



# Health literacy of future healthcare professionals: a cross-sectional study among health sciences students in Nepal

Shyam Sundar Budhathoki<sup>a,\*</sup>, Paras K. Pokharel<sup>a</sup>, Nilambar Jha<sup>a</sup>, Emma Moselen<sup>b</sup>, Robyn Dixon<sup>b</sup>, Meika Bhattachan<sup>a</sup> and Richard H. Osborne<sup>c</sup>

<sup>a</sup>School of Public Health and Community Medicine, B. P. Koirala Institute of Health Sciences, Dharan, Nepal; <sup>b</sup>School of Nursing, University of Auckland, Auckland, New Zealand; <sup>c</sup>Health Systems Improvement Unit, School of Health and Social Development, Centre for Population Health Research, Faculty of Health, Deakin University, Victoria, Australia

\*Corresponding author: Tel: +977 25 525555; Fax: +977 25 520251; Email: ss.budhathoki@gmail.com

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**Background:** There is an assumption that health literacy is higher among health professionals, allowing them to improve the health literacy of their patients. This study explored health literacy profiles of health science students in Nepal, the future health professionals and educators of health literacy.

**Methods:** The multidimensional Health Literacy Questionnaire and demographic questions were administered online to medical and other health science students at the B. P. Koirala Institute of Health Sciences, Dharan, Nepal.

**Results:** More than half (55.8%) of the participants were male, 68.3% were  $\leq 19$  y of age, 62.2% had parents with a university degree, 73.5% were studying undergraduate courses and 61.6% were pursuing medicine. Students reported having moderate support and skills to manage their health. Health was regarded as important to them. They reported a moderate ability to engage with health professionals and the healthcare system. Medical students reported higher scores for all scales except social support for health, which was similar across the groups.

**Conclusions:** Universities should target interventions to improve students' access to health information and to develop students' ability to engage actively with healthcare providers. This will likely produce health professionals with improved health literacy levels who are sensitive to the health literacy needs of their patients from different population groups.

**Keywords:** decision making in health, health literacy, health personnel, medical education, self-management

## Introduction

Health literacy refers to the cognitive and social skills that determine the motivation and ability of individuals that enable them to access, understand and use information in the maintenance and promotion of good health.<sup>1</sup> The concept goes beyond just reading health information and utilizing healthcare services; it refers to the state of empowerment of an individual to be able to access and use health information to improve one's own health and the health of others.<sup>1,2</sup>

Health literacy is a challenge to healthcare provision all over the world. Health literacy is referred to as a priority public health goal for the twenty-first century.<sup>2</sup> People with long-term illness

sometimes have difficulties understanding health information and engaging with healthcare providers.<sup>3</sup> Low uptake of preventive healthcare, inadequate adherence to medication regimens, late presentation to health facilities, poor self-management of chronic diseases, greater communication gaps with healthcare providers, increased morbidity and mortality and the inability of the healthcare system to respond to people's health needs have been linked with low levels of health literacy in populations.<sup>4</sup> Health literacy has been discussed for its potential role in addressing challenges in the management of chronic disease as well as infectious disease, even in low-income countries.<sup>5,6</sup> Creating profiles of health literacy in different populations helps to identify areas that need improving and helps map the focus of the

interventions in order to address the inequalities in health and improve health outcomes.<sup>7,8</sup>

The WHO's Southeast Asia Regional Office Health Literacy Toolkit for Low- and Middle-Income Countries recommends that health literacy principles be used as a key mechanism to improve health equity in the region.<sup>9</sup> Health literacy was also identified as a priority for health promotion at the WHO's recent Shanghai Declaration on promoting health in the 2030 Agenda for Sustainable Development.<sup>10</sup>

The majority of health literacy research has focused on the health literacy of patients and has largely neglected to consider the health literacy of professionals who deal with patients on a daily basis.<sup>11</sup> Since health professionals are expected to educate and improve their patients' health literacy, it seems important to explore whether health professionals themselves have a strong health literacy profile,<sup>12</sup> particularly when research shows that health professionals, even those in high-income nations, need capacity building with regard to their own health literacy.<sup>13-15</sup> Since health professionals typically spend  $\geq 4$  y in university education learning their profession, it makes sense to assess the health literacy profiles of future graduates prior to their entry into the workforce. It is incumbent upon universities that they train health sciences students to ensure the future health workforce is able to understand and respond to the health literacy needs of the communities they will come to serve.<sup>16</sup>

As part of an international collaboration, universities from around the world have begun exploring the health literacy profile of their health professional students.<sup>17,18</sup> The results from these preliminary studies indicate that student levels of health literacy might not be as high as expected. Understanding the health literacy levels of health science students and then addressing any gaps provides a mechanism towards producing professionals who can deliver healthcare effectively.<sup>19</sup> Adding to this growing body of literature, this study aims to establish the health literacy profile of the health science students of the B. P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal. Specifically, it aims to identify areas of health literacy where students may require further support and training and to determine how health literacy varies by academic course as well as the sociodemographic backgrounds of the students.

## Materials and methods

### Study setting

The BPKIHS, located in eastern Nepal, is the oldest and largest health sciences university in Nepal. It is the only health sciences university that offers both undergraduate and postgraduate health sciences courses.<sup>20</sup> The BPKIHS has a community-based curriculum that enables students to receive training at district health facilities.<sup>20,21</sup> Students are from all over Nepal and some parts of India.<sup>20</sup> English has always been the language of instruction for health sciences courses all over Nepal. Undergraduate coursework is 4 y for nursing and allied sciences and 4.5 y for medical and dental sciences. Postgraduate coursework is  $\geq 2$  y, providing a specialist degree in the respective discipline.<sup>20</sup>

### Study design

A cross-sectional study was conducted by administering an online version of the English version of the Health Literacy Questionnaire (HLQ)<sup>4</sup> to health sciences students of the BPKIHS between February and July 2015. This study is a part of the health literacy project exploring the health literacy of students across 19 universities from 10 countries around the world, coordinated by the University of Auckland, Auckland, New Zealand.

### Participants

We invited 700 students at the BPKIHS, including undergraduates and postgraduate students in all health professional training programmes, to take part in the study via e-mail and Facebook messages.

### Data collection

The questionnaire comprised two main sections: demographic information and the HLQ. The HLQ was developed over 6 y in consultation with individuals from the community, health practitioners and policymakers. The tool has undergone psychometric evaluation in a range of contexts,<sup>4,22-24</sup> including in university student settings.<sup>17,18</sup>

The HLQ consists of 44 items across nine scales. Each scale measures conceptually and psychometrically distinct aspects of health literacy. The HLQ reveals the health literacy strengths and weaknesses of individuals and groups, providing a framework for intervention development.<sup>4,25</sup> The scales are listed in Table 1.

For the first five scales, participants were asked to rate 'How strongly you disagree or agree with the following statements?' and to select from the options of 'strongly disagree', 'disagree', 'agree' and 'strongly agree', which were scored from 1 to 4, respectively. For scales six to nine, participants were asked, 'How easy or difficult are the following tasks for you to do now?' and to select from the options 'cannot do', 'very difficult', 'quite difficult', 'quite easy' and 'very easy'; these were scored from 1 to 5, respectively.

Each scale comprises a range of items that have different 'difficulties', i.e. the propensity for a respondent to attend to the response options at the upper end of the scale varies. This was undertaken purposefully during the development of the HLQ to enable the scales to have precision across the breadth of the constructs. Consequently, across scales, given the difference in difficulty, mean scale scores are not directly comparable.

The paper version of the HLQ in English was pretested among 10 university students and 5 researchers (including student educators) in order to explore whether the English HLQ required linguistic or cultural adaptation. Information was collected on the comprehensibility of the questions, students' understanding of questions and reasons for selecting their responses. No changes were deemed necessary. The overall response rate was 59.8%. The response rates across teaching programmes were medicine 60.7%, dentistry 53.8%, nursing 56.5%, public health 70% and allied sciences 90%.

### Data analysis

SPSS 22 (IBM, Armonk, NY, USA) was used to conduct the data analysis. Descriptive statistics, mean scores, SDs and 95% CIs

**Table 1.** The nine scales of the HLQ

- (1) Feeling understood and supported by healthcare providers  
Items cover having at least one healthcare provider they can trust for useful advice and help them understand health information in order to make decisions about their health.
- (2) Having sufficient information to manage my health  
Items cover feeling confident about having all the information they need to manage their health and make healthcare decision.
- (3) Actively managing my health  
Items cover the ability to recognize the importance of and ability to take responsibility for their own health using proactive approaches.
- (4) Social support for health  
Items cover the availability of a social system to provide them with the support they need for their health.
- (5) Appraisal of health information  
Items cover the participant's ability to identify good information sources and to resolve conflicting information by themselves or with the help of others.
- (6) Ability to actively engage with healthcare providers  
Items cover the participant's ability to proactively engage with healthcare providers when needed for their health.
- (7) Navigating the healthcare system  
Items cover the ability to find out about health services and support that they may need for their health.
- (8) Ability to find good health information  
Items cover the ability to use a diverse range of resources to find information and stay up to date.
- (9) Understanding health information well enough to know what to do  
Items cover the ability to understand written information in relation to their health and complete the forms as necessary.

were generated for the HLQ scales. For inferential statistics, the sociodemographic variables were converted into dichotomous variables. For age category, 19 y was used as a cut-off, with the justification that older adolescents as a single group compared with older youths and adults. For the parents' highest level of education, 'not completed high/secondary school', 'completed high/secondary school' and 'trade certificate/diploma' were categorized as a single group, as these qualifications make individuals eligible for non-officer-level jobs only. Bachelor's degree and above were grouped into a single category as university education, as both of these groups are eligible for officer-level and above jobs in Nepal. Owing to the low frequencies of the participants in categories other than medicine individually, we grouped them into 'other' courses to compare with medicine. These categories were also used to allow for comparison with studies from other countries implementing similar HLQ research protocols. The independent samples t-test was used to explore HLQ differences within demographic variables, including age ( $\leq 19$  y,  $\geq 20$  y), sex (male, female), parents' education (no university education, university education), level of study (undergraduate, postgraduate) and programme of study (medicine, other). Because assumptions of normal distribution were not met for all scales, the robust Welch method of analysis was used. Effect size (Cohen's *d*) was calculated for mean differences between demographic groups.

## Results

We recruited 419 participants; more than half were male (55.8%) and the majority (68.3%) were  $\leq 19$  y of age, had parents who had attained a bachelor's degree or above (62.2%) and were studying in an undergraduate-level programme at the BPKIHS (73.5%). Close to two-thirds (61.6%) were studying

medicine and the remaining third (38.4%) were studying in other programmes such as dentistry (18.4%), nursing (12.4%), public health (3.3%) and other allied sciences (4.3%). Nearly all of the participants lived in Dharan (99.8%) and most (90.0%) were citizens of Nepal. Most participants (87.4%) reported that they do not suffer from any long-term illness or disability. Table 2 shows the details of the participant characteristics.

The mean scores from each HLQ scale are presented in Table 3. Mean (SD) scores across the first five scales, which used a 4-point response scale, indicated that, on average, students agreed with the statements (the scores clustered around a score of  $\leq 3$ ) rather than strongly agreeing or disagreeing. The lowest score was 2.80 (SD 0.50) for '2. Having sufficient information to manage my health', whereas the highest score was 3.02 (SD 0.48) for '4. Social support for my health'.

For the last four scales, which used a 5-point response scale, the scores centred around 3.5, i.e. students generally found the tasks to be somewhere between quite difficult and quite easy. The lowest mean score was 3.43 (SD 0.71) for '6. Ability to actively engage with healthcare providers' and the highest was 3.66 (SD 0.59) for '9. Understanding health information well enough to know what to do'.

Overall, across the scales, there were no floor or ceiling effects. Very few students scored towards the top of the scales and even fewer students scored towards the bottom. The distribution of HLQ scores is shown in Figure 1.

The HLQ scores across demographic variables are shown in Table 4. Males had somewhat higher mean (95% CI) scores of health literacy than females for '2. Having sufficient information to manage my health' (effect size [ES] 0.24 [95% CI 0.19 to 0.29]), '6. Ability to actively engage with healthcare providers' (ES 0.21 [95% CI 0.15 to 0.28]) and '8. Ability to find good health information' (ES 0.24 [95% CI 0.18 to 0.31]). Participants who were  $\geq 20$  y of age had higher scores than younger

students for '1. Feeling understood by my healthcare professional' (ES  $-0.24$  [95% CI  $-0.29$  to  $-0.19$ ]) and '2. Having sufficient information to manage my health' (ES  $-0.26$  [95% CI  $-0.31$  to  $-0.21$ ]). Participants whose parents had attained a university level of education were more likely to report that they

could '7. Navigate the healthcare system' with ease compared with students whose parents had not attained a university education (ES  $-0.28$  [95% CI  $-0.33$  to  $-0.22$ ]). Postgraduate students were more likely to report higher '1. Feeling understood by my healthcare professional' (ES  $-0.19$  [95% CI  $-0.24$  to  $-0.13$ ]), '2. Having sufficient information to manage my health' (ES  $-0.30$  [95% CI  $-0.35$  to  $-0.25$ ]) and '7. Able to navigate the healthcare system' (ES  $-0.28$  [95% CI  $-0.33$  to  $-0.22$ ]) than their undergraduate counterparts. Compared with students who are currently studying in other programmes such as dentistry, nursing, public health and allied sciences, students who were studying medicine had higher health literacy scores across all the scales except for their '5. Ability to appraise health information'. The largest differences (ES  $>0.40$ ) were seen in scales '2. Having sufficient information to manage my health' (ES  $0.44$  [95% CI  $0.40$  to  $0.49$ ]) and '7. Able to navigate the healthcare system' (ES  $0.46$  [95% CI  $0.40$  to  $0.52$ ]).

**Table 2.** Demographic data of health sciences students (n=419)

Demographic characteristics	n	%
Sex		
Male	234	55.8
Female	185	44.2
Age (y)		
15–19	286	68.3
20–24	100	23.9
$\geq 25$	33	7.9
Parents' highest level of education <sup>a</sup>		
Did not complete high/secondary school	41	9.8
Completed high/secondary school	65	15.6
Attained a trade certificate or diploma	52	12.5
Attained a bachelor's degree from a university	117	28.1
Attained a master's degree from a university	120	28.8
Attained a doctoral-level qualification from a university	22	5.3
Undergraduate or postgraduate		
Undergraduate	308	73.5
Postgraduate	111	26.5
Programme of study		
Medicine	258	61.6
Dentistry	77	18.4
Nursing	52	12.4
Public health	14	3.3
Other allied sciences	18	4.3

<sup>a</sup>Two participants did not know their Parents' highest level of education.

## Discussion

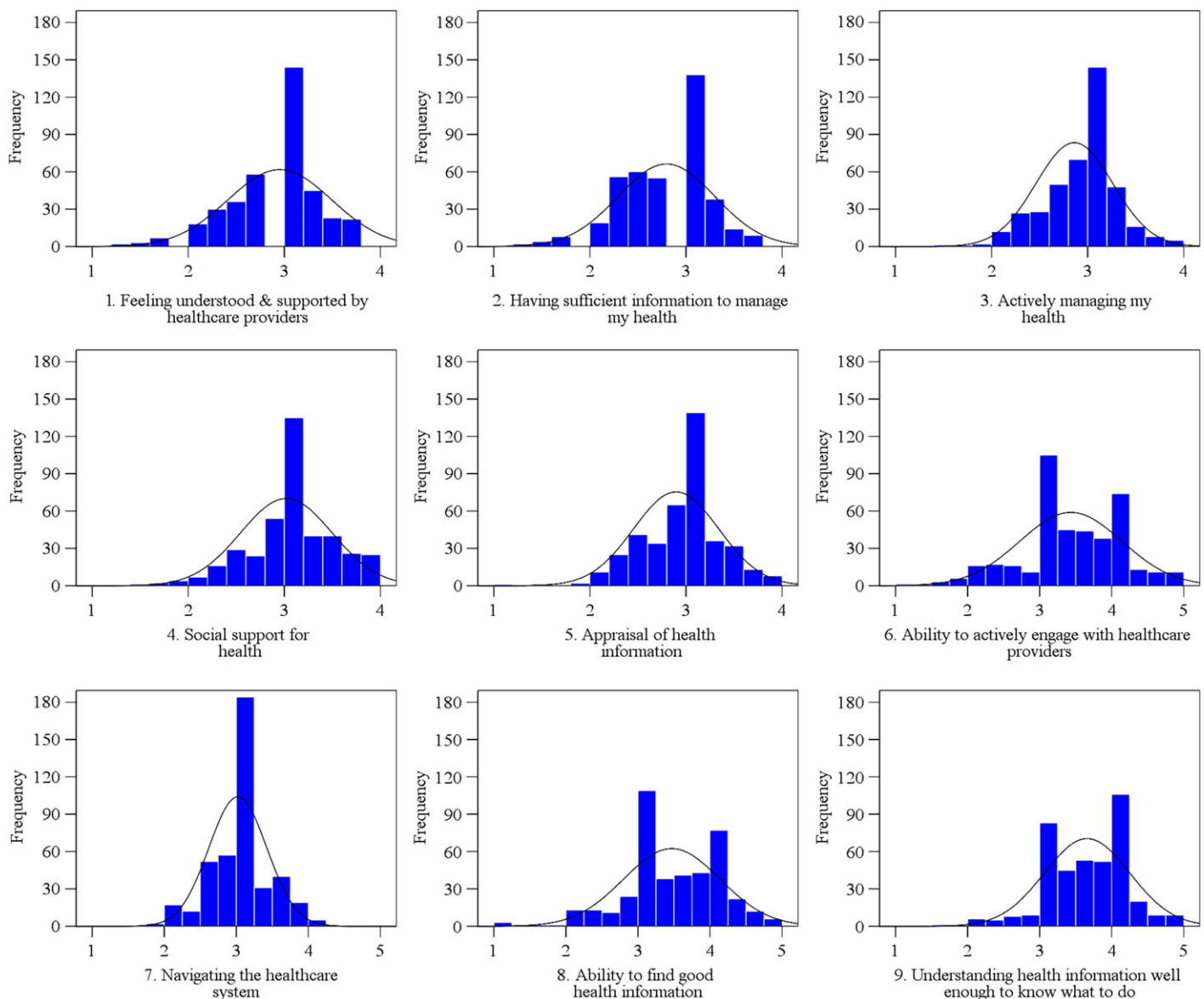
With a multidimensional health literacy assessment tool, the health literacy strengths and challenges of a large group of health sciences university students were profiled. Overall, most students had only moderate health literacy, and few individuals reported high health literacy. Health literacy weaknesses were more common among students from courses other than medicine. Levels of health literacy varied among different subgroups within a population, providing insights into potential intervention points to improve student health and welfare. The data also provide insights into how health professional training could be strengthened.

Across the first five scales, where the students report their agreement concerning whether they have the support and skills to manage their health and that they see their health as important to them, health sciences students were generally strongest in their '4. Social support for health'. This likely reflects the close social networks among the students and is a characteristic of Nepalese society, with its collectivist structure. Owing to the collectivist nature of the Nepalese community, it is a

**Table 3.** HLQ scores for the overall sample (n=419)

Scale	Mean	SD	95% CI
1. Feeling understood and supported by healthcare professional	2.95	0.54	2.90 to 3.00
2. Having sufficient information to manage my health	2.80	0.50	2.75 to 2.85
3. Actively managing my health	2.86	0.42	2.82 to 2.90
4. Social support for health	3.02	0.48	2.97 to 3.07
5. Appraisal of health information	2.90	0.44	2.85 to 2.94
6. Ability to actively engage with healthcare providers	3.43	0.71	3.36 to 3.50
7. Navigating the healthcare system	3.48	0.63	3.42 to 3.54
8. Ability to find good health information	3.47	0.67	3.40 to 3.54
9. Understanding health information well enough to know what to do	3.66	0.59	3.60 to 3.72

For scales 1–5, scores ranged from 1 to 4. For scales 6–9, scores ranged from 1 to 5.



**Figure 1.** Distribution of HLQ scores for overall respondents in this study (n=419).

commonly accepted belief that one's family, friends and neighbours will provide help immediately when in need.<sup>26,27</sup> Healthcare seeking is commonly a household decision, as the role of the family is crucial in healthcare decision making in Nepal.<sup>6</sup> Moreover, the BPKIHS is a residential setting where all the students and teachers live on campus. Students had comparatively low scores in '1. Having sufficient information to manage their health'. This is surprising, as health sciences students are expected to have good access to information on health. It seems that they may lack the skills to facilitate the translation of health information into skills in order to manage their own health. The practice of using the internet to find health resources was found to be low among the health sciences students at the BPKIHS.<sup>28</sup> The students also reported some difficulties in '5. Appraisal of health information'. The experiences of these students with a problem-based health sciences curriculum<sup>29</sup>

during their respective courses may have helped them realize that making accurate judgements is difficult.

Across scales six to nine, which examine participants' beliefs in their ability to carry out a range of behaviours, the students had the highest score for '9. Understanding health information well enough to know what to do'. As university students who are training to become health professionals, it is not surprising that students in this study are most comfortable with their understanding of health information. The lowest scale score was for '6. Ability to actively engage with healthcare providers'. The low score here suggests students are passive in their approach to healthcare, i.e. they are unable to ask for clarification or information about health and healthcare options. In this study setting, the clinicians and nurses in the teaching hospital are the teachers of these students. There exists a strong cultural demarcation, where doctors have a higher social status than



**Table 4.** Association between HLQ scores and sociodemographic characteristics

Characteristics	1. Feeling understood and supported by healthcare professionals	2. Having sufficient information to manage my health	3. Actively managing my health	4. Social support for health	5. Appraisal of health information	6. Ability to actively engage with healthcare professionals	7. Navigating the healthcare system	8. Ability to find good health information	9. Understand health information enough to know what to do
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
<b>Sex</b>									
Male (n=234)	2.97 (0.51)	<b>2.85 (0.50)</b>	2.87 (0.41)	3.03 (0.43)	2.91 (0.41)	<b>3.50 (0.68)</b>	3.53 (0.57)	<b>3.54 (0.60)</b>	3.67 (0.55)
Female (n=185)	2.93 (0.58)	<b>2.73 (0.51)</b>	2.84 (0.43)	3.01 (0.54)	2.88 (0.49)	<b>3.35 (0.74)</b>	3.42 (0.68)	<b>3.38 (0.74)</b>	3.64 (0.64)
Effect size	0.07	<b>0.24</b>	0.07	0.04	0.07	<b>0.21</b>	0.18	<b>0.24</b>	0.05
95% CI	0.02 to 0.13	<b>0.19 to 0.29</b>	0.03 to 0.11	0 to 0.09	0.03 to 0.11	<b>0.15 to 0.28</b>	0.12 to 0.24	<b>0.18 to 0.31</b>	-0.01 to 0.12
<b>Age (y)</b>									
≤19 (n=286)	<b>2.91 (0.56)</b>	<b>2.76 (0.52)</b>	2.83 (0.45)	3.02 (0.50)	2.87 (0.46)	3.46 (0.73)	3.46 (0.66)	3.46 (0.70)	3.66 (0.61)
≥20 (n=133)	<b>3.04 (0.50)</b>	<b>2.89 (0.46)</b>	2.90 (0.46)	3.02 (0.43)	2.95 (0.39)	3.38 (0.67)	3.54 (0.54)	3.48 (0.61)	3.66 (0.57)
Effect size	<b>-0.24</b>	<b>-0.26</b>	-0.16	0.00	-0.18	0.11	-0.13	-0.03	0.00
95% CI	<b>-0.29 to -0.19</b>	<b>-0.31 to -0.21</b>	0.20 to -0.11	-0.05 to 0.05	-0.23 to -0.14	0.05 to 0.18	-0.19 to -0.07	-0.09 to -0.03	-0.06 to 0.06
<b>Parents' education</b>									
No university education (n=158)	2.90 (0.55)	2.74 (0.53)	2.86 (0.43)	2.98 (0.51)	2.88 (0.50)	3.37 (0.73)	<b>3.38 (0.68)</b>	3.41 (0.74)	3.61 (0.64)
University education (n=259)	2.99 (0.53)	2.83 (0.49)	2.86 (0.41)	3.05 (0.45)	2.91 (0.41)	3.47 (0.70)	<b>3.55 (0.58)</b>	3.50 (0.63)	3.69 (0.56)
Effect size	-0.17	-0.18	0.00	-0.15	-0.07	-0.14	<b>-0.28</b>	-0.13	-0.14
95% CI	-0.22 to -0.12	-0.23 to -0.13	-0.04 to -0.04	-0.19 to -0.10	-0.11 to -0.03	-0.21 to -0.07	<b>-0.33 to -0.22</b>	-0.20 to -0.07	-0.19 to -0.08
<b>Undergraduate/postgraduate</b>									
Undergraduate (n=308)	<b>2.92 (0.54)</b>	<b>2.76 (0.51)</b>	2.84 (0.44)	3.01 (0.49)	2.88 (0.45)	3.44 (0.72)	<b>3.44 (0.65)</b>	3.44 (0.68)	3.64 (0.60)
Postgraduate (n=111)	<b>3.02 (0.54)</b>	<b>2.91 (0.47)</b>	2.91 (0.36)	3.04 (0.44)	2.95 (0.41)	3.43 (0.68)	<b>3.61 (0.53)</b>	3.54 (0.64)	3.71 (0.57)
Effect size	<b>-0.19</b>	<b>-0.30</b>	-0.17	-0.06	-0.16	0.01	<b>-0.28</b>	-0.15	-0.12
95% CI	<b>-0.24 to -0.13</b>	<b>-0.35 to -0.25</b>	-0.21 to -0.13	-0.11 to -0.02	-0.20 to -0.04	-0.05 to 0.08	<b>-0.33 to -0.22</b>	-0.21 to -0.09	-0.18 to -0.06
<b>Programme</b>									
Medicine (n=258)	<b>3.03 (0.50)</b>	<b>2.88 (0.50)</b>	<b>2.89 (0.41)</b>	<b>3.07 (0.45)</b>	2.91 (0.42)	<b>3.52 (0.73)</b>	<b>3.59 (0.62)</b>	<b>3.56 (0.64)</b>	<b>3.73 (0.59)</b>
Other (n=161)	<b>2.83 (0.58)</b>	<b>2.66 (0.49)</b>	<b>2.80 (0.43)</b>	<b>2.95 (0.51)</b>	2.87 (0.48)	<b>3.29 (0.66)</b>	<b>3.31 (0.60)</b>	<b>3.33 (0.70)</b>	<b>3.55 (0.59)</b>
Effect size	<b>0.38</b>	<b>0.44</b>	<b>0.22</b>	<b>0.25</b>	0.09	<b>0.33</b>	<b>0.46</b>	<b>0.35</b>	<b>0.31</b>
95% CI	<b>0.33 to 0.43</b>	<b>0.40 to 0.49</b>	<b>0.18 to 0.23</b>	<b>0.21 to 0.30</b>	0.05 to 0.13	<b>0.26 to 0.40</b>	<b>0.40 to 0.52</b>	<b>0.28 to 0.41</b>	<b>0.25 to 0.36</b>

Results in bold have a p-value <0.05 for the difference in means (using a robust analysis of variance). Effect size was calculated using Cohen's d for a standardized difference in means. Interpretation of effect size: small, ES>0.20-0.50 SD; medium, ES approximately 0.50-0.80 SD; large, ES>0.80 SD.

patients and teachers are higher than students, which is a consistent observation in Asian cultures.<sup>30</sup> This factor may create a gap in two-way communication between the students and the healthcare service providers.

This study shows some health literacy differences across the demographic groups. There are differences in the health literacy profiles of the university students across sex, age, parents' education, level of university study and the disciplines. Compared with female students, male students generally reported higher mean scores in all nine scales, particularly '2. Having sufficient information to manage my health' and '6. Ability to actively engage with healthcare providers'. Nepal is a predominantly patriarchal society,<sup>31</sup> which may have influenced their answers, as the involvement of women in household decision making is low in Nepal. Households tend to favour male children compared with female children for healthcare services in Nepal.<sup>32,33</sup> Males may also rate themselves higher in these scales compared with females, with the perception that boys must know more and should be capable of managing their own health. The trend of higher scores in male students compared with females was also observed in China;<sup>17</sup> however, female students scored higher in Denmark<sup>34</sup> and the USA.<sup>18</sup> This could be due to the sociocultural differences between Nepal and Denmark or the USA.

As expected, health literacy is higher in older students. With increasing age, students are more likely to have had more experience with the healthcare system. This finding is consistent with similar studies in other parts of the world.<sup>17,18</sup> Health literacy scores were also higher in postgraduate students compared with undergraduate students. This was also found among university students in China, where the scores increased with increasing levels of education.<sup>17</sup>

Students with parents who had completed a university education had higher health literacy scores in our study. Higher education has been commonly found to be associated with higher health literacy.<sup>17,18</sup> It is likely that more educated parents have greater access to health services and may actively seek to improve their children's knowledge of health and the healthcare system.<sup>35</sup>

There was a very strong pattern, across eight of the nine scales of the HLQ, that students enrolled in medicine courses have higher health literacy compared with students in other health science courses. Clinical medicine, as an academic discipline, is known to be better developed compared with other health disciplines in Nepal.<sup>36</sup> This is likely to result in medical students having better access to and an understanding and appraisal of the information to actively make healthcare-related decisions compared with other disciplines.

There are many students with low health literacy, as shown by the distributions in Figure 1, which calls for interventions to increase the health literacy of these students. The health sciences students have low scores despite having many educational components focusing on health and disease in their curriculums. Healthcare professionals teach the courses and the students have access to hospitals on their university campus. Educating health sciences students about health literacy and creating a health-literacy-responsive university health service is a potential path to supporting students and generating more responsive healthcare professionals.<sup>8,18</sup>

It seems reasonable to expect that health sciences students would have stronger health literacy profiles compared with university students in other disciplines. Given that the health sciences students in our sample had only moderate health literacy, it is likely that students from other disciplines, and in other non-medical universities, could have even lower health literacy.

Understanding the health literacy needs of all students in our universities seems necessary so that responsive student health services can be provided. If the students are better supported to look after themselves, they are likely to perform better academically and acquire skills to engage in health promotion in the community during their careers. This is also likely to be important for the reputation of the university—if the healthcare professionals graduating from a university are more responsive to the needs of the community, they are more likely to be highly regarded. While there are differences in health literacy scores in the subgroups of students, given the strong link between health literacy and health equity, it is important for universities to consider programme-wide health literacy interventions.

### Limitations

The e-mail and e-survey approach may have discouraged some students with lower internet skills and possibly a lower health literacy to take part, so they could have been under-represented. Future studies should seek to employ face-to-face interviews, including students with disabilities. The grouping of all health sciences disciplines except medicine into one category compromised our opportunity to compare between health sciences disciplines other than medicine. We did not collect reliable data about the economic status of the students in our study or other socioeconomic data apart from parental education. Given the strong link between health literacy and health equity, future work will be strengthened through the collection of a wider range of these variables.

### Conclusions

Given the links between health literacy, health and health inequality, there is a need for the university to consider interventions to improve the health literacy of students. There is a need to pay attention to the health literacy needs of university students, especially female students and those enrolled in disciplines other than medicine. Further research on ways to improve communication between health science students and healthcare providers who are their teachers is important. The data from this study provide guidance for improving student health services and the teaching curriculum. A considered response to the health literacy strengths and limitations of all students should then generate a stronger health workforce.

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input from PKP, NJ, RD, MB and RHO. All authors performed draft editing and final draft preparation. All authors read and approved the final manuscript. SSB and RHO are the guarantors of the paper.

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