illness, limitation related to health, frequency of visiting doctors, and having somebody to accompany their visits to see the doctor. These findings highlighted the presence of the relationship between low health literacy and poor health outcomes and were consistent with other studies (5, 21, 23).

Health behavior was associated with health literacy (24, 25). Thus, interventions aimed to change risky behavior would improve health literacy (23). Further research should focus on the using the results of studying in the predictors of health literacy to work out approaches for behavior changes in the general public.

The study was with some strengths and limitations. Using internationally developed and validated instrument for the purpose of the study was a valuable asset that allowed making international comparisons. This study was the first attempt to our knowledge to examine and assess health literacy of Kazakhstan population. The limitation lied in the nature of a cross-sectional design.

**Conclusion**

The level of general health literacy among residents of Almaty city was characterized as borderline sufficient. Almost half of the respondents had limited general health literacy, which indicated the need for activities to enhance health literacy. The associations revealed in the study demonstrated influence of demographic, socioeconomic and behavioral determinants on population’s health literacy. Further researches are needed to develop approaches to increase health literacy of the population to change health behavior and improve health outcomes.
Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Conflict of interest

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