

# The Relationship of Nutrition Literacy, Eating Pattern, and Nutritional Status among Medical Students

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## Abstract

**Introduction:** Nutrition literacy is the ability to search, obtain, understand, and apply nutrition information. Low nutrition literacy may cause a negative impact in eating patterns and nutritional status. This study aims to determine the relationship between nutrition literacy with eating pattern and nutritional status among medical students in the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia.

**Methods:** This study was a descriptive analytic cross-sectional study among 97 medical students of the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia. Nutrition literacy was measured with The Newest Vital Sign questionnaire. Food consumption data was collected with the 24-hours recall questionnaire. Nutritional status was measured based on body mass index (BMI). Research data were analyzed using the Rank Spearman test.

**Results:** Based on the data analysis, there were 66% of students with adequate nutrition literacy, 66,3% of students with improper diet, and 44,3% of students with normal nutritional status. The bivariate result showed that there was no association between nutrition literacy with nutritional status ( $P = 0,057$ ), nutrition literacy and eating pattern for carbohydrates ( $P = 0,562$ ), protein ( $P = 0,876$ ), and fat ( $P = 0,569$ ).

**Conclusion:** There was no association between nutrition literacy with eating pattern and nutritional status among medical students in the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia.

**Keywords:** Nutrition Literacy - Eating Pattern - Nutritional Status - Medical Students

## INTRODUCTION

Based on Basic Health Research (Riset Kesehatan Dasar, RISKESDAS) 2018 data, the proportion of overweight & obese people over 18 years of age tended to increase from 2007 until 2018. The proportion of overweight in 2007 was 8.6%, increasing to 13.6% in 2018,

as well as the proportion of obesity that increased from 10.5% to 21.8% in 2018. The proportion of obesity in DKI Jakarta for those over 18 is almost 30.2%.<sup>1</sup>

Eating pattern may be different across everyone, and it can be grouped into healthy and unhealthy eating patterns. According to

the World Health Organization (WHO), a healthy diet prevents non-communicable diseases and malnutrition. A healthy diet includes consuming fruits and vegetables, reducing consumption of free sugar and salt, choosing healthy types of fat, and maintaining energy balance.<sup>2</sup> An unhealthy diet consists of consuming food that high in content, excess sugar, and salt intake, lack of vegetables and fruit, and irregular eating schedule.

Indonesia is currently facing a double nutritional problem, namely underweight and obesity. Nutritional status is a condition caused by a balance between the number of calories intake and the nutrients the body needs. Nutritional status can evaluate the balance of nutrients and their use, which is influenced by diet.<sup>3</sup> Nutritional status can be calculated by measuring height and weight. Good nutritional status can be achieved through a good diet, in which the body gets enough nutrients for growth and development. Nutritional status is divided into two groups: normal and abnormal status. Normal nutritional status indicates a balance in the number of calories eaten, while abnormal nutritional status indicates an imbalance in the number of calories consumed and expended. Undernutrition and excess nutrition are included in the category of abnormal nutritional status.

Obesity is the reason for the emergence of various types of dietary programs, the

purpose of which is to regulate and maintain an ideal body weight.<sup>2</sup> Research conducted on students of SMP IT Iqra Bengkulu shows that there is a relationship between diet and nutritional status of adolescents. Students with poor or excess nutritional status have an eating pattern that is not in accordance with the recommended balanced nutrition guidelines.<sup>4</sup>

Adolescence is a period of growth and development that takes place rapidly, and many changes occur, one of which is related to diet and nutritional needs. Research on preclinical students of the Faculty of Dentistry, Padjadjaran University, regarding eating patterns based on the Healthy Eating Plate, shows that students tend to choose unhealthy eating patterns.<sup>5</sup> Research in the United States showed that most students had poor eating patterns and tended to choose foods based on taste, convenience, and food cost compared to nutritional value.<sup>6</sup>

Nutritional literacy is a person's ability to seek, obtain, understand, and use information to make health-related choices for oneself and others.<sup>7</sup> Nutritional literacy can impact a person's attitudes and behavior in making decisions about an event related to health and can create a healthy diet to prevent or reduce the risk of disease. Research in the United Kingdom stated that the level of nutritional literacy was influenced by age, education level, financial condition, perceptions of a healthy

lifestyle, and internet access.<sup>8</sup> Nutritional literacy is important for medical students who will become health workers. Nutrition literacy at the student level is expected to add insight into self-knowledge and disseminate reliable health information for patients.

Research on Public Health Study Program students stated that the level of student health literacy still needs to be improved. Only 6.1% or five people can make nutritional decisions correctly. Students still have difficulty finding reliable information, understanding the information, and making the right health decisions.<sup>9</sup>

Hence, the aim of this study was to investigate the relationship between the level of nutritional literacy and eating pattern and nutritional status of students at the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia.

## **METHODS**

### **Study Design**

This study was a cross-sectional study design, and data was collected in April 2022. The study was carried out amongst medical students studying in School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia.

### **Subject and Sampling method**

This study included a total of 97 participants aged between 18 and 21 years old, who were

selected using proportional stratified sampling. The inclusion criteria required participants to be active university students of batch 2019 – 2021, aged between 18 and 21, willing to participate and provide informed consent. The exclusion criterion is those who did not complete the questionnaire completely. The Newest Vital Sign was used to measure the nutrition literacy level. The 24h Food Recall Questionnaire was used to measure the eating pattern. The nutritional status was assessed by counting the body mass index (BMI). The questionnaire was distributed online using Google Forms.

### **Data Collection**

This research obtained ethical approval from the ethical review committee of the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, on March 24<sup>th</sup>, 2022, with the number 07/03/KEP-FKIKUAI/2022. We also obtained approval from each respondent by using an informed consent form before filling out the research questionnaire.

### **Statistical Analysis**

Statistical analysis was conducted using SPSS ver.25 program with Rank Spearman analysis to determine the correlation between nutrition literacy, eating pattern and nutritional status.

## RESULTS

Table 1 describes the characteristics of the respondents, which include age, gender, and year of study. The result shows that most of the subjects were 20 years old (33%), female (71,1%), and from the 2020 batch (34%). Most of the respondents' nutritional status is in the normal-nutrition group.

**Table 1.** Respondent Characteristics

Subject Characteristic	n	%
<b>Age</b>		
18	23	23.7
19	24	24.7
20	32	33
21	18	18.6
<b>Gender</b>		
Female	69	71.1
Male	28	28.9
<b>Year of Study</b>		
2019	32	33
2020	33	34
2021	32	33
<b>Nutritional Status</b>		
Underweight	14	14.4
Normal weight	43	44.3
Overweight	14	14.4
Obese (Class 1)	18	18.6
Obese (Class 2)	8	8.2

Table 2 describes eating patterns based on macronutrient intake, including carbohydrates, protein, and fat following guidelines proposed by WHO. Macronutrient intake that is less than or exceeds the criteria is included in the "false eating pattern", while "true eating pattern" means the macronutrient intake is according to the WHO criteria. The

result shows that half of the respondents got false eating patterns.

**Table 2.** Eating Pattern

Macronutrient	True		False	
	n	%	n	%
Carbohydrate	27	27,8	70	72,2
Protein	28	28,9	69	71,1
Fat	43	44,3	54	55.7
Mean	33	33.7	64	66.3

Table 3 describes the nutritional literacy level. Most respondents (66%) had adequate literacy levels, and only 9,3% had a high likelihood of limited literacy. Adequate level means the respondent answered 4-6 questions correctly. Meanwhile, respondents with the possibility of limited literacy level answered 2-3 questions correctly, and those with a high likelihood of limited literacy level answered 0-1 questions correctly.

**Table 3.** Nutrition literacy level

Nutrition Literacy Level	n	%
High likelihood of limited literacy	9	9.3
Possibility of limited literacy	24	24.7
Adequate literacy	64	66
<b>Total</b>	<b>97</b>	<b>100</b>

Table 4 shows that there is no relationship between eating patterns and nutritional literacy level. Table 5 describes the relationship between nutritional status and nutritional literacy level. The correlation coefficient of -0.194 means that the relationship between nutritional literacy level and nutritional status is the opposite.

**Table 4.** Relationships of Nutritional Literacy Level with Eating Pattern

Variable	Category	Nutritional Literacy Level								rho	P value
		Highly likelihood of limited		Possibility Limited		Adequate		Total			
		n	%	n	%	n	%	n	%		
Carbs	True	4	14.8	6	22.2	17	63	27	100	0.060	0.562
	False	5	7.1	18	25.7	47	67.1	70	100		
Protein	True	3	10.7	6	21.4	19	67.9	28	100	-0.016	0.876
	False	6	8.7	18	26.1	45	65.2	69	100		
Fat	True	7	16.3	8	18.6	28	65.1	43	100	0.059	0.569
	False	2	3.7	16	29.6	36	66.7	54	100		

**Table 5.** Relationships of Nutritional Literacy Level with Nutritional Status

Variables	Category	Nutritional Literacy								rho	P value
		Highly likelihood of limited		Possibility		Adequate		Total			
		n	%	n	%	n	%	n	%		
Nutritional Status	Underweight	0	0	1	7.1	13	92.9	14	100	-0.194	0.057
	Normal	4	9.3	11	25.6	28	65.1	43	100		
	Overweight	3	21.4	4	28.6	7	50	14	100		
	Obese 1	1	5.6	5	27.8	12	66.7	18	100		
	Obese 2	1	12.5	3	37.5	4	50	8	100		

## DISCUSSION

Respondents in this study were respondents in the age range of 18-21 years. Most of the respondents were female (71.1%), and this is in line with research by Shofi et al. and Cholidah et al.<sup>10,11</sup>

The eating pattern of the respondents is dominated by wrong eating patterns. This study's results align with research by Cholidah et al. and Charina M et al.<sup>11,12</sup> Research on university students in Germany states that the main reason students do not have a healthy diet is related to time problems. The process of determining and

preparing healthy food is considered quite time-consuming, and busy class schedules make it difficult for students to find time to eat.<sup>13</sup> Research conducted on medical students at Udayana University states that students are used to skipping one or more meals because there is not enough time to eat or want to maintain body shape.<sup>14</sup> In addition, students tend to consume foods that are not diverse. College students are in their puberty stage, where it is important to have a good diet to meet nutritional needs. The results of a study conducted by Charina M. et al. said that most medical students

have less varied eating patterns.<sup>12</sup>

Nutritional status is the balance between nutrient intake and the body's needs. The nutritional status needs of each person are different and depend on age, sex, physical activity, body weight, and height. The nutritional status of the respondents was dominated by the "normal nutritional status" category, and these results were in line with research on students at Nusa Cendana University, Sorong Ministry of Health Polytechnic, UPN Veteran Jakarta, and UNUSA.<sup>12, 15, 16, 17</sup>

The level of nutritional literacy of the respondents in this study was dominated by the level of adequate nutritional literacy. When compared to studies conducted on students at Pattimura University and Halu Oleo University, this study showed a higher prevalence.<sup>18</sup> This difference in results may be due to the fact that the study respondents were medical students, so they received more health and nutrition information than non-health students. There is a significant difference in the proportion of nutritional literacy levels between health and non-health students.<sup>19</sup>

Adequate levels of nutritional literacy can also be affected by access to information. Based on research conducted on medical students in Peru, students tend to seek health information from legitimate sources.

Sources of information that are often used are the Google search engine, scientific journals, research articles, video documentaries, and YouTube.<sup>20</sup>

In this study, less than half of the total respondents were able to answer questions Q2 and Q3 correctly, namely questions that require respondents to examine documents by reading, counting, and understanding. These results are in line with research by Sopamena Y., which stated the possible reason is that respondents are the first to conduct a survey like this and are unable to read nutrition labels.<sup>18</sup> Research on medical students at Sriwijaya University states that students tend not to read nutrition labels for several reasons. These include feeling that they are healthy and not susceptible to or having a history of metabolic disease, not caring about nutrition labels, finding the labels too difficult to understand, feeling that they have never been taught to read them, and considering it not to be the duty of doctors to understand nutrition labels.<sup>21</sup>

The results of this study indicate no relationship between the level of nutritional literacy and the characteristics of the respondents, namely age, gender, and year of class. In this study, it was found that in the 2019 class, most respondents were in the "Adequate" and "Highly Likelihood Limited" categories. This can be caused because several other factors influence the level of

nutritional literacy and everyone has differences in the ability to access and obtain information, the sources of information used, and the ability to process and interpret this information.<sup>22</sup>

The results of this study indicate that there is no relationship between the level of nutritional literacy and diet. Sufficient knowledge of nutrition cannot directly affect if individuals are not able to apply their knowledge.<sup>14</sup> Research on students in Germany explains why students are not motivated to change their eating patterns: feeling lazy, finding it more practical to buy snacks than cooking, preferences for food, and lack of concern for healthy eating patterns.<sup>13</sup> The results of this study were different from the research conducted by Syafei A., which stated that there was a relationship between the level of nutritional literacy and food intake.<sup>23</sup> This difference was thought to be because the research subjects were high school students, while in this study, the subjects were college students. Parents still manage high school student's life, while college students tend to be more independent and able to make choices, especially in terms of diet. College students are freer to choose their food, but this can lead to bad eating patterns and cause them to choose unhealthy foods.<sup>6</sup>

The results of this study indicate that there is no relationship between the level of

nutritional literacy and nutritional status. This research is not in line with the research conducted by Syafei, who found that there was a significant relationship between nutritional literacy and nutritional status.<sup>23</sup> The differences in the results of this study were thought to be due to differences in the level of understanding of each student regarding nutrition, as well as self-motivation to seek more information independently.

The results of this study indicate that there is a relationship between dietary protein intake and nutritional status. Two separate studies by Ilham I. and Khairani M. state that there is a relationship between dietary protein intake and nutritional status.<sup>24,25</sup> Consumption of protein per the body's needs will produce a normal nutritional status.

The limitations of this study were that the research was carried out during the COVID-19 pandemic, so the questionnaires were distributed online, and filling out the questionnaires was not done face-to-face, so researchers could not monitor, and self-report bias could occur.

## **CONCLUSION**

Based on the results of the study, there was no relationship between the level of nutritional literacy and eating pattern and nutritional status of students at the School of Medicine

and Health Sciences, Atma Jaya Catholic University of Indonesia.

Researchers suggest expanding and deepening data collection on dietary patterns and the factors that can influence eating patterns and levels of nutritional literacy. In addition, medical students are expected to make efforts to improve their nutritional literacy skills so that they can apply nutrition knowledge in their daily lives so that they have good nutritional literacy skills and adequate nutritional knowledge, so they can educate themselves and others around them.

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#### **CONFLICT OF INTEREST**

There is no conflict of interest from any related parties in this study.

#### **REFERENCES**

1. Hasil Utama Riskesdas 2018 | Badan Penelitian dan Pengembangan Kesehatan [Internet]. Litbang.kemkes.go.id. 2018 [cited 1 May 2021]. Available from: <https://www.litbang.kemkes.go.id/hasil-utama-riskesdas-2018/>
2. Healthy diet [Internet]. Who.int. 2020 [cited 25 May 2021]. Available from: <https://www.who.int/news-room/fact-sheets/detail/healthy-diet>
3. M. Par'i H, Wiyono S, Priyo Harjatmo T. Bahan Ajar Gizi : Penilaian Status Gizi [Internet]. Bppsdmk.kemkes.go.id. 2017 [cited 22 May 2021]. Available from: <http://bppsdmk.kemkes.go.id/pusdiksdmk/wp-content/uploads/2017/11/PENILAIAN-STATUS-GIZI-FINAL-SC.pdf>
4. Utami H, Kamsiah K, Siregar A. Hubungan Pola Makan, Tingkat Kecukupan Energi, dan Protein dengan Status Gizi pada Remaja. 2020.
5. Ar Rahmi N, Hendiani I, Susilawati S. Pola makan mahasiswa berdasarkan Healthy Eating Plate. Eating patterns of the undergraduate students based on Healthy Eating Plate. *Jurnal Kedokteran Gigi Universitas Padjadjaran*. 2020;32(1):41.
6. Abraham S, R. Noriega B, Shin J. College students eating habits and knowledge of nutritional requirements. *Journal of Nutrition and Human Health*. 2018;02(01).
7. What is health literacy? Take action. Find out. [Internet]. Centers for Disease Control and Prevention. 2021 [cited 15 May 2021]. Available from:



- <https://www.cdc.gov/healthliteracy/learn/index.html>
8. Protheroe J, Whittle R, Bartlam B, Estacio E, Clark L, Kurth J. Health literacy, associated lifestyle and demographic factors in adult population of an English city: a cross-sectional survey. *Health Expectations* [Internet]. 2016 [cited 8 June 2021];20(1):112-119. Available from: <https://doi.org/10.1111/hex.12440>
  9. Soenaryati S, Rachmani E. Health Literacy pada Mahasiswa Kesehatan, Sebuah Indikator Kompetensi Kesehatan yang Penting [Internet]. *Publikasi.dinus.ac.id*. 2016 [cited 25 May 2021]. Available from: <https://publikasi.dinus.ac.id/index.php/visikes/article/view/1444>
  10. Jauziyah S, nuryanto N, Tsani AFA, Purwanti R. Pengetahuan Gizi dan Cara Mendapatkan Makanan Berhubungan dengan Kebiasaan Makan Mahasiswa Universitas Diponegoro. *Journal of Nutrition College* [Online]. 2021 May;10(1):72-81. <https://doi.org/10.14710/jnc.v10i1.30428>.
  11. Cholidah R, Widiastuti I, Nurbaiti L, Priyambodo S. Gambaran pola makan, kecukupan gizi, dan status gizi mahasiswa Fakultas Kedokteran Universitas Mataram, Nusa Tenggara Barat. *Intisari Sains Medis*. 2020;11(2):416
  12. Charina M, Sagita S, Koamesah S, Woda R. Hubungan Pengetahuan Gizi dan Pola Konsumsi dengan Status Gizi pada Mahasiswa Fakultas Kedokteran Universitas Nusa Cendana. *CMJ* [Internet]. 1May2022 [cited 14Jul.2022];10(1):197-04. Available from: <https://ejournal.undana.ac.id/index.php/CMJ/article/view/6829>
  13. Hilger-Kolb J, Diehl K. 'Oh God, I Have to Eat Something, But Where Can I Get Something Quickly?'—A Qualitative Interview Study on Barriers to Healthy Eating among University Students in Germany. *Nutrients* [Internet]. 2019 [cited 10 May 2021];11(10):2440. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6835904/>
  14. K Vijayan D, Seri Ani L. Eating habits and knowledge of nutrition status among medical students of Medical Faculty, Udayana University. *Intisari Sains Medis*. 2019;10(2).
  15. Daniela Fatie S, Briliannita A, Florensia W. Gambaran Asupan Zat Gizi Makro dan Status Gizi Mahasiswa Poltekkes Kemenkes Sorong pada Masa Pandemi COVID 19. *JNA* [Internet]. 31Dec.2021 [cited 19Jul.2022];15(2):81-2. Available

- from: <https://poltekkes-sorong.ejournal.id/nursingarts/article/view/159>
16. Sufyan D, Nurdiantami Y, Wahyuningsih U, Krisdiani A. Nutrition Knowledge Determinants among Undergraduate Students in Selected University in Jakarta. *Indonesian Journal of Human Nutrition*. 2021;8(1):65.
  17. Kanah P. Hubungan Pengetahuan dan Pola Konsumsi dengan Status Gizi pada Mahasiswa Kesehatan. *MTPHJ* [Internet]. 2020 Sep. 25 [cited 2022 Jul. 18];4(2):203-11. Available from: <https://journal2.unusa.ac.id/index.php/MTPHJ/article/view/1199>
  18. Sopamena, Y., Pongtambing, Y., Andriani, W., Fitriani, Y. and Anshari, D., 2022. Adaptasi Alat Ukur Literasi Gizi Pada Mahasiswa Angkatan Pertama Program Sarjana Di Universitas Pattimura, Maluku. [online] [Journal.unhas.ac.id](http://journal.unhas.ac.id). Available at: <<https://journal.unhas.ac.id/index.php/mgmi/article/view/18946>>.
  19. Sadikin D. Nutrition Literacy Proportion Differences among Regular Undergraduate Students in Universitas Indonesia Year 2021. *Amerta Nutrition*. 2021;5(2SP):38.
  20. Moya-Salazar J, Contreras-Pulache H, Cañari B, Jaime-Quispe A, Chicoma-Flores K. Where Do Medical Students Look for Information? A Study on Scientific Consultation Sources in Peru. *Electronic Journal of General Medicine*. 2022;19(3):em363.
  21. Mulia M, Syakurah R, Ma'mun A. Fenomena Membaca Label Informasi Makanan pada Mahasiswa Kedokteran Universitas Sriwijaya. *Ghidza: Jurnal Gizi dan Kesehatan*. 2020;4(2):153-165.
  22. Mahmuudah L, Mardiah W, Lumbantobing V. Student Knowledge in Reading Nutrient Label Information and Types of Packaging Food Consumed by Nursing Students. *Media Keperawatan Indonesia*. 2020;3(2):45.
  23. Syafei A, Badriyah L. Literasi Gizi (Nutrition Literacy) dan Hubungannya dengan Asupan Makan dan Status Gizi Remaja. *Jurnal Ilmu Kesehatan Masyarakat*. 2019;8(04):182-190.
  24. Ilham I, Oktorina S, As'at M. The Relation Pattern Between Energy and Protein Intake Against Student's Body Mass Index. *Journal of Health Science and Prevention*. 2017;1(2):97-106.
  25. Khairani M, afrinis N, Yusnira Y. Hubungan Asupan Energi dan Protein dengan Status Gizi Santri Madrasah Aliyah Darul Qur'an Tahun 2021. *jptam* [Internet]. 2022Jan.13 [cited 2022Aug.16];5(3):10985-91. Available from: <https://jptam.org/index.php/jptam/article/view/2749>