# Determining Priority Subgroup: Insight from a Health Literacy Survey in Universitas Gadjah Mada, Indonesia

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**Abstract.** Health literacy measurement and source of information are important to design health education programs. Aims: To measure the level of health literacy, its factors and pattern of source of information among faculty members in Universitas Gadjah Mada, Indonesia. Materials and methods: A cross-sectional study was done among lecturers, staffs and students with consecutive sampling methods. The HLS-EU-Q16 questionnaire was used to measure the health literacy. Furthermore, the respondents' characteristics of sex, age, faculty discipline, academic role, and education attainment were also collected. The data collection used E-HDSS online survey application distributed via the official university information system. Results: The respondent involved in this study was 1,036 people, with majority had adequate health literacy (74%). The proportion of adequate health literacy was significantly higher among staff, had bachelor and postgraduate education degree (OR 2.6, 1.4, and 1.8 respectively). Internet and Instagram were the most preferred source of information. Conclusions: Inadequate health literacy was more prevalent among students and those with lower education levels. This was the prioritized target subpopulation for health education programs, that should be delivered through Instagram and internet.
**Keywords**: HLS-EU-Q16; Health Promoting University; Health literacy; Information channel; Health education design; LMIC

## 1 Introduction

Adequate health literacy was higher among lecturer and staff, had bachelor and postgraduate education degree. Inadequate health literacy was higher among students and those with lower education levels, was the most prioritized target audience for health education programs. The main source of information was internet, and the most preferred social media was Instagram.

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Health literacy is the ability of individuals to seek, comprehend, appraise, and apply health information to maintain and enhance their health [1]. Poor health literacy tends to be associated with limited access to healthcare services and lower health outcomes [2]. Studies in the United States have shown that 36% of the population has low health literacy [3], and similarly in Europe, more than half of the population has low health literacy [4]. Person with low health literacy is often linked to disadvantage social determinants, which in turn result in health inequities. Health literacy is associated with several factors such as occupation type, income level, and educational level [5]. A higher education does not always guarantee higher health literacy, but cultural and linguistic facinterventions, thus enabling the development of better communication strategies to reach the target population (refetors also play a role in the status of health literacy [6].

The population health literacy needs to be known in order to identify the priority subpopulation for health education interventions, thus enabling the development of better communication strategies to reach the target population [7]. Health literacy is measured by defining and exploring its dimensions, which include an individual's ability to access, comprehend, appraise, and apply health information for the purpose of disease treatment, prevention, and improving health status [3]. The health education will be more effective if it is delivered through preferred sources of information by the target subpopulation. Therefore, understanding the sources of information is also important. This is essential for improving education and health promotion, healthcare services, reducing health inequalities, and enhancing the overall health status of the community [3]

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Despite numerous studies conducted on health literacy, research on health literacy among academic communities remains limited. This study aims to 1) measure the level of health literacy and identify various factors associated with health literacy levels, and 2) determine the sources of health information among the academic community at Universitas Gadjah Mada in Yogyakarta, Indonesia. By measuring the health literacy of the academic community, specific subpopulations can be identified as priorities for health education initiatives.

## 2 Materials and Methods

This Health Literacy survey is part of the routine activities of the Health Literacy working group at UGM HPU, one activity under the health literacy working group [8]. A cross-sectional study was done, with the population of all lecturers, staffs and students. The HLS-EU-Q16 questionnaire was used to measure the health literacy, and demographic factors of sex, age, affiliated faculty, academic status, and education level were also measure. E-HDSS online survey application is distributed via the official university information system to collect the data. The sampling method was consecutive, based on the willingness of respondents to participate. We report this study following the STROBE guidelines for a cross-sectional study [9].

A cross-sectional study involving lecturers, staffs and students was done in year 2022. This study located in a University in Yogyakarta, Indonesia. The University has 18 faculties and has 4,336 faculty staffs and 61,440 students. Dependent variable, health literacy was measured using a health literacy behavior questionnaire adapted from the Health Literacy Study Short Form (HLS-EU-16Q-Indonesia) questionnaire developed by the Asian Health Literacy Association (AHLA) [10]. HLS-EU-16Q has been translated into Indonesian and has been tested for validity and reliability [11]. HLS-EU-16Q has also been used in routine survey activities in the population of Sleman Regency [12]. The determinant factors: sex, age, affiliated unit, academic status, and education level were measured using self-developed questions. Those questions were sought through a E-HDSS application online and distributed via the official informatics system of the University during 2 weeks periods in 2022. HLS-EU-Q16 questionnaire consist of 16 questions asking ability to search for health information, to understand the health information, to criticize the health information and to make an informed decision [10], the respondents were required to indicate the answers very difficult, difficult, easy, or very easy. We scored the very difficult and difficult as 0, and easy or very easy as 1. The health literacy data were categorized as adequate if the total score of the health literacy ≥ 13 and inadequate if < 13. Sex was determined as man or woman; age was categorized as ≥ 40 year and < 40 year; affiliated unit was categorized as natural science, social sciences and administrative units; academic status was grouped into lecturer, staff and student; and education was categorized into undergraduate, bachelor and postgraduate levels.

After the data was collected using Google Forms within a 2-week data collection period, the data were extracted from the system and cleaned for completeness. The data were analyzed using STATA version 14.2 software [13]. To determine the level of health literacy and provide a health literacy patterns, a descriptive analysis was conducted and presented in a table with percentages. Furthermore, to identify factors associated with health literacy, initial bivariate analysis was performed using bivariate logistic regression test. Variables that showed significant associations with health literacy were further analyzed using multivariate logistic regression test.

The most significant threat is sampling and selection bias, given the consecutive sampling method and online data collection. The sample may not represent the population adequately due to a higher likelihood of subgroup participation, considering the online data collection method might be easier for certain subgroup. Therefore, caution is required in interpreting the data. Despite the limitations of online data collection, it offers the advantage of broader reach.

Ethical approval was obtained from the Ethics Commission of the Faculty of Medicine, Public Health, and Nursing at UGM.

## 3 Results

The participating respondent was 1037 people, and after cleaning for data completion and outlier, 1036 respondents were considered for analysis. Out of all respondents were women (62 %), within the <40 years age group (72%), affiliated with natural science faculty (51%), currently active students (59%), and came from bachelor education background (43%) as shown in Table 1. In both men and women, majority of respondents were within the <40 years age group, affiliated with natural science faculty, were currently active students and came from bachelor education background.

The bivariate analysis showed that being aged >= 40 year, being staff, lecturer and had postgraduate degree were significantly had higher possibility for adequate health literacy (with OR 1.9, 2.7, 2.3, 1.9 respectively). Those determinants of age group, academic type, and education that had significant relationships with health literacy were then included into the model for a multivariate analysis using logistic regression. The results of multivariate analysis in Table 2 return to being staff, had bachelor and postgraduate education degree has more possibilities for adequate health literacy with OR 2.6, 1.4, and 1.8 respectively. The most priority group for a health education program was those aged < 40 year, student and with undergraduate education.

**Table 1**. Characteristics of respondents stratified by sex

| Variable | Group | Men | | Women | | Total | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| N | | 397 | 38 | 639 | 62 | 1036 | 100 |
| Health Literacy | Adequate | 290 | 73 | 475 | 74 | 765 | 74 |
| | Inadequate | 107 | 27 | 164 | 26 | 271 | 26 |
| Age in years, mean (SD) | | 35.1 (12.4) | | 30.8 (11.4) | | 32.5 (11.9) | |
| Age group | <40 years | 245 | 62 | 505 | 79 | 750 | 72 |
| | ≥40 years | 152 | 38 | 134 | 21 | 286 | 28 |
| Affiliated Unit | Natural science | 190 | 48 | 342 | 54 | 532 | 51 |
| | Social science | 105 | 26 | 175 | 27 | 280 | 27 |
| | Administrative unit | 102 | 26 | 122 | 19 | 224 | 22 |
| Employment Status | Lecturer | 38 | 10 | 71 | 11 | 109 | 11 |
| | Staff | 150 | 38 | 163 | 26 | 313 | 30 |
| | Student | 209 | 53 | 405 | 63 | 614 | 59 |
| Education | Undergraduate | 143 | 36 | 188 | 29 | 331 | 32 |
| | Bachelor | 146 | 37 | 292 | 46 | 438 | 42 |
| | Postgraduate | 108 | 27 | 159 | 25 | 267 | 26 |

**Table 2.** Bivariate and multivariate logistic regression analysis to predict health literacy adequacy according to sociodemographic characteristics

| | | Bivariate | | | Multivariate | | |
|---|---|---|---|---|---|---|---|
| **Variables** | **Categories** | | **CI** | | | **CI** | |
| | | **OR** | **Lowest** | **Highest** | **OR** | **Lowest** | **Highest** |
| Sex | Man | 1.0 | | | | | |
| | Woman | 1.1 | 0.8 | 1.4 | | | |
| Age group | <40 | 1.0 | | | 1.0 | | |
| | ≥40 | 1.9* | 1.4 | 2.7 | 1.1 | 0.7 | 1.7 |
| Affiliated Unit | Social | 1.0 | | | | | |
| | Administrative | 1.0 | 0.7 | 1.5 | | | |
| | Natural | 1.2 | 0.9 | 1.7 | | | |
| Academic type | Student | 1.0 | | | 1.0 | | |
| | Staff | 2.7* | 1.9 | 3.8 | 2.6* | 1.8 | 3.9 |
| | Lecturer | 2.3* | 1.4 | 4.0 | 1.6 | 0.9 | 3.1 |
| Education | Undergraduate | 1.0 | | | 1.0 | | |
| | Bachelor | 1.3 | 0.9 | 1.8 | 1.4* | 1.0 | 1.9 |
| | Postgraduate | 1.9* | 1.3 | 2.7 | 1.8* | 1.1 | 2.8 |

Table 3 represents the means of health literacy score according to domain and activity. Among the three domains that were measured, disease prevention scored the lowest mean (2.89), followed by health promotion (3.14) and healthcare (3.18). While across the four activities, appraise and applying information both scored the lowest means (2.97 and 2.99, respectively).

Internet was the main source of health information for majority of the respondents (61.8%), followed by social media (23.9%) and conventional or other media (14.3%) (Figure 1). Out of the respondents with social media as their main source of health information, 63.7% were Instagram users, followed by Twitter (14.9%), Youtube (11.7%), Tiktok (4.84%), Facebook (2.0%) and others (2.8%) (Figure 2). Instagram is mostly popular among under 40-year-olds (91.8%), students (70,3%) and undergraduate and bachelor respondents (30.4% and 51.3%, respectively) (Table 4).

**Table 3**. Mean of Health Literacy Score by Domain and Activity

| Domain | Mean | Activity | Mean |
|---|---|---|---|
| Healthcare | 3.18 | Access/finding information | 3.15 |
| Disease Prevention | 2.89 | Understanding information | 3.23 |
| Health Promotion | 3.14 | Appraise/judge/evaluate information | 2.97 |
| | | Applying information | 2.99 |

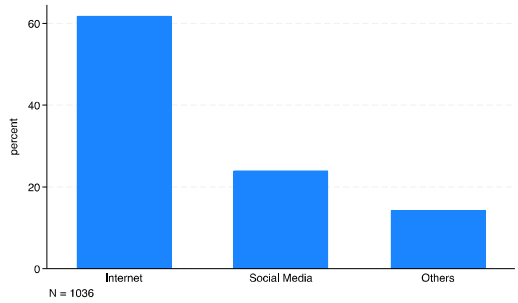


**Fig. 1.** Main source of health information

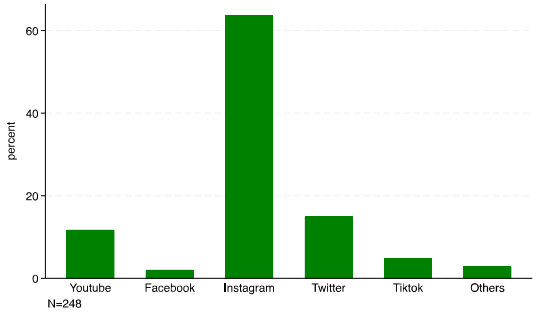


**Fig. 2.** Social media preference

## 4 Discussions

This study was conducted to measure the health literacy of the academic community in Universitas Gadjah Mada, Indonesia, and their source of information patterns. Our study show that the level of health literacy was majority adequate (74%). Our results found that being staff, had bachelor and postgraduate education degree has more possibilities for adequate health literacy. Internet was the main source of health information, followed by social media. The most preferred social media were Instagram, Twitter, YouTube, Tiktok, and Facebook respectively. Instagram is mostly popular among the under 40-year-olds, students and undergraduate respondents.

Previous studies have found that the relationship between health literacy and gender is not always significant. Some studies have shown significantly higher health literacy among women, while others have found higher health literacy among men [14]. In our study, we did not find a significant relationship between health literacy and gender. It is possible that health literacy is influenced by various factors that interact in complex ways, and gender is not the primary determinant of health literacy.

Our study found that adequate health literacy was higher among individuals aged ≥ 40 years and above. Health literacy tends to increase with age [15]. As individuals grow older, they accumulate more learning experiences and interactions with healthcare professionals, leading to an improvement in health literacy [15, 16]. However, health literacy tends to decline among the older age group (age 65 years and above) [17]. The lower health literacy among older age groups may be associated with factors such as cognitive decline and reduced exposure to health information as individuals age.

**Table 4.** Social media preference across respondents' sociodemographic characteristics

| Variable | | YouTube n (%) | Facebook n (%) | Instagram n (%) | Twitter n (%) | Tiktok n (%) | Others n (%) | P-value |
|---|---|---|---|---|---|---|---|---|
| N | | 29 | 5 | 158 | 37 | 12 | 7 | |
| Age group | <40 years | 14 (48) | 3 (60) | 145 (92) | 34 (92) | 8 (67) | 2 (29) | <0.001 |
| | ≥40 years | 15 (52) | 2 (40) | 13 (8) | 3 (8) | 4 (33) | 5 (71) | |
| Employment status | Lecturer | 2 (7) | 0 (0) | 6 (4) | 0 (0) | 0 (0) | 0 (0) | 0.007 |
| | Staff | 13 (45) | 2 (40) | 41 (26) | 5 (14) | 4 (33) | 6 (86) | |
| | Student | 14 (48 | 3 (60) | 111 (70) | 32 (87) | 8 (67) | 1 (14) | |
| Education | Undergrad | 12 (41) | 2 (40) | 48 (30) | 19 (51) | 4 (33) | 2 (29) | 0.39 |
| | Bachelor | 13 (45) | 2 (40) | 81 (51) | 15 (41) | 6 (50) | 2 (29) | |
| | Postgrad | 4 (14) | 1 (20) | 29 (18) | 3 (8) | 2 (17) | 3 (43) | |

A study found that health literacy is associated with faculty affiliation. Those affiliated with healthcare units tend to have higher health literacy [18]. Individuals in a healthcare environment are more likely to be exposed to health information, resulting in higher health literacy. In contrast, our study found no relationship between health literacy and faculty affiliation. This may be due to the larger proportion of student participants (Table 1), who may have limited exposure to the specific health-related knowledge they are currently studying.

Our study revealed that adequate health literacy was higher among lecturers and staff compared to students. Previous research comparing health

literacy based on academic roles is lacking. Research on health literacy among non-health faculty-affiliated lecturers showed lower levels of health literacy [19]. Another study among students indicated that 45% of students had inadequate health literacy [15, 20]. Conversely, research among staff members showed higher levels of health literacy regarding depression in Australia [21]. However, comparing the three academic roles of lecturers, staff, and students is difficult due to the different instruments and research contexts. Several studies have found a significant association between higher education levels and higher health literacy, although this significance disappears in multivariate analysis [17]. It is possible that lecturers have higher health literacy compared to students due to their higher educational attainment.

Health literacy is a multidimensional concept influenced by various factors that interact with each other in complex ways, ultimately impacting social determinants of health and health equity [22]. However, beyond that, based on these results, it can be concluded that students was the most important target group for interventions. Educational institutions have the opportunity to enhance the health literacy of their academic community and empower them to make informed decisions for themselves and their [15].

In addition to knowing the health literacy level of the population, this study also identified the main sources of information that were mostly used by the students and undergraduate education attainment, were the internet and social media. While the internet is the most popular way for students to access information, it is also associated with the worst health literacy scores, possibly due to the quality of information is often incorrect and hardly comprehendible [21].

The strength of this study lies in its sufficiently large sample size and its focus on developing appropriate health education strategies for priority targets based on their health literacy levels and preferred sources of information. Internet-based data collection has both advantages and disadvantages. On one hand, internet-based data collection offers the advantages of a wide reach to respondents, cost-effectiveness [22], and increased respondent confidentiality, thereby facilitating more honest responses [23, 24].

However, on the other hand, the biggest threat in internet-based data collection is non-response bias, which may limit the representativeness of the sample. Internet-based research and applications are still controversial. Studies comparing internet-based surveys with pen-and-paper surveys have shown no significant differences in the results of both types of surveys, suggesting that internet-based surveys can be considered as an additional research approach alongside conventional surveys [2, 27]. However, it is necessary to design questionnaires and ensure better data collection validity in internet-based surveys [28].

## 5 Conclusions and Recommendations

Adequate health literacy was higher among lecturer and staff, had bachelor and postgraduate education degree. Inadequate health literacy was higher among students and those with lower education levels, was the most prioritized target audience for health education programs. The main source of information was internet, and the most preferred social media was Instagram.

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