Open Access

Journal of Scientific Insights
E-ISSN: 3062-8571
DOI: https://doi.org/10.69930/jsi.v2i6.595
Research Article

ScienceTech. Group

Vol. 2 (6), 2025
Page: 651-657

Dietary Patterns and Physical Activity on Nutritional Status of Science Faculty Students, Universitas Negeri Makassar

A. Mushawwir Taiyeb *, Amaliah Amriani Amran Saru

Department of Biology, Faculty of Mathematics and Natural Science, Universitas Negeri Makassar, Indonesia
*Email (corresponding author):a.mushawwir.t@unm.ac.id

Abstract. *Nutritional status is an important health indicator influenced by multiple factors. Students aged 19–24 years remain in a growth phase and require adequate nutrition and healthy lifestyle habits to support academic performance and long-term wellbeing. This study aimed to examine the effects of dietary patterns and physical activity on the nutritional status of Biology Department students at the Faculty of Mathematics and Natural Sciences, State University of Makassar. An analytic observational study with a cross-sectional design was conducted among 115 students. Dietary patterns were assessed using an FFQ questionnaire, physical activity using the GPAQ, and nutritional status using BMI measurements. Data were analyzed using Chi-square tests and multiple linear regression. Results showed that 53.9% of students had poor dietary patterns, while 63.5% had high levels of physical activity. Both dietary patterns and physical activity were significantly associated with nutritional status ($p < 0.001$). Regression analysis indicated that dietary patterns had a significant positive effect on nutritional status, whereas physical activity had a significant negative effect. The model explained 81.6% of the variation in nutritional status ($R^2 = 0.816$). In conclusion, dietary patterns and physical activity significantly influence students nutritional status. Interventions should emphasize improving dietary habits and promoting physical activity to maintain optimal nutritional health.*

Keywords: *Dietary patterns, physical activity, nutritional status, body mass index (BMI), health behavior*

1. Introduction

Students are classified as late adolescents, generally within the age range of 19 to 24 years. At this stage, the body continues to undergo physical and psychological growth and development. Consequently, adequate nutrient intake, sufficient physical activity, and proper sleep remain essential components for maintaining health and supporting academic productivity. Optimal nutritional status during adolescence is particularly important, as it influences quality of life, learning capacity, immune function, and long-term disease risk. Nutritional status itself refers to the body's condition as the outcome of interactions between nutrient intake and physiological requirements for energy, growth, tissue repair, and metabolic regulation (Septikasari, 2018).

Data from the 2018 Basic Health Research (Riskesdas) show that the prevalence of undernutrition among individuals aged 19 years was 20.7%, while overnutrition reached 15.5%. In the 20–24 year age group, undernutrition prevalence was 15.8% and overnutrition 20.5%. These figures illustrate that nutritional problems—both undernutrition and overnutrition—remain significant public health issues among adolescents, including university students.

Dietary patterns are one of the primary determinants of nutritional status. They represent the frequency, quantity, and types of foods consumed over a specific period

Received: 20 November 2025 / Accepted: 24 November 2025 / Available online: 28 November 2025

(Moore et al., 2023). The Indonesian Balanced Nutrition Guidelines (2014) emphasize the importance of consuming three balanced meals daily, comprising carbohydrate sources, animal and plant proteins, vegetables, fruits, and adequate water. However, in practice, many students exhibit irregular and unbalanced eating patterns due to academic pressures, psychological stress, or financial constraints. Prior studies support this concern: Dini et al (2025) reported that 28.9% of adolescent girls had abnormal nutritional status linked to irregular eating habits. Similarly, Djide (2023) found that dietary consumption patterns significantly influence university students' nutritional status.

Physical activity is another key factor affecting nutritional status. It encompasses bodily movement produced by skeletal muscles that requires energy expenditure (Ministry of Health of Indonesia, 2019). Regular physical activity helps maintain energy balance, strengthens the cardiovascular and muscular systems, and reduces the risk of excessive fat accumulation. Nevertheless, research by Teuber et al. (2024) revealed that approximately 76.4% of students rarely or never engaged in vigorous physical activity. This low level of energy expenditure, particularly when coupled with high-calorie dietary intake, may increase the risk of overnutrition. Given these conditions and the ongoing issues surrounding nutritional status among university students, this study aims to examine the effects of dietary patterns and physical activity on the nutritional status of Biology Department students at the Faculty of Mathematics and Natural Sciences, State University of Makassar. This study offers a novel contribution by specifically analyzing students from a science-focused faculty, a population characterized by demanding academic workloads that may influence both eating habits and physical activity. Furthermore, it investigates the combined effect of dietary patterns and physical activity two factors often studied separately, thus providing a more comprehensive understanding of how their interaction shapes nutritional status in this unique student group.

2. Methods

2.1 Study Design, Setting, and Duration

This study employed an analytical observational design with a cross-sectional approach to examine the relationship between dietary patterns and physical activity with the nutritional status of students. The research was conducted at the Biology Department, Faculty of Mathematics and Natural Sciences (FMIPA), Universitas Negeri Makassar. Data collection was carried out from September to December 2024.

2.2. Study Population and Sampling Procedure

The study population consisted of all active students enrolled in the Biology Department, FMIPA, Universitas Negeri Makassar. A total of 115 respondents were included as the study sample. Sampling was conducted using a purposive sampling technique based on predefined inclusion and exclusion criteria.

a. Inclusion criteria:
   1) Active students of the Biology Department, FMIPA, Universitas Negeri Makassar.
   2) Aged 18–25 years.
   3) Willing to participate and sign the informed consent form.
   4) Physically and mentally healthy during questionnaire administration and anthropometric measurements

b. Exsclusion criteria:

1) Currently undergoing a medically prescribed special diet (e.g., extreme weight-loss diets or diets for chronic diseases).
2) Having medical conditions that may affect nutritional status or the ability to perform physical activity (such as hormonal disorders, metabolic abnormalities, or injuries).
3) Failure to complete the questionnaire or follow the procedures for accurate weight and height measurements.

2.3. Types and Methods of Data Collection

Data were collected through structured questionnaires. The independent variables included dietary patterns, assessed using the Food Frequency Questionnaire (FFQ), and physical activity, measured using the Global Physical Activity Questionnaire (GPAQ). The dependent variable, nutritional status, was determined through anthropometric measurements of body weight and height, which were subsequently used to calculate the Body Mass Index (BMI) as an indicator of nutritional status.

2.4. Data Processing and Analysis

All collected data were analyzed using SPSS version 22 for Windows. Univariate analysis was performed to describe respondents' characteristics including sex, dietary patterns, physical activity, and nutritional status and presented in frequency distribution tables. Bivariate analysis using the Chi-square test was employed to determine the association between the independent and dependent variables. Furthermore, multiple linear regression analysis was conducted to assess the influence of each independent variable on nutritional status.

3. Results and Discussion

Based on data collected from 115 students, the characteristics of respondents including sex, dietary patterns, physical activity, and nutritional status are presented in Table 1. The majority of respondents were female (92.2%), 53.9% had poor dietary patterns, 63.5% engaged in high levels of physical activity, and 59.1% had normal nutritional status. This relatively high proportion of vigorous physical activity may be influenced by the academic structure of the Biology Department, where students routinely participate in laboratory practicums, field activities, and other hands-on tasks that involve substantial physical movement and energy expenditure. These activities may contribute to elevated MET scores as captured by the GPAQ assessment.

Table 1. Distribution of Respondent Characteristics

Respondent Description		Frequency (n)	Percentage (%)
Gender	Male	9	7.8
	Female	106	92.2
Dietary Pattern	Good	53	46.1
	Poor	62	53.9
Physical Activity	Light (<600 MET)	3	2.6
	Moderate (600-2999 MET)	39	33.9
	Heavy (≥3000 MET)	73	63.5
Nutritional Status	Underweight	32	27.8

Respondent Description	Frequency (n)	Percentage (%)
Normal	68	59.1
Overweight	15	13.0

Table 2 shows that respondents with underweight nutritional status tended to have poor dietary patterns (27%) and engaged mostly in vigorous physical activity (27.8%). Those with normal nutritional status generally exhibited good dietary patterns (33%) and high levels of physical activity (35.7%). Meanwhile, among respondents classified as overweight, 12.2% had good dietary patterns and 10.4% engaged in moderate physical activity. Chi-square test results indicated a statistically significant association between both dietary patterns and physical activity with nutritional status ($p < 0.001$).

Table 2. Cross-tabulation and Chi-square Test of Dietary Patterns and Physical Activity with Students' Nutritional Status

Variabel		Nutritional Status						*p*
		Underweight		Normal		Overweight		
		n	%	n	%	n	%	
Dietary Pattern	Poor	31	27	30	26	1	0.9	<0.001
	Good	1	0.9	38	33	14	12.2	
Physical Activity	Light (<600 MET)	0	0	0	0	3	2.6	<0.001
	Moderate (600-2999 MET)	0	0	27	23.5	12	10.4	
	Heavy (≥3000 MET)	32	27.8	41	35.7	0	0	

A multiple linear regression analysis was conducted to further examine the influence of dietary patterns and physical activity on nutritional status. As shown in Table 3, dietary patterns had a significant positive effect on nutritional status, as indicated by a t-value of 4.283 (> t-table 1.981) and a significance value <0.001, with a positive coefficient (B = 0.006). This finding suggests that better dietary patterns are associated with higher BMI among students. In contrast, physical activity showed a significant negative effect on nutritional status, with a t-value of -11.439 (> t-table 1.981), significance <0.001, and a coefficient of B = -0.002. This result indicates that lower physical activity levels are associated with higher BMI. The F-test confirmed the simultaneous effect of dietary patterns and physical activity on nutritional status (F = 247.692 > F-table = 3.08; $p < 0.001$). Furthermore, Table 4 shows that the two variables collectively explain 81.6% of the variation in nutritional status ($R^2 = 0.816$).

Table 3. Multiple Linear Regression (t-test and F-test Results)

Independent Variable	Unstandardized Coefficients		t	Sig.	F	Sig.
	B	Std. Error				
Dietary Pattern	.006	.001	4.283	<0.001	247.691	<0.001
Physical Activity	-.002	.000	-11.439	<0.001		

Dependent Variable: Status Gizi

Tabel 4. Coefficient of Determination (R^2) for the Regression Model

		Change Statistics				
R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
.903[a]	.816	.816	247.691	2	112	<0.001

Nutritional status is a key indicator reflecting the balance between nutrient intake and energy expenditure in the body. The findings of this study reinforce the critical role of dietary patterns and physical activity as major determinants of students' nutritional status. The positive influence of dietary patterns aligns with the energy balance model (Hall et al., 2018; Islam et al, 2024), which posits that adequate nutrient intake supports optimal energy availability and metabolic functions. This is consistent with the findings of Blundell et al. (2021) and Ahmed et al. (2024), who emphasized the importance of balanced dietary intake in maintaining healthy nutritional status.

Conversely, the negative influence of physical activity on nutritional status highlights the complex interplay between energy expenditure and nutrient adequacy. High levels of physical activity that are not supported by sufficient nutritional intake may lead to energy deficits and reductions in body mass index (BMI). These findings are in agreement with Chen et al. (2020), who reported that increased physical activity without adequate dietary intake could result in weight loss and undernutrition. National studies by Wijaya et al. (2021) similarly confirmed that poor dietary habits and excessive physical activity significantly contribute to nutritional problems among university students. This underscores the need for balanced interventions that address both energy intake and expenditure.

An additional contextual factor that may explain the unusually high proportion of students categorized as having vigorous physical activity (63.5%) relates to the nature of the Biology Department's academic workload. Laboratory practicums, field observations, specimen collection, and hands-on experimental activities typically require prolonged standing, walking, lifting equipment, and repetitive manual tasks. Furthermore, the frequent preparation of laboratory reports and practical assignments often involves active engagement rather than fully sedentary study patterns. These curriculum driven demands may collectively elevate students' overall MET scores, thereby contributing to the higher-than-expected classification of vigorous physical activity in this population.

The energy homeostasis theory (Thivel et al., 2018) also supports these results by explaining that the body maintains energy balance through metabolic regulation and adaptive eating behaviors. Vigorous physical activity without adequate nutrition can induce energy deficits and impair nutritional status. Conversely, insufficient physical activity combined with poor dietary control may result in energy accumulation and increased risk of overweight status. The observed positive association between dietary patterns and BMI, as well as the negative association between physical activity and BMI, is consistent with previous studies by Kim and Lee (2021) and Patel and Desai (2021), which highlight the importance of balanced dietary patterns and physical activity for healthy weight management among university students.

However, this study has an important limitation that must be acknowledged. The sample was overwhelmingly dominated by female respondents (92.2%), resulting in a substantial gender imbalance. This condition limits the generalizability of the findings because dietary behaviors, physical activity patterns, and nutritional status may differ

meaningfully between male and female students. Therefore, the conclusions presented here may not fully represent the broader student population. Future studies should include a more balanced sample to improve representativeness and strengthen external validity.

Conclusions

Based on the findings of this study, it can be concluded that dietary patterns and physical activity have a significant influence on students' nutritional status. Healthy and well-balanced dietary patterns contribute positively to improved nutritional status, whereas engaging in high levels of physical activity without adequate nutritional intake may lead to a decrease in nutritional status. These results highlight the importance of maintaining a balanced relationship between energy intake and expenditure to support optimal nutritional health among university students.

In light of these findings, several targeted actions are recommended. First, the integration of nutrition education into departmental or faculty-level academic programs may enhance students' knowledge and awareness of healthy dietary practices. Second, universities should consider providing accessible dietary planning support particularly for students with high physical activity levels to ensure adequate energy and nutrient intake. Third, campus-based interventions such as nutrition counseling, healthy cafeteria options, and physical activity guidance could be strengthened to promote balanced lifestyle behaviors. Finally, routine monitoring of students' nutritional status through periodic anthropometric assessments may help identify those at risk and provide timely support.

Acknowledgments

The authors would like to express their sincere gratitude to all parties who provided financial assistance and institutional support throughout the implementation of this study. Appreciation is also extended to the department and institutional units that facilitated the research process, as well as to the professionals and contributors whose expertise and guidance greatly assisted in the preparation of this manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

References

Ahmed, M. A., Ali, A. M., Hassan, S. M., & Jerar, H. M. (2025). Nutritional status and associated factors among adolescent girls attending high schools in Jigjiga, Ethiopia. Clinical Nutrition Open Science, 62, 11–25. https://doi.org/10.1016/j.nutos.2025.05.005

Blundell, J. E., Finlayson, G., & Gibbons, C. (2021). Appetite control and energy homeostasis: Role of physical activity. Obesity Reviews, 22(Suppl 1), e13177.

Chen, L., Zhang, J., & Wang, Y. (2020). Interaction of diet and physical activity on obesity and metabolic health in young adults. Public Health Nutrition, 23(8), 1343–1351.

Dini, B., Lubis, T. N., & Juwita, S. (2025). The relationship between dietary patterns and nutritional status among female adolescents at SMK Negeri 8 Pekanbaru. Jurnal Maternitas Kebidanan, 10(2), 182–190. https://doi.org/10.34012/jumkep.v10i2.7711

Djide, N. A. N., & Pebriani, R. (2023). Pengetahuan gizi dan kebiasaan makan pada mahasiswa. Media Kesehatan Politeknik Kesehatan Makassar, 18(1), 112–118. https://doi.org/10.32382/medkes.v18i1.445

Hall, K. D., Farooqi, I. S., Friedman, J. M., Klein, S., Loos, R. J. F., Mangelsdorf, D. J., O'Rahilly, S., Ravussin, E., Redman, L. M., Ryan, D. H., Speakman, J. R., & Tobias, D. K. (2022). The energy balance model of obesity: Beyond calories in, calories out. The American Journal of Clinical Nutrition, 115(5), 1243–1254. https://doi.org/10.1093/ajcn/nqac031

Islam, M. S., Roy, C., Ishadi, K. S., Mithu, M. M. U., Abedin, E. S., Karim, M. S., Alam, M. F., Apou, A. C., Chowdhury, A. M. B. A., & Mubarak, M. (2024). Dietary pattern and nutritional status of school-going adolescents in rural areas of Bangladesh. Nutrition and Food Science, 12(3). https://doi.org/10.12944/CRNFSJ.12.3.11

Kementerian Kesehatan Republik Indonesia. (2019). Pedoman aktivitas fisik bagi masyarakat Indonesia. Kemenkes RI.

Kim, Y., & Lee, J. (2021). Nutritional knowledge and dietary habits of college students: A cross-sectional study. Nutrition Research and Practice, 15(1), 1–9.

Moore Heslin, A., & McNulty, B. (2023). Adolescent nutrition and health: Characteristics, risk factors and opportunities of an overlooked life stage. Proceedings of the Nutrition Society, 82(2), 142–156. https://doi.org/10.1017/S0029665123002689

Patel, R., & Desai, M. (2021). Sedentary lifestyle and BMI in Indian university students. Indian Journal of Public Health, 65(3), 243–248.

Septikasari, N. (2018). Status gizi dan hubungannya dengan kesehatan remaja. Jurnal Kesehatan Remaja, 5(2), 45–52.

Teuber, M., Leyhr, D., & Sudeck, G. (2024). Physical activity improves stress load, recovery, and academic performance-related parameters among university students: A longitudinal study on daily level. BMC Public Health, 24, 598. https://doi.org/10.1186/s12889-024-18082-z

Thivel, D., Aucouturier, J., Doucet, E., et al. (2018). Daily energy balance in children and adolescents: The role of physical activity. Obesity Reviews, 19(Suppl 1), 10–20.

Wijaya, R., Santoso, D., & Prabowo, R. (2021). Pola makan dan aktivitas fisik dalam kaitannya dengan status gizi mahasiswa. Jurnal Nutrisi Indonesia, 10(1), 45–52.