

# Healthy snack food campaign through educational games for elementary school student

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## ABSTRACT

Elementary school students like various snacks in the school environment, which frees children to choose the food and drinks available. They tend to consume foods containing causative spices, sweet foods, and beverages, and foods with additional ingredients, which will cause things that are not good for children's health. There are still many students who need help understanding about healthy snacks food. Education on healthy snacks in schools is not optimal because knowledge related to these snacks food still needs to be better socialized. This community service activity aims to increase knowledge about healthy snacks in elementary school students through educational games. The methods are socialization, focus group discussion, game simulation through snake and ladder educational games, healthy snack food puzzles, self-evaluation, and documentation. The results obtained from this activity were in the form of increasing the knowledge score of healthy snack food after education and educational games and commitment from partners to incorporate healthy snack food materials into PJOK subjects. This result shows that knowledge of healthy snacks can be improved through snake and ladder educational game activities and beneficial snack food puzzle games. It is recommended that the school continuously allocate time regularly for healthy snack food education for all students.

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## 1. INTRODUCTION

Indonesia is faced with a double burden of nutritional problems in society, especially in children, namely short problems (stunting) and malnutrition problems in the form of overnutrition conditions (overweight or obesity) & malnutrition (Global Nutrition Report, 2020). Basic Health Research in 2018 showed that undernutrition in Indonesia, according to body weight per age, reached 17%, and the proportion of obesity reached 21.8% of the total number of children in Indonesia. These nutritional problems can occur due to a need for knowledge of balanced nutrition that should be given early (Almatsier, 2009; Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia, 2018).

Children of elementary school age (7-12 years) are a group that easily suffers from nutritional disorders. One that needs to be considered now is the habit of eating at school. Around 35-47% of

children consume snack food in a school environment where children can choose or buy their food menu. Basic Health Research in 2018 showed that undernutrition in Indonesia, according to body weight per age, reached 17%, and the proportion of obesity reached 21.8% of the total number of children in Indonesia. These nutritional problems can occur due to a need for knowledge of balanced nutrition that should be given early (Mâsse et al., 2014; Tim Penyusun Direktorat Sekolah Dasar, 2021).

The Minister of Health of the Republic of Indonesia (2003) stated that snack food is food and beverages processed by food craftsmen at points of sale and or served as ready-to-eat food for sale to the public which is served safely. Food and Agriculture Organization (FAO) (Fellows & Hilmi, 2012) mentioning snack food in the form of street food, which is food that is prepared/processed and sold in public places or on the roadside, generally using carts, bicycles, beds, or stalls, and snack food is food or soft drinks that can be consumed on the spot or taken home and eaten between main meals. In Indonesia, in addition to public places, snack food can also be traded in the school environment, commonly known as *Pangan Jajanan Anak Sekolah* (PJAS).

The test results of 10,429 samples of school snacks in 2013 by BPOM throughout Indonesia showed that only 80.79% of samples met the requirements of safe and healthy consumption. This is also the case in Aceh Province. Data from 762 food samples examined by BPOM Aceh in nine cities showed 55 food samples positive for hazardous ingredients (Pusat Komunikasi Publik Sekretariat Jenderal Kementerian Kesehatan RI., 2014). Student knowledge about healthy snacks in Aceh is still low. Research conducted by Fahleni & Tahlil (2016) towards 80 students also by Julinar and Lubis (2021) research of the 67 elementary school students, only 52% of respondents understood about healthy snacks, and 60% had healthy snack food consumption behaviours. So, it is necessary to socialize knowledge about healthy snacks through play techniques where playing can make educational activities fun and understand the material better.

Based on observations in one of the elementary schools in Meulaboh-West Aceh, the school has provided various kinds of food to support the learning process in the form of a school cafeteria. In areas outside the SD Negeri 01 Percontohan Meulaboh school environment, there are many hawker vendors of school-age children with dominant food characteristics that do not meet health requirements, such as food not closed, fried snacks such as fried meatballs, flashy coloured foods and drinks, and ready-to-eat foods. In general, students of this school often consume canteen food, but they also buy many snacks outside the school. The results of the initial meeting between the proposer team and partners have been obtained so far. Even though there is a canteen that can meet consumption needs, many students still choose snacks outside of school. Although there has been noticed from the school, there is not too much change from, but there is not too much change from students regarding their hawker behaviour.

The proposer team, after asking ten students about healthy snacks, many students needed help understanding healthy snacks. The results of the initial data collection by the proposer team also found that the level of knowledge of students about healthy snacks was moderate. This is evidenced by the results of questionnaires to 10 elementary school students, which were carried out randomly; it was found that 65% of students did not understand about healthy snacks at school, and 75% of students often choose snacks outside of school because they never have breakfast time at home so that instead students buy snacks at school, students also do not care about the nutrition in these snacks, Students are also interested in buying snacks from mass media such as TV advertisements and easy access to snacks such as vendors who sell snacks in the home environment and the school environment.

The school realizes that knowledge related to snacks still needs to be better socialized. So far, the school admits that it has provided information pertaining to balanced nutrition, but this information is only provided in general. The school wants regular socialization related to healthy snacks for students.

Still, along with many school programs, it must be done at the same time socialization or education related to healthy snacks food has yet to be realized. The school hopes that there will be more socialization or education pertaining to balanced nutrition, especially in the snack section. The hope is that socialization related to healthy snacks can increase knowledge and form positive behaviours for healthy snacks food in students.

The purpose of this activity is to increase knowledge in choosing and consuming healthy snacks that are clean, safe, and nutritious through nutritional snack food education by using educational games at an elementary school in Meulaboh-West Aceh because this can have an impact on student achievement levels in schools. This service activity also contributes to the success of national development and the success of the second part of the SDGs target in the health sector, namely improving nutrition directed at school-age children where school-age children actively participate and respond to their own nutritional needs. In addition, this activity is also part of the priority of health independence research through improving community nutrition, which is also one of the research topics of the 2017-2045 National Research Master Plan. One of them is nutrition education, which is carried out through aspects of knowledge, attitudes, and behaviour changes in choosing snacks. The hope is that the knowledge possessed can change behaviour and improve children's nutritional status.

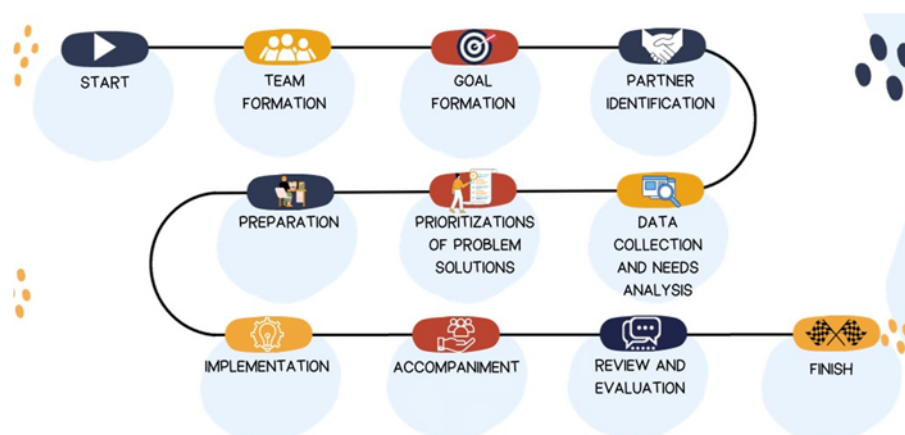
## 2. METHODS

### Community Service Partners

This community service activity lasts for three months, from July to October 2023. The partners or targets of this service activity School at SDN 01 Percontohan Meulaboh, Johan Pahlawan District, West Aceh Regency Service activities were carried out at School Partners at SDN 01 Percontohan Meulaboh with the target of teacher councils, especially teachers of Physical Education, Sports and Health subjects and 40 elementary school students.

### Stages of Community Service Activities

In sequence, the stages of this service activity start from team building to determining new needs and goals following the workflow as illustrated in the flow diagram (Figure 1) adopted from Phillips and Pittman (2015).



**Figure 1.** Flow diagram of community service stages

This service activity began with the formation of an implementation team consisting of lecturers from three study programs and students of the West Seramoe Medical Health School Undergraduate Nursing Study Program to guarantee all priority needs of partners. This activity began with an initial meeting of the service team with the Institute for Research and Community Service (LPPM) STIKes Medika Seramoe Barat to ask for permission to go to SDN 01 Percontohan Meulaboh. In the meeting, the background and objectives of the implementation of activities were explained.

After the implementation team was formed, an initial meeting was held to consist of identifying partners, namely schools at SDN 01 Percontohan Meulaboh, to determine and formulate the objectives of the activity, namely increasing the knowledge of elementary school student in choosing and consuming healthy snacks that are clean, safe, and nutritious through education and educational games related to healthy snacks. The collection and analysis of partner needs is the next stage, capturing information from partners, namely teachers and elementary school students, through interviews and needs surveys. From extracting this information, it is concluded that there are several obstacles related to these healthy snacks in the form of healthy snack food education materials that need to be optimally integrated into the school curriculum, especially physical education, sports, and health (PJOK) subjects.

In addition, the knowledge of elementary school students about healthy snacks at school has not been optimal and limited; education about balanced nutrition, including healthy snacks, has been carried out by the school but needs to be carried out regularly. Another obstacle to the use of educational media in schools is only limited to lecture and exclamation methods and has never used educational game tools that can be used in health socialization.

Once the problem is clearly mapped out, the next priority is determined based on urgency, breadth of scope, and impact. Thus, the topic of healthy snack food campaigns using snakes and ladders, educational games and puzzles was determined because they were key factors from several main obstacles that had been identified. Preparation for the implementation of activities is carried out by collaborating and coordinating with partners regarding the technical performance of activities so that they run conductively. Review and evaluation are carried out through interview and survey methods to determine the assessment, obstacles faced, further expectations related to activities that have been carried out and follow-up for subsequent actions.

### **Method of Activity Implementation**

The method used in this activity to increase knowledge about healthy snacks food consists of three main activities: Discussion related to the proposal Integration of healthy snack food education materials into physical education, sports and health (PJOK) subjects, providing education to elementary school students about healthy snacks food and conducting educational games in the form of snakes and ladders and puzzles containing healthy snack food materials. The troubleshooting solution framework can be seen in Figure 2.

The implementation methods used are socialization, focus group discussion, game simulation, self-evaluation, and documentation. Support and active participation from the school management in the allocation of time and place, active involvement of participants and openness in communication and discussion are urgently needed. The media used in this community service activity are LCD projectors, brochures, educational games, snakes and ladders and healthy snack foods snakes and ladders puzzles.

Evaluation of educational activities and educational games for elementary school students is carried out by giving pretest and posttest. According to the purpose of carrying out the service, the evaluation was carried out by looking at the increase in knowledge score about healthy snacks. Knowledge is

measured using questionnaires that have been validated by the service team and are reliable for use. The questionnaire contains knowledge about balanced nutrition and the principles of healthy snacks; for discussion activities related to the proposal to integrate healthy snack food educational materials into PJOK subjects, evaluation and assistance will be carried out gradually to PJOK teachers so that a Learning Implementation Plan is formed that contains healthy snack food materials.

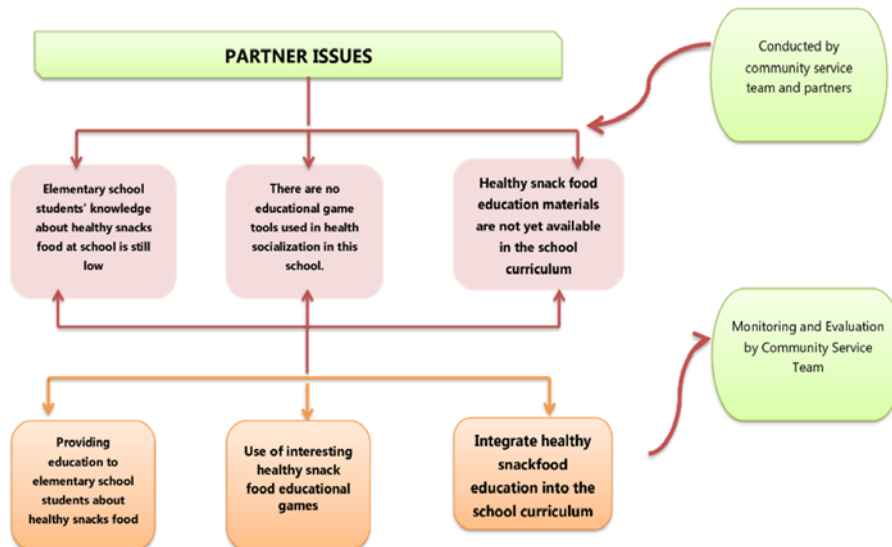


Figure 2. Troubleshooting solution framework

### Educational Game Materials Snakes and Ladders and Puzzles

Snakes and Ladders educational games and healthy snack food puzzles are developed as supplements to implement education more exciting fun and increase student knowledge. Experts have validated snakes and ladders and puzzle game media before being used for counselling healthy snack food materials. The experts involved in providing the assessment are two people with competence in the field of nutrition and media. The results of the expert assessment show that Snakes and Ladders media and healthy snack food puzzles are relevant and valid to be used as beneficial snack food educational games for elementary school students.

The healthy snack food snakes and ladders educational game in this activity is an illustrated screen that can be spread on the floor. This media is printed on thick flexi material with digital printing technology with a size of 2x2 meters by containing 100 boxes containing images and writing with a length of 4x4 cm each. This snakes and ladders game is also equipped with pillow-shaped dice measuring 13x13 cm. Healthy snack food snakes and ladders educational game is done by dividing students into several groups.

The puzzle educational game in this activity is a picture board that contains how to choose healthy snacks. Namely, healthy snacks must be nutritious, clean and safe. The community service team designed a puzzle shape in the form of a board game. This media is printed on PVC Board material with a thickness of 3mm through digital printing technology measuring 30 x 42 cm, which contains images and writing. Educational games of healthy snack food puzzles are carried out by dividing students into several groups.



**Figure 3.** Healthy snack food snakes and ladders educational game  
**Figure 4.** Healthy snack food puzzle educational game

### 3. RESULTS AND DISCUSSION

#### Results

#### Preparatory stage

At this stage, the implementation team prepares all the needs needed for community service activities.



**Figure 5.** Preparation for community service

#### **Implementation of focus group discussion (FGD) related to the integration of healthy snack foodmaterials into *Pendidikan Jasmani, Olahraga, dan Kesehatan (PJOK)* subjects**

This activity was initially planned one week before the socialization activity with students was carried out, but because partners had many movements, there was no agreement as expected. The action finally started two hours before the socialization activity with students was carried out. The motion was carried out with all teachers of SDN 01 Percontohan Meulaboh. FGD material focuses on healthy snack food materials that should be integrated into PJOK subjects. The results of the discussion stated that the curriculum from the Ministry of Education, Culture, Research, and Technology actually mentions food and snacks in level 3 PJOK subjects.

However, so far, schools, especially PJOK subject teachers, only discuss healthy food and do not discuss details related to restorative snack food materials. This is because references related to healthy snacks are somewhat limited and challenging to discuss in detail. Even if it is discussed in the

PJOK subject, it is only discussed briefly and then. The recommendation produced during this meeting is that PJOK subject teachers will again review healthy snack food materials and include them in PJOK materials specifically, and this can be seen in the Learning Implementation Plan document, which contains restorative snack food materials (Figure 6). In addition, the service team will assist in providing educational materials related to healthy snacks so that partners can further develop healthy snack food materials.



**Figure 6.** FGD Integration of healthy snacks food materials

### **Implementation of Healthy Snacks Food Education and Education Games**

Education on healthy snacks is carried out by first carrying out a pre-test using a questionnaire presented in Figure 7.



**Figure 7.** Filling out the healthy food knowledge pretest questionnaire

The activity was then continued by providing counseling materials accompanied by discussions in an interactive atmosphere presented in Figure 8.

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**Figure 8.** Education and discussion of healthy food with an interactive atmosphere

The activity continued with educational games, namely snakes and ladders games and puzzles carried out in groups (Figure 9). The first educational game is the healthy snack foods snake and ladder game carried out by dividing 40 students into five groups, each consisting of 8 students. Healthy snack food snakes and ladders educational game is carried out with an allocation of 30 minutes. The procedure begins with the whole group preparing for each snake and ladder game provided by the service team. Then, the group rolls the dice and moves according to the number of dice that come out. The pieces in this game are the students, with the student standing in front, acting as the team leader.



**Figure 9.** Implementation of healthy snack food snakes and ladders educational game



Facilitators from the service team read the questions listed on the snakes and ladders according to the plot number occupied by students, and students must answer the questions in the box using discussion. If the student stops at the box with a picture of the lower end of a ladder, then go up, and if the student stops at the box with a picture of a snake head, then go down. The first group of students standing in the finished box and successfully answering all the questions on the snakes and ladders wins the game and gets prizes in the form of healthy snacks that the community service team has prepared.

The second educational game is a healthy snack food puzzle game carried out in groups, dividing 40 students into five groups, each consisting of 8 students. Each group is given a whole puzzle. They were allowed to remember the whole puzzle's shape for 3 minutes. Then, the facilitator will shuffle the puzzle shape, and the group is welcome to arrange the puzzle pieces into a complete picture. The first group of students to complete the puzzle rearrangement is the group of students who win the game and get prizes in the form of healthy snacks that the service team has prepared. The activity presented in Figure 10.



**Figure 10.** Implementation of educational puzzle stacking games

After the educational activities and educational games were completed, the activity ended with giving prizes and gifts to the winning groups in both games and continued by giving post tests (Figure 11). Pre-test and post-test activities are intended to measure the level of knowledge about healthy snacks.

The time allocation for this healthy snack food education activity is 120 minutes. Observation of the course of educational activities shows active participation from students. At each discussion and Q&A session, students showed enthusiasm to ask and answer questions from the facilitator. Snakes and ladders games and healthy snack food puzzles are enthusiastically performed by students in a joyful atmosphere and all students can be actively involved in the game.

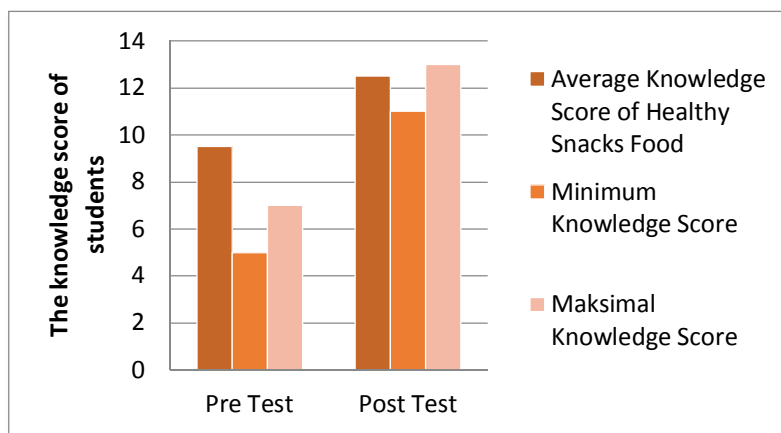
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**Figure 11.** Distribution of gifts and parcels and provision of posttest questionnaire on healthy snack food knowledge

**Evaluation of the results of healthy snack food education**

The results of community service activities show that education accompanied by educational games can improve the knowledge of target groups about healthy snacks. Figure 12 presents the average snack knowledge score before and after education



**Figure 12.** Average knowledge score of healthy snacks before and after education accompanied by educational games

Knowledge of healthy snacks is measured through 13 questions with a minimum score of 0 and a maximum score of 13. The knowledge score of students before being given education and educational

games about healthy snacks obtained an average of 9.5 with a minimum score of 5 and a maximum value of 11. In contrast, the knowledge concentration of respondents after being given education and educational games obtained an average score of 12.5, with a minimum score of 7 and a maximum score of 13. These results show an increase in knowledge of healthy snacks in elementary school student after being educated and using educational game media, Snakes and Ladders, and puzzles.

## Discussion

*Pangan Jajanan Anak Sekolah* (PJAS), or what we call school children's snack food, plays a vital role in the lives of elementary school student. PJAS is needed for children who do not or lack breakfast and do not bring provisions to meet their energy and protein needs (Rohmawati et al., 2023). The knowledge profile of healthy snacks in elementary school students at partner places before educational activities accompanied by educational games illustrates that students have received healthy snack food education. However, the education still needs to be comprehensive, covering all the principles of healthy snacks. The increase in healthy snack food knowledge scores after education and educational games shows that healthy snack food knowledge can be improved through educational activities with various media innovations and learning methods such as game methods.

Learning using educational games makes students acquire knowledge in a fun and focused learning atmosphere. Elementary school students are in a phase of great curiosity about various things in the surrounding environment. Educational games also allow students to experience learning specific topics in a multi-sensory, active, and experimental environment so that decision-making and problem-solving skills on a topic are developing (Adachi & Willoughby, 2013). The use of educational games makes the learning process more interesting, motivating, increases attention and can even improve peer communication and social skills (Liao et al., 2011; Sun-Lin & Chiou, 2019).

Games, especially educational games, can present messages about health, and one of the strategies to facilitate health promotion in children who are primary school age at such age still like to play. Educational games can relieve boredom when in the process of learning. This game can also stimulate creativity in socializing and intellectual growth in children and improve concentration. One aspect promoted through educational games in children is healthy behaviors such as eating breakfast, consuming vegetables and fruits, increasing physical activity, and clean living behaviors (Baranowski et al., 2016; Vozza et al., 2014).

One of the educational games that can increase children's knowledge about healthy snacks is playing with snakes and ladders. This game was chosen because it effectively creates an interactive atmosphere between children. The Snakes and Ladders game is a traditional game originating from India and has been known since the 2nd century. Two or more players can play it, which is quite popular in Indonesia. The goal is to reach the last square on the game board by moving the pieces through the dice to determine how many steps to take.

Snakes and ladders games can create a fun atmosphere while educating children's abilities. The characteristics of this game are that players can learn what must be considered in choosing balanced nutrition and healthy snacks, where interesting combinations in each box with pictures of stairs and snakes make this game suitable for children to play while learning to increase knowledge in choosing healthy snacks. The Snakes and Ladders game creates a feeling of happiness when children expect to win, satisfaction when successfully answering questions and climbing stairs, pleasant failures, intensive communication, and social relationships between players teach children to establish good social relationships (Prameswari, 2018).

Another educational game that can be done is a puzzle game that relies on children's intelligence in playing by disassembling pairs of puzzle pieces based on their partners by adjusting their shape, color, and size. Puzzle games as an educational medium are a fun method and can bring something joy to children's learning and unknowingly stimulate the brain. Learning through puzzles can also increase students' creativity, activeness, and curiosity through the stage where students are asked to think creatively about how to arrange pieces of pictures into complete unity and try various ways so that their curiosity also increases (Farhani & Pratiwi, 2019).

Using puzzles as an educational tool for healthy snacks is a creative and interactive way to help children understand the importance of knowing what healthy snacks should be consumed. With this approach, children learn about healthy snacks and develop confidence in choosing clean, safe, and nutritious snacks for daily consumption. Ultimately, they will feel more aware and careful in selecting daily snacks to support their health and fitness.

In the educational game carried out in this community service activity, the goal is to improve children's cognitive abilities related to healthy snacks, which are expected to also aim at behavior change, namely being able to choose healthy snacks that should be. A child's cognitive abilities are essential for getting stimulus. Cognitive ability is an individual's thought process in relating, judging, and considering an event or events. The process of cognition relates to the level of intelligence (intelligence) that characterizes a person with various interests. Cognitive abilities include various aspects, such as problem-solving, creativity, logical thinking, memory, language, and numeracy skills (Khadijah, 2016).

The use of games in nutrition education is an important thing to learn because using games can increase participation and motivation in learning activities. Educational games generally show effective results in influencing activities in children and are very helpful in educating healthy eating patterns in children (Brown et al., 2020). Learning through educational games is more interesting because in the learning process there is more play and this is according to the age stage of children in elementary school where at this age they prefer learning that adapts to the experiences they have gone through and sees the learning in accordance with reality (Suparno, 2001).

In implementing this community service program, several inhibiting factors occur during the implementation of activities, namely, limited ways to organize students who participate in activities so that they require assistance from teachers so that conditions become conducive. In addition, doing two educational games requires a more extended explanation time-related to the methods and procedures of playing so that students can understand all the rules of the game.

#### **4. CONCLUSION AND RECOMMENDATIONS**

The community service program through the results of activity evaluation can be concluded that healthy snack foodcampaign efforts with the media of snake and ladder educational games and healthy snack foodpuzzles are proven to significantly increase knowledge of healthy snacks in students.

It is recommended to the school to continuously allocate time regular for healthy snack foodeducation for all students. Efforts to educate healthy snacks in the future are recommended to increase the target audience, namely parents. This is because improving aspects of attitudes and practices about healthy snacks in students also really requires the role of parents as the party most responsible for providing student food. In addition, schools also need to immediately incorporate this healthy snack foodmaterial into PJOK subjects

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