




# The effort to prevent stunting by training in making vegetable nuggets at Gombang, Boyolali

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ARTICLE INFO	ABSTRACT
<p><b>Article history</b> Received 2023-06-28 Revised 2023-12-06 Accepted 2023-12-20 Published: 2024-08-03</p> <p><b>Keywords</b> Community training Stunting Vegetable nugget</p>	<p><i>The prevalence of stunting under five in Boyolali Regency was still unstable in 2018, at 10%; in 2019, it decreased to 7.2%, and until October 2020, it was 9.26% by looking at the height/age of each toddler. Nutrition is the main factor for forming the body's immune response, and malnutrition can cause a decrease in body immunity. The active participation approach in this community service is based on community independence. It aims to provide education about the importance of fulfilling nutrition needs through the consumption of nutritious food for Family Welfare Programme/Pemberdayaan Kesejahteraan Keluarga (PKK) Gombang Village mothers, especially in fulfilling daily family nutrition needs. The socialization is about making vegetable nuggets that can become local food creations while at the same time being able to fulfill daily food fiber needs. This activity is implemented through several stages: 1) Observation and request for willingness to cooperate with partners; 2) Formulation of Solution Steps; 3) Socialization; 4) Focus Group Discussion. The PKK's participation in this community service activity was very enthusiastic. This activity can provide knowledge about producing organic vegetable nugget processed products to form new entrepreneurs.</i></p>
<p><b>Kata Kunci</b> Nugget sayur Pelatihan komunitas Stunting</p>	<p><b>Upaya pencegahan stunting dengan pelatihan pembuatan nugget sayur di Gombang, Boyolali.</b> Prevelensi balita stunting di Kabupaten Boyolali masih labil pada tahun 2018 10% pada tahun 2019 mengalami penurunan menjadi 7,2% dan sampai dengan bulan Oktober 2020 sebesar 9,26% dengan melihat tinggi badan/usia masing-masing balita. Nutrisi merupakan faktor utama pembentuk respon imun tubuh dan kekurangan gizi dapat menyebabkan menurunnya imunitas tubuh. Pendekatan partisipasi aktif dalam pengabdian masyarakat ini dilandasi oleh kemandirian masyarakat dan bertujuan untuk memberikan edukasi tentang pentingnya pemenuhan gizi melalui konsumsi makanan bergizi bagi ibu-ibu PKK Desa Gombang khususnya dalam pemenuhan gizi keluarga sehari-hari. Sosialisasi yang dilakukan adalah pembuatan nugget sayur yang dapat menjadi kreasi pangan lokal sekaligus mampu memenuhi kebutuhan serat pangan sehari-hari. Pelaksanaan kegiatan ini dilakukan beberapa tahapan, yaitu: 1) Observasi dan permohonan kesediaan bekerja sama dengan mitra; 2) Perumusan Langkah Solusi; 3) Sosialisasi; 4) Diskusi Kelompok Terfokus. Partisipasi PKK dalam mengikuti kegiatan pengabdian masyarakat ini sangat antusias. Kegiatan ini dapat memberikan pengetahuan tentang pembuatan produk olahan nugget sayur organik sebagai salah satu cara untuk membuat wirasaha baru.</p> <p style="text-align: right;">Copyright © 2024, Rahmawati, et al This is an open access article under the CC-BY-SA license</p> 

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## INTRODUCTION

Indonesia is a rich country with a variety of natural resources (Rahayu, 2021). Indonesia has a very abundant biodiversity, both on land and in water (Keong, 2015; Sanka et al., 2023). The potential for biodiversity diversity in Indonesia is sufficient to become a food source for the people of their own country if appropriately managed (Rintelen et al., 2017). However, with a variety of biodiversity and animal sources, Indonesia is still faced with the problem of

malnutrition (De Silva & Sumarto, 2018). In Indonesia, cases of stunting or malnutrition are still high among children during their growth period (Arini et al., 2022).

SDGs are sustainable development agreements based on human rights and equality. In implementing the SDGs, three pillars are the points for grouping SDGs goals, namely the pillars of social, economic, and environmental development (Purvis et al., 2019). Based on the currently developing concept of development, partnership, and empowerment, it is a development model that has received much attention. Partnership and empowerment are separate concepts, although they can complement each other. Under the 17 SDG goals in points 2 and 3, namely End Hunger (Zero Hunger). No more hunger, achieve food security, improve nutrition, and encourage sustainable agricultural cultivation. Good Health and Well-Being (Blesh et al., 2019; Fonseca et al., 2020; Halisçelik & Soytaş, 2019). Guaranteeing a healthy life and cultivating a prosperous life for all ages. Reducing the stunting rate in Indonesia must continue, and all age groups must be educated, especially parents with children in their infancy. The role of health cadres in tackling stunting is very much needed (Mediani et al., 2022; Sufri et al., 2023). Village communities are generally synonymous with education, which is still very low. The low level of education in the village usually impacts the mindset of the village community, which is very ordinary, and it is difficult to accept new input or knowledge.

Data on malnutrition in Central Java was based on the category of height and age (height/age). The first screening is carried out at the integrated health service post/*Pos Pelayanan Terpadu* (Posyandu) by comparing height with age through measurement activities. Suppose a toddler is below the red line or does not rise twice (2T). In that case, confirmation of nutritional status is carried out using the weight-for-height indicator. Suppose it turns out that the toddler is a bad case. In that case, malnutrition treatment is immediately carried out according to the guidelines at the Posyandu and public health centers/*Pusat Kesehatan Masyarakat* (Puskesmas). Suppose it turns out that there are co-morbidities that are severe and cannot be treated at the Puskesmas. In that case, they are immediately referred to the hospital (Badan Pusat Statistik Provinsi Jawa Tengah, 2018).

Boyolali is one of Central Java Province's regencies. The prevalence of stunting under five in Boyolali Regency was still unstable in 2018 at 10%; in 2019, it decreased to 7.2%, and until October 2020, it was 9.26% by looking at the height/age of each toddler. Consisting of 25 sub-districts in one district, the three sub-districts with the highest average stunting cases are Wonosamodro (17.4%), Selo (16.6%), and Musuk (13.7%). Meanwhile, the district with the lowest average stunting cases was Ngemplak District (0.3%) (Dinas Kesehatan Kabupaten Boyolali, 2020).

Immune status or immunity is a system in the human body that protects body cells from various diseases (Nicholson, 2016). Nutrition is the main factor for developing the body's immune response (Childs et al., 2019; Macpherson et al., 2017) and malnutrition can cause a decrease in body immunity (Bourke et al., 2016; Rytter et al., 2014). One of the nutrients that the body needs is protein. Protein in the body functions to regulate metabolic processes in the form of enzymes and hormones and as a defense mechanism for the body against various microbes and other toxic substances that come from outside, as well as to maintain cells and body tissues (Arentson-Lantz et al., 2015; Tang et al., 2018; Wu, 2016). It should be understood that animal protein generally has the most suitable amino acid composition for human needs. To ensure the quality of protein in the daily diet, it is recommended that one-third of the protein consumed comes from animal protein because animal protein has a higher rate (nutritional value) and can contain amino acids that the body cannot produce (Mokoginta et al., 2016).

Vegetables are food sources of vitamins, minerals, and fiber, which are suitable for health. However, the consumption of vegetables by Indonesian people is still relatively low because the taste is not liked, especially by the younger generation. Processing in the food sector is growing in processed products. But not everyone likes vegetables because, according to some people, vegetables taste "strange," and they don't like the texture and smell. Therefore, people make nuggets with the body's enormous needs that may still not be met through the food consumed. Therefore, the author aims to reduce the stunting rate by providing education on making vegetables nuggets that are high in nutritional content. The active participation approach in this community service is based on community independence. It aims to provide education about the importance of fulfilling nutrition needs through the consumption of nutritious food for Family Welfare Programme/*Pemberdayaan Kesejahteraan Keluarga* (PKK) Gombang Village mothers, especially in fulfilling daily family nutrition needs. This is also in line with the SDG's goals in the field of partnerships to achieve goals. This is because vegetable nuggets are local food creations that can meet daily food fiber needs.

## METHOD

This community service was implemented to target audiences with interests related to education on fulfilling daily nutrition for 22 PKK mothers. The implementation of this activity is carried out through several stages, namely: 1) Observation and request for willingness to cooperate with partners; 2) Formulation of Solution Steps; 3) Socialization; 4) Focus Group Discussion (FGD).

Community service was carried out in Gombang Village, Boyolali. The location of the village is presented in Figure 1 while Figure 2 is a photo of the village office. Boyolali is one of Central Java Province's regencies at the eastern foot of Mount Merapi and Mount Merbabu. In Boyolali district, 22 sub-districts are subdivided into 261 villages. One of the villages in the Boyolali district is Gombang Village, located in the Sawit District, Boyolali. As with villagers in general, the

people of Gombang Village are included in areas that have never received counseling about food safety. One of them is the use of food additives such as MSG, preservatives, and the use of cooking oil. This community service was conducted from May 1 2023 to May 27, 2023, with 22 PKK women from Gombang Village participating.



Figure 1. The strategic location of the Gombang Village



Figure 2. Gombang Village office

## RESULTS AND DISCUSSION

With this plan, a community service activity entitled "Improving Quality and Nutritional Value Through Processing Vegetable Nuggets in Gombang Boyolali Village" was carried out. The details of the activities were carried out as follows.

### *Observation and request willingness to cooperate with partners*

In this activity, the PKM team at Slamet Riyadi Surakarta University visited the village administration on Monday, May 1, 2023, to coordinate the implementation of community service activities. This coordination process is followed up by a willingness to cooperate with partners as a forum for implementing community service activities. This observation activity aims to identify the problems, needs, and constraints the village is experiencing.

Based on the results of this observation, it can be seen that after many visits to activities from other universities, lecturers, or students who attended the Gombang sub-district, no community service activity raised or discussed food processing, quality improvement, increased nutritional value, and made a product. Thus, there is a need for assistance and socialization to broaden the insights of local PKK women so they can maximize something commonplace to become something quite valuable.

### *Solution preparation and formulation*

After a series of discussions with partners, the PKM team formulated and described the activities to be carried out to minimize problems when consuming foods that are very common in everyday consumption, namely nuggets. In this case, the service team refers to Government Regulation of the Republic of Indonesia Number 86 of 2019 concerning food safety to describe the steps and solutions to the problems experienced by implementing them. Therefore, the roles and tasks of each PKM team group in the village were identified, as well as consumers such as local mothers.

Preparation in the implementation of this activity is to prepare a very essential plan. Planning is closely related to program implementation. The function of planning is to facilitate program implementation. The training, coaching, and mentoring in this program are to form PKK women in Gombang Village with the skills to make innovative processed products, namely vegetable nuggets.

Foods such as nuggets are often chosen by the public for consumption. Nuggets are processed meat products that can increase the usability and shelf life of the meat itself (Darmadi et al., 2019). Nuggets are made from the essential ingredients of ground meat and mixed with other additional components to form a dough steamed and coated with bread crumb and fried (Sari & Ayu, 2022). Nuggets are expected to be able to meet nutritional intake, especially for children who generally have difficulty consuming vegetables in fresh form, an alternative to meeting the dietary needs of society in general and especially for children who have problem-consuming vegetables in fresh form. Some of the vegetables that have been added to make nuggets are spinach, broccoli, carrots, and others. One of the vegetables that have the potential to be added to nuggets is Moringa leaves (Hastuti et al., 2016). One of the efforts that can be made to increase household income is to increase the added value of vegetable nugget products (Charina et al., 2016).

### Socialization

Furthermore, the team carried out socialization of the results of the formulation that had been formulated (Figure 3). As for the stages of carrying out activities by the team to provide education about the purpose of holding services with related themes, then a presentation about the dangers of long-term consumption of manufactured, processed foods, which can trigger unwanted prolonged effects. Then, an explanation of the nutritional content of vegetables such as carrots, celery, spinach, and broccoli, which contain various types of vitamins, fiber, and minerals rich in antioxidants, and the benefits of consuming these vegetables. The food processing theory used as material in this training is oriented towards innovative processed food. Creative processed food has its charm, where the processing is the same. Innovation in processed food must follow general principles, namely prioritizing consumer safety and health as well as the nutritional feasibility of food (Ayustaningwarno, 2014).

After explaining vegetable nuggets, the event continued with making nuggets directly so that PKK women could witness how they were made. It is hoped that the process of making vegetable nuggets can be understood and understood with direct practice. Afterwards, the question-and-answer session. This is done so there are no misunderstandings about making vegetable nuggets or the information.



Figure 3. Socialization in Gombang Village, Boyolali: (a) presentation from community service team; (b) enthusiasm of PKK members in Gombang Village; and (c) Gathering with the Gombang Village community

After being educated about manufactured processed foods and the benefits of processed vegetables, the discussion went quite effectively; this was seen from the enthusiasm of the community service participants in the partner environment asking for more information about processed food's nutritional content and dangers. They were also very interested in knowing that the vegetables they often consumed had considerable benefits and contained complete nutrition. The exposure to this service becomes an input for these mothers to pay more attention to the intake that should be given to their children. The mothers also promised to start getting used to processing their food.

### Evaluation

Community members in Gombang Hamlet, Sawit Boyolali District, welcomed the results of this community service activity. Some of the things that can be obtained from this activity include: (1) Increased knowledge of women members of the PKK, Gombang Village, Sawit District, Boyolali Regency. Regarding the dangers of consuming manufactured, processed foods in the long term. (2) Increase awareness of PKK member mothers to choose and sort out the best intake for their children in the future. (3) Adding to the understanding of women who are members of the Gombang Village PKK to be able to use carrots, broccoli, celery, and green onions as ingredients for processed nuggets because their nutritional content is quite complete and their antioxidants are high enough so they are perfect for children's consumption. (4) Increased awareness of the local community regarding the possibility of a healthy lifestyle starting from the best choice of foods that are sure to have a balanced nutritional content, the processing process of which is more hygienic.

The measurement of the knowledgeability of PKK mothers was not carried out quantitatively using special instruments but only qualitatively from the discussion and question and answer process that took place after the presentation of the

material. Then, it was also assessed using the distributed partner satisfaction questionnaire. Several assessment items showed that PKK mothers as partners felt that this activity was beneficial and hoped that it could continue in the future.

Based on the questionnaire that we distributed to PKK women in Gombang Village before starting this activity, there are still many who don't know what stunting is and how to prevent it. The average value of the right answers only showed 53.36 from 100 point. However, after this activity was carried out, we distributed the questionnaires again and found that there were many correct answers with the average of right answers 87.83 from 100 point. This means that this service activity makes the Gombang Village PKK women know what stunting is and how to prevent it.

## CONCLUSION

The conclusions obtained from the results of this service activity are: (1) The participation of PKK mothers in participating in this community service activity was very enthusiastic because the attendance rate of participants according to the target reached 100% (20 target community participants attended this activity according to the proposal); (2) This activity can provide knowledge about producing organic vegetable nugget processed products as a way to form new entrepreneurs. The existence of community groups in Gombang Village, Sawit District, Boyolali Regency, especially PKK mothers who can process and produce vegetable nuggets that can be consumed, can improve family nutrition and increase people's income if they are marketed. The contribution of this service is organic vegetable nugget products that are of high quality, clean, and safe for consumption and marketing.

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## REFERENCES

- Arentson-Lantz, E., Clairmont, S., Paddon-Jones, D., Tremblay, A., & Elango, R. (2015). Protein: A nutrient in focus. *Applied Physiology, Nutrition, and Metabolism*, 40(8), 755–761. <https://doi.org/10.1139/apnm-2014-0530>
- Arini, H. R. B., Hadju, V., Thomas, P., & Ferguson, M. (2022). Nutrient and food intake of Indonesian children under 5 years of age: A systematic review. *Asia Pacific Journal of Public Health*, 34(1), 25–35. <https://doi.org/10.1177/10105395211041001>
- Ayustaningwarno, F. (2014). *Teknologi pangan; teori praktis dan aplikasi*. Graha Ilmu. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=1160558>
- Badan Pusat Statistik Provinsi Jawa Tengah. (2018). *Profil kesehatan provinsi Jawa Tengah 2017*. <https://jateng.bps.go.id/publication/2018/08/03/0392a381b71c2bc8f708f794/profil-kesehatan-provinsi-jawa-tengah-2017.html>
- Blesh, J., Hoey, L., Jones, A. D., Friedmann, H., & Perfecto, I. (2019). Development pathways toward “zero hunger.” *World Development*, 118, 1–14. <https://doi.org/10.1016/j.worlddev.2019.02.004>
- Bourke, C. D., Berkley, J. A., & Prendergast, A. J. (2016). Immune dysfunction as a cause and consequence of malnutrition. *Trends in Immunology*, 37(6), 386–398. <https://doi.org/10.1016/j.it.2016.04.003>
- Charina, A., Andriani, R., & Hermita, A. (2016). Pengenalan bisnis produk olahan sayuran organik untuk meningkatkan pendapatan rumah tangga petani. *Jurnal Aplikasi Ipteks Untuk Masyarakat*, 5(1), 34–37. <https://doi.org/10.24198/dharmakarya.v6i3.14826>
- Childs, C. E., Calder, P. C., & Miles, E. A. (2019). Diet and immune function. *Nutrients*, 11(8), 1933. <https://doi.org/10.3390/nu11081933>
- Darmadi, N. M., Gde, I., Pandit, S., & Sugiana, G. N. (2019). Pengabdian kepada masyarakat (PKM) nugget ikan (fish nugget). *Community Services Journal (CSJ)*, 2(1), 18–22. <https://doi.org/10.22225/cs.j.2.1.2019.18-22>
- De Silva, I., & Sumarto, S. (2018). Child malnutrition in Indonesia: Can education, sanitation and healthcare augment the role of income? *Journal of International Development*, 30(5), 837–864. <https://doi.org/10.1002/jid.3365>
- Dinas Kesehatan Kabupaten Boyolali. (2020). *Profil kesehatan Kabupaten Boyolali tahun 2020*. <https://www.scribd.com/document/596523847/PROFIL-DINKES-KABUPATEN-BOYOLALI-2020>
- Fonseca, L. M., Domingues, J. P., & Dima, A. M. (2020). Mapping the sustainable development goals relationships. *Sustainability*, 12(8), 3359. <https://doi.org/10.3390/su12083359>
- Halisçelik, E., & Soytaş, M. A. (2019). Sustainable development from millennium 2015 to Sustainable Development Goals 2030. *Sustainable Development*, 27(4), 545–572. <https://doi.org/10.1002/sd.1921>
- Hastuti, S., Suryawati, S., & Maflahah, I. (2016). Pengujian sensoris nugget ayam fortifikasi daun kelor. *Agrointek*, 9(1), 71. <https://doi.org/10.21107/agrointek.v9i1.2126>
- Keong, C. Y. (2015). Sustainable resource management and ecological conservation of mega-biodiversity: The southeast asian big-3 reality. *International Journal of Environmental Science and Development*, 6(11), 876–882.

<https://doi.org/10.7763/IJESD.2015.V6.715>

- Macpherson, A. J., de Agüero, M. G., & Ganal-Vonarburg, S. C. (2017). How nutrition and the maternal microbiota shape the neonatal immune system. *Nature Reviews Immunology*, 17(8), 508–517. <https://doi.org/10.1038/nri.2017.58>
- Mediani, H. S., Hendrawati, S., Pahria, T., Mediawati, A. S., & Suryani, M. (2022). Factors affecting the knowledge and motivation of health cadres in stunting prevention among children in Indonesia. *Journal of Multidisciplinary Healthcare, Volume 15*, 1069–1082. <https://doi.org/10.2147/JMDH.S356736>
- Mokoginta, F. S., Budiarmo, F., & Manampiring, A. E. (2016). Gambaran pola asupan makanan pada remaja di Kabupaten Bolaang Mongondow Utara. *Jurnal E-Biomedik*, 4(2). <https://doi.org/10.35790/ebm.4.2.2016.14618>
- Nicholson, L. B. (2016). The immune system. *Essays in Biochemistry*, 60(3), 275–301. <https://doi.org/10.1042/EBC20160017>
- Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability Science*, 14(3), 681–695. <https://doi.org/10.1007/s11625-018-0627-5>
- Rahayu, D. (2021). Natural resources, human capital and economic Growth: Evidence from Indonesia. *Proceedings of the 2nd Borobudur International Symposium on Humanities and Social Sciences, BIS-HSS 2020, 18 November 2020, Magelang, Central Java, Indonesia*. <https://doi.org/10.4108/eai.18-11-2020.2311792>
- Rintelen, K. Von, Arida, E., & Häuser, C. (2017). A review of biodiversity-related issues and challenges in megadiverse Indonesia and other Southeast Asian countries. *Research Ideas and Outcomes*, 3(e20860), 1–16. <https://doi.org/10.3897/rio.3.e20860>
- Rytter, M. J. H., Kolte, L., Briend, A., Friis, H., & Christensen, V. B. (2014). The immune system in children with malnutrition—A systematic review. *PLoS ONE*, 9(8), e105017. <https://doi.org/10.1371/journal.pone.0105017>
- Sanka, I., Kusuma, A. B., Martha, F., Hendrawan, A., Pramanda, I. T., Wicaksono, A., Jati, A. P., Mazaya, M., Dwijayanti, A., Izzati, N., Maulana, M. F., & Widyaningrum, A. R. (2023). Synthetic biology in Indonesia: Potential and projection in a country with mega biodiversity. *Biotechnology Notes*, 4, 41–48. <https://doi.org/10.1016/j.biotno.2023.02.002>
- Sari, L., & Ayu, D. F. (2022). Rasio tahu dan nangka muda dalam pembuatan nugget. *Jurnal Sagu*, 20(2), 66. <https://doi.org/10.31258/sagu.20.2.p.66-72>
- Sufri, S., Nurhasanah, Jannah, M., Dewi, T. P., Sirasa, F., & Bakri, S. (2023). Child stunting reduction in Aceh Province: Challenges and a way ahead. *Maternal and Child Health Journal*, 27(5), 888–901. <https://doi.org/10.1007/s10995-023-03601-y>
- Tang, Y., Li, J., Liao, S., Qi, M., Kong, X., Tan, B., Yin, Y., & Wang, J. (2018). The effect of dietary protein intake on immune status in pigs of different genotypes. *Food and Agricultural Immunology*, 29(1), 776–784. <https://doi.org/10.1080/09540105.2018.1455812>
- Wu, G. (2016). Dietary protein intake and human health. *Food & Function*, 7(3), 1251–1265. <https://doi.org/10.1039/C5FO01530H>