Socialization of White Jack Bean Tempe Production as a Strategy to Reduce Stunting Rates in Gumantar Village, North Lombok Regency

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Abstract: Gumantar Village is in North Lombok Regency, West Nusa Tenggara. This village is classified as a developing village with many problems, including stunting. Stunting is caused by mothers and children's lack of adequate nutrition and nutrients, which impacts children's physical and mental growth as the nation's golden generation. Therefore, it is vital to prevent stunting in Gumantar Village, considering the village is the frontline in eradicating stunting. To prevent stunting, the KKN-PMD group of Mataram University initiated the utilization of white Jack bean (Canavalia ensiformis) as a raw material for making tempeh to replace soybeans to increase nutritious food and the economy in Gumantar Village. The activity was carried out from December 2023 to January 2024. This tempeh-making aimed to fulfill the community's nutritional intake through tempeh, which is rich in properties and nutrients and can become a community income to improve the economy. The method used through the work program to reduce stunting rates in Gumantar Village was healthy village socialization on stunting prevention, a stunting campaign through Posyandu, and nutritious food demonstrations to make tempeh from white Jack beans. Other activities carried out to prevent stunting were sexual education to children and socialization of early marriage to adolescents who are experiencing the puberty phase. The results of the socialization activities and demonstrations of processing white Jack beans as a primary ingredient for making tempeh were that the community had a better understanding of how to prevent stunting and how to make tempeh from white Jack beans—most of the community members like the tempeh both in terms of taste, shape, and texture. Participants well accepted sexual education and early marriage socialization.

Keywords: Demonstration; Education; Nutritious food; Posyandu; Socialization.

Introduction

Indonesia is committed to implementing the Sustainable Development Goals (SDGs) to improve the welfare of its people. The SDGs were agreed upon as a global agenda for 2030 during the United Nations General Assembly in September 2015, consisting of 17 goals and 169 targets from 2015 to 2030. Some of these goals include good health and well-being and clean water and sanitation, which are the third and sixth goals of the SDGs, respectively (Alisjahbana and Murniningtyas, 2018). In line with the implementation of
the SDGs, Indonesia aspires to outline the vision of Indonesia Emas 2045, where in 2045, Indonesia will celebrate its 100th anniversary. The vision of Indonesia Emas 2045 is to become an advanced country that can compete with superpowers and face the challenges of the times. Additionally, Indonesia Emas aims for solid leadership and global influence, with poverty levels approaching zero percent and narrower income gaps.

To achieve these goals and aspirations, Indonesia has a significant opportunity due to its demographic bonus. The demographic bonus is a dynamic change resulting from changes in the population structure by age. This phenomenon occurs due to a decrease in birth rates accompanied by high death rates in the long term, resulting in a significant or drastic increase in the working-age population. In other words, the demographic bonus occurs when the working-age population is greater than the non-working-age population. This demographic bonus phenomenon can be assessed using the Dependency Ratio. This ratio compares the productive and non-productive-age populations (Sutikno, 2020).

With the demographic bonus, Indonesia strives to ensure that the productive-age population becomes a generation of human resources that excels in all aspects, including health. The hope is that future generations will also become superior and avoid all kinds of diseases, including stunting. Stunting is a child growth and development disruption caused by inadequate nutrition intake and repeated infections, resulting in a children height falling below the standard (Daracantika et al., 2021). Indonesia ranks third in Southeast Asia with a high prevalence of stunting. Based on data from the Indonesia Nutrition Status Survey (SSGI) (2022), the prevalence of stunting in Indonesia reached 21.6%. Although the stunting occurrence decreased from 24.4% in 2021, the percentage is still high compared to the standard set by the World Health Organization (WHO), below 20%. From the prevalence of stunting in Indonesia, West Nusa Tenggara Province (NTB) is one of the regions with the highest prevalence, ranking fourth with a rate of 32.7% (Annur, 2023). According to the Community-Based Nutrition Recording and Reporting (E-PPBGM) survey results in February 2023, North Lombok Regency has the highest stunting rate in NTB Province, with a prevalence of 19.49% or a total of 4,573 children. One of the villages contributing to the high stunting rate in NTB is Gumantar, as evidenced by the 2023 stunting data obtained from the Head of the Integrated Service Post (Posyandu) of Gumantar Village.

A population of around 7,231 people inhabits Gumantar Village. One of the problems in this village is the high number of children experiencing stunting. Data from the Gumantar Village Posyandu in 2023 shows that 121 children in Gumantar Village are experiencing stunting. This is because many parents ignore the nutrition of the food consumed by their children. This happens because most of the population of Gumantar Village work as farmers in the fields or the fields, so they do not have much time to pay attention to their children. Moreover, during the planting season, cases of stunting tend to increase due to the lack of attention to dietary patterns and the inadequate nutritional intake of children.

To fulfill children's nutrition, healthy and nutritious food is needed. One of the typical Indonesian foods that is famous for its nutrition is tempeh. Tempeh is a product made from soybeans that is fermented using special tempeh yeast or tempeh yeast. However, in reality, soybeans, which are the primary ingredient for making tempeh, are currently experiencing a price increase. This price increase is because soybeans are much needed as food, feed, and fuel, so soybeans are highly contested (Istiani et al., 2015). Apart from that, soybeans, as the tempeh raw material, still have to be imported. Data shows that around 90% of Indonesia's soybean imports in 2020 came from the United States, namely 2.24 million tons (DPR RI, 2022). Furthermore, in 2021, data from the Badan Pusat Statistik (BPS) recorded that Indonesia imported 2.49 million soybeans (Badan Pusat Statistik (BPS), 2021). This proves that every year, there is an increase in soybean imports, thus making soybean prices higher, and automatically, the price of tempeh also soars.

Seeing the existing problems, alternative raw materials are needed to replace soybeans as the main ingredient for making tempeh. One type of bean that can replace soybeans as a raw material for tempeh is the white sword bean (Canavalia ensiformis) or, in Lombok, a white jack bean. There are quite a lot of white jack beans in Indonesia at low prices. No less than soybeans, white jack bean has many good ingredients for the body. According to Professor at the Faculty of Food Technology, Gadjah Mada University, Prof. Dr. Ir. Agnes Murdiati, M. S., the protein content in white sword koro or white jack bean is not much different from soybeans (Gloria, 2020). According to Nursalma et al. (2021), white jack bean contains high carbohydrates, protein, and low fat. 100 g of white jack bean contains 389 kcal of energy, 27.4 g of protein, and 2.9 grams of fat. Therefore, this service activity aims to utilize white jack bean as raw material for making tempeh to reduce the prevalence of stunting in Gumantar Village. By carrying out this service activity, it is hoped that the community can realize the knowledge and skills they have acquired so that, in the long term, it can be beneficial for health and the village economy.

Method

Based on the condition and problem of stunting in Gumantar Village, the Community Service Program
(known as KKN-PMD) of Mataram University, Gumantar Village, period 2023/2024, initiated the improvement of nutritious food through the utilization of white jack bean, which is the primary and flagship work program. The activities were carried out in Gumantar Village, Kayangan District, North Lombok Regency (KLU), West Nusa Tenggara (NTB) from December 2023 to January 2024. Before realizing the vision of improving nutritious food, the Head of the Gumantar Village Posyandu initially observed the implementation method to identify cases of stunting and the lifestyle patterns applied by the people of Gumantar Village. In addition, trials and experiments were conducted to make tempeh from white jack beans so that the community could understand the stages of making tempeh and the obstacles that occurred during the tempeh-making process. Socialization activities by conducting product trials can provide information about the feasibility of the product, optimize quality, and ensure the safety of the resulting products (Sabana, 2015).

After obtaining a broad overview of the results of observations regarding cases of stunting and the lifestyle patterns of the community and successfully conducting trials of making processed tempeh from white jack beans, the next step was to design work programs to address community issues. The steps taken to improve nutritious food and increase the community economy through the production of processed tempeh from white jack beans in Gumantar Village are outlined as follows.

1. Healthy Village Socialization on stunting prevention. This activity was carried out to provide understanding and awareness to the community about the importance of preventing stunting, especially in efforts to improve nutritious food. The Healthy Village Socialization activity with the theme "The Importance of Family Role in Stunting Prevention Efforts" was held on Tuesday, January 9, 2024, at the Multipurpose Hall of Gumantar Village, Kayangan District, KLU. The target audience for this socialization activity includes pregnant women, mothers with toddlers, Posyandu cadre mothers, and Family Welfare Empowerment (known as PKK) mothers.

2. Campaign on stunting prevention and distribution of white jack bean seeds. This campaign strategy aimed to inform, persuade, and motivate behavioral changes in the community. Identification and segmentation of the campaign targets are believed to facilitate the delivery of the campaign objectives (Bender, 2022). This activity was carried out by assisting the Posyandu cadre mothers and providing knowledge about the importance of stunting prevention during the Posyandu activities held every month in the 16 hamlets in Gumantar Village. This activity was conducted from January 3, 2024, to January 22, 2024. In this way, the goal of conveying the message about stunting prevention is better communicated to the intended targets. These mothers, brought their toddlers for immunization and weighing at their respective hamlet's Posyandu. During this activity, white jack bean seeds were also distributed to the community to increase the white jack bean commodity as the raw material for tempeh, and information was provided to attend tempeh-making demonstrations.

3. Demonstration of making processed tempeh from white jack beans. The making of tempeh from white jack beans was held from January 21 to 23, 2024. The demonstration was conducted as a further effort from the stunting prevention socialization program and stunting campaign held at Posyandu. This demonstration was conducted in three different locations due to the vast geographical area of Gumantar Village. These three locations included Beleq Village on January 21, 2024, Melepa Village on January 22, 2024, and Boyotan Proyek Village on January 23, 2024. These locations were chosen so that each target audience could participate in the demonstration. The target audience for this demonstration activity includes PKK mothers, Women Farmer Groups, Posyandu cadre mothers, and mothers with toddlers. The demonstration activity was conducted by practicing all stages of tempeh-making, which are directly observed by the community. This way, it was hoped that the community can understand the procedures and steps of making processed tempeh from white jack beans. In making tempeh, only two ingredients are needed, which are white jack beans and tempeh starter, along with several utensils used to prepare them, such as pots, stoves, trays, spoons, filters, plates, plastic bags, and toothpicks. The first step in making tempeh was to wash the white jack beans thoroughly, then soak them for about 5 hours. After that, boil the white jack beans for about 30 minutes and peel them until clean. Then, wash and soak the white jack beans for 3 hours or until foamy. Next, rinse the white jack beans and steam them for about 20 minutes. After 20 minutes, cool and mix the white jack beans with tempeh starter. Then, put the white jack beans into plastic bags pierced with toothpicks. The final step was the fermentation process, which lasts about two days until the tempeh is ready to be consumed.

In addition to the three main activities outlined earlier, supporting activities were also carried out to prevent stunting in Gumantar Village. These supporting activities consisted of socialization and education at several elementary schools in Gumantar Village and one of the Kayangan District's high schools. Educational activities were conducted at SDN 1 Gumantar, SDN 2 Gumantar, and SDN 5 Gumantar by selecting classes 3 and 4 to educate them about healthy lifestyles and sexual education. Socialization activities were held at SMAN 1
Kayangan, focusing on early marriage, one of the causes of stunting, aimed at the 12th grade.

Results and Discussion

Community service activities was carried out for 54 days in Gumantar Village, primarily focusing on stunting prevention. In Gumantar Village itself, stunting is an important issue, both in prevention and treatment. Therefore, the KKN-PMD UNRAM group utilized white jack beans to make tempeh, which became the main initiative for improving nutritious food, along with several other programs supporting the prevention and treatment of stunting in Gumantar Village.

Healthy Village Socialization on Stunting Prevention

This healthy village socialization on stunting prevention was conducted on Tuesday, January 9, 2024, at the Gumantar Village Multipurpose Hall. This socialization was aimed at increasing the knowledge and awareness of families, especially parents, about their role in preventing stunting in children. Knowledge based on understanding will foster a positive attitude in stunting prevention efforts. (Sarimin et al., 2023). This socialization addressed the theme "The Importance of Family Role in Stunting Prevention Efforts" with the rationale that the family plays a frontline role in the interaction between parents and children, so children see their families as role models in their daily habits such as childcare, personal hygiene, and medical care; thus a good family role is a basis for building a healthy lifestyle for children or toddlers (Qolbi et al., 2020).

Several speakers who were experts in the field of health, especially child stunting, participated in this socialization. The speakers were Monalisa, S.Tr., Gz., the Nutrition Expert from the Kayangan Community Health Center, and Dr. Bartolomeus Umbu Flugentius, the General Practitioner from the Kayangan Community Health Center. In this socialization, Ms. Monalisa comprehensively explained the understanding of stunting, its causes, and its impacts, as well as the treatment process when there are cases of stunting in Gumantar Village. On this occasion, Ms. Monalisa explained the malnutrition framework concept, which includes several causes of nutritional problems or malnutrition that are the core of stunting, including economic and political crises as the root causes. This aligns with UNICEF's statement that financial crises are one of the root causes of infant growth and development problems.

The leading causes of this issue are poverty and education, food availability, and job opportunities. Meanwhile, the indirect causes of this nutritional problem include inadequate food availability at the household level, maternal and child care practices, or poor caregiving practices such as lack of knowledge about health and nutrition before and during pregnancy, infants aged 0-6 months not receiving exclusive breastfeeding, and children aged 0-24 months not receiving Breast Milk Substitutes. This is consistent with the findings of research conducted by Noorhasanah and Tauhidah (2021), which stated that there is a relationship between maternal caregiving patterns and stunting problems in children aged 12-59 months, where poor or inadequate maternal caregiving patterns that neglect important nutritional issues result in children experiencing stunting. This is also in line with the findings of research conducted by Putri (2020), which stated that mothers with poor caregiving patterns are eight times more likely to cause stunting compared to mothers with good caregiving patterns. The direct causes of nutritional problems are inadequate iron consumption and disease infections.

Another resource person in the socialization of this healthy village was Dr. Bartolomeus Umbu Flugentius, a General Practitioner at Kayangan Health Center. He explained about healthy lifestyles and nutrition for children. In this outreach, he emphasized a healthy lifestyle by saying that the family's most important role in preventing stunting is to educate their children to maintain a healthy lifestyle, one of which is paying attention to the nutritional intake consumed by children. A healthy lifestyle is one of the challenges in preventing stunting (Martoni., 2023).

The people of Gumantar Village were very enthusiastic about this healthy village socialization, which could be seen from the total number of people who attended this socialization, reaching 64. The total community included the Head of Gumantar Village, Babinsa and Babinkamtibmas of Gumantar Village, representatives of posyandu cadre women from 16 hamlets in Gumantar Village, representatives of Family Welfare Empowerment (PKK) women, representatives of Gadjah Mada University KKN students, representatives of KKN students from the Institute of Religion Hindu Negeri Gde Pudja Mataram, representatives of the Gumantar Village Student Association, and pregnant women and mothers with
toddler. Apart from that, the enthusiasm of the people who participated in this healthy village socialization was also seen when many asked the resource persons about the material presented during the question and answer session. By holding this healthy village outreach, it was hoped that the community will understand more deeply about stunting and its prevention to reduce the stunting rate in Gumantar Village.

**Stunting Prevention Campaign and Distribution of White Jack bean Seeds**

Apart from carrying out stunting prevention outreach to increase public knowledge regarding exposure to stunting and handling of stunting cases by health workers, it was also necessary to implement a stunting prevention campaign among the Gumantar Village community using an informal approach. Campaigns that aimed to change people attitudes and behavior are essential not only to see the target or audience of the campaign but also to see the messages and media used and their effects (Bender, 2022). Therefore, this stunting prevention campaign was implemented on a massive scale by following the Posyandu schedule, which was held 16 times in 16 hamlets in Gumantar Village every month by Kayangan Health Center Health Workers and Posyandu Cadre Women. In this way, the results obtained in the activities that have been implemented were more effective and efficient by targeting the target object, namely mothers who take their children for health checks and immunizations, so that pregnant women and mothers with toddlers paid more attention to their children's health to avoid stunting. It was evident from the activities carried out that most mothers were enthusiastic in listening and listening to explanations regarding the leading causes and what solutions could be a breakthrough in reducing the stunting rate in Gumantar Village.

![Figure 2](image-url) Photo activity with health workers and some participants in the stunting prevention campaign (left) and Stunting Prevention Campaign Activities and Distribution of White Jack bean seeds at Posyandu (right)

Apart from the campaign, white jack bean seeds were also distributed so that white jack bean commodities increased in Gumantar Village. Before distributing the white jack bean seeds, the UNRAM KKN-PMD group first asked the women at the Posyandu for knowledge about white jack bean. All of them stated that white jack bean was previously widely cultivated. Still, the people of Gumantar Village no longer cultivate it because of lack of use by the community, and white jack bean is only used for children's toys. Therefore, increasing the productivity of white jack bean plants needs to be carried out to develop the white jack bean commodity, which has excellent potential as a substitute for soybeans in making tempeh. One of the essential ways to encourage the community to establish the white jack bean commodity is the distribution of white jack bean seeds. The white jack bean or sword koro plant can grow up to 2,000 meters above sea level and grow well at an average temperature of 140C to 270C in rainfed land or 120C to 320C in lowland tropical areas. White jack bean plants can grow well in high rainfall of 4,200 mm and low rainfall of up to 700 mm yearly. White jack bean plants can also grow well in acidic soil to neutral conditions (4.4–6.8) and flooded and saline areas (Saragih et al., 2018). The Gumantar Village area is primarily agricultural land and plantations, where the people livelihood is as farmers. The community was quite enthusiastic about distributing white jack bean seeds to be planted and cultivated as raw material for making tempeh, both planted in home gardens and fields owned or managed. Each person received a variety of white compact seeds, ranging from three to five.

**Demonstration of Making Tempeh from White Jack bean**

This demonstration of making tempeh from white jack bean raw material was carried out to provide expertise and skills for the whole community in making tempeh from white jack bean, which can later be used as a source of income or personal consumption which can be a source of protein for the family. This demonstration was carried out in three different hamlets in Gumantar Village to ensure that the community, especially the targets, could easily reach the demonstration location. The first demonstration was held in Beleq Village Hamlet on January 21, 2024. It was attended by 17 people, including Posyandu cadre mothers, mothers with toddlers, KKN students from Sebelas Maret State University, and local teenagers. Then, on January 22, 2024, a demonstration was held in Melepah Hamlet. It was attended by 17 people, most women from the Women’s Farmers Group (KWT). The last demonstration was held on January 23, 2024, at Boyotan Project Hamlet and was attended by 21 people, most of whom consisted of Posyandu cadre mothers and mothers with toddlers.

The first activity carried out in this demonstration was an explanation of white jack bean as a substitute for soybeans in the raw material for making tempeh. In this case, it was explained that soybeans as a raw material for tempeh are already very expensive because the need for
soybeans has started to increase, so according to BPS data in 2020, Indonesia imported 2.24 million tons of soybeans and 2.49 million tons in 2021. This import is what causes the price of soybeans to increase. Therefore, it was initiated to use local farmers’ products as a substitute for soybeans, which have properties that are not inferior to soybeans, namely white jack bean.

The first experiment produced tempeh with a bitter taste because a lot of mycelium was found that tempeh with a lot of yeast will produce bitter taste because too much yeast was used. This is in line with research conducted by Irna et al. (2020), who found that tempeh with a lot of yeast will produce tempeh with a bitter taste because a lot of mycelium was produced so if the tempeh is fried, the mycelium will absorb a lot of oil. In the second experiment, the amount of yeast was reduced from that in the first experiment, and tempeh was successfully produced with no bitter taste. When practicing how to make tempeh, the purpose of each step taken was also explained. Documentation of the process of making tempeh from white jack bean is presented in Figure 4.

In Figure 4, you can see the shape of white jack bean, which has not been processed to become tempeh, which can be consumed. In making tempeh, there was a soaking process before the white jack bean was steamed and leavened. According to Putra et al. (2021), soaking the white jack bean aims to remove the toxins contained in the white jack bean. This poison is cyanide acid (HCN), which is dangerous and can disrupt the respiratory system because this compound can bind oxygen in the blood, and this can affect the function of the heart, blood vessels, and lungs. By soaking, the toxic substances contained in the white jack bean can disappear. After washing, the white jack bean is steamed and then given yeast. The yeast used in making this tempeh is tempeh yeast with the RAPRIMA brand. White jack bean-given yeast was stored for two days until the jack bean formed tempeh and could be consumed. During these two days, the white jack bean undergoes a fermentation process. This is based on the statement in research conducted by Valen (2023), which stated that the fermentation process helps the formation of tempeh, which is caused by fungus growth. In the tempeh yeast used, some microorganisms play an essential role in fermentation, including the molds Rhizopus oryzae and Rhizopus oligosporus.

In the final activity in the tempeh-making demonstration, participants explained the benefits of the white jack bean-based tempeh that had been made. It was explained that tempeh, which was made from white jack bean, also has ingredients that are very good for the body because the raw material used is white jack bean.
which has good nutrition for the body. Research conducted by Yarlina et al. (2023) said that the contents of tempeh made from white jack bean raw material include 29.04% protein and all essential and non-essential amino acids. Tempeh from white jack bean has many benefits for the body, including improving digestibility and reducing allergenicity. Apart from that, research conducted by Puspitojati et al. (2022) states that sword koro tempeh releases seven types of peptides, a mixture of which can regulate blood pressure.

The method used in this education was to color the sketch "Four Healthy Five Perfect Foods" and explained nutritious foods to be consumed with a cheerful approach. As a result, in this way, children were enthusiastic about receiving the material presented through colored pictures. Balanced nutrition is a daily food composition that contains nutrients in types and quantities that suit the body needs, taking into account the principles of diversity or variety of food, physical activity, cleanliness, and ideal body weight. If someone experiences malnutrition due to nutritional intake below requirements, the child will be more susceptible to disease and less productive (Palupi et al., 2018). The pictures that the children had colored were displayed on wall magazines at schools and home so that the children remember to maintain nutritional balance every day. The stages of memory are divided into the process of entering information into memory, storing it, and then resurrecting the stored data through what is seen, touched, and smelled by the senses that one has (Walgitgo, 2014). Socialization regarding early marriage was also carried out to teenagers who are vulnerable and have the potential to enter into early marriage at the age of just being single. This socialization was carried out at one of the high schools in Kayangan District, namely SMAN 1 Kayangan. This socialization aimed to provide students with an understanding of the dangers of early marriage and other impacts that can be caused by early marriage.

### Conclusion

Based on the previous explanation, it can be concluded that stunting is an urgent problem, so it was our collective concern to overcome it. The results of the activities show:

1. Healthy Village Socialization on Stunting Prevention has made the community, especially Posyandu cadres, pregnant women, and mothers with toddlers, understand the importance of preventing stunting and the benefits of tempeh from white jack bean in meeting the community's nutritional needs.
2. The stunting campaign and the distribution of white jack bean seeds through Posyandu have made the community better understand the problem of stunting, and it is hoped that the community will be able to plant white jack bean seeds as raw material for tempeh in the future.
3. The demonstration of nutritious food can further increase people's understanding of nutrition and improve their skills in making tempeh from white jack bean. In the long term, it is also hoped that this activity can become a family business activity to improve the community's economy.
4. Supporting activities, namely sexual education and balanced nutrition for children and early marriage
for adolescents, have made children and adolescents understand the meaning and methods of prevention in their communities.

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References


