ABDIMAS POLSAKA
JURNAL PENGABDIAN KEPADA MASYARAKAT
ISSN (Online) : 2829-162X
OPEN ACCESS
Publisher : LPPM Politeknik Sandi Karsa, Sulawesi Selatan, Indonesia
DOI: 10.35816/abdimaspolsaka

DOI: https://doi.org/10.35816/abdimaspolsaka.v4i2.118

Balanced nutrition education for adolescents: Pre-post test approach to increase awareness of healthy diets in disaster-prone areas

Febiani Riskika[a]*, Ummu Aiman[a], Aldiza Intan Randani[a], Nurulfuadi[a], Try Nur Ekawati Lukman[a], Linda Ayu Rizka Putri[a]

[a] Department of Nutrition, Faculty of Public Health, Universitas Tadulako, Central Sulawesi, Indonesia

Corresponding Author:
Hapisah, Department of Midwifery, Poltekkes Kemenkes Banjarmasin, South Kalimantan, Indonesia.
Email: febianiriskika@gmail.com

Received: 05 July 2025 | Revised: 05 August 2025 | Accepted: 01 September 2025 | Published: 10 September 2025

ABSTRACT

Adolescents are vulnerable to nutritional problems, especially in disaster-prone areas with limited access to nutritious food. Sigi District, Central Sulawesi, was severely affected by the 2018 earthquake and liquefaction, which disrupted food security and increased instant food consumption. This study aimed to evaluate the effectiveness of balanced nutrition education using a pre-test and post-test approach in improving students' knowledge of healthy eating at SMK 1 Sigi. The intervention involved 30 students who received lectures and leaflets on the Balanced Nutrition Guidelines. Knowledge was assessed through pre- and post-tests, and differences were analyzed statistically. Results indicated a significant increase in mean knowledge scores from 37.31 ± 15.89 to 65.77 ± 21.20 ($p < 0.05$). The proportion of students in the poor category decreased from 93.33% to 30%, while those in the fair and reasonable categories increased substantially. These findings highlight that simple educational interventions can enhance adolescents' nutritional awareness in disaster-affected areas. Therefore, balanced nutrition education should be integrated into school health programs as a sustainable preventive strategy.

Keywords: Balanced Nutrition, Nutrition Education, Adolescents, Disaster-Prone Areas.

INTRODUCTION

Indonesia has a high risk of natural disasters because it is located at the confluence of three major tectonic plates [1]. The 2018 Central Sulawesi earthquake and tsunami caused thousands of casualties and damaged large infrastructure. The impact is not only short-term, but also disrupts food security and the nutritional status of the community, especially vulnerable groups such as children and adolescents [2]. Natural disasters contribute to changes in people's consumption patterns, including adolescents, who are vulnerable to meeting nutritional needs [3]. In post-disaster conditions, access to nutritious foodstuffs is often limited due to disruptions in food distribution, reduced purchasing power of people, and changes in lifestyle in evacuation centers [4]. This has an impact on the increasing prevalence of consumption of low-nutrition foods, which indirectly affects the health status and growth of adolescents. Most post-disaster adolescents in Palu City, Central Sulawesi, experience a significant decrease in nutritional intake, potentially increasing the risk of malnutrition and other health problems [5].

The prevalence of malnutrition in adolescents in Indonesia is still a serious health problem that requires serious attention. The 2023 Indonesian health survey shows 6.6% of adolescents are underweight [6]. In Central Sulawesi, the prevalence of underweight in adolescents has increased from 7.01% in 2018 to 9.7% in 2023 (Ministry of Health of the Republic of Indonesia 2019; Health Development Policy Agency 2024). That 98.96% of adolescents in disaster-affected areas have energy intake below daily needs, with 58.33% classified as underweight. This lack of nutrition impacts physical growth, study concentration, and endurance, reducing academic achievement and productivity [7].

Sigi Regency is one of the areas directly affected by the earthquake and liquefaction disaster in 2018. This condition has disrupted food security for the community, including teenagers living in the area. Based on research conducted in Palu City, an area that has similar geographical characteristics to Sigi Regency, it is known that the majority of adolescents are still in the food insecure category (61.46%), but experience significant malnutrition. This condition shows that even though food is available, consumption patterns and understanding of the importance of balanced nutritional intake still need to be improved so adolescents can better meet their nutritional needs, especially in disaster-prone conditions [8]. Education about balanced nutritional intake is essential in increasing adolescents' awareness of the importance of a healthy diet. Pre-test and post-test-based educational interventions have proven to be effective in improving students' understanding of nutrition, healthy consumption patterns, and the selection of nutritious foods in accordance with the socio-economic conditions of the local community [9].

Therefore, community service activities with a dissemination scheme entitled "Food Security, Nutrient Intake and BMI in Post-Disaster Adolescents in Palu City" need to be carried out. The goal to be achieved in community service activities is to increase adolescents' understanding and awareness of the importance of balanced nutrition, especially in post-disaster conditions that limit access to nutritious food. Through a pre-test and post-test approach, this activity aims to measure the effectiveness of education in increasing knowledge and changing students' eating habits to be healthier and in accordance with the nutritional needs of adolescents. The benefits of implementing this service are expected to enable students to adopt a more nutritious diet and adjust their nutritional intake according to the nutritional needs of adolescents.

METHODS

Participants in this activity are teenagers. It will be held at SMK 1 Sigi, Sidera, Sigi Biromaru District, Sigi Regency, Central Sulawesi. The service activities were conducted using interactive lecture methods and leaflet distribution based on the Balanced Nutrition Guidelines (PGS). Evaluation uses a pretest-posttest one-group design with a 10-question questionnaire to measure knowledge before and

after education. The analysis was carried out quantitatively through the paired sample t-test and qualitatively through observation of student participation and reflection after the activity.

Increasing knowledge scores measured success, changes in attitudes in the form of awareness of choosing healthy foods and reducing instant consumption, and socio-cultural aspects in the form of the emergence of the habit of bringing healthy provisions to school. From an economic perspective, success is shown through the ability of students to prepare a balanced menu based on affordable local ingredients. Thus, the achievement of activities can be assessed comprehensively from knowledge, attitudes, socio-cultural, and economic factors.

RESULT

Implementing balanced nutrition education activities at SMK 1 Sigi was conducted to determine how much lecture interventions and leaflet distribution could increase adolescents' knowledge about healthy eating. Evaluation was carried out through pre-tests and post-tests given to 30 students. The measurement results showed increased knowledge scores after educational activities were carried out.

Table 1. Pre-test and Post-test Scores of SMK 1 Sigi Students

Statistic	Result
Mean ± SD (pre-test)	37.31 ± 15.89
Mean ± SD (post-test)	65.77 ± 21.20
Median (pre-test)	40.00
Median (post-test)	75.00
Minimum Score (pre-test)	0
Minimum Score (post-test)	20
Maximum Score (pre-test)	70
Maximum Score (post-test)	90
P value (difference test)	0.00

Table 1 presents the results of descriptive analysis in the form of mean values, standard deviations, medians, minimum, maximum, and test results of differences between pre-test and post-test. Based on the table, the average pretest score of 37.31 ± 15.89 increased to 65.77 ± 21.20 in the post-test. The median score also differed from 40.00 on the pre-test to 75.00 on the post-test. The range of grades students get is improving, with the minimum score increasing from 0 to 20 and the maximum score increasing from 70 to 90. The results of the differential test produced a p-value of 0.00, meaning there was a significant increase in knowledge after being given balanced nutrition education.

Table 2. Distribution of Students' Knowledge Categories Before and After Balanced Nutrition Education

Category	Pre-test n (%)	Post-test n (%)	P-Value
Poor (<60%)	28 (93.33%)	9 (30.00%)	0.00*
Fair (60–80%)	2 (6.67%)	17 (56.67%)	
Good (>80%)	0 (0.00%)	4 (13.33%)	

*Paired Sample T-test with significance value $p \leq 0.05$

Table 2 illustrates the change in the distribution of students' knowledge categories. Before education, almost all students (93.33%) were in the poor category, only a small number (6.67%) were in the adequate category, and none were in the good category. After education, the proportion of the less category decreased drastically to 30%, while the category of enough increased to more than half of the students (56.67%), and 13.33% of students managed to achieve the good category. This increase in distribution shows that educational activities not only increase average scores but also improve the overall quality of students' knowledge, with more and more students achieving adequate to reasonable

levels of expertise. Overall, the analysis results from both the average score and the category distribution show that balanced nutrition education activities effectively increase the understanding of SMK 1 Sigi students about healthy diets, especially in disaster-prone areas prone to nutritional problems.

DISCUSSION

The results of this activity show that balanced nutrition education through lecture methods and leaflet media can significantly increase the knowledge of SMK 1 Sigi adolescents. The average knowledge score increased from 37.31 in the pre-test to 65.77 in the post-test, with a p-value of < 0.05, meaning there was a significant difference between before and after the intervention. The distribution of knowledge categories has also improved, where students who were previously the majority were in the poor category (93.33%), and decreased to 30%. In comparison, the proportion of students with sufficient and good knowledge increased to 56.67% and 13.33%.

These findings align with previous research that suggests that nutrition education interventions can improve adolescent nutrition knowledge and awareness. Nutrition education based on lectures and leaflets significantly increased the nutritional knowledge of high school students in food-insecure areas [10]. Simple educational media such as leaflets are effectively used to improve understanding of balanced nutrition in adolescents [11]. The condition of teenagers in Sigi Regency who were affected by the 2018 earthquake and liquefaction added to the urgency of this activity. Limited access to food and increased consumption of instant food have been shown to worsen the nutritional status of adolescents, as reported by the Central Sulawesi Health Office (2023), with an increase in the prevalence of underweight from 7.01% in 2018 to 9.7% in 2023. In this context, nutrition education serves as a promotive and preventive effort to reduce the long-term impacts of malnutrition, such as growth disorders, decreased learning concentration, and low productivity in the future [12].

This intervention's use of lectures and leaflets proved an effective and low-cost approach [13]. Significant improvements in knowledge suggest that even simple educational tools can create meaningful changes when tailored to the target group's needs [14]. Lecture-based education accompanied by leaflets significantly increased nutrition knowledge among high school students in food-insecure regions [15]. In addition, other studies also show that adolescents are a group that is very vulnerable to nutritional problems due to food consumption habits that tend to be instant and less diverse [16]. Nutrition education interventions in schools effectively improve healthy eating behaviours if done with participatory methods and supported by appropriate learning media [17]. The increased knowledge gained in this study is expected to be followed by healthier eating behaviour changes, although behavioral changes typically require a longer time and repeated interventions [18].

Thus, balanced nutrition education activities at SMK 1 Sigi have been proven to increase student knowledge and potentially be a sustainable intervention strategy to strengthen adolescent nutritional resilience in disaster-prone areas. This is in line with the recommendations of the Ministry of Health of the Republic of Indonesia (2014), which emphasise the importance of implementing Balanced Nutrition Guidelines (PGS) to improve public health quality.

CONCLUSION

Balanced nutrition education through lectures and leaflets has proven to be effective in increasing the knowledge of SMK 1 Sigi students about healthy eating. Significant increases occurred in both the average score and the distribution of knowledge categories. These results show that simple educational interventions can strengthen adolescent nutrition awareness, especially in disaster-prone areas. Going forward, this program needs to be continued with repeated interventions and integration into the school curriculum to ensure more sustainable changes in eating behaviors.

ACKNOWLEDGEMENTS

The author would like to thank SMK 1 Sigi for their full support in the implementation of the activity, the students who have actively participated, as well as funding from the Faculty DIPA in the community service program Number: 888660/UN.28/PL/2025

References

[1] M. Fuady, R. Munadi, and M. A. K. Fuady, "Disaster mitigation in Indonesia: between plans and reality," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 1087, no. 1, p. 012011, Feb. 2021, doi: https://dx.doi.org/10.1088/1757-899X/1087/1/012011.

[2] A. Suppasri *et al.*, "Cascading disasters triggered by tsunami hazards: A perspective for critical infrastructure resilience and disaster risk reduction," *Int. J. Disaster Risk Reduct.*, vol. 66, p. 102597, Dec. 2021, doi: https://dx.doi.org/10.1016/j.ijdrr.2021.102597.

[3] L. Hunter, S. Gerritsen, and V. Egli, "Changes in eating behaviours due to crises, disasters and pandemics: a scoping review," *Nutr. Food Sci.*, vol. 53, no. 2, pp. 358–390, Feb. 2023, doi: https://dx.doi.org/10.1108/NFS-12-2021-0385.

[4] N. P. Rosenheim, M. Watson, J. Casellas Connors, M. Safayet, and W. G. Peacock, "Food Access After Disasters," *J. Am. Plan. Assoc.*, vol. 90, no. 3, pp. 452–470, Jul. 2024, doi: https://dx.doi.org/10.1080/01944363.2023.2284160.

[5] N. U. Dewi *et al.*, "Factors Associated with Diet Quality among Adolescents in a Post-Disaster Area: A Cross-Sectional Study in Indonesia," *Nutrients*, vol. 15, no. 5, p. 1101, Feb. 2023, doi: https://dx.doi.org/10.3390/nu15051101.

[6] M. Musfira and V. Hadju, "Nutrition and dietary intake of adolescent girls in Indonesia: A systematic review," *Scr. Med. (Brno).*, vol. 55, no. 4, pp. 473–487, 2024, doi: https://dx.doi.org/10.5937/scriptamed55-49461.

[7] V. Sember, G. Jurak, M. Kovač, S. A. Morrison, and G. Starc, "Children's physical activity, academic performance, and cognitive functioning: a systematic review and meta-analysis," *Front. public Heal.*, vol. 8, p. 536635, 2020.

[8] T. Y. Nour and K. H. Altıntaş, "Obesity after Natural disasters and Associated Risk Factors: A Systematic Review – ERRATUM," *Disaster Med. Public Health Prep.*, vol. 19, p. e15, Jan. 2025, doi: https://dx.doi.org/10.1017/dmp.2025.2.

[9] S. Noreen and Z. Iqbal, "Effectiveness of Social Practice Approach for Academic Achievement of Adult Learners in Basic Literacy: A Mixed-Methods Study," *Eur. J. Educ.*, vol. 60, no. 1, p. e70015, Mar. 2025, doi: https://dx.doi.org/10.1111/ejed.70015.

[10] R. Sabriana, R. Riyandani, and R. Rosmiaty, "Pemberdayaan Ibu Hamil Melalui Peningkatan Pengetahuan tentang Pentingnya Gizi dalam Kehamilan untuk Mencegah terjadinya Anemia," *Abdimas Polsaka*, vol. 1, no. 1, pp. 7–11, Mar. 2022, doi: https://dx.doi.org/10.35816/abdimaspolsaka.v1i1.4.

[11] S. Suprapto, "Pengaruh Edukasi Media Kartun Terhadap Peningkatan Pengetahuan Ibu dan Status Gizi Anak," *J. Heal.*, vol. 9, no. 2, pp. 81–87, Jul. 2022, doi: https://doi.org/10.30590/joh.v9n2.500.

[12] A. S. Asmi, I. A. Tyarini, M. K. F. Saputra, J. A. Putra, and H. K. Son, "Video media is more effective to improve balanced nutrition knowledge," *J. Ilm. Kesehat. Sandi Husada*, vol. 13, no.

2, pp. 242–249, Dec. 2024, doi: https://doi.org/10.35816/jiskh.v13i2.1210.
[13] G. A. S. Rezende, M. T. Rezende, and C. M. Carneiro, "Low-Cost Interventions to Improve Cervical Cancer Screening: An Integrative Review.," in *Oncology Nursing Forum*, 2023, vol. 50, no. 1, doi: https://dx.doi.org/10.1188/23.ONF.59-78.
[14] M. Shuremu, K. H. Abate, and T. Belachew, "Effect of nutrition education intervention to improve dietary diversity practice and nutritional status of the older people: A cluster randomized controlled trial," *Food Sci. Nutr.*, vol. 11, no. 11, pp. 7383–7395, 2023.
[15] S. Kaur, "Barriers to consumption of fruits and vegetables and strategies to overcome them in low-and middle-income countries: a narrative review," *Nutr. Res. Rev.*, vol. 36, no. 2, pp. 420–447, 2023, doi: https://dx.doi.org/10.1017/S0954422422000166.
[16] A. N. Daly, E. J. O'Sullivan, and J. M. Kearney, "Considerations for health and food choice in adolescents," *Proc. Nutr. Soc.*, vol. 81, no. 1, pp. 75–86, 2022, doi: https://dx.doi.org/10.1017/S0029665121003827.
[17] S. Suprapto, D. Arda, M. Kurni Menga, B. Adji Saktiawan, and S. Nggaá Woge, "OPTIMALCARE: Community-based homecare policy innovation in accelerating stunting reduction in Makassar City," *Abdimas Polsaka*, vol. 4, no. 2, pp. 148–156, Aug. 2025, doi: https://dx.doi.org/10.35816/abdimaspolsaka.v4i2.107.
[18] Y. Chen, F. J. A. Perez-Cueto, A. Giboreau, I. Mavridis, and H. Hartwell, "The promotion of eating behaviour change through digital interventions," *Int. J. Environ. Res. Public Health*, vol. 17, no. 20, p. 7488, 2020, doi: https://dx.doi.org/10.3390/ijerph17207488.