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Nutrition Education and Non-UPF Cooking Demonstrations to Reduce Ultra-Processed Food Consumption Among Islamic Boarding School Students

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ABSTRACT

The consumption Ultra-Processed Foods (UPF) continues to rise among adolescents, including students in Islamic boarding schools. Easy access to snacks high in sugar, salt, and fat (SSF), limited nutrition education, and insufficient provision of healthy meals make santri vulnerable to dietary patterns that increase the risk of obesity and chronic diseases, including cancer. This community service program aimed to improve the knowledge of students regarding cancer risks associated with UPF consumption, as well as their skills in preparing healthy non-UPF meals. The method employed was a participatory empowerment approach through educational activities and practical training conducted from October to November 2025 at Pondok Pesantren Tadabbrur Al Qur'an. The activity stages included socialization, nutritional status assessment, delivery of educational materials on cancer risk and UPF, and training on healthy food preparation. Evaluation was carried out through pre-test and post-test assessments and participant feedback. The results showed from 30 participants, UPF consumption among students remained high, dominated by flavored UHT milk, instant noodles, sweet biscuits, and packaged beverages. The educational sessions significantly improved students' knowledge scores (p= 0.000). This activity demonstrates that educational and practical interventions can effectively enhance healthy eating understanding and practices within the pesantren environment, thereby serving as a potential preventive strategy against chronic disease risks in the future. We suggest Islamic boarding schools can provide supervision on UPF consumption by students and the menu recommendations given in Non-UPF Cooking Demonstrations can be used as a reference in food service for students.

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INTRODUCTION

The increasing consumption of unhealthy foods and Ultra-Processed Foods (UPF) has become a growing concern among adolescents, including those in Islamic boarding schools (pondok pesantren). As religious-based educational institutions, pondok pesantren play an important role in shaping students' habits and lifestyles. However, limited supervision and of food consumption, easy access to snacks and packaged foods high in sugar, salt, and fat (SSF), limited food variety within the boarding environment, and the lack of nutrition education have made students vulnerable to unhealthy eating patterns (Syahrul et al., 2020).

According to a survey conducted by Jakpat, approximately 49% of Generation Z respondents reported consuming fast food 1–2 times per week, while 24% consumed it 3–4 times per week, and 12% reported eating fast food daily. Interestingly, none of the respondents completely avoided fast food within a week. This finding indicates that fast food has become an integral part of modern youth lifestyles. Generation Z, known for its preference for speed and convenience, has increasingly relied on practical and easily accessible food options (Prakoso et al., 2025).

This tendency is also evident in Islamic boarding schools, where UPF products are often chosen by parents as food supplies for their children. UPF includes various products such as carbonated soft drinks, chocolate, sweet bread, biscuits, sponge cakes, cereals, instant noodles, powdered foods, and other ready-to-eat items (Monteiro et al., 2019). These foods are preferred due to their addictive taste, affordability, convenience, and long shelf life (Carvalho, 2017; Mateen et al., 2025). Excessive consumption of fast food and UPF contributes to an increased risk of obesity and metabolic diseases, which over time may lead to degenerative diseases.

South Sumatra Province ranks fourth among provinces in Sumatra Island with the highest number of cancer cases (Kemenkes, 2024). Recently, an increase in cancer incidence among younger age groups has also been observed in several Pacific countries (Alam, 2017). Cancer risk factors are closely associated with low fiber intake, poor nutritional balance, and unhealthy lifestyles (Kemenkes, 2015). The habitual consumption of foods high in saturated fats, such as junk food, has been proven to increase the risk of obesity, which is a major contributing factor to breast cancer (Oktora et al., 2025).

Long-term consumption of UPF, which is high in calories but low in fiber and micronutrients, may accelerate this process because its additive contents can disrupt gastrointestinal health and nutrient absorption (Bevilacqua et al., 2025; Fiolet et al., 2018). Therefore, the habit of consuming ultra-processed foods from an early age can be a significant risk factor for future health problems.

Islamic boarding school called Pondok Pesantren Tadabbrur Al Qur'an, accommodating approximately 200 adolescent students and 32 teachers. Preliminary observations and interviews with the school administrators and students revealed several complex issues, particularly regarding healthy food consumption. The pesantren's location, which is close to a main road with numerous vendors selling various types of Ultra-Processed Foods (UPF), coupled with the absence of monitoring over students' access to snacks and food from outside the school and nutrition education related to the impact of UPF has never been carried out there contributes to unhealthy dietary behaviors.

Therefore, it is important to provide comprehensive information and education as promotive and preventive efforts that can increase students' knowledge and awareness regarding the impact of UPF. Apart from that, Non-UPF Cooking Demonstrations is provided so that students can prepare healthy food independently at pesantren so that the food menu at the pesantren becomes healthier.

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METHOD

Location, Time, and Participants

This community service activity was conducted from October to November 2025 at an Islamic boarding school named Pondok Pesantren Tadabbrur Al Qur'an, located in Sako Administrative Village, which is one of the Community Development Villages (Desa Binaan) of Sriwijaya University (UNSRI). The target group of this community service activity consisted of 30 islamic boarding students (santri). Based on initial observations and interviews with the boarding school administrators and students, several complex issues were identified, particularly regarding the consumption of healthy foods. The boarding school's location, which is close to a main road with many vendors selling ultra-processed foods (UPFs), combined with the lack of nutrition education and supervision over students' food access outside the boarding area, has contributed to unhealthy eating habits among the students.

Stages of Activity Implementation

The method employed in this community service activity was an active participatory empowerment approach, involving knowledge transfer between the proposing lecturers and participating students. The proposal development process began with a field survey at the Pondok Pesantren Tadabbrur Al Qur'an to identify problems faced by the partner institution and to offer possible solutions proposed by the team, leading to a mutual agreement between both parties.

The agreed community service implementation method consisted of several stages as follows:

Socialization:

This stage involved conducting an educational session on the impact of Ultra-Processed Foods (UPF) in increasing cancer risk among adolescents at Pondok Pesantren Tadabbrur Al Qur'an. The objective was to improve the knowledge of 50 students and 10 teachers, as well as to perform basic health assessments for the students. Questionnaires were distributed before and after the activity to measure participants' knowledge levels prior to and following the educational session. The activities conducted in this stage included:

- Meeting 1: Activity preparation and social engagement with participants.
- Meeting 2: Assessment of students' nutritional status.
- Meeting 3: Educational session on cancer risk, types of UPF, and anti-cancer foods.
- Meeting 4: Healthy cooking demonstration on non-UPF meal preparation.

Training:

Training sessions were provided for both the students and the kitchen management staff of Pondok Pesantren Tadabbrur Al Qur'an. The training activities focused on practical demonstrations of healthy food preparation without UPF. To support the implementation of this activity, the proposing team provided cooking utensils and a recipe booklet containing healthy non-UPF meal options.

Data Collection

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This community service activity involved several stages of data collection. Nutritional status measurements were conducted using the anthropometric method, by measuring participants' body weight and height. The nutritional status indicators were then analyzed using the WHO Anthro software to determine nutritional categories. In addition, program evaluation was carried out through pre-test and post-test questionnaires to assess the improvement in participants' knowledge before and after the intervention. The questionnaire created by the community service team itself by adapting it to the content of the educational material provided to the target. In this activity, an assessment of UPF food consumption was also carried out using an FFQ questionnaire which was created by recording all types of food available at the Islamic boarding school and stalls around the boarding school.

Quis Feedback from participants was also collected following the healthy non-UPF food processing training to serve as input for evaluation and further improvement of the program.

Data Analysis

Quantitative descriptive analysis was conducted to examine the frequency distribution of age, nutritional status, mid–upper arm circumference (MUAC), and UPF consumption among students. Quantitative data from the pre- and post-tests were analyzed using descriptive statistics (mean and standard deviation) and the Wilcoxon Signed Ranks Test to assess significant differences in students' knowledge and behavior improvement.

RESULTS AND DISCUSSION

Participant Profiles

Table 1 presents the characteristics of the participants. The participants in this activity were predominantly adolescents aged 15–16 years, each accounting for 36.67%, while those aged 17 years comprised 26.67%. The majority of participants had a normal nutritional status (66.67%), although some were categorized as thin (10%) and severely thin (3.33%), and 20% were classified as overweight. Based on MUAC measurements, most participants had values >22 cm (76.67%), indicating generally adequate nutritional conditions. These findings suggest that although the overall nutritional status of participants falls within the normal range, there remain groups at risk of both undernutrition and overnutrition, highlighting the need for targeted nutrition education interventions.

FIGURE 1. Assement of nutritional status in respondents.

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TABLE 1. Participants Characteristics

Characteristics	n	%
Age		
15	11	36.67
16	11	36.67
17	8	26.67
Nutritional status		
Severely thinness	1	3.33
Thinness	3	10
Normal	20	66.67
Overweight	6	20
Obese	0	0

UPF Consumption Among Participants

Table 2 presents the ten types of Ultra-Processed Foods (UPF) most frequently consumed by students at Pondok Pesantren Tadabbrur Al Qur'an. Based on the results of the Food Frequency Questionnaire (FFQ) completed by 30 students, the consumption of UPF remains considerably high. The most commonly consumed items include flavored UHT milk (consumed by 40% students ≥ once per day), instant noodles (36.67% students consuming 2–6 times per week), sweet biscuits (40% students consuming once per week), and packaged fruit-flavored beverages (30% students consuming once per week). This pattern reflects a preference for foods enriched with synthetic additives such as artificial sweeteners, colorants, preservatives, and emulsifiers, which are rarely found in conventional home-cooked dishes. The high intake of these ultra-processed products among the students warrants serious attention due to their potential long-term health risks, particularly the increased risk of cancer.

TABLE 2. Distribution of Consumption Frequency of the 10 Most Commonly Consumed UPF Types Among Participants

Type of UPF	Consumption Frequency n (%)				
	Never	1-3 times/month	Once/week	2-6 times/week	≥1 time/day
Flavored UHT milk	0 (0)	6 (20)	5 (16.67)	7 (23.33)	12 (40)
Instant powdered beverages	4 (13.33)	8 (26.67)	8 (26.67)	6 (20)	4 (13.33)
Instant noodles	3 (10)	8 (26.67)	7 (23.33)	11 (36.67)	1 (3.33)
Instant donuts/cakes	5 (16.67)	6 (20)	11 (36.67)	5 (16.67)	3 (10)
Packaged fruit-flavored drinks	5 (16.67)	7 (23.33)	9 (30)	7 (23.33)	2 (6.67)
Chocolate/cream wafers	6 (20)	7 (23.33)	11 (36.67)	2 (6.67)	4 (13.33)
Ready-to-use sauces	5 (16.67)	10 (33.33)	7 (23.33)	5 (16.67)	3 (10)
Sweet candies	7 (23.33)	9 (30)	6 (20)	6 (20)	2 (6.67)
Sweet biscuits	4 (13.33)	10 (33.33)	12 (40)	3 (10)	1 (3.33)
Packaged bread	7 (23.33)	9 (30)	7 (23.33)	5 (16.67)	2 (6.67)

Ultra-processed foods (UPFs) refer to industrially manufactured products that contain ingredients not commonly used in household food preparation. These ingredients often include preservatives, colorants, artificial sweeteners, and flavor enhancers, all of which contribute to the reduction of natural nutritional quality in such products. As the global food industry continues to expand, UPF consumption has increased substantially, particularly in developing countries and among children (Diba, 2025).

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Shanty (2025) also reports that high UPF intake is significantly and consistently linked to elevated Body Mass Index (BMI) and a higher risk of obesity, a well-established risk factor for various types of cancer. The mechanisms underlying this association relate to the characteristics of UPFs, which are typically nutrient-poor yet high in calories. When consumed regularly, these products can disrupt satiety regulation, encourage overeating, and lead to weight gain. Resulting obesity may subsequently trigger chronic inflammation and hormonal alterations that facilitate carcinogenesis.

Moreover, UPFs frequently contain synthetic additives, including preservatives and colorants, which may exert carcinogenic effects. Although the Indonesian Ministry of Health Regulation No. 28 of 2019 does not specifically address UPFs, the recommended dietary allowances may serve as a guide for identifying and controlling excessive UPF consumption. UPFs generally contain high levels of sugar, fat, and salt, all of which contribute to excessive caloric intake and nutritional imbalance.

Nutrition Education

Increasing awareness of the importance of maintaining healthy dietary habits, especially in relation to the consumption of UPF, can serve as a preventive measure against chronic diseases such as cancer. The higher an individual's level of nutritional knowledge, the greater their likelihood of adopting healthy eating behaviors and becoming more selective in food choices (Aisyiah et al., 2023). Education can change a person's knowledge from not having information to understanding information, but changes in attitudes and eating behavior cannot change quickly because it takes a longer time.

Interventions such as nutrition education, reduced UPF consumption, and improved access to healthier food options are essential to implement within the pesantren environment to mitigate future risks of cancer and other chronic diseases.

FIGURE 2. Nutrition education to Islamic boarding students

TABLE 3. Effects of Nutrition Education on Students' Knowledge and Behaviour

Variables	Pretest	Posttest	Score Increase	p-value
Knowledge	4.46 ± 2.37	8.16 ± 2.06	3.7 (82.8%)	0.000*

The results of the Wilcoxon Signed Ranks Test, *show a significant difference ($p < 0.05$)

Table 3 presents the differences in pretest and posttest scores regarding students' knowledge and behavior related to UPF consumption as the outcome of the nutrition education delivered. The nutrition education conducted at Pondok Pesantren Tadabbrur Al Qur'an successfully improved students' knowledge significantly. The mean knowledge score increased markedly from 4.46 to 8.16, representing

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an 82.8% improvement (p = 0.000). This finding aligns with the study by Wulansari & Rahmawati (2025) at As'ad Islamic Boarding School in Jambi City, which reported that nutrition education increased students' knowledge from 21% to 79% in the "good" category. Similarly, a study by Maidelwita & Arifin (2023) at Pesantren Ramadhan demonstrated a substantial improvement in students' knowledge, rising from 37.5% to 92.5% after receiving health education on balanced nutrition. Adequate knowledge serves as the foundation for shaping attitudes and health-related behaviors. Health education plays an essential role in enhancing students' understanding of balanced nutrition, thereby enabling them to adopt healthier eating patterns.

These findings indicate that education delivered through structured material presentation is effective in increasing students' awareness and fostering positive health behaviors. When students understand the negative impacts of UPF consumption, they become more motivated to choose nutritious foods and adopt healthier lifestyles. Nutrition education serves as an effective preventive strategy to reduce the tendency of students to consume UPF, as increased knowledge has been shown to influence healthier eating behaviors. The boarding school environment also provides a unique advantage, as its structured system, strong social bonds, and religious values help reinforce students' motivation to implement healthy living practices.

Non-UPF Cooking Demonstrations

The community service program conducted at Pondok Pesantren Tadabbrur Al Qur'an combined education on the dangers of UPF with cooking demonstrations. Students not only gained theoretical knowledge but also received hands-on experience in preparing healthy non-UPF foods, such as chicken nuggets, dim sum, and stuffed tofu as alternatives to packaged UPF products. This combined educational method has been proven effective in improving both understanding and skills. For instance, a study by Atasasih et al. (2024) at SMPN 1 Kampar showed that nutrition education integrated with healthy snack-making demonstrations increased adolescents' knowledge by 25 points. Through direct practice, students learned that preparing nutritious and healthy meals is not difficult, and they experienced firsthand that healthy food can also taste appealing and enjoyable.

FIGURE 3. cooking demonstration on Non-UPF Side Dish

This demonstration-based learning approach is highly suitable for students, who are predominantly adolescents. Such experiences can enhance confidence, strengthen responsibility in making food choices, and increase motivation to maintain healthy eating behaviors over time. Moreover, students can apply these skills in the school kitchen, share their knowledge with peers, and practice these habits at home with their families. Thus, nutrition education combined with cooking demonstrations provides a

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practical and sustainable strategy for preventing diseases associated with high UPF consumption among Islamic boarding school students.

CONCLUSION

This study demonstrates that nutrition education significantly improves students' knowledge about the risks of Ultra-Processed Food (UPF) consumption, although changes in behavior were not statistically significant. UPF intake among students remains high, indicating the need for continued intervention. The combination of theoretical education and cooking demonstrations proved effective in enhancing students' understanding and practical skills in preparing healthier, non-UPF foods. Implementing structured and practical nutrition education within the pesantren environment is essential to reduce UPF consumption and support healthier dietary habits among adolescents. After being given education, the students' knowledge increased by 82.2%. We suggest Islamic boarding schools can provide supervision on UPF consumption by students also provide education to parents of students to be more selective in providing provisions for their children during scheduled visits to the Islamic boarding school. The menu recommendations given in Non-UPF Cooking Demonstrations can be used as a reference in food service for students.

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