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Utilization of Gonad Sea Urchin for Cookies Product as A Potential Local Resources in Preventing Stuting in Linsowu Village North Buton Regency

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ABSTRACT

Stunting is a child's growth and development disorder caused by a lack of nutritional intake, infection, or inadequate stimulation. The impact of stunting includes decreased intelligence, vulnerability to disease, hampered economic growth and work productivity, and exacerbated inequality. The aim of this service is to provide information, knowledge, and education about the processing of sea urchins into cookies as a local resource with the potential to prevent stunting. This community service aims to educate through outreach and counseling using a food diversification approach for participants. The service was carried out in one of the houses of Linsowu Village residents, involving 47 participants in the socialization session and 27 participants in the counseling session. The target children, who were given cookies, included 11 children suffering from stunting. The PKM activities were conducted over 2 days, starting with the socialization stage on the first day and counseling on the following day, which focused on live demonstration activities related to the procedures for making sea urchin gonad-based cookies. The result of this activity is a cookie product made from sea urchin gonads, ready to be consumed by children suffering from stunting, made from Soroaki and Taeo gonads. Based on taste and preferences, cookies with a mixture of pineapple jam and Soroaki gonads were the most popular with both participants and stunted children.

1. Introduction

Indonesia is one of the countries with a coastline of almost 100,000 km and 17,504 islands stretching from west to east. Indonesia's sea resources are considered among the most productive in the world. However, this potential is not reflected in the consumption of marine products. Data shows that Indonesia's production rate reaches 6.5 million tons per year, yet consumption only reaches 33.86 kg per capita per year (Stefánsson *et al.*, 2017). Increasing the consumption of marine products is a way to boost protein intake for vulnerable groups, including infants, pregnant women, and breastfeeding mothers. Protein sources vary from animal to vegetable origins. Coastal areas rich in marine products can optimize the consumption of animal products to meet children's protein needs and reduce stunting prevalence (Nirmala & Lestari, 2022).

Stunting is one of the nutritional problems that impact children's intelligence in the future (Sadiq *et al.*, 2022; Murniati *et al.*, 2023; Khatimah *et al.*, 2024). Global stunting prevalence reaches 21.9%, with Asian countries being the most affected (WHO, 2020). According to data from Indonesia's Infants' Nutritional Status Survey (SSGBI) in 2023, stunting prevalence decreased from 27.6% in 2019 to 24.4% in 2020, and further to 21.6% in 2022. The Ministry of Health aims to reduce this prevalence to 17% by 2023. Southeast Sulawesi had the ninth highest stunting prevalence in 2022, with Central Buton having the highest prevalence in the region at 17%. North Buton Regency ranked eighth with a prevalence of 31.2%, followed by Bombana, South Buton, Buton, Konawe Islands, West Muna, and Muna. Since the end of 2020, North Buton has had a stunting prevalence exceeding the national rate, initially at 26.8% compared to 24.4%, before experiencing a decrease. However, stunting prevalence started to increase drastically in 2023, making Buton one of the regions with the highest stunting prevalence in Southeast Sulawesi.

Several efforts have been made to address stunting in North Buton. The Provincial BKKBN has allocated 16 billion to accelerate the reduction of stunting. However, this effort has primarily focused on educating stunting cadres and has not directly reached those affected by stunting. Additionally, relevant institutions and village governments have provided staple foods. Yet, in practice, these aids have not been centered on the stunting sufferers themselves, but rather on their families, so the staple foods have not effectively reached the intended targets.

To prevent stunting, proper, focused, and synchronous collaboration is needed, with interventions directed at the stunting sufferers themselves, based on education from healthcare service facilities and families. This way, nutritional improvement for the stunting sufferers can be effectively achieved. Appropriate animal protein consumption is one alternative to improve infants' nutrition. One of the best sources of animal protein for improving nutritional status is found in sea urchin gonads, including those from sea urchins or fire sea urchins. Sea urchins are important fishery resources because their eggs have economic value and provide good nutrition for health (Mulis &Nane, 2020). The abundance of sea urchins in the waters of North Buton is still very high, but their use remains limited to ordinary consumption by the community.

Stunting treatment in North Buton is carried out in each village categorized as a Stunting Locus by maximizing the role of stunting parents and cadres, facilitated by the BKKBN as the secretary of the TPPS team, and managed by the Health Office of North Buton through the Nutrition Field. Efforts include educating each village cadre about stunting, providing additional food facilitated by the Health Office in cooperation with the village stunting cadre, and implementing periodic examinations by the stunting field of each public health center. Additionally, the village government provides staple aids directly to the stunting sufferers and monitors them. However, these efforts have not yet succeeded in decreasing the annual stunting rate.

2. Methods

The service implementation was carried out using socialization and counseling methods at different times. Socialization activities were held on Friday, May 19, 2023, followed by counseling the next day. The socialization activity involved 48 residents, including mothers, PKK members, and several members of other non-governmental organizations such as the BPD, sub-district assistants, village stunting cadres, and parents of children suffering from stunting. This outreach activity discussed the impact of stunting and its causes, the contents and benefits of sea urchins, and their processing procedures. Meanwhile, the counseling activities focused more on how to make cookies from processed sea urchin gonads to be consumed by stunted children in the village. This hands-on outreach activity was attended by 27 participants, consisting of 11 mothers of stunted children, 5 members of the village stunting cadre team, 6 members of the village posyantek, 3 village officials, community members, and 3 PSKRLD team members as companions or presenters.

The socialization activity was conducted in front of one of the residents' houses, as requested by the residents to facilitate easier participation. For the initial stage, the PKM team from PSKRLD distributed pre-prepared materials to the participants. The socialization took place openly and interactively, with participants engaging more during the discussion sessions. They viewed stunting cases as opportunities for assistance rather than health threats to be wary of. Regarding the topic of sea urchins, participants focused on how gonads can improve the nutrition of stunted children and the processing methods involved.

Furthermore, on the following day, outreach activities were carried out involving 27 participants with the following activity stages:

a. Material Preparation

The material preparation stage began with residents collecting sea urchins using a canoe. The sea urchins collected were adult specimens with a minimum size of 10 cm. The sea urchins were cleaned, and the gonads were removed using a knife or spoon, separating them from water and dirt. The gonads were then collected in a sterile container. The urchin eggs used consisted of two species: Soroaki and Taeo sea urchins. Additionally, ingredients for making cookies, such as chicken eggs, flour, granulated sugar, cake spices, equipment, and other supporting materials, were prepared by the participants under the direction of the PKM team.

b. Education

This stage was explained directly by the PKM team leader through a presentation and direct discussion while demonstrating how to prepare the gonads for the filling and cookie mixture. The gonads needed to be dried by roasting to remove the water content and fishy smell. Once dry and emitting a fragrant aroma, the gonads were transferred to a sterile container, ready to be used for the cookie dough.

c. Cookie Making

This final stage involved making cookies from sea urchin eggs. The cookies were made using typical cake ingredients with a pineapple mixture. The resulting pineapple cookies had a unique and delicious taste. Four types of cookies were made with various flavors: mixed cookies, pineapple cookies, cookies filled with pineapple jam, and plain cookies. The most popular variant was the mixed cookies, where the cookie dough and gonads were mixed together with a little pineapple jam. These were favored by both children with stunting and other residents who tasted them.

d. Taste Test

In this stage, the cookies were given to several residents and participants to evaluate the taste, texture, and aroma. The feedback determined the most popular type of cookie. The cookies produced are targeted for distribution and intervention over the next three months, which will be continued in future community service activities.

3. Results and Dicussion

Community service activities were carried out using socialization and counseling methods. On the first day, 48 participants attended the socialization activities, and on the second day, 27 participants, who were also part of the first day's participants, attended the outreach activities. The difference in the number of participants on the second day was due to the focus on mothers of children with stunting in Linsowu village, village stunting cadres, and members of the village Posyantek. The socialization method involved directly presenting the prepared material, followed by participant discussions. The main topic discussed was related to myths and public misunderstandings regarding stunting, which were seen as deliberate creations rather than a disease with life-threatening health impacts. During the discussion session, the Community Service Team provided clarification and explained why stunting occurs, using cases and direct examples from Linsowu village. Participants learned that stunting impacts a child's brain intelligence if not supported by proper nutrition that stimulates the brain and promotes growth over time. The team also showed slides and videos from the WHO website about stunting in various countries and the growth patterns affected by nutrition.

The extension program in Linsowu Village, Kulisusu District, North Buton Regency, used a food diversification approach to stimulate local community interest, especially among mothers involved in household kitchen production. The writers believe that mothers have learned about and accepted sea urchin egg products as suitable for consumption, including making delicious meatballs. The goal of diversifying sea urchin eggs into cookies is to increase the nutritional intake of the local communities. This initiative also aims to create new business opportunities for increasing income through selling cookies made from sea urchin eggs. Sea urchins are a significant source of animal protein (56.62%). Coastal areas with rich marine resources can optimize the consumption of animal products to meet children's protein needs and reduce the prevalence of stunting.

Stunting is a global health problem caused by multiple factors, including maternal and child health, living environment, health facilities, and health workers. Public health workers play a crucial role in providing information and education regarding the risk factors for stunting, and nutrition during pregnancy and postpartum. Good education increases a mother's knowledge, enabling her to provide proper nutritional intake for her child. This highlights the importance of women's empowerment in preventing stunting, as mothers play a vital role in the family (Yuwanti et al., 2021; Fitri et al., 2022).

Participants found the outreach activities and cooking demonstrations on making sea urchin cookies for stunted toddlers very useful. They realized the importance of maintaining nutrition during pregnancy to prevent stunting. Participants were enthusiastic about the cooking demonstration and actively participated during the event. The process of making cookies is shown in Figures 1 and 2 below:

Figure 1. Cookies Making Process and Products

Figure 2. Posyantek and PSRKLD Team With Butur North Guidance

Sea urchins are an innovative alternative for managing stunting because Taeo and Soroaki sea urchins contain 28 kinds of amino acids, vitamin B complex, vitamin A, minerals, omega-3 and omega-6 fatty acids, while their shells have anticancer, antitumor, and antimicrobial properties. Specifically, sea urchin gonads contain high levels of protein (33.16%), fat (19.73%), ash (8.03%), carbohydrates (3.8%), and water (64.97%). Therefore, they are useful for improving vitality, regulating metabolism, decreasing cholesterol, and reducing blood pressure (Karnila et al., 2022). Afifudin et al. (2014) explained that 15 types of amino acids are detected in sea urchin gonads, including 8 essential amino acids and 7 non-essential amino acids. The essential amino acids are methionine, valine, phenylalanine, isoleucine, leucine, threonine, lysine, and histidine, while the non-essential amino acids are arginine, aspartate, glutamate, serine, glycine, alanine, and tyrosine.

The savory aroma produced by sea urchin gonads is due to their glutamic acid content, which can stimulate nutrition in children's brains. Glycine, another amino acid present in sea urchin gonads, plays an important role in children's growth by stimulating the release of growth hormones. Berlin (2004) stated that glutamate is an important amino acid for brain nutrition, and Sulistyawibowo & Warsidah (2013) explained that glycine stimulates the release of growth hormone, aids wound healing, supports muscle development and growth, and reduces stomach acidity.

Combining high-protein nutritional intake with locally sourced, tasty food ingredients is an innovative approach to reducing stunting. Previous research that combined fish and egg protein with Moringa leaves demonstrated an increase in arm size and body weight of stunted toddlers in the coastal area of Torobulu (Saranani *et al.*, 2023). Additionally, having good knowledge, especially for women accompanying stunted toddlers, plays a crucial role in reducing stunting. Akbar *et al.* (2023) assured that proper knowledge about handling stunting can increase understanding and reduce the incidence of stunting by up to 40%.

4. Conclusions

The conclusions from the implementation of this PKM activity are as follows:

1. The community service activities carried out are using the socialization and counseling method, namely a food diversification approach involving 48 participants for socialization and counseling activities as many as 27 participants and the target of giving cookies is 11 stunted children who will focus on community service activities at this stage.

2. During the activity until it was finished, participants said that through direct demonstration-based socialization and counseling activities, the understanding regarding stunting which had previously been understood as something that was normal and considered a myth, had changed into something that needed to be anticipated and became a shared responsibility. Treatment can be done by utilizing local materials found in the local environment, such as using animal protein which can be applied through the gonads of sea urchins.
3. The innovation carried out is based on local products originating from Gonad Soroaki and Taeo sea urchins with cookies as the final foods with a taste that children like.

5. Acknowledgment

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6. Authors Note

All data contained in this article is the original work of Community Service and has never been published anywhere.

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