



## OBSERVATIONAL STUDY

# The level of Health Literacy among high school students of Bergamo: an observational study

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## Findings:

*More than half of the sample has problematic or inadequate H.L. levels. The acquisition of H.L. skills requires specific training to enable health professionals to adopt appropriate communication strategies.*

## ABSTRACT

**BACKGROUND:** Recent studies have highlighted how Health Literacy (H.L.) represents one of the fundamental determinants of health for people's well-being. Despite this concept being widely approved by the scientific community, research trends focus on outcomes such as misinformation and H.L. deficiencies in individuals with mental health issues, chronic diseases, drug use and abuse, rather than evaluating its actual level in the population. Therefore, a broader and more generalized analysis is needed to support the European community in assessing H.L. levels in the population, in order to demonstrate how increasing H.L. can improve both individuals' health and the healthcare system.

**AIM:** To measure H.L. competencies in a sample of fifth-year students attending high schools, aged between 17 and 19 years old.

**METHODS:** This descriptive monocentric study was conducted between September 15th and 30th, 2021, carried out on a sample of 434 students, and used the HLS Q-16 questionnaire (European Health Literacy Survey Questionnaire) to assess the level of H.L.

**RESULTS:** The results are consistent with those present in the literature and indicate that more than half of the sample has problematic or inadequate H.L. levels.

**CONCLUSION:** It is essential to continue research in this unexplored area in Italy and to objectively and demonstrably analyze potential corrections that can remedy the lack of H.L. in citizens.

**KEYWORDS:** *Health Literacy, Students, Survey, Nurses, Nursing Care*

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STUDIO OSSERVAZIONALE

## Il livello di Health Literacy negli studenti Bergamaschi delle scuole superiori: uno studio osservazionale

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### Riscontri:

*Più della metà del campione presenta livelli di HL problematici o inadeguati. L'acquisizione di competenze in materia di HL necessita di una formazione specifica che permetta ai professionisti della salute di adottare strategie comunicative appropriate.*

### ABSTRACT

**INTRODUZIONE:** Recenti studi hanno evidenziato come l'Health Literacy (HL) rappresenti uno dei determinanti della salute fondamentali per il benessere delle persone. Nonostante questo concetto sia ampiamente approvato dalla comunità scientifica, il trend di ricerca verte su outcomes quali disinformazione e carenza di HL nel soggetto con problematiche legate alla dimensione della salute mentale, delle malattie croniche, utilizzo e abuso di droghe, piuttosto che valutarne l'effettivo livello nella popolazione. È quindi necessaria un'analisi più ampia e generalizzata, che appoggi la comunità Europea nella valutazione dei livelli di HL nella popolazione, così da dimostrare quanto un suo incremento, permetta un miglioramento sia della salute degli individui, che del Sistema Sanitario.

**OBIETTIVI:** Misurare le competenze di HL in un campione di studenti delle classi quinte frequentanti istituti superiori, con un'età compresa tra i 17 ed i 19 anni.

**MATERIALI E METODI:** Questo studio monocentrico, descrittivo, si è svolto nel periodo tra il 15 ed il 30 settembre 2021, su un campione di 434 studenti, ed ha utilizzato il questionario HLS Q-16 (European Health Literacy Survey Questionnaire), per valutare il livello di HL.

**RISULTATI:** I risultati sono in accordo con quanto presente in letteratura e consentono di affermare che più della metà del campione, risulta avere un livello di HL problematico o inadeguato.

**CONCLUSIONI:** Risulta fondamentale continuare la ricerca in questo ambito fortemente inesplorato sul territorio italiano ed analizzare in modo oggettivo e dimostrabile, dei potenziali correttivi che possano rimediare alla carenza di HL nel cittadino

**KEYWORDS:** *Alfabetizzazione Sanitaria, Studenti, Indagine, Infermieri, Assistenza Infermieristica*

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## BACKGROUND

"Health literacy is correlated with the concept of literacy and refers to the necessary knowledge, motivation, and competencies that allow people to access, understand, evaluate, and use information about health, with the goal of expressing opinions and making daily life decisions in with regards to healthcare, sickness prevention, and promoting health and to maintain or improve ones' life quality" (1).

Despite studies and research of the last decade describing Health Literacy (H.L.) as one of the fundamental predictors of people's well-being and health, research interest has been focused on specific populations with outcomes of specific pathologies, such as the ones from mental health, chronic diseases, prevention and information about sexually transmissible diseases, drug use, and abuse, analyzing their correlations at a scarce level of H.L. In the past years, no researcher has focused on a broader and nonspecific analysis. It would be reasonable to support the European community in the evaluation of H.L. levels among the population to show that its increase could allow for an improvement both of individuals' health and of the healthcare system. The concept of H.L. is often difficult to grasp in its entirety, as it is interconnected to multiple dimensions that led several authors to give it diverse definitions, as shown in the literature review by De Caro et al. (2), where 28 definitions are pinpointed between 1998 and 2014. In that regard, five thematic areas representing the multidimensional construct of H.L. have been defined (Figure 1).

H.L. should, therefore, be considered as a citizen empowerment tool, a means for health promotion, surpassing the limits of the educational context (3). Although the growing interest in health has led to an increase in the number of studies and research about this topic, the concentration of publications about a topic more generic than H.L. is not homogeneous.

From the several publications in the literature, it is evident that nurse involvement, being the encounter between citizens and the healthcare system, is fundamental when researching this factor.

## Aim:

The primary endpoint of this study is to determine H.L. levels in a specific population sample through a survey validated in the literature for the attribution of an objective level of H.L. The identified sample is made of senior (last year) students in high schools in the city of Bergamo, who participated voluntarily. The descriptive monocentric study was inspired by the literature. It measured H.L. levels among participants through the subministered survey HLS Q-16 (European Health Literacy Survey Questionnaire) validated by Lorini (4), which was built of 16 questions.



## METHODS

The study design is observational, descriptive, and monocentric. An initial literature review was carried out, followed by sampling and survey methods ideal for the target and goals of this study. Subsequently, after identifying the proposed survey, the sub-ministration methods were chosen, as well as the data gathering period (from September 15<sup>th</sup>, 2021, to September 30<sup>th</sup>, 2021).

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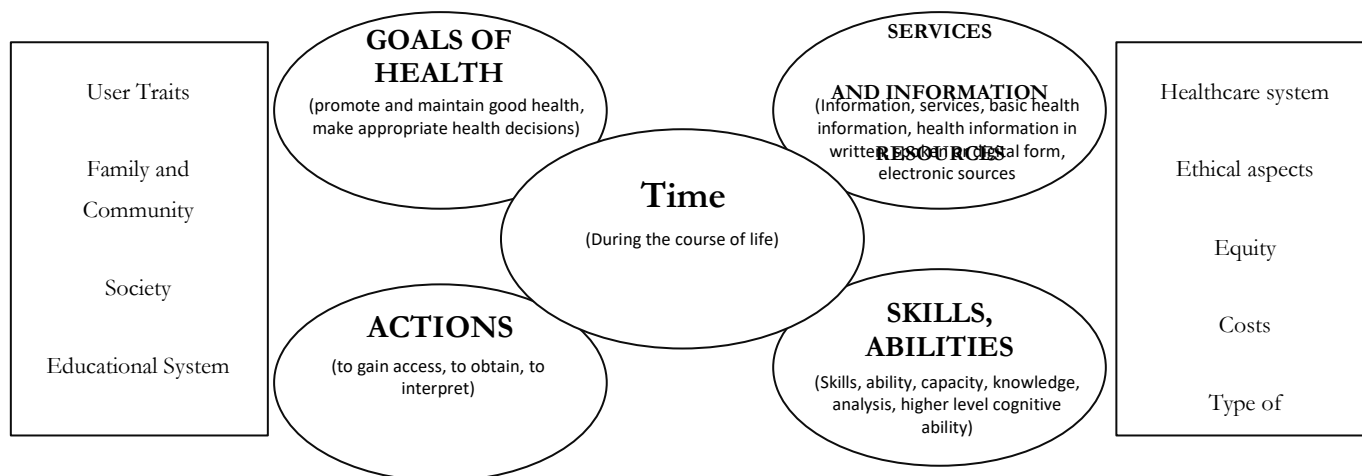


Figure 1: dimensional areas related to Health Literacy and connection to its context (2)

## Data collection instruments

To facilitate the use of the survey to the selected target, a website was designed to instruct participants through a tutorial video, where the student was directed to a specific post, with the survey link, reproduced according to its validation, on the platform Google® Moduli; the time frame planned for data collection was from September 15<sup>th</sup> to September 30<sup>th</sup>, 2021. To avoid inopportune answers or fill-in errors, an access password was made available for students through written communication, sent exclusively to the participants, together with an illustrated communication for the students' parents, and approved by the single participants. The survey is made of first standardized part with questions on anagraphic and demographic data, such as age, gender, nationality, and attending school; the second part hosts the HSU-EU-Q16 (4), consisting of 16 items and the possibility to choose a Likert scale answers ranging from "Very difficult" to "Very easy."

Once the data collection period finished, the data was collected and cataloged with Microsoft Excel worksheets and discussed with descriptive statistics.

## Strengths of the HLS-EU-Q16 survey:

- automatic fill-in tools;
- measure interactions, comprehension, information research, application/function, decision process/critical thought, evaluation, responsibility, trust, and internet surfing navigation ability.
- the Pearson correlation index with the HLS-EU-Q47 (5) is very high;
- the scores are strongly correlated to high indexes in the NVS test;
- in the survey validation, participants showed a small percentage of answers "I don't know/refuse to answer," which are aspects proving acceptance and comprehension of the proposed items;
- the survey is validated in the Italian language; hence, it is easy to use for the sample.

## Weakness of the HLS-EU-Q16 survey:

Differently from the E.U. research (6), the items concerning mental health (numbers 8 and 13) in Lorini's study show a higher percentage of "I do not know" answers (14,3% vs. 5,6% for items 8, 6,3% vs. 3,9% for item 13). As suggested by other Authors (7), this displays a lack of sensitivity of the tool,

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which ought to be calibrated based on the country and the area in which it is proposed. Keeping this in mind, the high percentage of "I do not know" answers for mental health problems highlights critical issues that might be attributed on the one hand to the lack of the respondents' experience with mental health problems and on the other hand, with prejudice and denial surrounding these issues.

## Ethical aspects

The research attained to the constraints imposed by D.lgs. 196/03 "Code in matter of protection of personal data" and kept maximum confidentiality concerning data, information, and knowledge acquired in the data collection process. The collected data is used in an anonymous and confidential form, exclusively for statistics and research. It is not intended to give any value judgment to the policies in force in the institutes examined nor to the personal thoughts of the students who kindly contributed to the study.

## Statistical validity

In other studies related to the evaluation of H.L. conducted on the population, a total homogenous standard of a thousand candidates have been examined and casually selected. For this study, the potential research population communicated by the regional school office was 18 schools in the city of Bergamo, with a total of 3600 students. The institutes that confirmed their participation in this study were 8 (44,45%) for a total of 1734 senior high school students (communicated by the school directors), of which 434 participated (25%) (Table 1).

N°	INSTITUTIONS INVOLVED IN THE STUDY	N. OF DECLARED STUDENTS	N. COMPLETED QUESTIONNAIRES
1	TECHNICAL INSTITUTE - CHEMISTRY, MATERIALS AND BIOTECHNOLOGY	293	15
2	LINGUISTIC HIGH SCHOOL	275	162
3	TECHNICAL AGRICULTURAL INSTITUTE	187	5
4	PROFESSIONAL INSTITUTE FOR TRADE - TOURISM - HOTEL MANAGEMENT	170	4
5	INDUSTRIAL TECHNICAL INSTITUTE FOR FASHION AND GRAPHICS	177	39
6	COMMERCIAL AND TOURIST TECHNICAL INSTITUTE	187	4
7	HUMANITIES AND MUSIC HIGH SCHOOL	241	6
8	SCIENTIFIC HIGH SCHOOL - LINGUISTIC - HUMANITIES	204	146
<b>TOTAL</b>		<b>1734</b>	<b>434</b>
<b>NON-PARTICIPATING DELTAS</b>			<b>1300</b>
<b>% PARTICIPANTS</b>			<b>25%</b>

Table 1: List of the participating high schools



## RESULTS

At the end of the data collection period (September 15<sup>th</sup> to 30<sup>th</sup>, 2021), the data collection of the official website was interrupted in order not to exclude eventual accidental data compilations. All the participants were considered valid thanks to the first question of verification and exclusion: "Are you a senior (last year) high school student?".

An Excel worksheet was made for the elaboration of the responses that allowed the development of the following conclusions:

- 434 students answered the survey in a complete way (25% of the total available sample).
- Students belonged to 16 different nationalities. Specifically, 406 students were of Italian origin (96%), and 15 were of other nationalities (4%).
- 94,5% of the students were aged between 17 and 19, while the remaining percentage was divided between 20 and 21 years old respondents.
- 63,6% of the students were female, and 33,9% were male. The remaining part chose not to specify the answer.

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The scores obtained by the students were calculated as predicted by Lorini (4). To generate the score, the items were dichotomized into two categories with two different scores, "easy" ("quite" and "very" easy = 1) and "difficult" ("quite" and "very" difficult = 0). In Lorini's study (4), "I do not know/refuse to answer" has been recorded as a missing value. The scores on the scale were calculated as a sum of the scores of each item and ranged from 0 to 16. Considering the scores of the HLS-EUQ16 survey, three different levels of health literacy have been defined: inadequate health literacy (0- 8), problematic health literacy (9-12), and adequate health literacy (13-16).

The scores obtained by individual students broken down for each question were also identified so that a value was assigned for each item (Table 2).

Next, the score results for each individual student was calculated, allowing the corresponding H.L. bands to be allocated and assigned according to the bands identified by Lorini et al. and the G-HL index explained below (Table 3).

ITEMS		
Question	Acquired Score	Distribution % among 434 students
1	282	64,98%
2	340	78,34%
3	341	78,57%
4	398	91,71%
5	136	31,34%
6	241	55,53%
7	395	91,01%
8	137	31,57%
9	344	79,26%
10	266	61,29%
11	141	32,49%
12	144	33,18%
13	277	63,82%
14	308	70,97%
15	248	57,14%
16	277	63,82%

Table 2: Survey with single scores per item

LEVELS OF HEALTH LITERACY		N. SINGLE RESULTS	Distribution % among 434 students
0-8	Inadequate health literacy	131	30,18%
09-dic	Problematic health literacy	205	47,24%
13-16	Adequate health literacy	98	22,58%
RANGES OF GENERAL HEALTH LITERACY INDEX Gele		N. SINGLE RESULTS	Distribution % among 434 students
0-25	Inadequate health literacy	153	35,25%
25,1-33	Problematic health literacy	202	46,54%
33,1-42	Sufficient health literacy	70	16,13%
42,1-50	Excellent health literacy	9	2,07%

Table 3: Distribution of questionnaire scores according to Lorini (4) and identification of the generic band of the G-HL index according to Gele (8)

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Similarly to the score of the survey HLSEU-Q47, it is possible to point out a general index of H.L. general (index G-HL, table 3) recommended in the analysis of the results on large samples (8), calculated as follows: firstly, the scores of the Likert scale have to be redistributed where the answer was "I do not know" 0 points, "Very easy" 1 point, "Quite difficult" 2 points, "Quite easy" 3 points, "Very easy" 4 points; the formula is:  $\text{Index G-HL} = ((\text{mean value} - 1) * 50) / 3$  where "mean value" is the average of the scores of the single answer of each participant. The

average per each, thus, will range between 1 and 4, and consequently (mean value-1) will range between 0 and 3. If the average (mean) is 0, then the G-HL Index assumes a value equal to 0; if the average (mean) is 4, then the G-HL Index assumes a value equal to 50. Subsequently, four different levels of health literacy have been defined in HLS-EUQ47: adequate health literacy (0-25), problematic health literacy (25,1-33), sufficient health literacy (33,1-43), and excellent (42,1-50) (see table 3).

## DISCUSSION

### Confronting results on a worldwide scale

AUTHOR	AGE	COUNTRY	TOOL	RISULTATI
Lorini et al. (4)	40-60 yo (mean)	Italy	HLS-EU-Q16	Greater difficulty on items 12-8-11 (online). 55.2% of the sample had H.L. problems.
Klinker et al. (9)	15-26 yo (mean)	Denmark	HLQ-Q47	Poor HL among males and younger students, but without identifying a specific age group (questionnaire not designed for this purpose).
Wang et al. (10)	19-21 yo (mean)	China	Chinese Citizens H.L. Questionnaire	The level of health knowledge among Chinese school students is extremely low (1.4% of students have adequate health knowledge).
Rababah et al. (11)	19-21 yo (mean)	Jordan	HLQ-Q47	The H.L. level was lower than that reported in the literature, but without identifying a specific age group (the questionnaire was not prepared for this purpose).
Harper (12)	20-24 yo (mean)	America	NAMLE	Results not classified as the type of study involved the creation of a new age-specific assessment method
Gazibara (13)	15-18 yo (mean)	Serbia	eHEALS	Results not classified as the type of study involved the validation of the questionnaire in the Serbian language
Elsborg (14)	20-24 yo (mean)	Denmark	HLQ-Q47	No classification of results, only inferences between individual questions without identifying a H.L. band (questionnaire not designed for this purpose).
Pelikan (5)	25-80 yo	Europe	HLS-EU-Q47	Results reported in Figure 2

Table 4: Results of similar studies in the rest of the world

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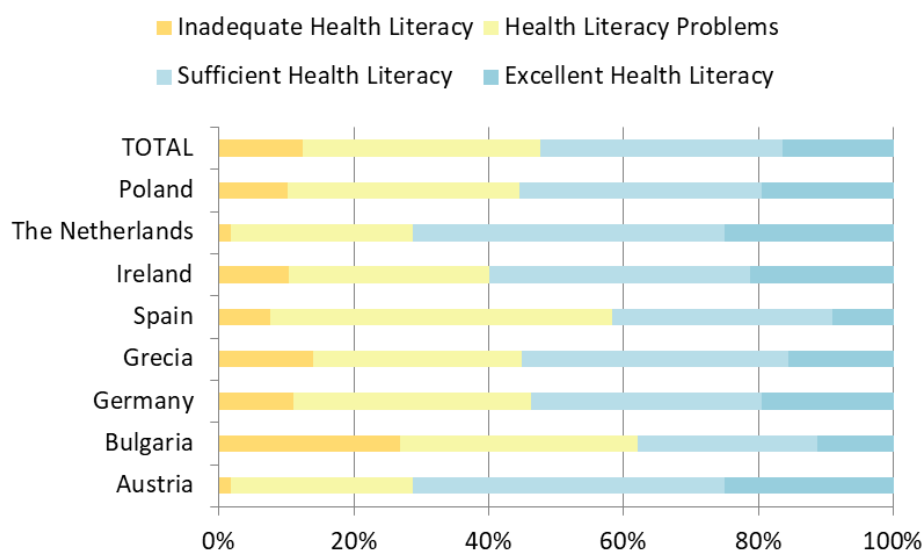


Figure 2: Graphical summary of the results of Pelikan et al. (5)

As can be interpreted from table 4 and figure 2, the results obtained in this study are similar to the ones in the rest of the world, specifically, compared to the study carried out in Italy, more difficulties are seen with regards to item 12-8-11 (in line) and the 55,2% of the sample with a problematic H.L.; in Denmark health literacy is scarce among males and younger students, but without identifying a specific age range, as that was not the survey's goal; the other study, also carried out in Denmark, did not highlight findings, but rather the inference between the single questions, thus without identifying a specific H.L. range; in China, the knowledge level on health among students is extremely low (only 1,4% of the students had an adequate knowledge level about health); in Jordan the level of H.L. appeared to be lower than the level reported in the literature, but without accounting for a specific age range; the study in the U.S. did not classify the results according to a H.L. level as the typology of study was aiming at creating a new evaluation method specific for age, and accordingly in the study in Serbia. Concerning the European study, figure 2 shows that problematic and inadequate H.L. is equal to, if not higher than, the sufficient H.L. Our results are mainly in line with the ones found by

Lorini et al. (4), although the sample was utterly different. It was not possible to estimate ulterior comparisons related to similar age ranges and to the target in other studies, as the methods and evaluations adopted were different from the ones of this study. However, we may affirm that as of today, a measurement tool for the H.L. index dedicated to the "young adults" category has not been developed, and it seems evident how each measurement tool needs to be adequate to its territorial context. Concerning the results of the European study on H.L. level (6), which used survey HLS-EU-Q47 from which Lorini et al. (4) used the questions of survey HLS-EU-Q16, we found how many European countries have similar high percentages of problematic H.L., as the one found among our sample of students. These comparisons underline the evidence that society needs to remedy this serious issue of public health.

### Limitations and weaknesses of this study

- The results are based on limited HL-related literature, especially in relation to the sample type and the type of general collected data.

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- The students' sample does not guarantee a strong statistical power, as it is not representative of the entire student population (selection bias).
- The typology of the study design limits the ability to conclude a causal inference.
- Our results are not representative of all types of curricula of students in Bergamo.
- This study is based on self-reported data.
- The sampling method is not probability-based: the participants involved are exclusively senior high school students in the city of Bergamo.

## CONCLUSIONS

Thanks to the literature and the results of this study, we can affirm that our sample, representing citizens and "future adults," is at risk of negative outcomes for health, which:

- increased risk for high mortality (15);
- increased health expenses, lower participation in health promotion and disease detection, and adoption of risky behavior leading as a consequence to work accidents, ineffective management of chronic diseases, scarce adherence to therapeutic indications, increased hospitalization, increased morbidity and mortality (7);
- limited H.L., associated with social dimensions that might reinforce ulteriorly existing inequalities (7);

Equal access to provisions and healthcare services alone is not sufficient to obtain equality in health, measured in terms of life quality and life expectancy; citizen education is therefore key ingredient and is indispensable to reach such equality, as well as activation strategies with the goal of increasing H.L. levels in the population, from all parties involved in the socio-health sphere, with a specific eye on nurses,

who appear to be a competent figure proactive in this type of activities, also in the educational field. In the past 20 years, many approaches and tools have been developed to strengthen H.L. in different environments and for different population groups, but the interventions need to be developed in several settings: health professionals urge the educational sector to improve the literacy abilities of people, but the healthcare sector itself needs to act in order to remove barriers of access to information, to service and treatments (7).

Albeit limited, the available research based on testing efficiency suggests a clear necessity to invest in H.L. as early as possible, starting from childhood and adolescence (16). Schools ought to assume a fundamental role and include health instruction and formation programs managed by nurses, who are currently only sporadically involved in the initiative of the individuals. Schools, which reach out to almost all children of school age, offer an ideal environment to work on H.L. through the realization of long-term H.L. programs, such as in Finland (17), in the U.S. (18-19) and in Australia (20), guaranteeing more sustainable and profitable educational interventions (21). Occasions to promote health in schools and health-education activities have an important impact on the levels of H.L. In Lithuania, it has been observed that students who took part in interventions for health promotions at school and health-educational activities (especially the ones focused on bullying) displayed a better H.L. compared to students who did not partake (22).

## Implications for nursing practices

The relationship between H.L. and nursing practices has yet to be widely investigated/examined/analysed (2). The attention of nurses for H.L. is limited: 53% of nurses do not consider it a priority aspect as compared to clinical-assistance necessities (23) both due to a not full understanding of its outcomes on





individual health, both due to a lack of evaluation of the topic (2). The interaction between the settings, people, and professionals is essential for the development of policies and programs that tackle the issues of H.L. and its evaluation (7), and it is a necessity to create specific programs for training and awareness about this topic (25). The acquisition of competencies on the subject of H.L. requires training focused on the development of abilities that allow health professionals employed in healthcare education to identify correctly the level of H.L. in a person in order to adopt different communication strategies appropriate for making the assistance relationship effective (7).

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