Comprehensive Health Literacy Among Undergraduates: A Ghanaian University-Based Cross-Sectional Study

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ABSTRACT

Background: Health literacy is the ability to access, understand, and use health information for enhancing health. Health literacy research has led to the understanding of its associations with health outcomes and health-promoting behavior. Health literacy is essential to health promotion, but a gap exists in the knowledge of health literacy in Ghana, especially among university students. **Objective**: This study aimed to ascertain the levels of health literacy and its sociodemographic determinants among undergraduate university students of Kwame Nkrumah University of Science and Technology. **Methods**: A cross-sectional survey was conducted using multistage cluster sampling to select 500 students from six colleges of the University; of those, 485 were included for data analysis after exclusions. Health literacy was assessed using the 16-item short version of the European Consortium for Health Literacy Questionnaire. **Key Results**: About 55% of students were found to have limited health literacy (20.4% had "inadequate" health and 34.2% had "problematic" health literacy). Students performed low on health literacy dimensions dealing with the access and appraisal of health information, especially relating to mental health. Multivariate logistic regression showed that factors associated with limited health literacy differed for each gender but generally included college type, self-esteem, health status, and year of study. **Conclusions**: Interventions need to be implemented to improve students' health literacy. **[*HLRP: Health Literacy Research and Practice*. 2019;3(4):e227-e237.]**

Plain Language Summary: The study reveals that health literacy may be a challenge even for the educated in Ghana especially among vulnerable people. University students should not be assumed to be health-literate and interventions that will help enhance their literacy in health should be implemented.

> 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 judgements and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course (Sorensen et al., 2012).

This comprehensive view of health literacy is distinct from the focus on reading and writing skills relating to health (functional health literacy).

Africa has a different social structure compared with the western world and presents a unique landscape of rich culture and traditional beliefs and practices, some of which have health implications for infectious as well as noncommunicable diseases. Misconceptions about health, diseases, and the health care system still abound. These factors coupled with low literacy rates mean that there is the need for research into health literacy that can inform local and context-based interventions. To date, empirical research specifically assessing the health literacy levels of African populations continent-wide is rare. Secondary analysis using demographic and health survey data that align with health literacy demonstrate an overall prevalence of high health literacy of 35.2% (McClintock, Schrauben, Andrews, & Wiebe, 2017).

In Ghana, as in other countries of Africa, there is no nationwide assessment of health literacy. However, some researchers have examined aspects of health literacy among

specific groups. For example, Amoah, Phillips, Gyasi, Koduah, and Edusei (2017) examined health literacy and self-perceived health status among street youth (i.e., people between ages 12 and 24 years who are either homeless or precariously housed and spend the majority of their time working and engaging in street life after rebelling family life) and found that 78% had limited health literacy. In a recent study conducted in the Ashanti Region of Ghana, 62.8% of participants were found to be limited in health literacy (Amoah, 2018). Health literacy has recently been shown to be important for improving universal health coverage (UHC) in Ghana (Amoah & Phillips, 2018). It was argued that improving UHC must not only focus on providing infrastructure but also equipping people to be able to explore, understand, and use existing channels to enhance their health. One of the challenges facing developing countries is the rising burden of noncommunicable diseases (NCDs). In Ghana, health literacy has been recently found to be associated with some behavioral risks factors of NCDs such as excessive alcohol intake among youth (Amoah, Koduah, Gyasi, Gwenzi, & Anaduaka, 2018).

A person's educational level of attainment has a strong association with their level of health literacy (Clouston, Manganello, & Richards, 2017; Levin-Zamir, Baron-Epel, Cohen, & Elhayany, 2016; Paasche-Orlow, Parker, Gazmararian, Nielsen-Bohlman, & Rudd, 2005; Sorensen et al., 2015). As such, university students may reasonably be expected to demonstrate good levels of health literacy. Globally, few studies have examined health literacy among university students. Furthermore, there appear to be regional variations in health literacy levels among undergraduate students. Some studies indicate good levels of health literacy among university students (Hansen, Shneyderman, & Belcastro, 2015; Ickes & Cottrell, 2010; Joseph, Fernandes, Hyers, & O'Brien, 2016; Vozikis, Drivas, & Milioris, 2014), whereas others indicate poor to moderate levels of health literacy among students (Runk, Durham, Vongxay, & Sychareun, 2017; Wang et al., 2014; Zhang et al., 2016a; Zhang et al., 2016b). In Ghana, there are currently no studies evaluating the health literacy levels among university students. The paucity of research in this area makes regional and global comparisons as well as policy decisions difficult. This study, therefore, sought to answer the research question, "What is the level of comprehensive health literacy and what factors determine limited health literacy among undergraduate students at the Kwame Nkrumah University of Science and Technology (KNUST)?"

METHODS

Study Population

The study employed a cross-sectional design to collect data about health literacy and study characteristics of participants as part of a broader study evaluating health literacy and physical activity. The study was conducted at KNUST, which has a total enrollment of 41,418 students of whom 35,617 are undergraduates (about 37% are women and 63% men). Approximately 88% of regular undergraduates are between ages 18 and 25 years. KNUST has six semiautonomous colleges: College of Agriculture and Natural Resources, College of Art and Built Environment, College of Engineering, College of Health Sciences (COHS), College of Humanities and Social Sciences, and College of Science.

The sample size was computed using the formula for estimating proportion of binary outcome (Hajian-Tilaki, 2011). The study minimum sample size of 460 was determined, assuming a 95% confidence interval (CI), an

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anticipated frequency of 50%, and a nonresponse rate of 10%. For practical reasons, however, a sample of 500 students was selected. All undergraduate students, between ages 16 and 35 years, from any of the six colleges of KNUST were eligible for inclusion. Postgraduate students, undergraduates enrolled in distance learning, and students undertaking affiliate programs were excluded. Questionnaires were distributed to colleges in a proportionate manner according to their population size. Within each college, a multistage cluster sampling technique was used to randomly select a faculty, a program, and a class. This was repeated until the college sample size was achieved. All students within selected classes who met the eligibility criteria were given questionnaires unless they declined (two students). Data collection occurred from February 2017 to March 2017 and questionnaires were self-administered after a uniform briefing session. Informed consent was obtained from students who were willing to participate. The study protocol was approved by the Committee on Human Research, Publications and Ethics of KNUST (CHRPE/AP/239/17).

MEASUREMENT

Dependent Variable

The 16-item short version of the European Consortium for Health Literacy Questionnaire (HLQ-EU-16) was used to assess health literacy. The tool was chosen because it measures comprehensive health literacy, it is relatively short, can be self-administered, and is already validated across different countries and populations (Pelikan, Röthlin, & Ganahl, 2014). The 16 items of the questionnaire focus on the four health literacy dimensions according to the integrated model of health literacy by Sørenson et al. (2012) which includes the ability to access, understand, appraise, and apply health information across the three domains of health care, disease prevention and health promotion. The 16 items have four responses (*very easy*, *easy*, *difficult*, and *very difficult*) with a *don't know* option, which is usually indicated by the interviewer only when respondents trigger that. Because this study was self-administered, the *don't know* option was included resulting in five responses for each item. All responses were given a numerical code as follows: 1, *very difficult*; 2, *difficult*; 3, *easy*; 4, *very easy*; and 0, *don't know* (coded as missing in the analyses). Mean scores were calculated for all items on the scale and then converted to an index using the formula below per recommendations of the HLS-EU consortium (Pelikan et al., 2014): *Health literacy index score = (mean-1) * (50/3)*, where mean is the mean of items on the scale, 1 = the minimal possible value of the mean (leads to a minimum value of the index of 0), 3 = the range of the mean, and 50 = the chosen maximum value of the new index scores.

The index scores, therefore, ranged from a minimum of 0 to a maximum of 50. To be valid for index score generation at least 13 items must have been answered. Therefore, scores could not be calculated for 15 respondents and were excluded from further analysis resulting in an effective response rate of 93.8%. The index scores were recoded into four health literacy categories as follows (according to thresholds established by the HLS-EU consortium): *excellent* (>42-50); *sufficient* (>33-42); *problematic* (>25-33); and *inadequate* (0-25). For logistic regression analyses, the health literacy categories were dichotomized as follows: *limited* (inadequate and problematic health literacy categories combined) and *adequate* (sufficient and excellent health literacy categories combined) health literacy. The HLS-EU-16 questionnaire showed good internal consistency for our sample with a Cronbach's alpha of 0.85.

Independent Variables

The study instrument obtained anonymous data on students' course and year of study, age, gender, highest educational level of parents, and place of residence. Others included a self-rating of their financial status (on a scale of 1 to 6 from *very poor* to *very rich*, based on income they receive from all sources); self-rated self-esteem (a single-item on a scale of 1 to 7 from *not very true of me* to *very true of me* in response to the item "I have very high self-esteem"); and self-rated overall health status (as *excellent*, *good*, *moderate*, *poor*, and *very poor*). The single-item self-esteem scale used in this study has been validated against the Rosenberg scale (Robins, Hendin, & Trzesniewski, 2001). For simpler analyses, some of the variables were re-categorized. Age was re-categorized into a new variable for students up to age 21 years and those older than 21 years. The highest educational levels of parents were also categorized into a new variable by combining basic and no education into "low educated" and secondary and tertiary into "high educated." The self-rated financial status on a scale of 1 to 6 was used to create a new variable as follows: 1-2 (*poor*) and 3-6 (*good*). Self-rated self-esteem on a scale of 1 to 7 was dichotomized into low and high self-esteem if the rated score was up to 4 or above 4, respectively. First and second years were classified as "lower classes" and third- and fourth-year students as "upper classes." Place of residence was classi-

fied as "non-rural" (urban/peri-urban) and "rural." Finally, for self-rated health status, the responses *excellent* and *good* health were combined into a new category (*satisfactory* health) while all other responses were categorized as *unsatisfactory* health status.

STATISTICAL ANALYSES

Descriptive statistics were used for the characteristics of the sample. Categorical variables were presented as frequencies, whereas the means and standard deviations (*SD*) of continuous variable(s) were presented. Health literacy index scores were presented as a mean and *SD* for the overall sample and for subgroups as well as percentages for the categories based on thresholds of the European Health Literacy Consortium. Two-tailed Student's *t*-test was used to test for significance in mean differences in health literacy index scores. To assess the association of limited health literacy with study characteristics, robust cluster logistic regression models were calculated accounting for possible dependencies within the same course of study. Variables that were significantly associated with limited health literacy in bivariate analyses were included in the multivariate model. The odds ratio (OR), *p* values, and 95% CI were reported for all regression models. Statistical analyses were conducted with the statistical program Stata/IC version 15.1 and the significance level was set at $p < .05$ for all analyses.

RESULTS

A total of 485 students were included in the analysis with a mean age of 21.6 years (*SD* 3.2) and with about 58% of the students being males. The characteristics of the sample are detailed in **Table 1**.

The overall mean health literacy score was 32.2 (*SD* 8) **(Table 2)**. The COHS had a significantly higher mean compared to the other colleges. Upper classes had significantly higher mean scores than lower classes. The mean scores were also significantly higher for students of good financial status, satisfactory health status, and high self-esteem compared to their counterparts of poor financial status, unsatisfactory health status, and low self-esteem, respectively. Considering the health literacy categories, more than one-half (54.6%) of the students had limited health literacy and about 1 of every 5 students had inadequate health literacy. Limited health literacy among male students was 59% compared to 48.6% for female students. Subgroups with the highest percentage of limited health literacy were students of poor financial status and students with low self-esteem (82.4% and 80%, respectively).

From bivariate analyses, limited health literacy was associated with gender, year of study, type of college, health status, financial status, and self-esteem level. The unadjusted odds ratios for the whole sample as well as the stratified analyses are shown in **Table 3**.

The multivariate logistic regression demonstrates that for the whole sample the college type, year of study, health status, and self-esteem were significantly associated with limited health literacy **(Table 4)**. Students of the lower years are about 1.7 times more likely to have limited health literacy compared to students of upper years (95% CI [1.05, 2.69]). Similarly, students belonging to non–health-related colleges had higher odds of having limited health literacy compared to students who belonged to the COHS (OR 1.78, 95% CI [1.22, 2.59]). Students who perceived their health to be unsatisfactory were 2 times more likely to have limited health literacy compared to students who perceived their health to be satisfactory (95% CI [1.24, 3.65]). Students of low self-esteem were more likely to have limited health literacy compared to students of high self-esteem (OR 3.47, 95% CI [1.38, 8.72]). In the stratified analyses, college type and year of study were found to be associated with limited health literacy among male students. Among the female students, however, college type, health status, and self-esteem were the factors that showed significant association with limited health literacy.

DISCUSSION

The study aimed to determine comprehensive health literacy levels among undergraduate students of KNUST and ascertain the association between study characteristics and limited health literacy. Our findings indicate that 54.6% of the students had limited health literacy with a mean score of 32.2. In Europe, limited health literacy was found in 47.6% of a general population sample achieving mean score of 33.8 (Sorensen et al., 2015). Furthermore, university-based studies, especially in the United States and Canada, have reported better levels of health literacy (about 7%-15% limited health literacy), although most of these studies relate to functional rather than comprehensive health literacy (Hansen et al., 2015; Ickes & Cottrell, 2010; Joseph et al., 2016). Students mainly struggled with health literacy items dealing with judging if a second opinion is necessary from another health care professional and finding information about the treatment of mental health diseases such as depression and stress **(Table A)**. The concept of health literacy-friendly settings should be introduced into health care facilities to remove existing barriers to health literacy (Kickbusch, Pelikan, Apfel, & Tsouros, 2013). Our sample, however, showed better health literacy than street youth in Kumasi among whom 78% had limited health literacy (Amoah et

al., 2017). The observed difference between the two studies is not surprising as most of the street youth had basic education.

The study findings show significant differences in health literacy among different colleges and year groups and by self-esteem, health, and financial status. In multivariate analyses, college type, year groups, self-esteem, and health were also found to be significantly associated with limited health literacy. Health literacy was significantly higher among COHS students. Joseph et al. (2016) also found that students taking health-related majors had higher mean scores for functional health literacy than non–health-related majors. Students from health-related courses naturally are acquainted with more health-related information, the health care setting, issues of health promotion, and disease prevention compared to students from non–health-related programs. The health literacy mean scores were significantly higher among upper classes compared to lower classes. These various academic levels reflect, albeit imprecisely, increasing levels of education within the cohort of tertiary students. Therefore, it is not surprising that students in upper classes had higher mean scores as health literacy is closely associated with the level of educational attainment. Most university-based health literacy studies have demonstrated increasing health literacy with an increase in academic level (Hansen et al., 2015; Wang et al., 2014; Zhang et al., 2016a; Zhang et al., 2016b). There was a significant difference in health literacy mean scores based on the financial status of students with poorer students having significantly lower mean scores. This is consistent with the results of some studies conducted among university students (Zhang et al., 2016a; Zhang et al., 2016b). However, financial status was not independently associated with limited health literacy in our study. This finding is inconsistent with most studies that show a strong association of financial status with health literacy (Sorensen et al., 2015; Vogt, Schaeffer, Messer, Berens, & Hurrelmann, 2018). Students who reported high self-esteem levels had higher mean health literacy scores than their counterparts who rated themselves as having low self-esteem. Self-esteem has rarely been studied in relation to health literacy and has not been fitted in most health literacy conceptual models. However, some longitudinal studies suggest that low self-esteem may be a predictor of poor health outcomes (Trzesniewski et al., 2006). Self-esteem may have a potential partial mediation role in the association between health literacy and health outcomes. This possible mediation role is corroborated by the fact that self-efficacy (which is closely linked but distinct from self-esteem) is recognized as a mediator of the relation between health literacy, health behaviors and other health outcomes (Dominick, Dunsiger, Pekmezi, & Marcus, 2013; Geboers, de Winter, Luten, Jansen, & Reijneveld, 2014; Osborn, Paasche-Orlow, Bailey, & Wolf, 2011). Self-esteem may also contribute to patient activation, which has been shown to play a mediatory role in the association between health literacy and some health outcomes (Charlot et al., 2017). Students of satisfactory health status also had significantly higher health literacy in this study, which is consistent in many studies (Amoah et al., 2017; Levin-Zamir et al., 2016; Sorensen et al., 2015).

TABLE 1

Participant Characteristics (*N* = 485)[a]

Characteristic	Total Number (%)
Age (17-35 years)	
Up to 21 years	290 (59.8)
≥21 years	195 (40.2)
Gender	
Female	204 (42.06)
Male	281 (57.94)
Father's education	
No formal education	34 (7)
Basic	58 (12)
Second cycle	120 (24.8)
Tertiary	272 (56.2)
Mother's education	
No formal education	63 (13)
Basic	121 (25)
Second cycle	144 (29.8)
Tertiary	156 (32.2)
Nature of place of residence	
Urban	248 (51.1)
Peri-urban	197 (40.6)
Rural	40 (8.2)
Self-rated health status	
Excellent	162 (33.4)
Good	247 (50.9)
Moderate	65 (13.4)
Poor	9 (1.86)
Very poor	2 (0.41)
Year of study	
1	87 (17.9)
2	218 (45)
3	73 (15)
4	107 (22.1)

Note. [a]Total number is not equal to 485 for some variables due to missing responses.

TABLE 2

Means and Categories of Health Literacy Scores by Study Characteristics (*N* = 485)

	Mean (*SD*) Health Literacy Scores	*p* value[a]	Health Literacy Scores Categories [*n* (%)]			
			Limited Health Literacy		Adequate Health Literacy	
			Inadequate	Problematic	Sufficient	Excellent
Total Sample	32.2 (8)	-	99 (20.4%)	166 (34.2%)	160 (33%)	60 (12.4%)
Sex						
Male	31.6 (7.9)	.066	64 (22.8%)	102 (36.3%)	84 (29.9%)	31 (11%)
Female	33 (8)		35 (17.2%)	64 (31.4%)	76 (37.3%)	29 (14.2%)
College						
COHS	34.2 (8.6)	.010	13 (15.5%)	20 (23.8%)	33 (39.3%)	18 (21.4%)
Other colleges	31.7 (7.6)		86 (21.5%)	146(36.4%)	127 (31.7%)	42 (10.4%)
Year						
Lower classes	31.4 (7.9)	.009	68 (22.3%)	118 (38.7%)	85 (27.9%)	34 (11.2%)
Upper classes	33.4 (8)		31 (17.2%)	48 (26.7%)	75 (41.7%)	26 (14.4%)
Age						
≤21 years	31.8 (7.8)	.230	62 (21.4%)	104 (35.9%)	92 (32.1%)	31 (10.7%)
>21years	32.7 (8.2)		37 (19%)	62 (31.8%)	67 (34.4%)	29 (14.9%)
Residential						
Non-rural	32.3 (7.9)	.346	88 (19.8%)	152 (34.2%)	149 (33.5%)	56 (12.6%)
Rural	31 (8.2)		11 (27.5%)	14 (35%)	11(27.5%)	4 (10%)
Financial status						
Good	32.6 (7.6)	.007	76 (18%)	145 (34.4%)	149 (35.3%)	52 (12.3%)
Poor	29.1 (9.4)		23 (37.1%)	21 (33.9%)	10 (16.1%)	8 (12.9%)
Self-esteem						
High	32.6 (8)	.000	83 (19.2%)	140 (32.3%)	152 (35.1%)	58 (13.4%)
Low	28.1 (6.5)		16 (31.4%)	26 (51%)	7 (13.7%)	2 (3.9%)
Health status						
Satisfactory	32.7 (7.9)	.000	74 (18.1%)	135 (33%)	144 (35.2%)	56 (13.7%)
Unsatisfactory	29.2 (7.7)		25 (32.9%)	31(40.8%)	16 (21.1%)	4 (5.3%)
Mother's education						
High	32.7 (7.9)	.060	56 (18.7%)	100 (33.3%)	102 (34%)	42 (14%)
Low	31.3 (7.9)		42 (22.8%)	66 (35.9%)	58 (31.5%)	18 (9.8%)
Father's education						
High	32.4 (7.9)	.250	75 (19.1%)	137 (35%)	129 (32.9%)	51 (13%)
Low	31.3 (8.1)		23 (25%)	29 (31.5%)	31 (33.7%)	9 (9.8%)

Note. COHS = College of Health Sciences.
[a]Two-tailed Student's t-test for difference in health literacy mean scores.

Bivariate and multiple logistic regression revealed marked gender differences in factors that were associated with limited health literacy. In a longitudinal study, Clouston et al. (2017) noted from the bivariate and multivariate analyses that there were significant gender differences in the pathways to low health literacy in a sample of well-educated older adults. The study, therefore, noted that risk factors for poor health literacy varied by gender and reasoned that possible gender role differences and different experiences could be possible explanations (Clouston et al., 2017). In a Taiwanese study that used the HLS-EU questionnaire (long version), gender differences

TABLE 3

Bivariate Analyses of Health Literacy and Study Characteristics for the Whole Sample and Stratified by Gender

	Whole Sample		Male		Female	
Characteristic	**OR**	**[95% CI], *p* value**	**OR**	**[95% CI], *p* value**	**OR**	**[95% CI], *p* value**
Sex						
Female (ref)			-	-	-	-
Male	1.53	[1.04, 2.26], .032				
Year						
Upper years (ref)						
Lower years	2.00	[1.47, 2.72], .000	2.98	[2.12, 4.18], .000	1.14	[0.75, 1.75], .540
College						
COHS (ref)						
Other colleges	2.12	[1.42, 3.16], .000	2.18	[0.82, 5.85], .120	1.81	[1.35, 2.43], .000
Residential status						
Non-rural (ref)						
Rural	1.42	[0.88, 2.31], .154	1.07	[0.54, 2.12], .835	2.74	[0.47, 16.09], .265
Health status						
Satisfactory (ref)						
Unsatisfactory	2.67	[1.66, 4.33], .000	2.32	[1.03, 5.22], .043	3.38	[2.04, 5.61], .000
Mother's education						
High (ref)						
Low	1.31	[0.93, 1.86], .126	1.45	[0.87, 2.41], .156	0.90	[0.53, 1.51], .685
Father's education						
High (ref)						
Low	1.10	[0.73, 1.66], .637	1.10	[0.69, 1.75], .674	0.80	[0.41, 1.58], .526
Financial status						
Good (ref)						
Poor	2.22	[1.22, 4.06], .009	1.72	[0.84, 3.51], .135	3.44	[0.97-12.28], .056
Self-esteem						
High (ref)						
Low	4.40	[1.91, 10.12], .001	3.19	[1.23, 8.27], .017	7.05	[1.59, 31.22], .010
Age						
≥21years (ref)						
<21years	1.30	[0.77, 2.18], .324	1.23	[0.57, 2.65], .594	1.52	[1.04, 2.23], .031

Note. CI = confidence interval; COHS = College of Health Sciences; OR = odds ratio; ref = reference.

were also noted in the associations with health literacy (Duong et al., 2015).

IMPLICATIONS

The results have many implications for Ghana and other developing countries within Sub-Saharan Africa and beyond. First, although health literacy has a link with general literacy, it cannot be assumed that people of high education are necessarily health literate as shown by this research. The finding also signals that the situation might be worse among the general populace; therefore, this may be a call for renewed efforts for the relevant stakeholders in health to put health

TABLE 4

Multivariate Analyses of Health Literacy and Study Characteristics for the Whole Sample and Stratified by Gender

	Whole Sample		Male		Female	
Characteristic	**OR**	**[95% CI], *p* value**	**OR**	**[95% CI], *p* value**	**OR**	**[95% CI], *p* value**
Sex						
Female (ref)						
Male	1.33	[0.93, 1.91], .124	-	-	-	-
Year						
Upper years (ref)						
Lower years	1.68	[1.05, 2.69], .032	2.89	[1.79, 4.67], .000	0.80	[0.44, 1.45], .461
College						
COHS (ref)						
Other colleges	1.78	[1.22, 2.59], .003	1.61	[1.04, 2.51], .033	1.60	[1.12, 2.26], .009
Health status						
Satisfactory (ref)						
Unsatisfactory	2.13	[1.24, 3.65], .006	1.82	[0.68, 4.88], .236	2.34	[1.49, 3.66], .000
Financial status						
Good (ref)						
Poor	1.60	[0.82, 3.11], .171	1.18	[0.55, 2.54], .671	3.30	[0.81, 13.39], .095
Self-esteem						
High (ref)						
Low	3.47	[1.38, 8.72], .008	2.53	[0.87, 7.37], .090	5.38	[1.23, 23.51], .025
Age						
≥21years (ref)						
<21years	0.88	[0.45, 1.73], .705	0.74	[0.32, 1.70], .480	1.26	[0.54, 2.93], .588

Note. COHS = College of Health Sciences; OR = odds ratio; ref = reference.

literacy on the national health agenda. This is because poor health literacy results in a range of health outcomes such as more hospitalizations, greater use of emergency services, and increased mortalities (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Second, the results have a bearing on the fight against the rapidly growing menace of NCDs in developing countries. Studies indicate that in low- and middle-income countries, people belonging to a high socioeconomic class are more likely to be at a higher risk for NCDs (Allen et al., 2017). University students are more likely to place in the high socioeconomic bracket. Even though NCDs mostly show up later in adult life, the behavioral risks associated with them are formed or reinforced at this stage and then carried on into adult life. For example, some reviews have reported significant weight gain among university students as early as their first year (Vadeboncoeur, Townsend, & Foster, 2015). As health literacy has been identified as key to the prevention of NCDs (Kickbusch et al., 2013; World Health Organization, 2016), a more health literate generation may lead to lessening the morbidity and economic burden associated with NCDs. The results also bear significance in terms of efforts aimed at achieving UHC in Ghana and elsewhere (Amoah & Phillips, 2018). Amoah and Phillips (2018) suggest that health literacy is a key factor that must be considered when strategizing for policies and interventions aimed at improving UHC.

CONCLUSIONS

Our results indicate that even among university students there are some challenges interacting with the current health care system. Without the adequate empowerment of the populace, provision of health care infrastructure and personnel may not sufficiently solve the challenges of achieving UHC. In addition, in many African countries, there is no national guiding policy for

health literacy enhancement in the general populace and for specific subgroups such as students, street youth, and the elderly.

We recommend the integration of student curricula with health-related tuition from basic to tertiary levels especially for those whose majors are not health related. Specific interventions aimed at improving students' access to health information (especially relating to mental health) and making health institutions health literacy-friendly must be implemented. We further recommend the institution of a national policy on improving health literacy. More health literacy research is needed to examine gender effects and the role of self-esteem in health literacy. To the best of our knowledge, this study is the first of its kind in Ghana to describe comprehensive health literacy among undergraduate university students using an internationally validated instrument albeit amidst some limitations. The sampling technique may result in less variability and the self-report-based instrument used means that health literacy was not measured objectively. Self-report measures could lead to biases such as recall and information bias. Future research in this area should consider the use of objective measures of health literacy.

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TABLE A

Frequencies of HLS-EU-16 Items Among the Sample (*N* = 485)[a]

HLS-EU-16 Items	Very Easy	Easy	Difficult	Very Difficult	Don't Know
How easy/difficult is it to:	*n* (%)				
1. Find information on treatments of illnesses that concern you.	95 (19.6)	251(51.9)	112 (23.1)	13 (2.7)	13 (2.7)
2. Find out where to get professional help when you are ill.	134 (27.8)	219 (45.4)	99 (20.5)	20 (4.2)	10 (2.1)
3. Understand what your doctor says to you.	123 (26)	279 (58)	65 (13.5)	10 (2.1)	3 (0.6)
4. Understand your doctor´s or pharmacist´s instruction on how to take a prescribed medicine.	196 (40.1)	236 (48.8)	41 (8.5)	10 (2.1)	1 (0.2)
5. Judge when you need to get a second opinion from another doctor.	50 (10.4)	159 (33.1)	204 (42.4)	33 (6.9)	35 (7.3)
6. Use information the doctor gives you to make decisions about your illness.	102 (21.1)	233 (48.1)	117 (24.1)	13 (2.7)	19 (3.9)
7. Follow instructions from your doctor or pharmacist.	172 (35.5)	251(51.8)	56 (11.6)	5 (1)	1 (0.2)
8. Find information on how to manage mental health problems such as stress and depression.	74 (15.4)	172 (35.7)	153 (31.7)	59 (12.2)	24 (5)
9. Understand warnings about behavior (e.g., smoking, low physical activity, and drinking too much).	255 (52.8)	192 (39.8)	26 (5.4)	6 (1.2)	4 (0.8)
10. Understand why you need health screenings.	181(37.5)	217 (44.9)	68 (14.1)	13 (2.7)	4 (0.8)
11. Judge if the information on health risks in the media is reliable (e.g., from television or Internet)	98 (20.3)	198 (41.1)	145 (30.1)	30 (6.2)	11(2.3)
12. Decide how you can protect yourself from illness based on information in media.	109 (22.6)	240 (49.7)	113 (23.4)	16 (3.3)	5 (1)
13. Find out about activities that are good for your mental well-being.	145 (30.1)	193 (40)	114 (23.7)	20 (4.2)	10 (2.1)
14. Understand advice on health from your family members or friends.	139 (29)	245 (51)	78 (16.3)	15 (3.1)	3 (0.6)
15. Understand information in the media on how to get healthier.	144 (29.7)	264 (54.4)	70 (14.4)	5 (1)	2 (0.4)
16. Judge which everyday behavior is related to your health.	134 (27.6)	222 (45.8)	104 (21.4)	15(3.1)	10 (2.1)

Note. About 89% of students understand doctor or pharmacist instructions on how to take prescribed medicines *easily* or *very easily*. More than 90% *very easily* or *easily* understand warnings about health risk behavior such as smoking, low physical activity, and excessive alcohol intake. On the other hand, close to 50% of students found it *difficult*/*very difficult* to judge when they need a second opinion from another doctor, and only about 10% found it *very easy* to do. Similarly, about 4 in 10 students find it *difficult* or *very difficult* to find information on management of mental health problems such as stress and depression. HLS-EU-16 = 16-item short version of the European Consortium for Health Literacy Questionnaire.

[a]Total number is not equal to 485 for some variables due to missing responses.