

## Research Article

# Health literacy - is it useful in prevention of behavioral risk factors of NCDs?

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### ABSTRACT

**Background:** Health literacy means cognitive and social skills of a person that determine his or her ability to access, understand and use health information to maintain and promote health. People need to understand and use health information in order to choose a healthy lifestyle or to take advantage of preventive measures. The occurrence and consequences of NCDs are related to unhealthy life styles. Insight into the relationship between health literacy and modifiable behavioral risk factors of NCDs may support the prevention and control of these diseases.

**Methods:** A cross-sectional study was conducted among 1367 adults. Multi-stage random sampling was used. Data entry and analysis was done using Stata 11.0 statistical package. Multiple logistic regression analysis was applied to assess the association between health literacy and behavioral risk factors.

**Results:** The proportion of participants who reported ever smoking, ever alcohol drinking and not-practicing daily-exercise was 19.8%, 16.2% and 85.2%, respectively. The prevalence of satisfactory level of health literacy was 31.5%. Health literacy was significantly related to behavioral risk factors even if age, sex, education status and monthly household's expenditure were adjusted. By improving the health literacy status of adults up to satisfactory level, the prevalence of ever smoking, ever drinking and not-practicing daily exercise among them would be reduced by 34%, 32.1% and 38.9%, respectively.

**Conclusions:** Health literacy status of community should be assessed, monitored and improved. Health literacy may be an effective tool in prevention and control of NCDs because of its preventive effect on modifiable behavioral risk factors.

**Keywords:** Adult, Health behavior, Health literacy, Risk factors

### INTRODUCTION

Non-Communicable Diseases (NCDs) are of long duration and generally slow progression. Globally, NCDs kill 38 million people each year. Of which, 42% or 16 million deaths occur prematurely (i.e. before the age of 70 years). Besides, almost 75% of all NCD deaths and 82% of premature deaths occur in developing world. NCDs not only impede the progress towards Millennium Development Goals and post-2015 development agenda but also cause poverty, especially in low-income

countries. The occurrence of NCDs and premature NCD deaths can be reduced by lessening the modifiable behavioral risk factors such as smoking, alcohol consumption, physical inactivity and unhealthy diet.<sup>1-3</sup>

Health Literacy (HL) can be defined as cognitive and social skills of a person that determine his or her ability to access, understand and use health information in order to maintain and promote health.<sup>4-7</sup> Health literacy is a concept, based on the idea that both health and literacy are important for daily-life.<sup>8,9</sup>

Health literacy is important not only for health but also for socioeconomic development because limited health literacy increases health care cost.<sup>10,11</sup>

Besides, limited health literacy can cause problem in educating patients with NCDs too.<sup>12</sup>

People need to understand and use health information in order to choose a healthy lifestyle or to take advantage of preventive measures or to know how to seek medical care, etc.<sup>6</sup>

Previous studies revealed that there is an association between HL and health risk behaviors.<sup>13,14</sup>

Insight into this relationship may support the prevention and control of NCDs. Therefore, the present study was conducted to assess the relationship between HL and behavioral risk factors of NCDs such as smoking, alcohol consumption and not-practicing daily-exercise.

## METHODS

Cross-sectional analytic design was used. Altogether 1367 participants from 35 townships were recruited using multi-stage random sampling. These townships were from one state and 5 regions. States and regions were selected randomly at first stage.

Townships from selected state and regions were chosen randomly at second stage. Then, households were selected using systematic random sampling procedure. Finally one adult member of a particular household was selected randomly.

Necessary data were collected by means of face-to-face interview after getting informed written consent. Behavioral risk factors examined in the study were self-reported practice of smoking, alcohol consumption and not-taking daily-exercise. Smokers were categorized into two groups; ever smokers and never smokers. Ever smokers included both current smokers and ex-smokers (i.e., those who had already quit smoking at the time of study). Never smokers were those who had never smoked. Alcohol drinkers were also divided into two categories; ever drinkers and never drinkers. If a participant drank alcohol at least once in past 12 months, he or she was regarded as ever drinker. Otherwise, he or she was considered as never drinker.

Practicing daily-exercise was defined as taking exercise such as running, walking or cycling, daily for minimum 30 minutes. If not, a participant was categorized as not-taking daily-exercise. Questionnaire (i.e. interview schedule) used to assess the health literacy status of the participants was adapted from HLS-Asia Questionnaire and translated into local language (i.e., Burmese). Pretesting was also undertaken. The questionnaire has four domains (HL indices) and a total of 47 items. The

internal consistency of the questionnaire was high (Cronbach alpha = 0.96).<sup>15</sup>

Four HL indices; namely Finding Health Information (FHI), Understanding Health Information (UHI), Judging Health Information (JHI) and Applying Health Information (AHI) were assessed and categorized into limited (i.e., scores of  $\leq 33$  points) and satisfactory (i.e., scores of  $> 33$  points) levels. Total health literacy score was also calculated. Moreover, health literacy status was created as a composite variable by combining four HL indices and categorized into two groups; satisfactory and limited. Satisfactory meant all four HL indices of a participant were at satisfactory level. Otherwise, a particular participant was considered as a person with limited HL. Age, sex, education and household's monthly expenditure were considered as potential confounders.

Stata 11.0 statistical package was used in data entry and analysis. Multiple logistic regression analysis with backward deletion strategy was applied to assess the association between HL and behavioral risk factors. Those variables whose p value was  $\leq 0.25$  in univariate analysis were selected as candidate variables for multivariate analysis.

## RESULTS

Altogether 1367 adults from 35 townships were recruited into the study. These townships (tsp) were from Shan State (4 tsp; n=160), Sagaing Region (6 tsp; n=232), Magway region (4 tsp; n=160), Bago region (6 tsp; n=233), Ayeyarwaddy region (4 tsp; n=160) and Mandalay region (11 tsp; n=422). Age, sex, education status and monthly household's expenditure of the participants are shown in Table 1.

**Table 1: Age, sex, education and annual household's income of the participants.**

Variables	Frequency (n=1367)	Percent
<b>Age-group (years)*</b>		
18-44	876	64.1
45-59	337	24.6
60-75	154	11.3
<b>Sex</b>		
Male	495	36.2
Female	872	63.8
<b>Education</b>		
Primary school	234	17.1
Middle school	454	33.2
High school	343	25.1
University & graduate	336	24.6
<b>Monthly household's expenditure</b>		
Sufficient	501	36.7
Insufficient	866	63.3

\*Mean age (SD) was 40.0 (14.2) years

**Table 2: Behavioral risk factors and HL status of the participants.**

Variables	Frequency (n=1367)	Percent	95% CI
<b>Smoking</b>			
Ever smokers	271	19.8	17.7, 22.0
Never smokers	1096	80.2	78.0, 82.3
<b>Alcohol consumption</b>			
Ever drinkers	221	16.2	14.3, 18.2
Never drinkers	1146	83.8	81.8, 85.7
<b>Practicing daily-exercise</b>			
Present	202	14.8	12.9, 16.8
Absent	1165	85.2	83.2, 87.1
<b>FHI</b>			
Satisfactory	803	58.7	56.1, 61.4
Limited	564	41.3	38.6, 43.9
<b>UHI</b>			
Satisfactory	610	44.6	42.0, 47.3
Limited	757	55.4	52.7, 58.0
<b>JHI</b>			
Satisfactory	730	53.4	50.7, 56.1
Limited	637	46.6	43.9, 49.3
<b>AHI</b>			
Satisfactory	658	48.1	45.5, 50.8
Limited	709	51.9	49.2, 54.5
<b>HL status*</b>			
Satisfactory	431	31.5	29.1, 34.1
Limited	936	68.5	65.9, 70.9

\*Mean (SD) value of total HL score was 136 (24.4)

Table 2 shows the self-reported behavioral risk factors, and HL status of the participants. The prevalence of smoking, alcohol consumption and not-taking daily-exercise as reported by the participants were 19.8%, 16.2% and 85.2%, respectively. The proportion of participants who were at satisfactory level in FHI, UHI, JHI, AHI and HL were 58.7%, 44.6%, 53.4%, 48.1% and 31.5%, respectively. HL could significantly prevent the occurrence of behavioral risk factors of NCDs. By improving the HL status of adults up to satisfactory level, the prevalence of ever smoking, ever drinking and not-practicing daily-exercise would be reduced by 34%, 32.1% and 38.9%, respectively. Preventive fractions of satisfactory HL status on these risk factors are shown in Table 3.

HL was significantly related to behavioral risk factors even if age, sex, education status and monthly household's expenditure were adjusted. Association between HL and behavioral risk factors are shown in Tables 4, 5 and 6.

**Table 3: Preventive fractions of being satisfactory level in HL on behavioral risk factors of NCDs.**

Behavioral risk factors	Preventive fraction (%)	
	Point estimate	Interval (95% CI) estimate
Smoking	34.0	9.8, 52.0
Alcohol consumption	32.1	4.9, 52.1
Not-practicing daily-exercise	38.9	15.8, 55.5

**Table 4: Association between HL and smoking.**

Variables	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p value	OR (95% CI)	p value
<b>Sex</b>				
Male	1.00		1.00	
Female	0.06 (0.04, 0.09)	0.000	0.07 (0.05, 0.09)	0.000
<b>Age</b>				
	1.03 (1.02, 1.04)	0.000	1.02 (1.01, 1.03)	0.000
<b>Education<sup>a</sup></b>				
Primary school	1.00			
Middle school	0.93 (0.63, 1.34)	0.719		
High school	1.15 (0.77, 1.73)	0.498		
University	0.88 (0.58, 1.35)	0.563		
<b>Household's expenditure<sup>a</sup></b>				
Sufficient	1.00			
Insufficient	1.07 (0.81, 1.41)	0.640		
<b>Health literacy</b>	0.99 (0.98, 0.99)	0.003	0.99 (0.98, 0.99)	0.003

<sup>a</sup>Not selected for multivariate analysis because p value in univariate analysis was >0.25 (i.e., cut-off points)

**Table 5: Association between HL and alcohol consumption.**

Variables	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p value	OR (95% CI)	p value
<b>Sex</b>				
Male	1.00		1.00	
Female	0.06 (0.04, 0.09)	0.000	0.06 (0.04, 0.09)	0.000
<b>Age<sup>a</sup></b>	1.00 (0.99, 1.01)	0.540		
<b>Education<sup>a</sup></b>				
Primary school	1.00			
Middle school	1.13 (0.72, 1.79)			
High school	1.62 (1.02, 2.57)			
University	1.28 (0.80, 2.06)			
<b>Household's expenditure<sup>b</sup></b>				
Sufficient	1.00			
Insufficient	1.24 (0.91, 1.68)	0.171		
<b>Health literacy</b>	0.99 (0.98, 0.99)	0.011	0.99 (0.98, 0.99)	0.030

<sup>a</sup>Not selected for multivariate analysis because p value in univariate analysis was >0.25 (i.e., cut-off points); <sup>b</sup>Selected for multivariate analysis but not included in the final model

**Table 6: Association between HL and not-practicing daily-exercise.**

Variables	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p value	OR (95% CI)	p value
<b>Sex</b>				
Male	1.00		1.00	
Female	1.96 (1.45, 2.64)	0.000	1.90 (1.40, 2.60)	0.000
<b>Age</b>	0.98 (0.97, 0.99)	0.000	0.98 (0.97, 0.99)	0.000
<b>Education<sup>a</sup></b>				
Primary school	1.00			
Middle school	0.78 (0.50, 1.21)	0.264		
High school	0.83 (0.52, 1.33)	0.437		
University	1.24 (0.75, 2.05)	0.398		
<b>Household's expenditure<sup>b</sup></b>				
Sufficient	1.00			
Insufficient	1.55 (1.14, 2.09)	0.005		
<b>Health literacy</b>	0.98 (0.98, 0.99)	0.000	0.98 (0.98, 0.99)	0.000

<sup>a</sup>Not selected for multivariate analysis because p value in univariate analysis was >0.25 (i.e., cut-off points); <sup>b</sup>Selected for multivariate analysis but not included in the final model

## DISCUSSION

The primary interest of this study was to determine the relationship between HL and behavioral risk factors of NCDs such as smoking, alcohol consumption and not-practicing daily-exercise among adults, and to assess to what extent these behaviors would be reduced by improving the HL status.

The prevalence of smoking habit reported in this study was slightly lower than those found in nation-wide surveys done in Myanmar (19.8% observed in this study compared to about 22% in WHO NCD STEPS survey 2009<sup>16</sup> and Sentinel Prevalence Survey 2011<sup>17</sup>). It was

also lower than global prevalence of smoking (22%).<sup>18</sup> Similarly, the prevalence of drinking habit found in the present study (16.2%) was lower than that revealed in WHO NCD STEPS survey conducted in Myanmar during 2009 (19.1%)<sup>16</sup> and the global prevalence of drinking (38%).<sup>19</sup> These discrepancies may be due to differences in the time of study or in age and sex distribution of the subjects or in data collection method or in operational definition of smoking and drinking used in the studies. Successful implementation of control program for these health risk behaviors may also be responsible for these findings. There was no previous information on the practice of daily-exercise among adults in Myanmar. WHO NCD STEPS survey conducted in Myanmar during

2009<sup>16</sup> measured the physical activity only, not specifically daily-exercise. In the present study, 14.8% of respondents reportedly practiced daily-exercise whereas less than 5% of adults in United States of America practiced daily-exercise.<sup>20</sup> These findings of low level of practicing daily-exercise may be due to being engaged in physically active lives or absence of time to practice for socio-economic reason or absence of intention to practice healthy behaviors.

Health literacy status of Myanmar people is lower than those of Brazilian and British adults. About 68% of Brazilian adults<sup>21</sup> and almost 89% of British adults<sup>22</sup> were at satisfactory level of HL whereas only 31.5% of Myanmar people were at that level. Differences in socioeconomic and education status between study populations may explain these findings. However, only 12% of adults in the United States had a proficient health literacy level.<sup>23</sup> A meta-analysis also reported that the prevalence of low health literacy ranged between 0% and 68%, and pooled (weighted) prevalence was 26%.<sup>24</sup> Therefore, the utilization of different tools in measuring health literacy and/or the use of different cut-off points in categorizing the health literacy status should be taken into consideration when we compare the findings of different studies.

In this study health literacy was significantly associated with behavioral risk factors of NCDs, such as smoking, alcohol drinking and not-practicing daily-exercise. This means that these behavioral risk factors could be prevented by improving health literacy status. These findings are supported by those of previous studies. A study done by Sun et al in 2013 concluded that health literacy is a significant determinant of health behavior.<sup>25</sup> Studies done in UK,<sup>22</sup> and Netherlands<sup>14</sup> also reported that health literacy is significantly associated with smoking and physical activity, respectively. However, a study conducted by Wolf et al. in 2007 revealed that in spite of having significant relationship between health literacy and health risk behaviors such as smoking, alcohol consumption and physical activity in univariate analysis, this association was not significant after adjusting for covariates.<sup>13</sup> Similarly, in some studies, health literacy was not found to be significantly related to smoking<sup>26</sup> and exercise.<sup>22</sup> A study done by Aranha et al. in 2015 also concluded that there was no significant association between health literacy and risk factors of Cardiovascular diseases.<sup>27</sup> Variation in study population or age and sex distribution, and socio-economic status of study population or inclusion/examination of different covariates or utilization of different tools of measurement would explain these inconsistent findings.

## CONCLUSION

Although the reported prevalence of smoking and drinking habits was lower than those of previous studies done in Myanmar, tobacco and alcohol control programs should be enhanced to reduce the extent of current

problem. The practice of regular daily-exercise should be promoted in the community. Health literacy status of community should be assessed, monitored and improved. Because of its preventive effect on modifiable behavioral risk factors, health literacy may be an effective tool in prevention and control of NCDs.

## Limitations

The present study has some limitations which should be considered while interpreting the results. Information on smoking, alcohol drinking and practicing daily-exercise relied on the report of the participants. Besides, the sample may not be representative of all adults of Myanmar, as only those respondents who were willing to disclose information on behavioral risk factors and expenditure of their households could be recruited. Uneven distribution of the sample size among state and regions included in the study may limit the generalizability of the results of the study.

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