FOOD AND NUTRITION IN COLLECTIVE HEALTH

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Nutrition literacy of technical and higher education students in the countryside of Ceará

Letramento nutricional de estudantes do ensino técnico e superior do interior do Ceará

Abstract

Objective: This study aimed to assess the level of nutrition literacy (NL) in technical and higher education students and to compare the level of NL of students in the field of health with that of students in other fields. ***Methods:*** A quantitative descriptive and analytical cross-sectional study was carried out from November 2018 to March 2019. The Newest Vital Sign (NVS) translated into Brazilian Portuguese was used to assess the level of literacy. Participants were 289 students, of whom 38.75% were men and 61.25% were women. The participants' mean age was 22.62 years (SD= 4.55). ***Results:*** With regard to the level of literacy, 48.44% of the students presented adequate NL; 25.26% exhibited possibility of limited NL; and 26.30% presented a high probability of limited NL. Adequate levels of NL were found in 70.83% of the students in the field of health and in 41.01% of the students in the other fields. ***Conclusion:*** The students had adequate nutrition literacy. Students in the field of health achieved better results when compared with those from other fields.

Keywords: Health literacy. Students. Health Sciences Students.

Resumo

Objetivo: Este estudo objetivou avaliar o grau de letramento nutricional (LN) de estudantes do ensino técnico e superior e comparar o nível de LN de estudantes da área de saúde com o de estudantes de outras áreas. ***Métodos:*** Estudo quantitativo, transversal, descritivo e analítico, realizado de novembro de 2018 a março de 2019. Para avaliar o grau de letramento, foi utilizada a ferramenta *Newest Vital Sign* (NVS), na versão traduzida para o português do Brasil. Participaram do estudo 289 estudantes, dos quais 38,75% pertenciam ao gênero masculino e 61,25% ao sexo feminino. Tinham média de idade de 22,62 anos (DP= 4,55). ***Resultados***: Quanto ao grau de letramento, 48,44% dos estudantes apresentaram LN adequado; 25,26% LN com possibilidade de limitação; e 26,30% LN com alta probabilidade de limitação. Estudantes da área da saúde obtiveram 70,83% de grau de LN adequado e estudantes de outras áreas, 41,01%. ***Conclusão:*** Os estudantes tiveram adequado letramento em nutrição. Discentes que estudam na área da saúde obtiveram melhor resultado, quando comparados com os de outras áreas.

Palavras-chave: Alfabetização em saúde. Estudantes. Estudantes de Ciências da Saúde.

INTRODUCTION

The term "literacy" originates from the English language and it etymologically and strictly represents the state, condition, or quality of being literate, that is, one who is educated, especially for reading and writing. However, literacy goes much further than that. Because it has several determinants, it is currently defined as the social phenomenon influenced by educational, socioeconomic, historical, cultural, and political aspects based on which an individual responds to the demands of society.[1]

The term "health literacy" encompasses the various skills and competences needed by individuals to make assertive decisions about their health. Functional health literacy (FHL) is one of its forms and is defined as the individual's ability to obtain, understand and use written or spoken health-related information.[2]

Similarly, functional nutrition literacy (FNL) can be understood as FHL applied to the Nutrition field and refers to the ability to acquire and process reliable nutrition information so that nutrition-related decisions can be properly made.[2] It includes the ability to read labels, prescriptions and guidelines.[3] To that end, literacy and numeracy skills are required.[2]

Although there is no consensus on the issue, the terms nutrition literacy (NL) and food literacy (FL) are commonly used interchangeably.[4] In one definition, FL is described as the instrument that empowers individuals to maintain quality diet by strengthening their dietary resilience. It is the result of interrelated knowledge, skills and behaviors required to plan, select, prepare and eat food to meet needs.[5] However, because of its multiple domains, it is still necessary to build a complete tool able to assess it in a reliable way.[6]

Given the evidence of the connections between the terms presented herein, it is understood that assertive nutrition-related decisions are key to an adequate state of health. In the broadest sense, an unsatisfactory FHL hinders self-care, particularly in older adults and chronically ill individuals, and it is one of the causes of non-adherence to drug therapy.[7] In adolescence, satisfactory FHL can contribute to adequate self-care in the short and long term, that is, including adult life.[8]

It is believed that more than 50% of adolescents have adequate FHL, especially those with better perception of social life and school inclusion and who follow some religion.[9] Healthcare students seem to be more likely to have a better FHL.[10]

Adequate FHL is also essential for adults given their constant need to make health-related decisions, such as choosing the best food or whether to smoke or not, how to access and move through the health system and how to communicate with professionals in the field.[11]

An adequate NL is indispensable for people to manage processes related to health and nutrition, such as selecting foods, recognizing their energy needs, and improving their quality of life. It is directly related to a better health condition.[12]

Several instruments are used to assess FHL, namely the Rapid Estimate of Adult Literacy in Medicine, dating from 1993 (REALM),[13] the Test of Functional Health Literacy in Adults, from 1995 (TOFHLA)[14] and the Newest Vital Sign (NVS), from 2005. The NVS is simple, fast, easy to apply and also appropriate to assess the level of NL,[15,16] but current studies consider that NL has many domains and, therefore, lacks a broad and consensual assessment tool.[5,6]

The topic is deemed important, especially in a country where there is little research in the field like Brazil, particularly when it comes specifically to NL. In view of that, there was the idea of conducting a study with higher education students in the countryside of Ceará to assess NL and contribute to the maintenance

of their health and quality of life. It was also intended to check whether this skill differed between students enrolled in healthcare courses and those enrolled in courses in other fields.

METHODS

This quantitative descriptive, analytical and cross-sectional study was carried out at the Instituto Federal de Educação, Ciência e Tecnologia do Ceará (IFCE) (Ceará Federal Institute of Education, Science and Technology), on the Limoeiro do Norte campus, from November 2018 to March 2019. At the time of data collection the campus offered six higher education courses, two of them in the field of health, namely a bachelor's degree in Nutrition and a licentiate degree in Physical Education. The other courses were bachelor's degrees in Agronomy, Food Technology, Industrial Mechatronics and Environmental Sanitation. There were also five technical skills training courses: Agriculture, Electronics, Industrial Mechanics, Environment and Bakery.

Sample

The study population consisted of students enrolled in the institution. The Triola formula[17] was used to determine the sample size with a 95% confidence level and a 5% margin of error, thus resulting in a total of 289 participants.

The study included students aged 18-60 years who were regularly enrolled in any of the courses and who agreed to participate by signing the Informed Consent Form (ICF). Those who for some reason did not completely answer the questions on the data collection instrument or who refused to participate were excluded.

The number of students in each course that comprised the sample was determined by proportional stratified sampling considering the percentage of representativeness of students in each course in relation to the total number of students enrolled in the institution. The participants were randomly selected from each stratum. Thus, in each class of students the researchers explained the research objective and methods and these students voluntarily attended the place set for interview.

The study was approved by the IFCE Research Ethics Committee under Approval No. 3.085.960 and complied with Resolution No. 466/2012, which provides for research involving human beings. The students received all information about the study objectives and methods. It was made clear that the participant could withdraw from the study at any time and that there were no health-related risks. Anonymity and confidentiality of the data were ensured, and if the participants reported fatigue, they would have the opportunity to respond at another time.

Instruments

The data were collected through the application of two data collection instruments. The demographic characterization of the group was assessed using a multiple-choice form containing the following variables: name, age (in years), course, gender, marital status, place of residence, level of education, self-reported ethnicity and household income.

The level of NL was assessed using the translated version of the NVS[13] validated for Brazilian Portuguese.[18] This tool, which makes it possible to assess numerical and reading skills, consists of six

questions that must be answered based on the reading of an ice cream label and ask about serving sizes, nutrition facts and ingredients. The questions are scored as right or wrong and the interviewees do not have access to response alternatives.[13]

The original version of the NVS, in English, was developed by a group of experts in health literacy based on tests of questions applied to more than 1,000 patients who participated in different settings studied in other studies on the topic or in studies of development of other instruments, such as the TOFHLA, previously mentioned and considered the most used in health literacy assessment studies.[13]

The settings and questions went through several refinement steps after feedback from patients, interviewers and data analysts regarding clarity and ease of scoring the items until a 21-question form was reached. This was applied to 500 patients out of the initial 1,000. Then, a short final form was developed with six questions selected from 21 based on their psychometric properties. This was called NVS and its validity was proven based on its correlation with TOFHLA scores. In addition, it has proven reliable (Cronbach>0.76) and requires much less time for application.[13]

The NVS uses questions answered based only on a nutrition facts label since after the refinement of items and settings its numerical and quantitative questions proved to be the best literacy predictors when using TOFHLA as a reference standard. The high internal consistency showed that the questions used assess not only mathematical aptitude, but also agility to access, read and understand information and abstract reasoning skills. In addition, nutrition facts labels are familiar and an important part of health management for many chronic diseases and are also used for health promotion, as many healthy people use their information as an aid to engage in healthy eating habits.[13]

In order to obtain the NVS in Brazilian Portuguese, the original tool was subjected to translation, back-translation, revision by experts and final validation with 301 individuals. Afterwards, it proved to be a good cross-cultural adaptation with construct validity in terms of population characteristics and usefulness, mainly in tracking inadequacy of health literacy.[18]

Procedures

The students were contacted in the shared common area of the institution and invited to join the study. Those who agreed to participate signed the ICF. After that, the socioeconomic and demographic form was applied and the level of NL of each university student was assessed. The participants received a nutrition facts label of an ice cream for application of the NVS tool. The application of the instruments lasted 10 minutes on average. Each question in the NVS answered correctly is equivalent to one point. The scores obtained in this test are summed and generate results that are classified as follows: 0 to 1, high probability of limited literacy or inadequate NL; 2 to 3, probability of limited literacy; and 4 to 6, adequate literacy.[19] Therefore, scores of 0 to 3 designate unsatisfactory NL.[13]

Statistical analysis

Data analysis was performed using the SPSS software (version 20.0). Microsoft Office Excel 2016 was used for data tabulation. Descriptive statistics were used for socioeconomic and demographic characterization of the study sample on tables and figures with absolute and percentage frequencies, means and standard deviations (SD). The categorization of age was based on the recommendations of the World

Health Organization (WHO), [20] which defines adolescence as the age range of 10 to 19 years. The classification of income took into consideration the amount of R$ 998.00, which refers to the minimum wage in 2019.

Bivariate analysis with Chi-squared test and Fisher's exact test at 5% was used to check for associations between NL classification and categories of socioeconomic and demographic characteristics. Logistic regression models were designed to estimate the gross odds ratio (OR). For this purpose, "residential area", "level of education", "household income" and "field of the course in which the students were enrolled" were adopted as independent variables, while the level of literacy was adopted as a the dependent variable. The variable "residential area" was grouped into rural and urban, level of education was grouped into complete secondary education and higher education (currently studying or complete), household income was grouped into below one minimum wage (MW) and above or equal to 1 MW and, finally, the field of the course was grouped into health and non-health. The level of NL was categorized into satisfactory and unsatisfactory.

The T test was used to check for significant differences in the level of literacy between the fields (health and non-health). Associations of NVS with sex, age, residential area, level of education and household income were checked.

Pearson's test was used to check for correlation between age, as a continuous variable, and NVS score. In all the tests $p<0.05$ was considered significant.

RESULTS

The mean age of the 289 participants was 22.62 years (SD= 4.55), with age ranging from 18 to 42 years. Table 1 summarizes the other social and demographic characteristics of the students.

Table 1. Socioeconomic and demographic profile of IFCE students. Limoeiro do Norte-CE, 2019.

Variables	n	%
Sex		
Men	112	38.75
Women	177	61.25
Total	289	100
Marital Status		
Single	250	86.51
Married	26	9.00
Common-law marriage	12	4.15
Divorced	01	0.34
Total	289	100
Residential Area		
Rural	83	28.72
Urban	206	72.28
Total	289	100
Level of Education		
Complete Secondary Education	80	27.68
Incomplete Higher Education	191	66.09
Complete Higher Education	14	4.84
Specialization	4	1.39
Total	289	100

Table 1. Socioeconomic and demographic profile of IFCE students. Limoeiro do Norte-CE, 2019. (Continues)

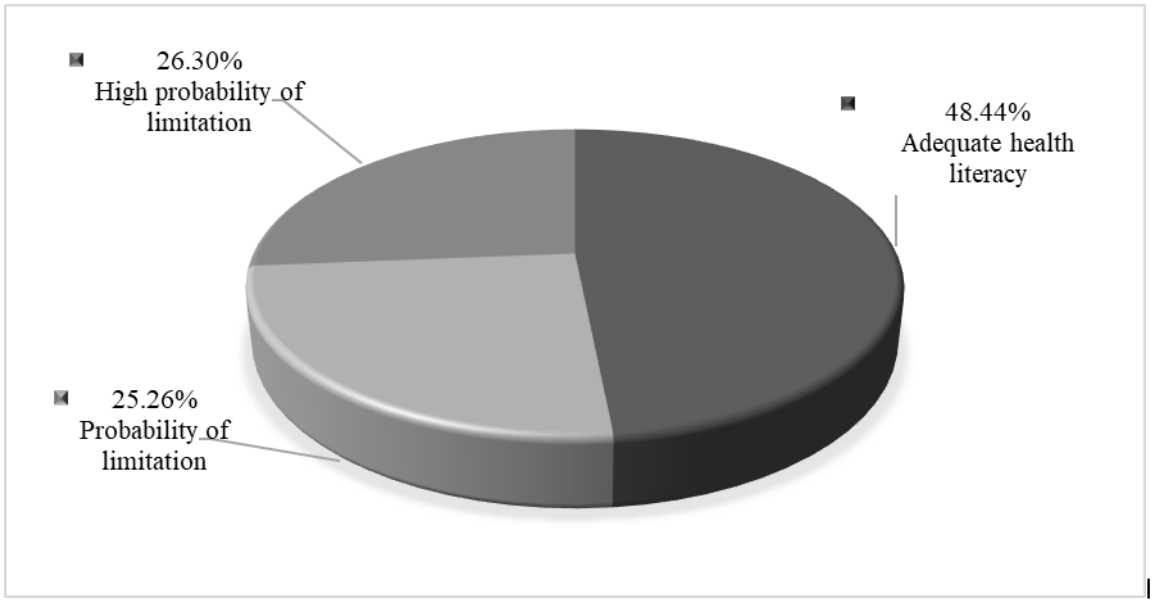
Variables	n	%
Self-reported Ethnicity		
White	81	28.03
Black	43	14.88
Yellow	14	4.84
Pardo	150	51.90
Indigenous	01	0.35
Total	289	100
**Household Income*		
< one wage	89	30.79
From one to three wages	180	62.28
> Three to six wages	16	5.54
> Six wages	4	1.39
Total	289	100

*Minimum wage: R$ 998.00.

Most of the participants (61.25%) were women, single (86.51%), lived in the urban area (72.28%), were enrolled in higher education (66.09%), were *Pardos* (Mixed-race Brazilians) (51.90%) and had a household income that ranged from one to three minimum wages (62.28%).

Figure 1 shows the overall result of the assessment of the level of nutrition literacy of the individuals analyzed.

Figure 1. Overall result of the interpretation of the NVS. Limoeiro do Norte-CE 2019



There was a higher prevalence of adequate NL (48.44%) among the participants, but an important percentage of individuals (26.30%) presented a high probability of limited literacy. The mean NVS score (right

answers) was 3.22 points (SD= 2.06). There was a weak positive correlation (Pearson's r = 0.012) between NVS score and mean age of the group, but it was not statistically significant (p= 0.843).

Table 2 depicts the correlation of the level of NL with the social and demographic conditions of the studied group.

Table 2. Correlations of sex, age, education, and income with level of nutrition literacy. Limoeiro do Norte-CE, 2019.

VARIABLES	NVS CLASSIFICATION						Total		p-value****	OR*****
	Adequate		Possibility of Limitation		High Probability of Limitation					
	n	%	n	%	n	%	n	%		
Sex									0.171	
Men	48	42.86	24	21.43	40	35.71	112	100		
Women	92	51.98	49	37.68	36	20.34	177	100		
*Age**									0.172	
Adolescent	28	43.08	17	26.15	20	30.77	65	100		
Adult	112	50.00	56	25.00	56	25.00	224	100		
Residential Area									0.021	1.16
Rural	38	45.78	17	20.48	28	33.74	83	100		
Urban	102	49.52	56	27.18	48	23.30	206	100		
Level of Education									0.000	8.95
Secondary Education	12	15.00	25	31.25	43	53.75	80	100		
Higher Education	128	61.24	48	22.97	33	15.79	209	100		
*Household Income***									0.016	1.49
< One MW	37	41.57	19	21.35	33	37.08	89	100		
≥One MW	103	51.50	54	27.00	43	21.50	200	100		

* Classification of age according to the World Health Organization (WHO); ** Minimum wage: R$ 998.00; ***MW = minimum wage; **** Chi-squared test or Fisher's Exact test, with a 5% significance level; ***** significant odds ratio (OR) – logistic regression.

The variables "sex" and "age" did not correlate significantly with the level of NL (p= 0.171 and p= 0.172, respectively). On the other hand, the variables "residential area", "level of education" and "household income" correlated significantly with the level of NL. Thus, the percentage of students with adequate NL was higher among those who lived in the urban area (49.52%; p= 0.021). Living in the city increased by 16% (OR= 1.16) the chances of presenting adequate NL in relation to those who lived in the countryside.

The percentage of students with an adequate level of NL was significantly higher among those who had completed higher education or were attending it (61.24%; p= 0.000). Thus, having completed or attending higher education increased the chances of having an adequate NL by 8.95 times (OR= 8.95) when compared to those who had only completed secondary education. Also, the percentage of students with an adequate level of NL was significantly higher among those who had a household income equal to or above 1 MW

(51.50%; p= 0.000). Those who reported this level of income had a 49% higher chance (OR= 1.49) of presenting adequate NL when compared to those with an income of less than 1 MW.

Table 3 shows the distribution of students according to level of NL and field of study.

Table 3. Association between nutrition literacy and field of study (healthcare courses *versus* non-health-related courses). Limoeiro do Norte-CE, 2019.

VARIABLES	NVS CLASSIFICATION						Total		p-value*	OR**
	Adequate		Possibility of Limitation		High Probability of Limitation					
	n	%	n	%	n	%	n	%		
Course									0.000	3.49
Healthcare	51	70.83	10	13.89	11	15.28	72	100		
Other fields	89	41.01	63	29.03	65	29.96	217	100		

* Chi-squared test or Fisher's Exact test 5% significance level; **odds ratio (OR) – logistic regression.

Most of the students enrolled in healthcare courses (70.83%) presented an adequate level of NL. Unsatisfactory NL predominated among students from other fields (58.99% with the probability of limited literacy or high probability of limited literacy).

There was a significant association between the field of study and the level of NL (p= 0.000), with students in the field of health having a 3.49 times greater chance of presenting an adequate level of literacy (OR= 3.49) compared to those who studied in other fields.

Healthcare students totaled, on average, four correct answers (SD= 1.81) in the NVS tool compared to 2.97 points (SD= 2.08) obtained by students from other fields (p= 0.000). Table 4 shows the means and standard deviations of the NVS score (correct answers) per course.

Table 4. Mean (M) and standard deviation (SD) of the NVS score among students by course. Limoeiro do Norte-CE, 2019.

COURSES	M (SD)
Healthcare Field	
Nutrition*	4.44 (1.37)
Physical Education*	3.26 (2.19)
Other Fields	
Mechatronics*	4.06 (1.97)
Food Engineering*	3.81 (1.92)
Agronomy	3.57 (2.00)
Bakery**	3.33 (1.73)
Environmental Sanitation*	3.21 (1.93)
Industrial Mechanics**	2.00 (1.83)
Environment**	2.00 (2.00)
Electro-Electronics**	1.40 (1.67)
Agriculture**	1.33 (1.11)

* Undergraduate ** Technical Skills Training Courses

The healthcare course that most contributed to an adequate NVS result (best score) was Nutrition, with a mean score of 4.44 (SD= 1.37). As for the other fields, the best score was observed in the Mechatronics course, with a mean score of 4.06 (SD= 1.97).

DISCUSSION

This study revealed that most of the students were women and had adequate NL. Those who lived in the urban area, had completed or were attending higher education, and had an income equal to or above one MW exhibited a higher percentage of adequate NL, thereby showing that the level of nutrition literacy varies according to socioeconomic and demographic characteristics. Students in the health field had better NL when compared to those in other fields.

As previously highlighted, functional literacy is a form of health literacy. When referring to the individual's ability to access, understand and put into practice the nutrition information to make the best decisions about their nutrition it is called functional nutrition literacy. Therefore, this discussion section will draw on the work of authors who have studied health literacy or nutrition literacy as these areas are known to be directly linked.[2]

Previous finding confirms that socioeconomic factors such as higher levels of education and better household income are determinants of satisfactory Nutrition Literacy.[21] Social and demographic conditions are important dimensions for obtaining adequate nutrition literacy.[22] Socioeconomic aspects, as well as environmental factors and health problems, are directly related to the understanding of the concept of health and therefore reflect individual care for one's own health and quality of life.[23]

In this study, there were no statistically significant correlations of sex and age with NL. The correlation with sex was also not confirmed in studies carried out with adults in Italy[23] and with North American older adults descendants of Africans and Westerners.[24] Despite that, health literacy is predominantly inadequate in older adults regardless of gender and influenced by low levels of education, lack of reading habit and clinical complications that make reading unfeasible.[25] On the other hand, a study highlighted the best nutrition literacy is found in women, probably because they use nutrition labels more frequently, as they are the ones who plan meals and buy food in many households.[26]

Considering that this study included adolescents, and despite the lack of correlation between age and NL, it is important to highlight that adolescence is a life cycle permeated by vulnerabilities as individuals in this age group are commonly exposed to situations such as violence, exploitation of labor, early and unprotected sexual activity, use of alcohol and illicit drugs, inappropriate eating habits, unfavorable socioeconomic conditions and school dropout, which are direct social determinants of absence of health[27] and which, for being socioeconomic, demographic or environmental factors, can compromise the level of FHL and, more specifically, nutrition literacy.[22,23]

With regard to this population group, A systematic review has suggested that food literacy interferes with food consumption in adolescents and that intensifying it can be an appropriate public health strategy to intervene on the increasing prevalence of overweight and obesity in this life cycle.[6]

Studies on FHL, particularly those on adolescents' NL, can contribute to the development of strategies and public policies aimed at enhancing the competences and skills of this population in these areas.[6,9] There is still little research conducted with adolescents to discuss their skills and behaviors towards health management.[9]

A study carried out in primary health care settings in the United States found inadequate FHL was diagnosed in 51.9% of the adults and in 40.3% of the young individuals. A higher level of FHL was detected in adults who had never smoked or who had quit smoking for more than 5 years.[19] A study carried out in Turkey with adults receiving primary health care found that 58.7% of the group presented adequate FHL measured by REALM. The NVS revealed 28.1% of adequacy, thus indicating that recognition of medical terms and pronunciation skills in the group were better than numerical and reasoning skills.[28]

The results obtained with the NVS differed from the findings of the present study as the percentage of participants with adequate FHL herein was much higher (48.44% versus 28.1% in the Turkish study).

In this study there was a significant correlation between NL and residential area and inadequate nutrition literacy was more frequent among people living in the rural area. A study carried out in Iran showed that 82.4% of the people who lived in rural areas had inadequate FHL, while the same was found in only 17.60% of the people living in urban areas, a finding that is similar to that of the present study (23.30%).[29]

In a study conducted in five provinces of Iran, 56.6% of the respondents presented inadequate FHL and, like in the present study, the people who lived in rural areas presented lower levels of FHL compared to the people who lived in urban areas. Such results may have been influenced by the disparities found in monthly income, number of family members, level of education and distance from healthcare facilities when comparing people living in rural areas to people living urban areas.[30]

With regard to the association between level of education and NL, 85% of those who had only completed secondary education exhibited an unsatisfactory level of literacy. The same was found among 38.76% of those who had completed or were attending higher education. Level of education was positively correlated with nutrition literacy in 1,281 Greek individuals aged 18 years or older.[31] Among 452 adults living in Florence, Italy, also assessed by the NVS, the participants who had attended secondary education at most exhibited a 2.59 times greater chance of presenting unsatisfactory literacy when compared to those with a college degree, which confirms the findings of the present study, but with a lower impact (OR = 8.95 in the present study).[32]

This socioeconomic factor can influence the level of NL because the fewer the years of study, the weaker the reading habit and the ability to understand labels seem to be.[33] Furthermore, the ability to find reliable sources of health-related information and understand them is influenced by the level of education.[34]

As for the relationship between NL and household income, only 41.57% of the students with a household income below one MW exhibited an adequate level of NL. The same was found in 51.50% of those with an income above one minimum wage. In the Greek study, previously mentioned herein, the mean annual income was assessed and correlated positively with health literacy.[31] In the study with Italians, also mentioned previously in this study, individuals with marginal or insufficient income had twice the chance (OR = 2.03) of having an unsatisfactory performance in the NVS compared to those with an adequate income or an income more than adequate to cover monthly expenses.[32] Therefore, income determined the level of literacy in the Italian study more significantly than in the present study (OR = 1.49).

In another study, which included participants from several countries in Europe, subgroups of the population with the lowest levels of income and education or older adults featured the highest proportions of people with limited health literacy.[35] Among Iranians, earning a higher monthly income also contributed to an adequate level of FHL in rural inhabitants.[29]

In the present study, most of the students (48.44%) had an adequate NL. Healthcare students achieved better results (70.83% of adequate NL) when compared to students from other fields, with the highest NVS

score found for the Nutrition course. This may have been caused by the fact that nutrition labeling is a theme included in the curriculum of the Nutrition course, and the NVS test consists of six questions on the interpretation of information on an ice cream label.

On the other hand, the non-health-related course that most contributed to increase the mean score on the NVS was Mechatronics, which requires numerical skills from students. Other courses, such as Industrial Mechanics and Electro-electronics, despite requiring knowledge of mathematics, may have shown worse performance because it is common that students of subsequent technical skills training courses present insufficient academic performance and high dropout rates. For instance, at the end of the second half of 2018, only 10% of all those who had enrolled in the first half of 2017 had completed their courses successfully, 34% were retained due to failure in some subject, and 56% had dropped out.[36] It should be noted that admission to these courses are based on the analysis of school transcripts without any other more rigorous selection process.

After searching the national and international literature, only one study was found to assess the level of FHL among undergraduate students. This included Physiotherapy undergraduate students and used an adapted version of the Short Assessment of Health Literacy Spanish and English (SAHL-S&E) just to find a predominance of adequate FHL. SAHL-S&E is a validated tool, but unlike NVS, it assesses knowledge about medical terms according 18 items. A score above or equal to 15 points indicates adequate FHL. The mean SAHL-S&E score was 16.6 for students in the first years, 16.7 for those in the middle years and 17.1 for those in the final years. There were no statistical differences between them, but all of them were adequate in all the periods.[37] This finding supports the present study and reinforces the assumption that higher education students in the health field have a greater chance of having adequate FHL.

Finally, the cross-sectional design of the present study constitutes a limitation as there is the disadvantage of not being possible to establishing causal relationships between the study variables (in this case, the level of NL and socioeconomic and demographic variables) because cross-sectional studies do not prove the existence of a temporal sequence and thus the influence of past events remain unknown.

Another potential limitation is the possibility of questioning whether the literacy level assessment tool really discriminates individuals with worse literacy or worse numeracy since it assesses arithmetic ability more clearly than other domains that can determine nutrition literacy.

The results of the present study should be the basis for future interventions, preferably of a permanent nature, to be carried out in the institution by students in the health field, student support personnel, academic extension personnel and campus managers in order to improve students' health and nutrition concepts and improve their quality of life in the long term. The restructuring of curricula should also be considered and it should be included in all courses featuring subjects involving health and nutrition in order to achieve the same benefits.

CONCLUSION

It is concluded that students predominantly presented adequate nutrition literacy, with better results among students in the health field. Socioeconomic and demographic conditions influenced the NL results. Having a higher level of education, living in the urban area, and having an income above a minimum wage were shown to possibly contribute to a better level of NL.

Further studies should be carried out to assess the level of NL in courses stratified by academic term as the study duration can influence the level of nutrition literacy. But from now on, multisectoral actions are

needed to foster the understanding of the concepts of health and nutrition among those with unsatisfactory NL.

The present study contributes to the construction of intervention strategies and to the restructuring of the curricula. It could be interesting to include it in all courses featuring subjects involving health and nutrition.

Interventions with students can bring benefits that will go beyond the walls of the institution and reflect on the rest of civil society since they will be professionals who, during the exercise of their functions, can be multipliers of the concepts learned. Individuals with an adequate level of literacy have the necessary skills and competences to manage their health and that of their families and/or community.

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Contributors

Moura ABL participated in the study design; in the collection, analysis and interpretation of data; in the writing of the manuscript; and in the final review and approval of the manuscript for submission. Silva BYC participated in the study design; in the analysis and interpretation of data; in the writing of the manuscript; in the final review and approval of the manuscript for submission. Lucena DM and Mesquita VL participated in the collection, analysis and interpretation of data.

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