

IMPROVING KNOWLEDGE OF HEALTHY AND SUSTAINABLE DIETARY PRACTICES AMONG ADOLESCENTS AT AL-HIKMAH ISLAMIC BOARDING SCHOOL :

a community-based educational intervention supporting lifelong health and sustainable development goals

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Abstract

Background: Adolescence is a critical period for establishing lifelong dietary habits that influence future health outcomes. However, unhealthy eating behaviors, low consumption of fruits and vegetables, excessive intake of sugar, salt, and fat, and limited awareness of sustainable food consumption remain common among adolescents. Educational interventions are needed to improve knowledge and awareness regarding healthy and sustainable dietary practices. Objective: This study aimed to evaluate the effectiveness of a community-based educational program in improving knowledge of healthy and sustainable dietary practices among adolescents at Al-Hikmah Islamic Boarding School. Methods: A community service-based educational intervention was conducted among 240 high school students from grades 10, 11, and 12 at Al-Hikmah Islamic Boarding School, Lampung, Indonesia. The program consisted of interactive lectures, group discussions, and question-and-answer sessions focusing on balanced nutrition, healthy eating habits, sustainable food consumption, reduction of food waste, and the role of dietary behavior in achieving Sustainable Development Goals (SDGs). Participants completed structured questionnaires before (pre-test) and after (post-test) the educational intervention. Changes in knowledge levels were assessed descriptively. Results: The educational intervention was successfully implemented with active participation from all participants. Post-intervention assessment demonstrated a 40% increase in participants' knowledge compared to baseline measurements. Participants showed improved understanding of balanced nutrition principles, healthy food choices, responsible food consumption, local food utilization, and food waste reduction. The program also increased awareness regarding the relationship between dietary practices, environmental sustainability, and long-term health outcomes. Conclusion: The educational intervention effectively improved adolescents' knowledge and awareness regarding healthy and sustainable dietary practices. School-based nutrition education programs within Islamic boarding school settings may serve as a strategic approach to promoting lifelong healthy behaviors and supporting Sustainable Development Goals, particularly SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-Being), and SDG 12 (Responsible Consumption and Production).

Keywords: Adolescent health; healthy diet; sustainable diet; nutrition education; Islamic boarding school; food waste; Sustainable Development Goals; community engagement.

INTRODUCTION

Adolescence is a critical stage of human development characterized by rapid physical growth, cognitive maturation, and behavioral changes that significantly influence future health outcomes. Nutritional requirements increase substantially during this period, making healthy dietary practices essential for optimal growth and development. However, unhealthy eating behaviors among adolescents remain a major global public health concern. Low consumption of fruits and vegetables, frequent intake of energy-dense and nutrient-poor foods, excessive consumption of sugar-sweetened beverages,

and irregular eating patterns are commonly reported among adolescents worldwide^{1,2}.

Poor dietary habits established during adolescence may persist into adulthood and increase the risk of obesity, cardiovascular diseases, type 2 diabetes mellitus, hypertension, and other non-communicable diseases (NCDs)³. Furthermore, dietary patterns not only affect individual health but also contribute to broader environmental challenges, including greenhouse gas emissions, excessive water use, biodiversity loss, and food waste⁴. Therefore, promoting healthy and sustainable dietary practices has become an important global strategy for improving both human and planetary health.

The concept of sustainable healthy diets has gained increasing attention in recent years. According to the Food and Agriculture Organization (FAO) and the World Health Organization (WHO), sustainable healthy diets are dietary patterns that promote all dimensions of individual health and well-being while exerting low environmental pressure and impact, thereby contributing to food and nutrition security for present and future generations⁵. Such dietary practices emphasize balanced nutrition, increased consumption of plant-based foods, responsible food consumption, reduction of food waste, and utilization of locally available food resources.

Educational institutions play a strategic role in promoting healthy eating behaviors among adolescents. Schools provide an environment where health promotion interventions can reach a large number of students and influence dietary knowledge, attitudes, and behaviors⁶. In Indonesia, Islamic boarding schools (pesantren) represent an important educational setting because students spend a substantial portion of their daily lives within the institution. Consequently, pesantren offer unique opportunities for implementing nutrition education programs aimed at fostering lifelong healthy habits and sustainable consumption practices.

Despite growing awareness of nutrition-related health issues, knowledge regarding sustainable dietary practices among adolescents remains limited. Many adolescents are unfamiliar with the relationship between food choices, environmental sustainability, and long-term health outcomes⁷. This knowledge gap highlights the need for targeted educational interventions that integrate nutrition literacy with sustainability principles. Improving adolescents' understanding of healthy and sustainable diets may encourage informed food choices and contribute to the achievement of global health and sustainability targets.

Nutrition education has consistently been identified as an effective approach for improving dietary knowledge and promoting healthy behaviors among young people^{8,9}. Interactive educational methods, including lectures, discussions, and participatory learning activities, have demonstrated positive impacts on students' nutritional awareness and decision-making abilities. Moreover, community-based educational interventions can strengthen collaboration between academic institutions and local communities while addressing specific health needs within target populations.

The Sustainable Development Goals (SDGs) emphasize the importance of ensuring healthy lives, ending hunger, improving nutrition, and promoting sustainable consumption patterns. In particular, SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-Being), and SDG 12 (Responsible Consumption and Production) highlight the critical role of nutrition and sustainable food systems in achieving global development objectives¹⁰. Educational initiatives that encourage healthy and sustainable dietary practices among adolescents may therefore contribute to these international development priorities.

Given the importance of promoting nutrition literacy and sustainable food consumption among adolescents, a community-based educational intervention was conducted at Al-Hikmah Islamic Boarding School, Lampung, Indonesia. This study aimed to evaluate the effectiveness of the educational program in improving adolescents' knowledge of healthy and sustainable dietary practices and to assess its potential contribution to lifelong health promotion and Sustainable Development Goals.

METHODS

Study Design and Setting

This study employed a community-based educational intervention using a one-group pre-test and post-test design. The program was conducted as part of a university community engagement initiative at Al-Hikmah Islamic Boarding School, Lampung, Indonesia. The intervention focused on promoting healthy and sustainable dietary practices among adolescent students through nutrition education and awareness-building activities.

Participants

The participants consisted of 240 high school students enrolled in grades 10, 11, and 12. Two representative classes from each grade level participated in the program, with approximately 40 students per class. All students who attended the educational sessions and completed both pre-test and post-test questionnaires were included in the evaluation.

Educational Intervention

The educational intervention was designed to improve participants' knowledge and awareness regarding healthy and sustainable dietary practices. The educational materials covered balanced nutrition principles, healthy food selection, adequate fruit and vegetable consumption, reduction of sugar, salt, and fat intake, responsible food consumption, reduction of food waste, utilization of local food resources, and the relationship between dietary practices and Sustainable Development Goals (SDGs). The program was delivered through interactive lectures, group discussions, and question-and-answer sessions. Educational materials were presented using visual aids and participatory learning approaches to encourage active student engagement and improve knowledge retention.

Data Collection

Knowledge assessment was conducted using structured questionnaires administered before and after the educational intervention. The pre-test questionnaire was distributed immediately before the educational session to assess baseline knowledge, while the post-test questionnaire was administered after completion of the program to evaluate knowledge acquisition.

The questionnaire consisted of multiple items addressing key concepts of healthy and sustainable dietary practices, including balanced nutrition, food diversity, healthy eating behaviors, food waste reduction, sustainable food choices, and the role of nutrition in supporting long-term health and environmental sustainability.

Outcome Measures

The primary outcome was the change in participants' knowledge regarding healthy and sustainable dietary practices following the educational intervention. Knowledge improvement was assessed by comparing pre-test and post-test results. Program effectiveness was determined based on the percentage increase in knowledge scores observed after the intervention.

Data Analysis

Data were analyzed descriptively. Participant characteristics and educational outcomes were summarized using frequencies, percentages, and narrative descriptions. Knowledge improvement was calculated by comparing pre-test and post-test results. The educational intervention demonstrated a 40% increase in participants' knowledge following program implementation.

Ethical Considerations

The educational activities were conducted with permission from the school administration and in accordance with the principles of community engagement and educational ethics. Participation was voluntary, and all collected information was

used solely for educational evaluation and scientific reporting purposes.

RESULTS

Participant Characteristics

A total of 240 students participated in the educational intervention. Participants were

recruited from grades 10, 11, and 12 of Al-Hikmah Islamic Boarding School. Each grade level was represented by two classes, with approximately 40 students per class. All participants completed both the pre-test and post-test assessments.

Table 1. Distribution of Participants by Grade Level

Grade Level	Number of Classes	Number of Students
Grade 10	2	80
Grade 11	2	80
Grade 12	2	80
Total	6	240

Implementation of the Educational Program

The educational intervention was successfully implemented according to the planned schedule. The program included interactive lectures, group discussions, and question-and-answer sessions focusing on healthy and sustainable dietary practices. Participants actively engaged in discussions related to balanced nutrition, healthy food choices, food waste reduction, and sustainable food consumption.

Knowledge assessment was conducted using pre-test and post-test questionnaires

administered before and after the educational intervention. The results demonstrated a substantial improvement in participants' knowledge regarding healthy and sustainable dietary practices. Overall, participants showed a 40% increase in knowledge following the intervention. The improvement was observed across several educational topics, including balanced nutrition principles, healthy eating behaviors, sustainable food choices, reduction of food waste, and the importance of local food utilization.

Table 2. Knowledge Improvement Following the Educational Intervention

Assessment	Knowledge Level
Pre-test	Baseline
Post-test	Increased
Knowledge Improvement	40%

Participant Engagement

Participant engagement during the educational activities was considered high. Students actively participated in discussions and demonstrated interest in topics related to

healthy eating behaviors and environmental sustainability. Many participants asked questions regarding practical strategies for adopting healthier dietary habits and reducing food waste in daily life.

Furthermore, participants expressed increased awareness of the relationship between dietary choices, personal health, and environmental sustainability. This observation suggests that the educational intervention successfully promoted not only nutrition knowledge but also awareness of sustainable consumption practices.

Program Outcomes

The intervention achieved its primary objective of improving adolescents' knowledge regarding healthy and sustainable dietary practices. The educational activities also strengthened awareness of the importance of healthy eating as a lifelong health investment and highlighted the role of responsible food consumption in supporting Sustainable Development Goals.

DISCUSSION

The present study demonstrated that a community-based educational intervention effectively improved adolescents' knowledge regarding healthy and sustainable dietary practices. Following the educational program, participants exhibited a 40% increase in knowledge compared with baseline assessment. These findings suggest that nutrition education remains an effective strategy for improving dietary literacy among adolescents and supporting the development of healthier lifestyle choices.

Knowledge acquisition is considered an essential first step in the process of behavioral change. According to health promotion theories, increased knowledge contributes to improved awareness, attitudes, and intentions toward adopting healthier behaviors¹¹. Adolescents who understand the importance of balanced nutrition and healthy food choices are more likely to make informed dietary decisions that contribute to their long-term health and well-being.

The observed improvement in knowledge is consistent with previous studies demonstrating the positive impact of nutrition education programs among adolescents. Educational interventions delivered through interactive approaches have been shown to significantly enhance nutritional knowledge and awareness, particularly when participants are actively engaged in discussions and problem-solving activities^{12,13}. In the present study, the combination of lectures, discussions, and question-and-answer sessions may have facilitated active learning and contributed to the substantial improvement observed among participants.

The educational setting also played an important role in the success of the intervention. Islamic boarding schools provide a unique environment where students spend a considerable amount of time learning, eating, and socializing within a structured community. Such environments offer valuable opportunities for health promotion initiatives because dietary behaviors can be influenced by both educational content and social norms¹⁴. Therefore, implementing nutrition education programs within Islamic boarding schools may have broader and more sustainable impacts than interventions delivered in less structured settings.

In addition to improving knowledge related to balanced nutrition, the intervention introduced participants to the concept of sustainable dietary practices. Sustainable diets have become increasingly important due to growing concerns regarding environmental degradation, food insecurity, and climate change¹⁵. Food systems contribute substantially to greenhouse gas emissions, land use change, and biodiversity loss, highlighting the need for dietary patterns that support both human and environmental health⁴. Consequently, educating adolescents about sustainable food choices represents an important investment in future public health and environmental sustainability.

An important component of the educational intervention was the promotion of food waste reduction. Food waste remains a significant global challenge, with approximately one-third of food produced for human consumption being lost or wasted annually¹⁶. Reducing food waste not only improves resource efficiency but also contributes to environmental conservation and food security. By increasing students' awareness of responsible food consumption practices, the intervention addressed an important aspect of sustainable development that is often overlooked in conventional nutrition education programs.

The findings also highlight the importance of introducing local food utilization as part of sustainable dietary practices. Local food systems may contribute to improved food security, support local economies, and reduce environmental impacts associated with transportation and distribution¹⁷. Encouraging adolescents to appreciate and consume locally available foods may therefore generate benefits that extend beyond individual nutrition outcomes.

The relationship between dietary practices and Sustainable Development Goals was emphasized throughout the intervention. Improved nutritional knowledge contributes directly to SDG 3 (Good Health and Well-Being) by supporting healthier lifestyles and reducing future risks of non-communicable diseases. Furthermore, promoting responsible food consumption aligns with SDG 12 (Responsible Consumption and Production), while increasing awareness regarding nutrition and food security supports SDG 2 (Zero Hunger)¹⁰. Therefore, educational interventions focused on healthy and sustainable diets can contribute to multiple dimensions of sustainable development simultaneously.

Although the intervention demonstrated positive outcomes, several limitations should be acknowledged. First, the study evaluated knowledge improvement immediately after the educational intervention and did not assess long-term retention of knowledge. Second, actual dietary behaviors were not measured, preventing evaluation of whether increased knowledge translated into sustained behavioral change. Future studies should incorporate longitudinal assessments and behavioral indicators to determine the long-term effectiveness of educational interventions in promoting healthy and sustainable dietary practices.

Despite these limitations, the findings provide evidence that school-based nutrition education programs can effectively improve adolescents' understanding of healthy and sustainable dietary practices. Given the strategic role of schools and Islamic boarding schools in shaping adolescent behaviors, integrating nutrition and sustainability education into routine educational activities may represent an effective approach for promoting lifelong health and supporting global sustainability goals.

CONCLUSION

The community-based educational intervention conducted at Al-Hikmah Islamic Boarding School successfully improved adolescents' knowledge and awareness regarding healthy and sustainable dietary practices. Following the educational program, participants demonstrated a 40% increase in knowledge, indicating the effectiveness of interactive nutrition education in enhancing understanding of balanced nutrition, healthy food choices, responsible food consumption, food waste reduction, and sustainable dietary behaviors.

The findings suggest that school-based nutrition education programs can serve as an effective strategy for promoting dietary

literacy among adolescents. Increased knowledge and awareness may contribute to healthier food choices and support the development of lifelong healthy behaviors. Furthermore, integrating sustainability concepts into nutrition education can help adolescents recognize the connections between dietary practices, environmental stewardship, and long-term public health outcomes.

This intervention also contributes to the achievement of Sustainable Development Goals, particularly SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-Being), and SDG 12 (Responsible Consumption and Production). Future programs should focus on evaluating long-term behavioral changes and expanding nutrition education initiatives to broader adolescent populations in both school and community settings.

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CONFLICT OF INTEREST

The authors declare no conflict of interest related to this study.

AUTHOR CONTRIBUTIONS

All authors contributed substantially to the conception, implementation, data collection,

analysis, manuscript preparation, and final approval of the submitted manuscript.

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