

The Effectiveness of Leaflet-Based Balanced Nutrition Education on Improving Students' Knowledge at Elementary School 2 Toronipa, Southeast Sulawesi, Indonesia

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Abstract

Background: The nutritional status of elementary school-aged children is a crucial factor in determining the quality of future human resources. However, limited nutritional knowledge among children remains a challenge, particularly in coastal areas with restricted access to information.

Purpose: This study aims to assess the effectiveness of leaflet-based educational media in improving students' knowledge about balanced nutrition at Elementary School 2 Toronipa, Konawe Regency, Southeast Sulawesi, Indonesia.

Methods: This research employed a pre-experimental design using a one-group pretest-posttest approach. The sample consisted of 45 students from grades III, IV, and V, selected through total sampling. The research instrument was a multiple-choice questionnaire developed based on the Balanced Nutrition Guidelines from the Indonesian Ministry of Health. The study procedure included a pretest, an educational intervention using leaflets, and a posttest.

Results: The results showed that before the intervention, the majority of students had moderate (51.1%) and low (31.1%) levels of knowledge. Following the intervention, there was a significant increase in the high knowledge category to 73.4%, while the low category decreased to 2.2%. The average knowledge score improved from 11.3 to 16.6. The paired sample t-test indicated a statistically significant difference ($p = 0.000$; $p < 0.05$), confirming the effectiveness of the leaflet in enhancing students' nutritional knowledge.

Conclusion: Leaflets are an efficient, easy-to-understand, and engaging educational medium for elementary school children. These findings have positive implications for school-based nutrition education programs, especially in regions with limited access to information.

Background

The nutritional status of elementary school-aged children is a key indicator in determining the quality of human resources in the future. The elementary school period marks a phase of rapid growth and development—physically, cognitively, and socially (I. Putu Sudayasa et al., 2022). Therefore, optimal nutritional intake is essential to support both learning processes and daily physical activities. Unfortunately, many children still engage in unhealthy eating habits, such as consuming instant foods high in sugar, salt, and fat, and low in fiber and vitamins (Sorasak et al., 2025). These habits are largely influenced by their limited understanding of the importance of balanced nutrition (Purnamasari, Prima, et al., 2022).

The concept of balanced nutrition emphasizes the consumption of diverse and adequate food according to the body's needs, while also considering physical activity, personal hygiene, and ideal body weight (Wahyuni, S et al., 2022). This concept replaces the previously popular “4 Healthy 5 Perfect” paradigm. However, not all elementary school students are able to understand and apply the principles of balanced nutrition in their daily lives, primarily due to limited access to information from both family and school environments (Israeli et al., 2020).

The Indonesian Ministry of Health has introduced the Balanced Nutrition Guidelines (Pedoman Gizi Seimbang or PGS), which highlight the importance of consuming a variety of foods, engaging in regular physical activity, maintaining personal hygiene, and monitoring body weight (Mokodompit et al., 2025). Nevertheless, this concept has not been fully understood or practiced by children, particularly those living in coastal areas with restricted access to health information. Elementary School 2 Toronipa is located in a coastal region of Konawe Regency, with students from diverse socioeconomic backgrounds. Preliminary observations indicated that most students have limited understanding of basic nutrition principles, including the functions of nutrients and examples of healthy foods. This low level of nutritional literacy can increase the risk of malnutrition and decrease students' learning concentration (Hadju et al., 2024).

Nutrition education can be effectively delivered through interactive and age-appropriate counseling sessions. One effective medium is the leaflet—a printed material containing concise information and illustrations to facilitate understanding (Purnamasari, Andas, et al., 2022). Leaflets are advantageous due to their simplicity, portability, and potential for repeated reading, making them useful for reinforcing information at home. In the context of elementary school students, leaflet-based education is expected to significantly enhance understanding, combining visual and textual elements in a child-friendly format (Zoahira & Purnamasari, 2023).

Several previous studies have shown that leaflets can improve knowledge across various health topics among children (Purnamasari et al., 2024). However, empirical evidence assessing the effectiveness of leaflet-based balanced nutrition education for elementary students—particularly in coastal regions like Toronipa—remains limited. Therefore, this study is important in evaluating whether leaflets are an effective medium for improving students' knowledge of balanced nutrition and to inform the development of more targeted nutrition education interventions (Darmayanti Waluyo et al., 2022).

This study aims to assess the knowledge level of students at Elementary School 2 Toronipa regarding balanced nutrition before and after nutrition education using leaflet media and to analyze the effectiveness of leaflets as a tool in delivering nutritional education to elementary school students.

Method

Research Design

This study employed a pre-experimental design with a one-group pretest-posttest approach, measuring students' knowledge before and after balanced nutrition education using leaflets (Purnamasari, Wa Ode Aisa Zoahira, et al., 2024).

Population and Sample

The study population comprised all third, fourth, and fifth-grade students at Elementary School 2 Toronipa. The sample was selected using total sampling, involving 45 students who met the inclusion criteria: willingness to participate in all stages of the study, absence of learning disabilities, and parental consent.

Research Instrument

A multiple-choice questionnaire was used to assess students' knowledge of balanced nutrition. It was developed based on indicators from the Balanced Nutrition Guidelines (PGS) by the Indonesian Ministry of Health (Islamiah et al., 2024). The questionnaire included questions on nutrient identification, examples of nutritious foods, the importance of dietary diversity, and supporting behaviors such as hygiene and physical activity.

Study Procedure

1. Pretest: Students completed a questionnaire to assess their baseline knowledge of balanced nutrition.
2. Intervention: Balanced nutrition education was delivered using leaflets, supported by an interactive lecture and brief discussion.
3. Posttest: Students completed the same questionnaire to assess knowledge changes after the intervention.

Data Analysis

Quantitative data were analyzed using paired sample t-test to determine the difference in mean knowledge scores before and after the intervention. The significance level was set at $\alpha = 0.05$.

Results

Respondent Characteristics

The study involved 45 students from grades III, IV, and V at Elementary School 2 Toronipa. All respondents met the inclusion criteria. No further demographic analysis (e.g., age or gender) was conducted, as the research focus was on the difference in knowledge before and after the intervention.

Table 1. Frequency Distribution and Descriptive Statistics of Students' Knowledge Before and After the Intervention

No	Knowledge Category	Score Range	Pretest (n/%)	Posttest (n/%)
1	Low	0 – 49%	14 (31.1%)	1 (2.2%)
2	Moderate	50 – 74%	23 (51.1%)	11 (24.4%)

3	High	75 – 100%	8 (17.8%)	33 (73.4%)
	Total		45 (100%)	45 (100%)

Table 1 shows the change in students' knowledge levels before and after the leaflet-based education. Prior to the intervention, the majority of students were in the moderate category (51.1%), followed by low (31.1%) and high (17.8%). After the intervention, the proportion of students in the high category significantly increased to 73.4%, while the low category decreased to only 2.2%.

Table 2. Descriptive Statistics of Knowledge Scores

Statistic	Pretest	Posttest
Mean	11.3	16.6
Standard Deviation	3.05	2.40
Maximum Score	18	20
Minimum Score	5	11

Table 2 shows that the average knowledge score increased from 11.3 to 16.6. The standard deviation decreased, indicating a more homogeneous distribution of scores post-intervention. The maximum score reached 20 (perfect), and the minimum improved from 5 to 11, indicating that all students showed better performance after the intervention.

Table 3. Paired Sample t-Test Results

Variable	t-value	df	Sig. (2-tailed)
Nutrition Knowledge	12.714	44	0.000

Table 3 presents the results of the paired sample t-test. The t-value was 12.714, with a significance level of $p = 0.000$ ($p < 0.05$), indicating a statistically significant difference between pretest and posttest scores. This confirms that the leaflet intervention effectively improved students' knowledge of balanced nutrition.

Discussion

This study demonstrates that leaflet-based balanced nutrition education significantly improved students' knowledge. The distribution of knowledge scores shifted substantially after the intervention, with the proportion of students in the high knowledge category increasing from 17.8% to 73.4%, and those in the low category decreasing from 31.1% to 2.2%.

Descriptive statistics also support this outcome. The mean score rose from 11.3 to 16.6, the maximum score increased to 20, and the minimum improved from 5 to 11. The decline in standard deviation suggests that student knowledge became more uniform post-intervention. The inferential analysis using paired t-test further validated this improvement with a highly significant p-value.

These findings align with previous studies showing that printed media such as leaflets are effective tools for increasing children's health knowledge due to their visual appeal, simplicity,

and ease of understanding (Purnamasari, Saragih, et al., 2024). Leaflets support independent learning and reinforce educational messages delivered during counseling sessions. Designed with age-appropriate language and attractive visuals, they help children better retain information over time (Nofitasari et al., 2023).

Moreover, the effectiveness of the leaflet was enhanced by the interactive delivery approach used in this study. Students were encouraged to ask questions and engage in discussions, which increased their involvement and improved knowledge retention (Wahyuni et al., 2024). However, a small portion of students (2.2%) remained in the low knowledge category, indicating the need for complementary or individualized educational strategies to address diverse learning needs. Factors such as learning motivation, family background, and home environment may also influence knowledge acquisition (Andas et al., 2024).

Overall, this study has positive implications for school-based health promotion. Leaflet-based nutrition education is an effective, affordable, and practical strategy. For greater impact, it should be combined with other media—such as posters, educational videos, or games—and implemented regularly to foster healthy habits from an early age.

Conclusion

Based on the findings at Elementary School 2 Toronipa, it can be concluded that there was a significant improvement in students' knowledge of balanced nutrition following the leaflet-based education. Most students initially fell within the low to moderate knowledge categories; however, post-intervention, a majority transitioned to the high knowledge category. The increase in average knowledge scores indicates that the leaflet was an effective educational tool. Therefore, leaflet media can be considered an efficient and impactful method for enhancing elementary students' understanding of balanced nutrition.

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