

Effectiveness of TikTok Video-Based Nutrition Education in Improving Dietary Knowledge: A Pre-Experimental Study Among Adolescent Girls in Banggai, Indonesia

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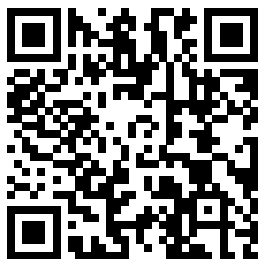
Adolescent Girls, Digital Health Intervention, Dietary Knowledge, Nutrition Education, TikTok

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ABSTRACT

Adolescent girls undergo rapid physical and psychosocial changes, resulting in increased nutritional needs and a higher susceptibility to iron-deficiency anemia, especially at the onset of menstruation. This makes them an important target group for nutrition interventions. This study aimed to assess the effectiveness of TikTok-based nutrition education videos in enhancing adolescent girls' knowledge of diverse diets and balanced nutrition. A pretest-posttest design was used, with no control group, and involved 146 students aged 12-18 years from two schools in Moilong District, Banggai Regency, Central Sulawesi, Indonesia. Participants attended four sessions over eight weeks, each featuring two TikTok videos on topics such as balanced nutrition, anemia prevention, physical activity, healthy eating habits, and menstrual hygiene management. Nutrition knowledge was assessed before and after the intervention using a structured questionnaire, and the data were analyzed using paired t-tests. The results showed a statistically significant increase in nutrition knowledge ($p < 0.05$). At SMAN 1 Moilong, knowledge scores improved from 40-85 to 70-90, while at SMPN 4 Toili, scores increased from 40-75 to 70-100. These findings demonstrate that short, contextually relevant TikTok videos are effective in improving adolescent girls' nutrition knowledge. Schools and health services are encouraged to incorporate TikTok-based content into routine nutrition education programs, complemented by digital literacy support.

Key Messages:

- TikTok-based nutrition education delivered through short, contextually tailored video content constitutes a novel and feasible pedagogical approach that effectively enhances adolescent girls' nutrition knowledge in school settings and holds substantial potential to complement routine school- and community-based nutrition programmes, provided it is underpinned by evidence-based messaging and strengthened digital literacy.

GRAPHICAL ABSTRACT



INTRODUCTION

Adolescence represents a critical period of rapid physical and psychological growth and development, during which individuals transition toward adulthood and future reproductive roles. In this life stage, nutritional requirements increase substantially, particularly among adolescent girls who have begun menstruating and are therefore at elevated risk of iron-deficiency (1,2). This vulnerability underscores the strategic importance of adolescent girls as a target group for nutrition interventions to prevent micronutrient deficiencies and their long-term consequences. Nevertheless, evidence from various studies indicates that many adolescent girls in Indonesia still have a limited understanding of the importance of a diverse, nutritionally balanced diet. Instead, they frequently prefer fast foods that are energy-dense yet poor in essential nutrients, a pattern that may exacerbate existing nutritional risks and contribute to adverse health outcomes in both the short and long term (3,4).

In Banggai Regency, efforts have been made to address this through the introduction of a Multiple Micronutrient Supplement (MMS) program for women of reproductive age since 2018. While this program has had some success, significant gaps remain in the region's nutritional outcomes. For example, a 2022 study among adolescent girls in South Batui, Banggai Regency, reported a prevalence of undernutrition of 22.1% and anaemia of 26.9% (5). Furthermore, the combined prevalence of undernutrition in South Batui and Moilong Districts reaches 6.1%, exceeding the national prevalence of 5.7% reported by SKI 2023 (6,7). These data highlight persistent gaps in nutritional outcomes and a localized nutritional crisis in Banggai, calling for a more comprehensive, contextually relevant approach to nutrition education.

One key factor contributing to poor nutritional outcomes in adolescents is the widespread consumption of poor-quality diets. Studies show that Indonesian adolescents generally exhibit poor diet quality, characterised by frequent consumption of foods high in fat and sodium (8). The majority of adolescents (95%) do not meet the recommended intake of fruits and vegetables (9). A study further reports that 40% of adolescent girls living in rural areas have low dietary diversity (10). Consistently, the 2018 Basic Health Research (RISKESDAS) found that 95.5% of individuals aged ≥ 15 years consumed fewer

than five servings of fruit and vegetables per day (11), a proportion that increased to 97.5% in 2023 according to Indonesian Health Survey (SKI) data (7), highlighting a worsening trend in inadequate fruit and vegetable consumption at the national level. This worsening trend underscores the urgency for interventions that can effectively shift dietary behaviors and improve nutritional knowledge among youth.

Low levels of nutritional awareness among adolescents necessitate the use of approaches that are both contextually appropriate and appealing to contemporary youth. Conventional educational media, such as lectures and printed posters, are increasingly perceived as less relevant, given that today's adolescents are highly engaged with digital and visually oriented platforms. In this context, TikTok content can be an effective way to improve nutritional knowledge among adolescent girls. TikTok enables the conveyance of health messages in a visual, emotional, and narrative format, thereby facilitating better engagement and comprehension (12–16). When the content is tailored to adolescents' everyday experiences, nutrition education can be delivered in a more enjoyable, relatable, and accessible manner. Empirical evidence suggests that visual media can enhance information retention by up to 60% compared to conventional methods and may be more effective because it aligns with adolescents' prevailing digital culture (17–21).

Therefore, this study aims to enhance knowledge of diverse diets and balanced nutrition, and to encourage the adoption of diverse dietary practices and balanced nutrition in the daily lives of adolescent girls in Banggai Regency through TikTok video-based educational content.

METHODS

Study Design and Setting

This study utilized a quantitative, one-group pretest-posttest design without a control group to evaluate the impact of a media-based nutrition intervention. The research was conducted in 2025 at two formal educational institutions in the Moilong District of Banggai Regency: SMP Negeri 4 Toili and SMA Negeri 1 Moilong. These specific schools were selected because they are located within the Corporate Social Responsibility (CSR) area of JOB Tomori, the organization funding this collaborative research project between the Faculty of Public Health at Tompotika Luwuk University and Hasanuddin University, Makassar. To ensure the study did not disrupt the students' routine learning, all educational activities were integrated into regular school hours in coordination with school authorities.

Participants and Sampling

We specifically targeted adolescent girls aged 12 to 18 years, recognizing that adolescence is a critical developmental window for shaping long-term dietary habits and nutritional well-being. Participants were drawn from grades VIII and IX at SMP Negeri 4 Toili, and grades X and XI at SMA Negeri 1 Moilong. Using a purposive sampling approach, students were included if they met the age criteria and expressed a willingness to participate. Ethical compliance was strictly maintained; participation required both signed informed consent from the students and formal consent forms signed by their parents or guardians.

Intervention and Educational Materials

The core intervention consisted of media-based nutrition education delivered through TikTok videos. We chose this format to make the content highly relatable, appealing, and easy for adolescent girls to apply in their daily lives. The videos were developed by the research team based on a pre-existing "Nutrition Guide for Adolescent Girls" module. Before being shown to the students, the content was thoroughly reviewed and validated by a nutritionist from Hasanuddin University to ensure scientific accuracy. The primary goal of these materials was to improve the students' understanding of diverse diets and the principles of balanced nutrition.

Implementation Procedures

The entire study spanned an eight-week period, encompassing preparation, the educational intervention, and reporting. The intervention itself was delivered in four structured, face-to-face sessions held bi-weekly throughout September (weeks 1 and 3) and October (weeks 1 and 3) of 2025. Each 60-

minute session was carefully paced: it began with a 5-minute introduction, followed by a 10-minute preliminary knowledge check. The core segment featured 30 minutes of video viewing (two TikTok videos per session), followed by a 10-minute interactive Q&A and discussion to reinforce the material. A 5-minute wrap-up concluded the session.

The curriculum was introduced progressively. In the first session, students learned about Balanced Nutrition and the "Fill My Plate" concept. The second session focused on anemia, iron intake, and the importance of physical activity. In the third session, the videos covered menstrual hygiene management alongside the mindful consumption of sugar, salt, and fat. Finally, the fourth session highlighted fruit and vegetable consumption, choosing healthy snacks, and avoiding junk food.

Instruments and Data Analysis

To measure the effectiveness of the intervention, we used a structured, 20-item questionnaire covering the key concepts of balanced nutrition, dietary diversity, and the specific topics featured in the videos. This instrument was administered as a pretest before the first session began, and again as a posttest after the entire four-week educational cycle was completed. Finally, the resulting pre- and posttest knowledge scores were analyzed using a paired t-test. This allowed us to determine whether the TikTok-based educational program produced a statistically significant improvement in the students' nutritional knowledge.

CODE OF HEALTH ETHICS

This research was approved by the Health Research Ethics Committee of the University of Muhammadiyah Purwokerto (KEPK-UMP), Approval No. KEPK/UMP/186/VIII/2025. All respondents provided written informed consent, and confidentiality of participants' data was maintained throughout the study.

RESULTS

Respondent Age

The study sample consisted of 146 adolescent girls, comprising 90 students from grades X and XI at SMA Negeri 1 Moilong and 56 students from grades VIII and IX at SMP Negeri 4 Toili. The age distribution of the respondents is presented in Figure 1.

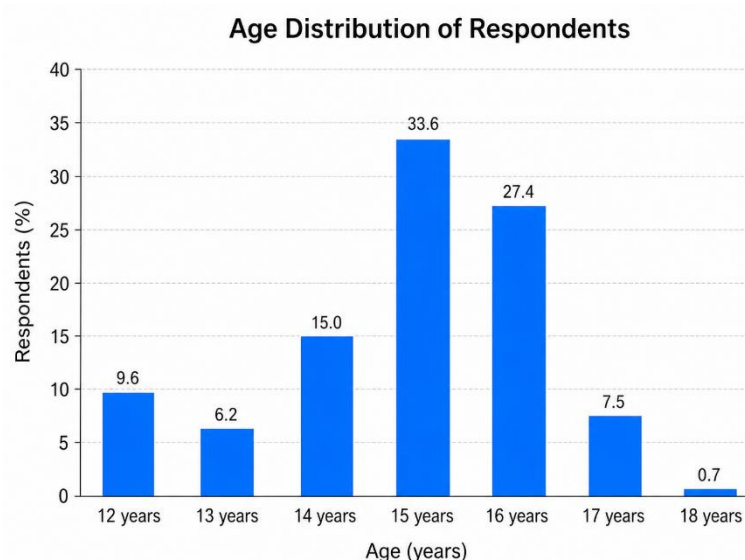


Figure 1. Distribution of Respondents by Age

The age distribution of participants indicated that the majority were in the middle-adolescent age group. The largest proportion was observed in the 15-year-old age group (33.6%), followed by those aged 16 years (27.4%) and 14 years (15%). In contrast, younger adolescents aged 12 (9.6%) and 13 years

(6.2%), as well as older adolescents aged 17 (7.5%) and 18 years (0.7%), constituted smaller proportions of the sample.

Knowledge of Students Before and After Being Given Balanced Nutrition Education

An overview of students' knowledge before and after educational interventions, as presented through TikTok video content, is shown in Table 1.

Table 1. Overview of Changes in Students' Knowledge After Education in Moilong District, Banggai Regency

Knowledge	n	Min-Max	Mean	p-Value
Student of SMAN 1 Moilong				
Before	90	40 - 85	71.416	0.000
After	90	70 - 90	78.525	($p < 0.05$)
Student of SMPN 4 Toili				
Before	56	40 - 75	64.286	0.000
After	56	70 - 100	84.361	($p < 0.05$)

The distribution of students' knowledge scores before and after education is illustrated in the pretest and posttest *box plots*. For SMAN 1 Moilong students, this is evident in Figure 2.

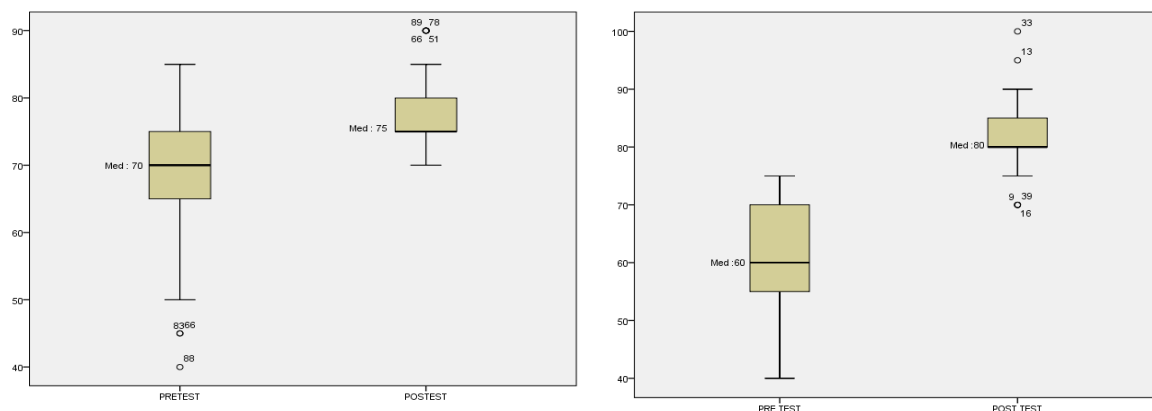


Figure 2. Box Plot for the Distribution of Knowledge Scores for SMAN 1 Moilong and SMPN 4 Toili Students

The boxplot visualisation of knowledge scores among students at SMAN 1 Moilong showed a clear improvement from the pretest to the posttest following the TikTok-based nutrition education intervention. The median knowledge score increased from approximately 70 at baseline to around 75 at posttest, indicating an overall enhancement in participants' understanding of balanced nutrition and dietary diversity.

The pretest-posttest boxplot for SMPN 4 Toili shows a substantial improvement in nutrition knowledge among adolescent girls following the TikTok video-based educational intervention. At baseline, the median score was approximately 60, with a relatively wide dispersion and a minimum value of around 40, suggesting considerable variation in initial understanding and the presence of participants with minimal nutrition knowledge. After the intervention, the distribution of scores shifted markedly towards higher values, with the median increasing to approximately 80 and the data becoming more narrowly distributed, reflecting a more consistent and homogeneous improvement in knowledge across participants.

The paired t-test results indicated a statistically significant increase in nutrition knowledge among students from both SMPN 4 Toili and SMAN 1 Moilong following the TikTok video-based educational intervention ($p < 0.05$). These findings provide further empirical support for the effectiveness of TikTok video-based interventions in enhancing nutrition knowledge among adolescent girls.

Furthermore, the increase in student knowledge, categorised by subject, is shown in Table 2.

Table 2. Student Knowledge before and after education

School	Knowledge Categories	Before Education		After Education	
		n	%	n	%
SMAN 1 Moilong	Less (Score <55)	7	7.8	0	0
	Enough (Score 56-75)	70	77.8	49	54.4
	Good (Score 76-100)	13	14.4	41	45.6
SMPN 4 Toili	Less (Score <55)	19	33.9	0	0
	Enough (Score 56-75)	37	66.1	19	33.9
	Good (Score 76-100)	0	0	37	66.1
Total		56	100	56	100

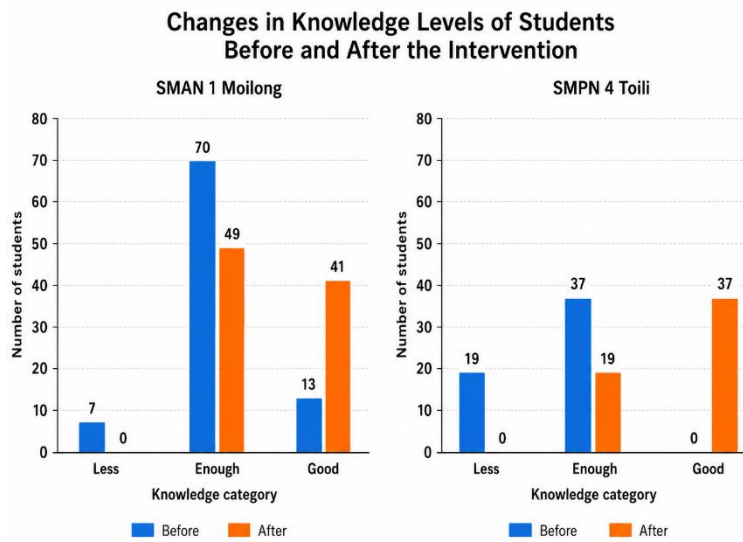
**Figure 3.** Increasing Knowledge of SMAN 1 Moilong and SMPN 4 Toili Students Based on Knowledge Categories

Figure 3 illustrates a marked improvement in the nutritional knowledge of students at SMAN 1 Moilong following the TikTok-based educational intervention. At baseline, the majority of participants demonstrated "adequate" knowledge ($n = 70$), with only 13 students scoring in the "good" category and 7 categorized as having "poor" knowledge. Post-intervention, this distribution shifted significantly. The "poor" knowledge category was completely eliminated, while the number of students achieving a "good" level of knowledge more than tripled ($n = 41$). Consequently, the "adequate" group decreased to 49 students. This reduction does not indicate a loss of knowledge, but rather reflects a positive upward transition of participants moving from the "adequate" to the "good" tier, underscoring a substantial overall enhancement in their understanding of nutrition. A similarly positive trend was observed among the students at SMPN 4 Toili, as depicted in Figure 3. Prior to the educational sessions, none of the students fell into the "good" knowledge category; most exhibited "adequate" knowledge ($n = 37$), while a notable proportion had "poor" knowledge ($n = 19$). Following the intervention, the "poor" knowledge category was entirely eradicated. Furthermore, the number of students with "adequate" knowledge dropped to 19 as a significant portion of the cohort successfully advanced, resulting in 37 students newly classified into the "good" knowledge category. This stark categorical shift highlights the efficacy of the TikTok videos in bridging fundamental knowledge gaps and elevating the students' nutritional literacy.

DISCUSSION

The results of this study indicate that nutrition education interventions based on TikTok video content can improve adolescent girls' knowledge of diverse diets and balanced nutrition. The increase in average knowledge scores in both schools, accompanied by a shift in categories from 'less' and 'enough' to

'good', indicates that repeated exposure to educational content packaged in an attractive, concise, and thematic manner can strengthen understanding of key concepts in balanced nutrition. The dominance of participants in the 14-16 age group, a phase in which nutritional needs increase and eating behaviours are increasingly influenced by social and social media environments, indicates that the intervention target was appropriate both biologically and sociocultural.

Conceptually, digital media has been widely used across various interventions and has proven effective, as evidenced by research. Digital media facilitates the delivery of health messages in a more interactive, engaging, and accessible format than traditional approaches. The use of TikTok in Health Education has been shown to increase knowledge, as this approach is easier to access and more attractive to the target group (13,15,22). Similarly, in social learning, animated videos can help children understand and develop their social-emotional skills in an engaging, easily digestible way in early childhood (17). Nutrition education delivered through social media (e.g., Instagram and TikTok), educational videos, and animated videos can significantly increase nutrition knowledge, positively affect balanced nutritional behavior and good eating habits, provide a more engaging visual experience, and encourage adolescents to adopt healthier eating habits (18,19,21,23,24). Thus, the application of TikTok in this study not only reflects adolescents' current media consumption patterns but also leverages platform-specific features that pedagogically support learning related to balanced nutrition and dietary diversity.

The observed shifts in knowledge categories across both schools also reveal a noteworthy pattern. At SMAN 1 Moilong, the proportion of students categorised as having less knowledge was eliminated, and the number of students in the good category more than tripled following the intervention. At SMPN 4 Toili, an even more pronounced shift was evident, with a transition from a distribution dominated by a combination of less-average knowledge to one characterised predominantly by the good category. Differences in the magnitude of improvement between the two schools may be attributable to several contextual factors, including variation in baseline cognitive abilities, levels of familiarity with social media, and the degree of support provided by the learning environment. Nevertheless, in both settings, the findings suggest that the same educational content, when delivered in a structured, repeated manner and accompanied by guided discussion, can effectively elevate students' knowledge from a basic level to a more advanced understanding.

Theoretically, the effectiveness of this intervention can be interpreted through the characteristics of educational videos that simultaneously engage visual and auditory processing channels, thereby strengthening the encoding and retention of information in long-term memory, making its use more effective at increasing knowledge than leaflets (25,26). Such videos enable abstract concepts such as balanced nutrition or meal composition to be conveyed more concretely through illustrations, animations, and real-life contextual examples (21,23,24). Video-based education is more effective because it involves *dual-channel processing*, namely eyes and ears; information is processed in parallel by the brain so that newer information is remembered and understood by students. Moreover, adolescents' high engagement with social media platforms increases their receptiveness to health messages delivered in familiar, appealing formats. The integration of locally relevant elements, such as common school snacks or routine physical activities, may further enhance message relevance and participant engagement.

The practical implications of this study highlight the importance of integrating short, social media-based video formats as complementary tools within school nutrition education strategies, particularly in settings with limited human resources and formal nutrition education infrastructure. Teachers, school counsellors, and health professionals can utilise platforms such as TikTok to present content on balanced nutrition, anaemia prevention, fruit and vegetable intake, and the risks associated with junk food consumption through concise narrative videos, demonstrations, or interactive challenges that foster active student engagement. The development of standardised, evidence-informed digital materials, accompanied by capacity-building for educators to produce and curate appropriate content, has the potential to strengthen and sustain school-based adolescent health promotion initiatives (23,27).

This study, however, has several limitations that warrant acknowledgment. Firstly, the assessment of outcomes was confined to knowledge acquisition and did not include evaluation of changes in dietary behaviors or nutritional status. A key aspect to consider in this context is the "Intention-Behavior Gap,"

where acquiring knowledge may not necessarily lead to immediate changes in behavior. While enhancing adolescents' understanding of critical topics such as "Fill My Plate" and "anemia prevention" is an essential first step, it is the necessary foundation for enabling informed decision-making. With a stronger grasp of these concepts, adolescents are better positioned to make healthier food choices, particularly when faced with the temptation of high-fat, high-sodium foods, as discussed in the introduction.

Nevertheless, knowledge alone is not sufficient. It must be complemented by interventions that actively promote behavior change, addressing the gap between intention and action in order to foster sustained improvements in dietary habits and overall nutritional health. Second, the use of TikTok video content as an educational medium should be accompanied by efforts to enhance digital literacy, so that adolescents are better equipped to distinguish between accurate and misleading nutrition information circulating on the same platform. Methodologically, this study has limitations, including a relatively small sample size, the absence of a control group, and a focus solely on adolescent girls' knowledge. Future research employing experimental designs with larger sample sizes, the case-control design, extended follow-up periods, and outcome measures that include behavioural and nutritional status indicators will be essential to more comprehensively evaluate the long-term effectiveness and sustainability of such interventions.

CONCLUSION

This study shows that TikTok-based nutrition education is an effective way to improve nutrition knowledge among adolescent girls. This intervention significantly increased adolescent girls' knowledge of dietary diversity and balanced nutrition, as evidenced by higher average scores, wider score ranges, and shifts in knowledge categories. The success of this approach is evident among participants aged 14-16 years, a critical phase for forming healthy eating habits, during which conventional media is no longer effective. The effectiveness of these interventions is driven by messages tailored to the local context, such as snacks commonly consumed in schools and regular physical activity, which make information more enjoyable, understandable, and accessible. Although these interventions have been shown to be effective among high school and junior high school students, the knowledge shift is more noticeable at the junior high school level. Therefore, it is recommended that health services prioritize interventions at the junior high school level to provide students with early knowledge before their eating habits are further formed. Additionally, schools need to provide digital literacy support to help students distinguish accurate and misleading nutritional information from non-evidence-based social media sources. A Digital Health Strategy involves all stakeholders, namely, schools, health centers, and content creators, and can be developed to accelerate the achievement of program targets that have been launched so far in Banggai Regency. In addition, further research is important to adopt experimental designs with control groups, larger and more diverse samples, and longer follow-up periods to assess their impact on actual eating behaviors and the durability of knowledge.

DECLARATION OF THE USE OF AI

The authors declare that no artificial intelligence (AI), AI-assisted technologies, or large language models (LLMs) were used in the conception of the study, data analysis, or the drafting, writing, and editing of this manuscript. The only exception is the graphical abstract, which was created using the design platform Illustrae (<https://illustrae.co/>). The authors take full responsibility for the content and accuracy of the graphical abstract and the entire manuscript.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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