



Preventing stunting among adolescents by increasing knowledge and awareness of local food utilization


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| ARTICLE INFO | ABSTRACT |
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| <p>Article history Received: 2024-06-25 Revised: 2024-11-26 Accepted: 2024-12-26 Published: 2024-12-28</p> <p>Keywords Adolescent Counselling Local food Knowledge Stunting</p> | <p><i>Stunting remains a critical public health issue in Indonesia. The "Acceleration of Stunting Reduction" program is targeting adolescents (teenagers) as one of its key groups. This reflects the understanding that adolescents play a vital role in overcoming the problem of stunting, both as parents-to-be and as individuals who can experience the negative impact of malnutrition, which in turn contributes to the incidence of stunting. This study exposing the effectiveness of educational interventions in improving adolescent knowledge and awareness about stunting and the utilization of local foods as preventive measures. Conducted at State Senior High School of Kademangan (SMKN 1 Kademangan), Blitar, the study involved 101 eleventh-grade students who participated in a series of counselling (educational sessions) on topic stunting and local food utilization. A pretest-posttest design was used to assess changes in knowledge across seven key areas related to stunting and nutrition. The results indicated substantial improvements in understanding, with knowledge increases ranging from 37% to 58% across all areas. These findings underscore the importance of targeted nutritional education in enhancing adolescent health literacy. Ongoing educational sessions, practical activities, and further research are recommended to sustain and build upon these gains, ultimately contributing to the reduction of stunting prevalence in Indonesia.</i></p> |
| <p>Kata Kunci Pangan lokal Pengetahuan Penyuluhan Remaja Stunting</p> | <p>Mencegah stunting pada remaja dengan meningkatkan pengetahuan dan kesadaran pemanfaatan pangan lokal. Stunting masih menjadi masalah kesehatan yang kritis di Indonesia. Program "Percepatan Penurunan Stunting" menargetkan remaja sebagai salah satu kelompok kunci. Hal ini mencerminkan pemahaman bahwa remaja memegang peranan penting dalam mengatasi masalah stunting, baik sebagai calon orang tua maupun sebagai individu yang dapat mengalami dampak negatif dari kekurangan gizi, yang pada gilirannya berkontribusi terhadap kejadian stunting. Penelitian ini mengungkap efektivitas intervensi edukasi melalui penyuluhan dalam meningkatkan pengetahuan dan kesadaran remaja tentang stunting dan pemanfaatan pangan lokal sebagai upaya pencegahan. Dilakukan di Sekolah Menengah Kejuruan Negeri 1 Kademangan (SMKN 1 Kademangan), Blitar, kegiatan ini melibatkan 101 siswa kelas XI yang berpartisipasi dalam serangkaian penyuluhan (sesi edukasi) dengan topik stunting dan pemanfaatan pangan lokal. Desain pretest-posttest digunakan untuk menilai perubahan pengetahuan di tujuh aspek yang terkait dengan stunting dan pemanfaatan pangan lokal. Hasil evaluasi menunjukkan adanya peningkatan substansial dalam pemahaman siswa, dengan peningkatan pengetahuan berkisar antara 37% hingga 58% di semua bidang. Temuan ini menggarisbawahi pentingnya edukasi gizi yang ditargetkan untuk meningkatkan literasi kesehatan remaja. Sesi edukasi yang berkelanjutan, kegiatan praktik, dan penelitian lebih lanjut direkomendasikan untuk mempertahankan dan mengembangkan hasil ini, yang pada akhirnya berkontribusi pada penurunan prevalensi stunting di Indonesia.</p> <p>Copyright © 2024, Mahmudah, et al. This is an open access article under the CC-BY-SA license</p>  |

How to cite: Mahmudah, N. A., Mardiana, N. A., Putra, A. W., Purnomo, P., Widigdyo, A., Kurniawan, D. (2024). Preventing stunting among adolescents by increasing knowledge and awareness of local food utilization. *Journal of Community Service and Empowerment*, 5 (3), 624-630. <https://doi.org/10.22219/jcse.v5i3.34583>

INTRODUCTION

Stunting, a condition characterized by impaired growth and development in children and adolescents due to chronic malnutrition, remains a critical public health challenge globally. In Indonesia, the prevalence of stunting is alarmingly high, with approximately 27.7% of children under the age of five affected, according to the Indonesia Basic Health Research (Anonymous, 2018). This condition not only hampers physical development but also adversely affects cognitive function and economic productivity in later life (de Onis & Branca, 2016). While extensive efforts have been directed towards early childhood interventions, there is an increasing recognition of the need to address stunting during adolescence, a critical period for growth spurts and development.

Adolescence is a phase marked by rapid growth, where nutritional needs peak, and dietary habits formed can persist into adulthood (Sawyer et al., 2018). According to "Peraturan Presiden Indonesia No. 72 tahun 2021," teenagers are recognized as a key group for accelerating the reduction of stunting, emphasizing the importance of targeted nutritional and educational interventions during adolescence. Exposing the knowledge about stunting and increasing awareness of local food utilization is a strategic intervention to prevent stunting among adolescents, including in the Kademangan District, Blitar Regency, East Java.

Particularly, in Blitar Regency, the stunting statistic number was increased up to 6%, as from 14.3% in 2022 and went to 20.3% in 2024 (Wardana, 2024). Given the high prevalence of stunting among children in Indonesia, it is crucial to educate teenagers about stunting. A preliminary situational analysis at Senior High School of 1 Kademangan (SMKN 1 Kademangan) identified significant gaps in students' understanding of stunting, including its causes, impacts, and prevention, due to inadequate formal education, minimal external information, and prevalent unhealthy dietary patterns, highlighting the need for enhanced educational efforts on nutrition and health.

Local foods, often rich in essential nutrients, offer a sustainable and culturally acceptable solution to combat malnutrition. However, there is a noticeable gap in awareness and utilization of these foods among adolescents. Studies have demonstrated that educational interventions can significantly improve dietary practices and nutritional status among young people (Story et al., 2009). Therefore, enhancing adolescents' understanding of the benefits of local foods and how to incorporate them into their diets is essential for stunting prevention.

The urgency to educate adolescents about stunting and local food utilization stems from several factors. Firstly, adolescence is a window of opportunity for catch-up growth and the establishment of healthy eating patterns (Patton et al., 2016). Secondly, adolescents are future parents, and their nutritional knowledge can influence the health and nutritional status of the next generation, breaking the intergenerational cycle of malnutrition (Black et al., 2013). Addressing adolescent nutrition can contribute to achieving broader developmental goals, including improved educational outcomes and economic productivity (Victora et al., 2008). Therefore, it aligns directly with Sustainable Development Goal (SDG) 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture. It also contributes to SDG 3: Ensure healthy lives and promote well-being for all at all ages, by fostering better health outcomes among adolescents and their future offspring. Furthermore, the promotion of local food utilization aligns with SDG 12: Ensure sustainable consumption and production patterns, as it encourages the use of sustainable and locally available resources.

The prevention of stunting among adolescents through increased knowledge and awareness of local food utilization is a critical strategy that requires urgent attention. This manuscript aims to provide evidence-based insights and recommendations for implementing effective educational interventions for adolescent students in the Kademangan District, ultimately contributing to support the national efforts to reduce stunting prevalence in Indonesia.

METHOD

This study and activities were conducted at SMKN 1 Kademangan, Blitar, on Wednesday 29th May 2024. It was involving 101 eleventh-grade adolescent students as participants. The objective was to assess and improve their knowledge and awareness about stunting and the utilization of local foods as a preventive measure. The activity stages were explained as follows:

Preparation. The preparatory phase involved designing the activity concept of the community service activity (PkM) to meet the needs of the partner State Senior High School of Kademangan (SMKN 1 Kademangan Blitar). The proposing team communicated with the partner to schedule the activities and complete the necessary administrative documents. Additionally, the team prepared educational materials and sample food product made from local food for the PkM activities.

Pretest Administration. A pretest was conducted to assess the participants' initial understanding of stunting and the importance of balanced nutrition. The pretest served as a baseline to evaluate the increase in knowledge following the educational intervention.

Material Presentation and Discussion. Expert speakers from the proposing team delivered presentations on stunting, including its definition, causes, impacts, and prevention methods. The material was presented in an engaging and comprehensible manner for the participants. Additionally, the team introduced "Mocica" cookies, made from local food ingredients, as an innovative nutritious snack. Mocica, a product of research conducted by research team of State

Community College of Putra Sang Fajar in 2023. It was highlighted for its high nutritional value and appeal to children. Mocica was an invention as the inclusion of chicken meat and carrot puree into cookies mocaf flour-based product. All those three main ingredients were representing the local food potential, resulting in a new product with global interest since cookies is notably marked as the most consumed snack over countries (Anonymous, 2022). Mocica had an excellent nutrition and good receptivity to the panelists (Mahmudah et al., 2023; Mahmudah et al., 2024). After the presentation, participants were given the opportunity to ask questions and engage in discussions to clarify their understanding of stunting, healthy snack innovations, and other related topics. In this stage, participants also given the Mocica cookies samples so they literally could have the experience to taste and evaluate a local food-based product directly.

Post-test Administration. Following the discussion, participants completed a post-test to evaluate their knowledge and understanding after the educational session. Comparing pretest and post-test results provided insights into the effectiveness of the educational intervention.

Data Analysis. The collected pretest and post-test documents were evaluated by calculating the scores before (pretest) and after (post-test) the educational intervention. The improvement in scores for each aspect was analyzed, and an average percentage increase in knowledge was determined. This average represented the overall enhancement in understanding of stunting among adolescent students at SMKN 1 Kademangan.

RESULTS AND DISCUSSION

The study surveyed 101 respondents from senior high school aged 17-18 years, predominantly male (82 males and 19 females) summarized in Table 1. This demographic profile is critical to understanding the baseline knowledge and awareness regarding stunting and local food utilization, especially in SMKN 1 Kademangan.

Table 1. Respondents' characteristic

| Parameters | Values |
|------------------------|--------------------|
| Age (years) | 17-18 |
| Gender: | |
| - Male | 82 |
| - Female | 19 |
| Educational level | Senior High School |
| Have received: | |
| - Stunting counselling | No |
| - Local food outreach | No |

The respondents' age group of 17-18 years is significant as it represents a critical period in adolescent development where nutritional knowledge and habits are formed. At the senior high school level, students are typically more receptive to educational interventions and can understand complex health and nutrition information. This demographic is poised to benefit from targeted educational programs that can influence long-term health outcomes, particularly in preventing stunting. The gender distribution in this study shows a predominance of male respondents (81.2%). This imbalance may influence the generalizability of the results, as males and females may have different nutritional needs and health behaviors. Previous studies have indicated gender differences in nutrition knowledge and dietary habits, which could affect the effectiveness of educational interventions on stunting prevention (Svendson et al., 2021). Future interventions should consider gender-specific strategies to ensure that both male and female adolescents benefit equally from the programs.

Notably, none of the respondents had received counseling on stunting or outreach about local food utilization. This lack of prior engagement underscores a significant gap in the current public health outreach and education efforts in Kademangan District. The absence of these interventions may contribute to a lack of awareness and knowledge about the importance of nutrition and the role of local foods in preventing stunting. Research has shown that nutrition education can significantly improve knowledge and dietary practices among adolescents (Kim et al., 2023). Therefore, implementing comprehensive educational programs focusing on the benefits of local food and strategies to prevent stunting is crucial.

The data presented shows a significant improvement in understanding various aspects of stunting prevention among adolescents (participants) following counseling on local food utilization. This pre-test (Figure 1) and post-test comparison reveals notable increases in knowledge and awareness across all 7 assessed areas summarized in Table 2.



Figure 1. Pretest administration

Definition of stunting. Respondents' understanding of stunting increased from 50% pre-counseling to 88% post-counseling. This substantial gain reflects the effectiveness of the educational intervention in clarifying fundamental concepts about stunting. Previous studies have shown that educational interventions can significantly enhance knowledge and awareness about nutritional issues (Kim et al., 2023).

Table 2. Knowledge improvement of respondents

| No | Understanding variable | Pre-counseling | Post-counseling |
|----|---|----------------|-----------------|
| 1 | Definition of stunting | 50% | 88% |
| 2 | Differences stunting & severe malnutrition | 24% | 61% |
| 3 | Indicators of stunting | 62% | 75% |
| 4 | Definition of "local food" | 54% | 90% |
| 5 | Mocaf as local food source (wheat flour replacement) | 32% | 82% |
| 6 | Innovation of mocaf-chicken cookies | 40% | 83% |
| 7 | Adolescents' role in promoting local food to prevent stunting | 69% | 83% |

Differences stunting & severe malnutrition. Knowledge regarding the differences between stunting and severe malnutrition improved from 24% to 61%. This distinction is crucial for implementing targeted interventions. Effective educational programs can bridge knowledge gaps and clarify misconceptions about malnutrition (Allen & Saunders, 2023).

Indicators of stunting. Awareness of the indicators of stunting increased from 62% to 75%. Recognizing these indicators is essential for early detection and intervention. Improved knowledge in this area is associated with better health outcomes. Recognizing these indicators is essential for early detection and intervention, which can significantly improve health outcomes. Improved knowledge in this area allows adolescents to identify early signs of stunting, facilitating timely and effective responses to nutritional deficiencies. Early intervention is crucial as it can prevent the long-term detrimental effects of stunting, such as impaired cognitive development, reduced physical capacity, and lower economic productivity in adulthood (de Onis & Branca, 2016). Enhanced awareness among adolescents also empowers them to take proactive measures in their communities, promoting healthier dietary practices and advocating for better nutritional policies. The increase in awareness underscores the effectiveness of targeted educational interventions, demonstrating their potential to contribute to public health efforts aimed at reducing the prevalence of stunting (Sawyer et al., 2018). Therefore, continuous and comprehensive nutritional education should be prioritized to sustain and further these gains in stunting prevention.

Definition of "local food". Understanding the concept of local food rose from 54% to 90%. Promoting local food systems is vital for sustainable nutrition practices, and educational efforts can significantly increase awareness and acceptance of local foods. Local foods often provide higher nutritional value and are more environmentally sustainable compared to imported alternatives (Fanzo et al., 2021). Furthermore, incorporating local foods into daily diets can help reduce food insecurity and support local economies. By understanding the benefits and uses of local foods, adolescents can play a crucial role in fostering sustainable eating habits that contribute to better health outcomes and environmental

stewardship (Story et al., 2009). The significant increase in their understanding suggests that targeted educational interventions can effectively enhance nutritional literacy and promote healthier dietary behaviors among young people. Mocaf as local food source (wheat flour replacement). Knowledge about modified cassava flour (mocaf) as a local food source increased from 32% to 82%. This substantial improvement suggests that the intervention successfully communicated the nutritional benefits and uses of mocaf flour. Local food innovations can enhance dietary diversity and food security (Wood et al., 2022). Creating a healthy food system that increases life expectancy must involve interventions such as nutrition education and nutrition-sensitive value chains to increase demand and supply of more local nutritious foods (Fanzo et al., 2024). The urgency of promoting mocaf in Indonesia stems from the country's heavy reliance on wheat imports. According to the United States Department of Agriculture (USDA), Indonesia imported approximately 11 million metric tons of wheat in the 2021/2022 marketing year, making it one of the largest wheat importers globally. This dependency not only strains the national economy but also exposes the country to global market fluctuations and supply chain disruptions (USDA, 2023). Mocaf, derived from cassava, presents a viable alternative to wheat flour. Cassava is abundantly available in Indonesia, and its utilization as mocaf can reduce the dependence on imported wheat, promote local agriculture, and enhance food security. Additionally, mocaf is gluten-free, making it suitable for individuals with gluten intolerance or celiac disease, further broadening its appeal and application in diverse dietary contexts.

Innovation of mocaf-chicken cookies. Understanding of innovations such as mocaf-chicken cookies improved from 40% to 83%. This demonstrates the effectiveness of the intervention in promoting new local food products. Innovations in food products play a crucial role in improving nutrition. Later, technologies for producing innovative food could accelerate the transition towards a more sustainable food system (Herrero et al., 2020). The Mocica cookies product (mocaf-chicken-carrot) product delivered, considering superior to many conventional snacks due to their enhanced nutritional profile. Chicken protein ingredients in cookies is important to increase the nutritional value. Chicken meat is considered a high-quality protein source (30.9%) with higher levels of bioavailability than plant-based proteins (Kralik et al., 2018; Marangoni et al., 2015). Furthermore, to improve the health benefits of cookies, carrot (*Daucus carota sativa*), as a rich source of β -carotene, a precursor of vitamin A and a proven antioxidant (Nagarajaiah, & Prakash, 201), was also incorporated to the cookies. Later, the incorporation of chicken meat and carrot puree in mocaf cookies resulted in a significant increase of protein and total dietary fibre content of the cookies (Mahmudah et al., 2024), which are considered to be substantially beneficial snack for health. The trend of snacking as part of teenager's diet is a growing global interest. This comes along with patterns that show a large increase in snack consumption over the past few decades. Snacking has a considerable impact on nutritional intake. Specific snacking habits in diets can reduce the occurrence of diseases caused by dietary problems (Almoraie et al., 2021). Adolescent time-age is a crucial period for promoting healthy eating habits, including snacking.

Adolescents' role in promoting local food to prevent stunting. Awareness of the role adolescents can play in promoting local food to prevent stunting increased from 69% to 83%. This empowerment is essential for sustainable community health initiatives. Educating and involving adolescents in health promotion activities can lead to significant improvements in public health. Adolescents are at a unique point where they can influence their own health and the health of future generations. Their dietary habits, knowledge, and attitudes towards nutrition can significantly impact their immediate and long-term well-being (Sawyer et al., 2018). After participating in this counselling activity, participants are expected to act as conduits for nutritional education within their peer environments, families and communities. Secondly, they can champion the use of local foods, which are often nutrient-dense and culturally appropriate.

The information above demonstrates significant improvements in adolescents' understanding of stunting and the role of local foods in its prevention after a targeted educational intervention. The increased knowledge spans from basic definitions to specific innovations such as mocaf flour and mocaf-chicken cookies. The marked gains in awareness highlight the effectiveness of educational programs in enhancing nutritional literacy. To build on these results, it is recommended to implement ongoing educational sessions, coupled with practical activities such as cooking demonstrations and community projects that engage adolescents in promoting local food consumption. Additionally, further research should be conducted to evaluate the long-term impact of these educational interventions on dietary behaviors and stunting rates.

CONCLUSION

This study aimed to address the critical issue of stunting among adolescents by enhancing their understanding of its causes, impacts, and preventive measures, with a particular focus on the utilization of local foods. The research was driven by the alarming stunting rates in Kademangan District, Blitar Regency, and the identified knowledge gaps among high school students. Through a targeted educational intervention, the study revealed significant improvements in adolescents' nutritional literacy, including a comprehensive understanding of stunting and innovative solutions such as the use of mocaf flour—a locally sourced alternative to wheat flour—and its derivative product, mocaf-chicken cookies, as a preventive strategy.

The findings demonstrate the effectiveness of structured educational programs in increasing awareness and fostering positive attitudes towards local food consumption. However, this study has limitations, including its relatively short intervention duration and the lack of long-term behavioral assessments to evaluate whether the acquired knowledge translates into sustained dietary changes.

To strengthen future interventions, it is recommended to incorporate ongoing educational sessions that integrate theoretical and practical components, such as cooking demonstrations and community-based projects. Expanding the program to include parents and community stakeholders could further enhance its reach and impact. Moreover, longitudinal studies should be conducted to assess the lasting effects of such interventions on dietary behaviors, nutritional status, and stunting prevalence. This would provide valuable insights into the scalability and sustainability of educational strategies for adolescent nutrition.

By addressing these aspects, future programs can contribute more effectively to the broader public health goals of reducing stunting rates and improving nutritional outcomes among adolescents, thereby supporting Indonesia's efforts to achieve the Sustainable Development Goals.

ACKNOWLEDGEMENT

All authors express sincere gratitude to the State Community College of Putra Sang Fajar Blitar that providing funding for this community service activity through the 'Internal Grant Program' in 2024.

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