

Effectiveness of Nutrition Booklets in Improving Nutritional Understanding Among High School Students

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ABSTRACT

ABSTRACT Nutritional issues among adolescents, particularly high school students, pose a significant challenge in public health improvement efforts. A lack of nutritional understanding can lead to poor dietary habits and long-term health impacts. This study aims to examine the effectiveness of booklets as a medium for nutrition education in enhancing high school students' knowledge, attitudes, and behaviors regarding nutrition. A review was conducted on 10 relevant scientific articles published between 2021 and 2025, employing quasi-experimental, pre-experimental, pre-posttest, and R&D methods. The findings indicate that booklets, whether in print or digital form, significantly improve students' nutritional knowledge and attitudes. Several studies also highlight positive impacts on dietary behaviors and the prevention of health issues such as anemia, chronic energy deficiency (CED), and dyspepsia. The highest effectiveness was observed in interventions combining booklets with audiovisual media. This study confirms that booklets are an effective, affordable, and flexible educational tool for adolescent nutrition education, supporting the achievement of Sustainable Development Goals (SDGs) in health and nutrition.

Keywords: Nutrition education; booklet; high school students; nutritional understanding; sustainable development

1 Introduction

Nutrition among adolescents in Indonesia remains a significant public health problem. During adolescence, including the high school years, the need for optimal nutrition increases due to growth and development. However, many adolescents lack good nutrition knowledge, leading to unhealthy eating habits and problems such as iron deficiency, overweight, and chronic energy deficiency. According to [1], Indonesian adolescents face a triple burden of malnutrition: undernutrition, overnutrition, and micronutrient deficiencies. About 25% of adolescents are stunted, 9% are classified as underweight, 16% are overweight, and about a quarter of adolescent girls suffer from anemia. [2] emphasizes that school-based nutrition education is a key strategy to sustainably improve the nutritional status of adolescents and support the achievement of the sustainable development goals of Zero Hunger (SDG2) and Good Health and Well-being (SDG 3).

One effective innovation for delivering nutrition education is the use of booklet media. Booklets are advantageous due to their accessibility, affordability, and flexibility, allowing students to independently review the material multiple times. [3] found that using booklets significantly improves students' nutrition knowledge. Similarly, [4] reported that e-booklets had a positive impact on the knowledge and attitudes of overweight students. [5] also observed significant improvements in adolescents' knowledge and attitudes regarding balanced nutrition after participating in booklet-based counseling programs.

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Based on this background, the aim of this study was to examine the effectiveness of booklets as nutrition education media in improving the nutritional understanding of high school students. The focus on high school students is particularly important, as this age group is a critical transition period for establishing long-term healthy behaviors. The results of this study are expected to support the development of nutrition education strategies that are more targeted and effective, and can contribute to the achievement of Sustainable Development Goals (SDGs), particularly on adolescent health and nutrition.

2 Literature

Nutrition education media play an important role in improving public knowledge and attitudes toward healthy eating patterns. One effective medium used is the booklet, available in both printed and electronic forms (e-booklet). Several studies have shown that using booklets as nutrition education media can have a positive impact across various age groups. Research by [4] demonstrated that the use of a balanced nutrition e-booklet significantly increased knowledge and attitudes among overweight high school students. In the study, the group that received the e-booklet showed an increase in knowledge scores by 15.68 points, compared to 2.95 points in the control group. Additionally, nutrition attitudes also showed a significant improvement in the intervention group.

Furthermore, a study by [6] examined the influence of e-booklet media on adolescents' knowledge and attitudes in the prevention of Type 2 Diabetes Mellitus. The results indicated that nutrition education through the e-booklet effectively increased adolescent knowledge by 25.49% and attitudes by 0.24 points. [7] compared the effectiveness of nutrition education through lectures and booklets on improving knowledge and attitudes of overweight adolescents. Their study found that both methods were effective in enhancing nutrition knowledge and attitudes, with no significant difference between the two.

Based on these findings, it can be concluded that the use of booklets, whether printed or electronic, is an effective nutrition education medium for improving nutrition knowledge and attitudes across various age groups. The advantages of booklets include ease of distribution, relatively low production costs, and the ability to deliver information in a systematic and engaging manner. Therefore, integrating booklets into nutrition education programs in schools and communities can be an effective strategy for enhancing nutrition literacy.

3 Research Methods

This study was conducted by analyzing and synthesizing research findings related to the effectiveness of using nutrition booklets to improve high school students' understanding of nutrition. Data were collected from 10 scientific articles that specifically focused on the use of booklets as nutrition education media for high school students. The selected articles met the criteria of being published within the last five years (2021–2025), involving high school students as subjects, and utilizing booklets as the primary educational medium. The article search process was carried out through academic databases such as Google Scholar and Perplexity using keywords such as "effectiveness of nutrition booklets," "nutrition education," "high school," and "teenage nutrition education."

After the articles were gathered, each study was analyzed to assess the effectiveness of booklet usage, focusing on the research methods employed, the description of the booklet media, and the main outcomes such as improvements in knowledge and changes in nutrition-related attitudes or behaviors. The results are presented narratively to provide a comprehensive overview and serve as a basis for further research recommendations. This research is expected to contribute to designing more optimal nutrition education strategies at the secondary school

level and support the achievement of the Sustainable Development Goals (SDGs), especially Zero Hunger (SDG 2) and Good Health and Wellbeing (SDG 3).

4 Result and Discussion

Based on the article search using keywords in Perplexity and Google Scholar from 2021–2025, 10 relevant articles were identified. The findings are summarized in Table 1.

Table 1: Information on Instruments Used in Each Reference

No	Author(s) & Year	Title	Method	Findings	Benefits	Disadvantages
1	Kumalasari et al., 2021	Effectiveness of Nutrition Education with Lectures and E-Booklets on Knowledge and Attitudes of Obese Adolescents	Quantitative experimental	Improves knowledge and attitude of obese adolescents	Effective for 34 high school students in Pekalongan	Limited to obese adolescent respondents only
2	Larasati et al., 2021	The Effect of Nutrition Counseling Using Booklets on Knowledge of Female Students with Nutritional Issues	Qualitative descriptive	Increases knowledge of female students about nutrition	Practical and easy to implement in Lombok	Small sample size, limited generalizability
3	Haya et al., 2022	Nutrition Counseling Using E-Booklets with Mentoring on Energy and Protein Intake in Chronically Energy-Deficient Adolescent Girls	Experimental with mentoring	Improves energy and protein intake	Helpful for 25 adolescent girls in Cianjur	Requires more time and supervision

No	Author(s) & Year	Title	Method	Findings	Benefits	Disadvantages
4	Fatin, 2023	The Effectiveness of Booklet Media in Increasing Knowledge of Balanced Nutrition and Food Diversity	Quantitative	Enhances knowledge about CED and food diversity	Effective for 30 students in Karawang	Does not cover long-term behavioral change
5	Putri & Ginting, 2023	The Effect of Balanced Nutrition Education Using E-Booklets on Knowledge and Dietary Patterns	Quantitative descriptive	Improves dietary pattern and nutrition knowledge	Effective for 36 students in Samarinda	Less effective for students with low reading motivation
6	Amalia et al., 2023	The Effectiveness of Nutrition Education Through E-Booklets on Balanced Nutrition for Overweight Students	Experim- ental quantita- tive	Improves e-booklet effectiveness on knowledge and attitudes	44 students (22 experim- ental) in Surakarta	Needs multi- media support for better en- gagement
7	Ulfah et al., 2023	The Effect of Fe Tablet Education Using Booklets on Adolescent Girls as a Stunting Prevention Effort	Quantitative descriptive	Improves knowledge about anemia and stunting prevention	56 female students in Malang	Lacks quali- tative insights into behavior change
8	Firmansyah et al., 2023	Development and Validation of a Nutrition Booklet on High-Fat Foods for Adolescents	Develop- mental research	Validates book- let material for nutrition education	30 students in Surakarta	Limited scope of booklet topic

No	Author(s) & Year	Title	Method	Findings	Benefits	Disadvantages
9	Amelia Sitopu, 2023	The Effect of Booklet and Video Media on Knowledge and Attitudes Toward Stunting	Experimental	Improves combined media learning impact	24 female students in Kuningan	Requires higher production resources
10	Nisa et al., 2023	The Effect of Nutrition Education with Booklets on Dietary Patterns and Dyspepsia Incidence	Quantitative descriptive	Improves dietary patterns and reduces dyspepsia cases	34 students in Samarinda	Short observation period

Table 2: Analysis of Articles on the Effectiveness of Nutrition Booklets in Enhancing High School Students' Nutritional Understanding

Authors & Year	Booklet Description	De-	Method	Key Results	Strengths	Limitations
Kumalasari et al., 2021 [8]	E-booklet + lecture on obesity nutrition		Quasi-experimental	Significant improvement knowledge attitudes	im- in combination of methods	Small sample size
Larasati et al., 2021 [9]	Printed basic nutrition booklet		Pre-experimental	Significant improvement (p=0.000)	im- Simple intervention	No control group
Haya et al., 2022 [10]	Interactive e-booklet with images and music		Pre-experimental	Significant increase in energy and protein intake	im- Includes mentoring	No control group
Fatin, 2023 [11]	Balanced nutrition and diverse foods booklet		Pre-experimental	Knowledge improved (p=0.001)	im- Focus on food diversity	Only cognitive outcomes measured
Putri & Ginting, 2023 [12]	Online-based balanced nutrition e-booklet		Quasi-experimental	Improved knowledge and dietary patterns	im- Comprehensive evaluation (knowledge & behavior)	Booklet content not detailed

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Table 2 – continued from previous page

Authors & Year	Booklet Description	De-Method	Method	Key Results	Strengths	Limitations
Amalia et al., 2023 [4]	Online booklet on balanced nutrition	Quasi-experimental	Quasi-experimental	Significant improvement in knowledge and attitudes	Includes control group	Short intervention period
Ulfah & Aulia, 2023 [13]	Fe tablet education booklet	Pre-posttest	Pre-posttest	Significant knowledge improvement (p=0.000)	Focus on stunting prevention	Behavior not measured
Firmansyah et al., 2023 [14]	High-fat foods booklet	R&D (Development)	R&D (Development)	High validation, 30% knowledge increase	Systematic approach	No long-term testing
Amelia & Sitopu, 2023 [15]	Booklet and video on stunting	Quasi-experimental	Quasi-experimental	Significant improvement in knowledge and attitudes	Combined media, engaging method	Small sample, no control group
Nisa et al., 2023 [16]	Booklet on dyspepsia symptoms and prevention	Quasi-experimental	Quasi-experimental	Improved dietary patterns, reduced dyspepsia	Comprehensive data instrument	No control for external variables

Eight of the ten analyzed articles used quasi experimental or pre experimental methods with a one group pretest posttest design. For example, [11] employed a pre-experimental design, while [12] and [16] used quasi-experimental designs. These methods effectively capture changes before and after booklet interventions. Two of the eight studies included control groups (Kurniasari et al., 2021; Amalia et al., 2023), enhancing methodological validity. Additionally, [14] used an R&D method, and [13] employed a pre-posttest design. The R&D method allows systematic product development from needs analysis to effectiveness evaluation.

The analysis reveals that booklets and e-booklets are effective tools for improving adolescents' nutritional knowledge, attitudes, and behaviors. Most studies reported significant knowledge improvements post-intervention, consistent across research by [8], [9], and [12], which focused on balanced nutrition or obesity-specific topics. [10] and [11] further demonstrated that e-booklets not only enhance knowledge but also improve intake of essential nutrients like energy and protein. Booklet use among chronically energy-deficient adolescent girls significantly increased energy and protein consumption, highlighting their strategic role in malnutrition prevention campaigns. [15] found that combining booklets with videos improved knowledge and attitudes toward stunting prevention. This aligns with [17], who noted that visual media engage multiple senses, enhancing understanding and active participation compared to text-based methods.

Future research should employ stronger methods, such as randomized controlled trials comparing booklet recipients to non-recipients. Additionally, most studies measured short-term outcomes; longer-term follow-ups are needed to assess sustained changes in knowledge, attitudes, and dietary habits. Expanding participant diversity across schools and regions would improve generalizability. Innovative media like animated videos, digital apps, or social media could further engage adolescents. Booklet development should involve students to ensure relevance, and proven-effective booklets could be integrated into school curricula (e.g., Biology or Physical Education) for continuous, embedded nutrition education.

Nevertheless, the findings underscore that booklets and e-booklets are not only relevant in formal education but also serve as effective public health promotion tools. Their use in

adolescent nutrition education directly supports Zero Hunger (SDG 2) and Good Health and Well-Being (SDG 3). As emphasized by [2], nutrition education interventions positively impact knowledge and behaviors while significantly improving dietary patterns across age groups.

5 Conclusion

This study concludes that booklets are an effective medium for enhancing high school students' nutritional knowledge, attitudes, and some behaviors. Nearly all reviewed articles reported significant improvements post-intervention. Booklets' strengths lie in affordability, accessibility, and flexibility for independent use. Booklet-based interventions also contribute to preventing malnutrition and non-communicable diseases common among adolescents. However, effectiveness can be enhanced by incorporating interactive visual or digital media tailored to contemporary adolescents' preferences. Future research should employ stronger experimental designs and broader populations for higher external validity.

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