**ORIGINAL ARTICLE**

# Health Literacy Among Adult Patients with Chronic Diseases in Sabah: HLS-Sabah

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## ABSTRACT

Health literacy (HL) sets on the ability and motivation of individuals to appraise, understand, access, and utilise information in ways that promote and maintain good health. Poorer health outcomes and incurs higher healthcare expenditures can be the cause of limited HL. Sabah public health facilities conducted a cross-sectional study between February and October 2020. A 12-item Short-Form Health Literacy Survey (HLS-SF12) comprising three domains (healthcare, disease prevention, and health promotion) was used to measure HL. The HL index score was categorised as 'limited' (0 – 33), 'sufficient' (>33 – 42), and 'excellent' (>42 – 50). Among 337 patients recruited, half were male (51%) with a mean age of 52.6 ± 12.3. The top 3 comorbid were hypertension (84.6%), dyslipidaemia (58.2%), and diabetes mellitus (47.8%). Health information was mainly accessed from television (84.6%), smartphones (75.1%), and radio (47.8%). The median HL index score was 31.94 (IQR 25 – 37.5), with 54.6% of patients having limited HL. The lowest median score was found in disease prevention, 11 (IQR 10 – 13) and 8 (IQR 7 – 9) when judging health information. The HL index was associated with age, educational level, household income, insurance ownership, and accessing health information with a smartphone or computer. In Sabah, the limited HL level observed the need to tailor interventional programmes to

vulnerable groups. Digital platforms should be enhanced in disseminating health-related information and educating the public on critical judgement skills.

## INTRODUCTION

Health literacy (HL) is the individual's ability to access, comprehend and use health information to promote and maintain good health (United Nations ECOSOC, 2009). This updated definition by the World Health Organization (WHO, 2016) and the U.S. Department of Human and Health Services (HHS) (CDC, 2021) has shifted the paradigm of HL beyond performing uncomplicated tasks. It is more than reading and understanding health-related materials, making appointments, and adhering to prescribed medical regimens (United Nations ECOSOC, 2009). Instead, it encompasses the ability to acquire actively and critically appraise health information and make informed decisions to improve health status (Institute of Medicine et al., 2004).

HL has been recognised as an integral determinant of health (Abdullah et al., 2020). Paradoxically, the HL level is still low globally regardless of the country's development status. For instance, 60% of the Australian population has scored below the optimal level for health maintenance. About 50% of adults in the United States have difficulties understanding and acting upon health information (Hickey et al., 2018). People with limited HL are less aware of the preventive health measures and the association between their daily lifestyle and health outcomes (UnitedHealth Group, 2020). This results in a higher tendency to overuse healthcare services with a higher rate of hospitalizations and emergency admissions and, consequently, more significant healthcare costs (UnitedHealth Group, 2020; Scott et al., 2002).

Poor HL level contributes to the rising of non-communicable diseases (NCDs) worldwide. More commonly known as chronic diseases, NCDs result from genetic, physiological, environmental, and behavioural factors. Examples are cardiovascular diseases such as heart attacks and stroke, chronic respiratory diseases such as chronic obstructive pulmonary disease, asthma, diabetes, and cancers (WHO, 2021). In addition, studies demonstrated that patients with NCDs and poor HL tend to have less knowledge of their illnesses and management (Abdullah et al., 2020; Nutbeam, 2009). This finding is in line with the outcome of the United Nations General Assembly on the comprehensive review of the prevention and control of NCDs in 2014, which identified the need to promote HL through health education to mitigate NCDs (WHO, 2015).

Being the leading cause of death worldwide, NCDs are also one of Malaysia's most significant disease burdens. While diabetes, hypercholesterolemia, and obesity are increasing, NCDs have accounted for 71% of premature deaths (Institute for Public Health, 2019). Apart from the nationwide HL assessment from the Health and Morbidity Survey (NHMS) commencing 2015, several studies have been carried out in Malaysia to assess the HL level of different target populations with various underlying morbidities. Although these studies generally indicated a moderate to low HL for Sabah, while the general HL figures have been publicized in the NHMS report, not much information has been yielded on the factors contributing to the poor HL status locally, especially among those suffering from NCDs (Institute for Public Health, 2019). Hence, this study aims to overview the HL level among patients with chronic diseases in Sabah and explore the associated sociodemographic factors. The baseline information will help policymakers design a programme tailored to the local needs to improve the HL level.

## MATERIALS AND METHODS

A cross-sectional study was conducted in Sabah public health facilities between February and October 2020. Using a "sample size calculator for estimating mean" (Naing & Rusli, 2006), the sample size required was 240 (95% confidence level; the precision of 1; standard deviation for health literacy index score obtained from a study by Duong et al. (2017) is 7.9).

Sabah's public health facilities are categorised into three divisions, i.e., West Coast, East Coast, and Interior. The list of all public hospitals (24 hospitals) and clinics with prescription load above 100/day (36 clinics) within these divisions was obtained from Sabah State Health Department. A total of 22 specialist and district hospitals (excluding Hospital Mesra Bukit Padang and Hospital Wanita dan Kanak-Kanak Sabah due to exclusion criteria below), as well as 30 health clinics (13 clinics from the west coast, 13 clinics from the east coast, and 4 clinics from interior region), participated in this study. Stratified sampling was employed to ensure adequate representatives from respective health facilities. Patients were then recruited based on inclusion criteria: (a) aged 18 and above; (b) have chronic diseases (diseases which are not passed from person to person and generally of long duration and slow progression; last for three months or more and cannot be prevented by vaccines or cured by medication) when they collect their repeat medication supply over the pharmacy outpatient counter. Patients who refused to participate or were incompetent with reasoning and judgement impairment were excluded. All participating patients were required to provide written informed consent.

A data collector was identified from each facility. Before data collection, briefings and training via phone instructions were carried out to ensure uniformity in understanding the questionnaire. Patients were given the option of answering the questionnaire either by themselves or with assistance from the data collector.

## Instrument

For the author's consent, HL was measured using a 12-item Short-Form Health Literacy Survey (HLS-SF12) (adapted from Health Literacy Survey European Questionnaire 47 (HLS-EU-Q47). This shorter version of HLS-SF12 has been validated and is a reliable tool among the general public in Asian countries, including Malaysia (Duong et al., 2017). The questionnaire used in this study was available in 3 languages (English, Malay, and Mandarin). It comprised three domains (healthcare, disease prevention, and health promotion) which assessed four areas (the ability to find, understand, judge, and apply health information). It has previously been validated in 6 Asian countries, including Malaysia, with high reliability (Cronbach's alpha = 0.85), good criterion-related validity, satisfactory item-scale convergent validity, and a good model-data-fit throughout the populations in the countries involved (Duong et al., 2017). The perceived difficulty of each item was graded on a 4-point Likert scale (1 = very difficult, 2 = difficult, 3 = easy, and 4 = very easy). The Health Literacy (HL) indices were standardized to unified metrics using the formula [index = (mean − 1) × (50/3)], with the index value 0 being the lowest HL and 50 the highest HL (Sørensen et al., 2015).

The HL index score was categorized into four levels: 'inadequate' (0 – 25), 'problematic' (>25 – 33), 'sufficient' (>33 – 42), and 'excellent' (>42 – 50) health literacy. To identify vulnerable groups, the 'inadequate' and 'problematic' levels were combined into one category, known as 'limited' health literacy (0 – 33) (Sørensen et al., 2015).

## Data Analysis

Data collected were entered into SPSS version 24. Descriptive statistics were used to present baseline characteristics and HL levels. Categorical variables were presented in frequency and percentage, whereas continuous variables were presented in

mean (standard deviation, SD) or median (interquartile range, IQR), depending on the data normality. Simple linear regression was performed for each sociodemographic characteristic with an HL score. A p<0.05 was considered statistically significant.

## Ethics Approval

This study was conducted by the ethical principles outlined in the Declaration of Helsinki and the Malaysian Good Clinical Practice Guideline. The Medical Research and Ethics Committee approved it with the identification code NMRR-13-1803-15923.

## RESULTS

### Baseline Characteristics

A total of 337 patients were included in this study. Almost half were male (51%), with a mean age of $52.6 \pm 12.3$. The baseline characteristics of patients summarise in Table 1.

**Table 1** Baseline characteristics of patients (n = 337)

| Characteristic | Number (%) |
|---|---|
| Age (years) | |
| Mean ± standard deviation | 52.6 ± 12.3 |
| Age < 60 years old | 235 (69.7%) |
| Age ≥ 60 years old | 102 (30.3%) |
| Gender | |
| Male | 172 (51) |
| Female | 165 (49) |
| Ethnic | |
| Dusun | 66 (19.6) |
| Malay | 58 (17.2) |
| Chinese | 53 (15.7) |
| Bajau | 47(13.9) |
| Kadazan | 23 (6.8) |
| Others | 90 (26.7) |
| Marital status | |
| Single | 28 (8.3) |
| Married | 286 (84.9) |
| Widower | 18 (5.3) |
| Divorce | 5 (1.5) |
| Education level | |
| None | 36 (10.7) |
| Primary | 60 (17.8) |
| Secondary | 156 (46.3) |
| Tertiary | 84 (24.9) |
| Missing data | 1(0.3) |
| Occupation | |
| Employed | 121 (35.9) |
| Self-employed | 61 (18.1) |
| Unemployed | 68 ( 20.2) |
| Retiree | 72 (21.4) |
| Others | 13 (3.9) |
| Missing data | 2 (0.6) |

| | | |
|---|---|---|
| **History of hospitalization in the past one year** | | |
| Yes | 72 (21.4) | |
| No | 263 (78) | |
| Missing data | 2 (0.6) | |
| **Health insurance** | | |
| Yes | 98 (29.1) | |
| No | 236 (70) | |
| Missing data | 3 (0.9) | |
| **Time to the nearest facility (minutes)** | | |
| Median, IQR | | 15 (10 – 20) |
| **Household income (R.M.)** | | |
| Median, IQR | | 2,000 (1,000 – 3,500) |
| **Source of information** | | |
| Television | 285 (84.6) | |
| Smartphone | 253 (75.1) | |
| Radio | 161 (47.8) | |
| Computer | 116 (34.4) | |
| Newspaper | 113 (33.5) | |
| **Comorbid** | | |
| Hypertension | 271 (80.4) | |
| Dyslipidaemia | 196 (58.2) | |
| Diabetes mellitus | 161 (47.8) | |
| Chronic heart disease | 41 (12.2) | |
| Chronic respiratory disease | 18 (5.3) | |
| Chronic kidney disease | 13 (3.9) | |
| Others | 42 (12.5) | |

About two-thirds (65.6%) of the patients self-administered the questionnaire, while the remaining required assistance from the data collector. Table 2 demonstrates the 12-item Short-Form Health Literacy Survey (HLS-SF12). The median (IQR) health literacy index score was 31.94 (25 – 37.5). Almost half of the patients (54.6%) had limited health literacy (HL index 0 – 33). The domain of disease prevention and the ability to judge health information had the lowest median score of 11 (IQR 10 – 13) and 8 (IQR 7 – 9), respectively.

**Table 2** A 12-item Short-Form Health Literacy Survey (HLS-SF12) (n = 337)

| Variable | Number (%) | Median, IQR |
|---|---|---|
| HL index | | 31.94 (25 – 37.5) |
| **Category** | | |
| Inadequate (0 – 25) | 88 (26.1) | |
| Problematic (>25 – 33) | 96 (28.5) | |
| Limited (0 – 33) | 184 (54.6) | |
| Sufficient (>33 – 42) | 114 (33.8) | |
| Excellent (>42 – 50) | 39 (11.6) | |
| **Domain** | | |
| Healthcare | | 12 (10 – 13) |
| Disease prevention | | 11 (10 – 13) |
| Health promotion | | 12 (10 – 14) |

| Dimension | |
|---|---|
| Access to health information | 9 (7 – 10) |
| Understand health information | 9 (8 – 10) |
| Critically appraise health information | 8 (7 – 9) |
| Applying the health information | 9 (8 – 10) |

## Health Literacy

### *Association Between Health Literacy and Sociodemographic Characteristics*

All the sociodemographic variables, age, education level, household income, health insurance, and accessing health information via smartphone and computer were found to have a significant relationship with the HL score. Table 3 elaborates on the association between these sociodemographic characteristics and the HL score.

**Table 3** Associated sociodemographic characteristics with the health literacy index

| Variables | Simple linear regression | | |
|---|---|---|---|
| | $b^a$ (95% CI) | p-value | $r^2$ |
| Age | −0.26 (−0.33; −0.18) | <0.001 | 0.112 |
| Education | | | |
| No formal education | 1 | − | 0.155 |
| Primary | NS | NS | |
| Secondary | 7.69 (4.59; 10.79) | <0.001 | |
| Tertiary | 11.49 (8.15;14.83) | <0.001 | |
| Income | 0.001 (0.0006;0.0014) | <0.001 | 0.077 |
| Insurance | 5.15 (3.02; 7.29) | <0.001 | 0.064 |
| Source of information | | | |
| Smartphone | 9.21 (7.13; 11.30) | <0.001 | 0.182 |
| Computer | 6.01 (4.01; 8.01) | <0.001 | 0.092 |

[a] Crude regression coefficient
[b] Adjusted regression coefficient
$r^2$ Coefficient of determination

## DISCUSSION

The NHMS 2019 indicated that 40.7% of Malaysians were found to have marginally sufficient HL levels. In contrast, more than one-third of Malaysians (35.0%) had limited HL. Limited HL was most prevalent in Sabah (43.2%) (Institute for Public Health, 2019). In our study, an even higher proportion of patients fell under limited HL (54.6%). Such findings can be translated into a significant barrier in gaining access, understanding, appraising, and applying health-related information for optimal health outcomes among chronic disease patients in Sabah. This could be because subject recruitment for this study took place in healthcare settings, which increased the likelihood of involving individuals with relatively poorer HL at baseline. Such justification is consistent with HL studies conducted in other countries, including Malaysia, where a lower prevalence of limited HL was observed in non-healthcare settings (Rajah et al., 2019). It is also noteworthy that both NHMS and our study adapted the assessment tools (HLS-M-Q18 and HLS-SF12, respectively) from the same source of HLS-EU-Q47. Looking specifically at the HL index score, our study showed a median score of 31.94 (IQR = 25–37.5). Malaysia was involved in the initial research on developing and validating the HL instrument chosen for our study. It demonstrated a similar HL index score using the same instrument (32.7 ± 7.9) (Duong et al., 2017). This further validates that Malaysians, in general, have limited HL (HL index 0-33), and only a minority possess excellent HL (>42-50).

Several studies have been published on HL levels in various Malaysian populations using different tools (Abdullah et al., 2020; Rajah et al., 2019). Prior studies in Asian and Western countries recognized a negative association between age and HL level (Rajah et al., 2019; Sørensen et al., 2015). Similarly, our study demonstrated a significant linear negative relationship between age and HL index (adjusted b: -0.26, p<0.001), which was more significant than in European countries with a collective adjusted b of only -0.04 (Sørensen et al., 2015). Some studies discovered a profound decrease in HL among elderly patients. In a cross-sectional survey conducted in England city, elderly aged 65 years and above were 2.5 times more likely to have limited functional HL than those aged between 18 and 34 (Protheroe et al., 2017). In Malaysia, 68% of the elderly aged 75 and above demonstrated limited HL (Institute for Public Health, 2019). This is possibly due to the declining cognitive function associated with the elderly (Geboers et al., 2018). It can be a concerning issue for elderly patients with NCDs who live independently without assistance in their daily lives. Unintentional poor medication adherence and failure to take appropriate measures during a medical emergency may cause undesirable or even fatal consequences.

Education attainment had a significant association with the HL index in our study. This factor was also identified in similar studies conducted in Southeast Asian countries (Rajah et al., 2019). Patients who received tertiary and secondary education scored 11.49 and 7.69 higher, respectively than those who did not have formal education. This implies that education is one of the vital keys to promoting health literacy. Education empowers a person with the knowledge to comprehend and critically evaluate health information, followed by informed decision-making to improve health status.

Chronic disease patients with lower household incomes were found to have more inadequate HL. This finding was supported by a local study by Jaafar et al. (2021), which indicated a prevalence of limited HL among respondents with lower household incomes (49.5%). Similar observations were also found in European countries, whereby a more significant proportion of financially-deprived residents demonstrated limited HL (Sørensen et al., 2015).

Interestingly, our study found that patients who access health information using smartphones and computers generally have a higher HL level. The former demonstrates a robust correlation (adjusted b: 9.21 and 6.01, respectively). With greater smartphone or computer ownership in this digital era, it has become a convenient tool for accessing the internet to look for health-related information. Indeed, as shown in a study conducted by Protheroe et al. (2017), the elderly who had no access to the internet was at least three times more likely to have limited health literacy than those who had access. The significantly positive association between smartphone or computer use and HL is also shown in other studies where individuals with low HL skills are less likely to own a smartphone or use Internet technology (Bailey et al., 2015; Jensen et al., 2010). This could partly be explained by hesitancy and reluctance to adopt less familiar tools or comprehend new knowledge, especially for the older generation (Bailey et al., 2015). Such behaviour may also be associated with lower motivation to improve one's status quo, including health. As mobile devices and the Internet for rapid information dissemination are increasingly pervasive, improving technology literacy and accessibility is another imperative agenda of HL to ensure equity in accessing the information and services provided.

The positive association between health insurance coverage and HL was demonstrated in our study, and this has also been observed among America's adults (Kutner et al., 2003; Sentell, 2012). Generally, people with low HL have a greater likelihood of being uninsured. Those uninsured with limited HL were also found to have more severe underlying conditions (Sentell, 2012). Possession of health insurance can be interpreted as heightened health awareness and having autonomy over one's life. These people are usually more alert to the available information and can act upon them rationally.

There are several limitations to this study. First, the cross-sectional study design cannot establish the causal relationship between contributing factors and health literacy among adults with chronic diseases. Second, the perceived difficulty of each question was self-reported, which may affect the clinical significance of the results. Nevertheless, head-to-head comparison between studies is difficult because of the heterogeneity in the HL assessment tools used.

This study overviewed HL levels among patients with chronic diseases in Sabah. Different approaches to improving healthcare literacy, disease prevention, and health promotion should be carried out, especially targeting the elderly. The educational material needs to be concise and straightforward, using layman's terms to obtain attention and ease for better understanding for those with limited health literacy. Also, considering the affordability of smartphones and the vast amount of health information now available on the Internet, it becomes vital to increase the ability of the public to appraise information and apply it to their health. Visual aids, for example, videos or infographics from reliable approved sources, can help improve patients' health literacy.

## CONCLUSION

In conclusion, about half of Sabah's patients with chronic diseases have limited health literacy. It highlighted the need to tailor interventional programmes to improve health literacy among vulnerable groups. In addition, digital platforms should be enhanced in disseminating health-related information and educating the public on critical judgement skills.

## CONFLICT OF INTERESTS

The authors declare that they have no competing interests in publishing this article.

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