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Effectiveness of Audiovisual Nutrition Education via YouTube on Balanced Nutrition Knowledge and Attitudes Among Indonesian Adolescents: A Quasi-Experimental Study

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Abstract

Introduction: *Adolescents currently face a double burden of malnutrition amidst a rapid transformation in digital health information. Conventional educational methods often fail to effectively engage Generation Z, a demographic with a distinct preference for visual and interactive learning formats.* ***Objective:*** *This study evaluated the effectiveness of a YouTube-based audiovisual intervention in improving knowledge and attitudes regarding balanced nutrition among adolescents in a boarding school setting.* ***Method:*** *This quantitative study employed a quasi-experimental, one-group pretest-posttest design. Participants comprised 88 students from MAPK Jabal Hikmah, an Islamic boarding school in East Lombok Regency, Indonesia, recruited via total sampling. The intervention consisted of a structured educational video aligned with the Indonesian Balanced Nutrition Guidelines (Pedoman Gizi Seimbang). Data were analyzed using the Wilcoxon Signed-Rank Test due to the non-normal distribution of variables.* ***Result and Discussion:*** *The intervention yielded a statistically significant increase in nutrition knowledge ($p < 0.001$), with mean scores rising from 30,51 to 80,40. Attitude scores also demonstrated significant improvement ($p < 0.001$), increasing from 46,53 to 61,02. Notably, the proportion of students categorized as having a "good" attitude rose substantially to 98.9% post-intervention, compared to 39.8% at baseline.* ***Conclusion:*** *YouTube-based audiovisual interventions are an effective and efficient digital health promotion strategy for enhancing adolescent nutrition literacy. Future studies should incorporate a control group to strengthen internal validity and generalizability.*

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Introduction

Adolescence represents a critical transitional phase that fundamentally shapes future adult health outcomes. This period demands optimal nutritional intake to support rapid physiological growth spurts and cognitive development. However, globally, adolescents currently confront a complex health challenge characterized by the double burden of malnutrition. While micronutrient deficiencies, such as anemia, remain endemic, the prevalence of overweight and obesity is simultaneously surging due to an increasingly obesogenic environment (WHO, 2024). Modern adolescent dietary patterns are frequently characterized by high intakes of calories, saturated fats, and sugars, yet remain critically deficient in fiber and essential micronutrients (Desai et al., 2013). In Indonesia, this trend poses a significant threat to the nation's anticipated demographic dividend. Data from the Basic Health Research (Riskesdas) indicates that the prevalence of nutritional issues among youth remains alarmingly high, potentially compromising long-term national productivity. Furthermore, the 2023 Indonesian Health Survey (SKI) highlights a concerning epidemiological shift: Non-Communicable Diseases (NCDs) such as diabetes and hypertension are increasingly diagnosed in younger populations (aged 15–19), driven largely by sedentary lifestyles and poor dietary quality (Kemenkes RI, 2024).

Low nutrition literacy has been identified as a primary driver of these maladaptive eating behaviors. Unfortunately, conventional nutrition education methods in schools typically reliant on unidirectional didactic lectures and print media have proven increasingly ineffective in engaging Generation Z (Flores-Vázquez et al., 2024). As digital natives, this generation is deeply immersed in the virtual world. According to a 2024 survey by the Indonesian Internet Service Providers Association (APJII), internet penetration among Indonesian youth has reached 87.02%, the highest across all age demographics (APJII, 2024). Pesantren (Islamic boarding schools) represent a distinctive and highly relevant setting for adolescent nutrition interventions because daily eating patterns are strongly shaped by a semi-closed living environment. Meals and snacking are often influenced by dormitory routines, peer norms, and the food options provided through canteens or surrounding vendors, while opportunities for self-directed food choice may be structured by institutional rules. At the same time, access to information and digital media can differ across pesantren depending on policies regarding gadget use, supervision, and permitted platforms. These contextual factors can affect baseline nutrition knowledge, exposure to health content, and the feasibility of delivering digital education. Therefore, evaluating a YouTube-based intervention in a pesantren environment is important to understand whether audiovisual nutrition messages can be effectively delivered and internalized under boarding school-specific conditions.

This shift in the media landscape necessitates a transformation in health promotion strategies. Social media has evolved beyond mere entertainment to become a primary source of health information for adolescents. Among various platforms, YouTube offers distinct advantages through its audiovisual format, which stimulates cognitive processing in accordance with Dual-Coding Theory. This theory posits that the simultaneous presentation of visual and auditory stimuli significantly enhances information retention and emotional engagement compared to text-based formats alone (Classen et al., 2020); (Furqan et al., 2020). While recent studies indicate that digital video interventions can effectively improve nutrition literacy and dietary compliance among adolescents

(Marlinawati et al., 2023); (Susilawati & Sugijati, 2025). Empirical evidence specifically evaluating structured YouTube-based interventions on the Indonesian Balanced Nutrition Guidelines (*Pedoman Gizi Seimbang*) within boarding school environments remains limited. This study aims to bridge this gap by evaluating the effectiveness of a YouTube-based nutrition education intervention in improving the knowledge and attitudes of adolescents in a focused institutional setting.

Method

This quantitative study employed a quasi-experimental, one-group pretest-posttest design. The research was conducted at MAPK Jabal Hikmah, an Islamic boarding school (*Pondok Pesantren*) in Indonesia, from January to March 2025. The target population comprised senior high school students (Grades X, XI, and XII). A total sampling technique was utilized, recruiting the entire population of 88 students who met the inclusion criteria to serve as respondents.

The research protocol commenced with a baseline assessment (pre-test) to establish initial knowledge and attitude levels (O_1). Subsequently, participants underwent the intervention (X), which consisted of exposure to a structured educational video on balanced nutrition hosted on the YouTube platform. The video content was developed to align with the Indonesian Balanced Nutrition Guidelines (*Pedoman Gizi Seimbang/PGS*), covering the *Isi Piringku* (My Plate) concept, the four pillars of balanced nutrition, and the ten messages of balanced nutrition. Following the educational session, a final assessment (post-test) was administered using the same instruments (O_2).

The independent variable was the video-based nutrition education, while the dependent variables were nutrition knowledge and attitudes. Knowledge was assessed using a 20-item objective questionnaire, and attitudes were measured using a 15-item Likert scale. The validity and reliability of both instruments were established prior to data collection. Data analysis was performed using statistical software. The Shapiro-Wilk test indicated that the data were not normally distributed. Consequently, the Wilcoxon Signed-Rank Test (non-parametric analysis) was employed to determine the statistical significance of the differences between pre-test and post-test scores, with the significance level set at alpha = 0.05.

Result and Discussion

A total of 88 students completed the study. As presented in Table 1, the majority of respondents were aged 18 years (48.9%), and the sample was predominantly female (58.0%). This distribution reflects the general profile of senior high school students situated within the late adolescence phase.

Table 1
Frequency Distribution of Respondent Characteristics by Age and Gender

Characteristics	N	%
Age (years)		
17	30	34.1
18	43	48.9
19	10	11.4
20	5	5.7
Gender		
Female	51	58.0
Male	37	42.0
Total	**88**	**100.0**

Table 2 presents the descriptive statistics for knowledge and attitude scores pre- and post-intervention. At baseline (pre-test), the mean knowledge score was 30,51, with the entire cohort (100%) classified in the poor knowledge category. Following the video intervention (post-test), the mean score increased substantially to 80,40, with 69,3% of respondents achieving the good category. A similar trend was observed in the attitude variable, where the proportion of participants in the good category rose from 39,8% at baseline to 98,9% post-intervention

Table 2
Comparison of Knowledge and Attitude Categories Pre- and Post-Intervention

Category	*Pretest*			*Posttest*		
	n	%	Min-Max	N	%	Min-Max
Knowledge						
Good	0	0		61	69.3	
Fair	0	0	5-55	26	29.5	45-95
Poor	88	100.0		1	1.1	
Attitude						
Poor	0	0		0	0	
Fair	53	60.2	37-61	0	0	57-77
Good	35	39.8		87	98.9	
Excellent	0	0		1	1.1	
Total		**88**			**100.0**	

To evaluate the statistical significance of the observed changes, comparative hypothesis testing was conducted. As presented in Table 3, the Wilcoxon Signed-Rank Test confirmed statistically significant differences for both variables ($p < 0.001$). These results indicate that the YouTube-based education intervention had a significant positive effect on respondents' nutritional knowledge and attitudes. Specifically, analysis of the data revealed that 98.8% of respondents experienced an increase in knowledge scores, while 95.4% demonstrated improved attitude scores.

Table 3
Results of the Wilcoxon Signed-Rank Test for Knowledge and Attitude Variables (Pre-test vs. Post-test)

Variable	Rank Direction	n	%	p-value
Knowledge				**< 0.001**
	Negative Ranks (Decrease)	1	1.1	
	Positive Ranks (Increase)	87	98.8	
	Ties (No Change)	0	0.0	
Attitude				**< 0.001**
	Negative Ranks (Decrease)	4	4.5	
	Positive Ranks (Increase)	84	95.4	
	Ties (No Change)	0	0.0	
Total		**88**	**100.0**	

This study provides robust empirical evidence supporting the integration of digital technology specifically YouTube as a highly effective strategy for adolescent health promotion. The statistically significant improvement in knowledge scores ($p < 0.001$) aligns with a recent systematic review by Marlinawati et al. (2023), which identified audiovisual media as the premier intervention modality for preventing nutritional issues among adolescents.

The observed effectiveness can be explained theoretically through the Cognitive Theory of Multimedia Learning. The educational video utilized in this study integrated auditory narration with dynamic visual illustrations. This combination facilitates information processing through two distinct sensory channels (visual and verbal) simultaneously. By reducing cognitive load, this process renders complex concepts such as the macronutrient proportions in the *Isi Piringku* (My Plate) guidelines more comprehensible and easier to encode into long-term memory. This stands in distinct contrast to conventional didactic lectures or static text, which adolescents often perceive as monotonous and lacking in interactivity (Nugroho et al., 2021).

Beyond the cognitive domain, this study also recorded a significant enhancement in the affective domain ($p < 0.001$). This finding corroborates previous research positing that improved knowledge serves as the fundamental baseline for the formation of positive attitudes (Arfenda et al., 2023; Hafid et al., 2023). Aesthetically appealing visual content fosters emotional engagement; when students are simultaneously entertained and educated, their psychological resistance to health messages diminishes, rendering them more receptive to adopting healthy dietary perspectives (Sofianita et al., 2025). Furthermore, digital features such as the ability to replay content provide learning autonomy, a critical factor in adolescent and adult learning pedagogy (Jannah et al., 2022).

However, it is necessary to acknowledge the double-edged nature of social media. Recent studies indicate a negative correlation between the duration of general social media usage and the quality of adolescent nutritional intake, largely due to high exposure to fast-food advertising (Yamin et al., 2025). Consequently, the success of this intervention underscores the critical need for academics and public health practitioners to proactively populate the digital landscape with evidence-based educational content to counteract nutritional misinformation and the promotion of unhealthy foods.

Limitations and Future Directions The primary limitation of this study lies in its pre-experimental design without a control group, which limits the ability to fully eliminate external confounding factors. Future research is recommended to employ a Randomized Controlled Trial (RCT) design and incorporate specific indicators of actual behavioral change to measure long-term clinical impacts.

Conclusion

This study validates the utility of YouTube-based audiovisual interventions as a potent tool for public health promotion. The findings demonstrate that utilizing digital media significantly enhances both knowledge and attitudes regarding balanced nutrition among Indonesian adolescents, with statistical analysis confirming robust improvements in both variables post-intervention ($p < 0.001$). Consequently, this research advocates for the strategic integration of social media platforms into formal school health frameworks, such as the School Health Unit (*Usaha Kesehatan Sekolah/UKS*). In the context of global health challenges, this digital approach offers a scalable, cost-efficient, and culturally relevant mechanism to combat the double burden of malnutrition, particularly by effectively engaging the digital native demographic.

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