



Community Education and Moringa Leaf Food Innovation in Payaroba Village

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ABSTRACT

This article describes a community service program that introduced moringa leaf food products and nutrition awareness activities in Payaroba Village, West Binjai, Indonesia. The program, known as KELUPAS, involved women from a local Yasin recitation group, children attending a learning group at the Ummi Muliani orphanage, and residents of Neighborhood II. Preparation included consultation with the group leader, discussion of activity arrangements, preparation of educational materials, and food processing. Activities combined lectures, questions and answers, explanations of moringa cultivation and processing, and distribution of seedlings and prepared foods. The documented outputs were an education meeting, moringa crackers for the women's group, seedlings for household cultivation, and pudding and croquettes for children. Photographs illustrated the activities and products. The available documentation did not include participant counts, standardized recipes, nutrient analyses, pretest and posttest scores, or child growth measurements. Consequently, the findings describe program delivery and food innovation without establishing improvements in nutritional status or prevention of stunting. The experience provides a basis for subsequent community activities that combine locally available foods with nutrition education and systematic evaluation of participation, product acceptability, and household use.

Keywords: moringa; community education; food innovation; Payaroba

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INTRODUCTION

Stunting is a form of undernutrition characterized by low height for age. Its causes include maternal nutrition, illness, feeding practices, and socioeconomic conditions (World Health Organization, 2024). An analysis of Indonesian national survey data found an association between maternal education and stunting among children under two years (Laksono et al., 2022). This association supports attention to access to nutrition information, although it does not establish that a brief education session can change child growth.

Moringa oleifera, locally called kelor, offers opportunities for food diversification. Laboratory research has characterized the nutritional and functional properties of its leaves

(Sultana, 2020), and a review describes their incorporation into familiar foods (Oyeyinka & Oyeyinka, 2018). The contribution of a moringa product depends on its formulation, processing, portion size, and consumption. A food chemistry review identifies gaps concerning composition and safety that matter when interpreting health claims (Grosshagauer et al., 2021).

In Payaroba Village, Universitas Sumatera Utara's thematic community service team developed KELUPAS, or Moringa for Healthy Payaroba, to connect nutrition education with leaf processing and household cultivation. The program worked through a women's recitation group and a children's learning group. This article documents its preparation, activities, and outputs, and identifies the evaluation needed before conclusions about dietary change or stunting prevention can be drawn.

METHODS

The activity was conducted by the thematic community service team KKNTD-09 in Neighborhood II, Payaroba Village, West Binjai, Indonesia. Intended participants included members of a women's Yasin recitation group, children attending a learning group at the Ummi Muliani orphanage, and nearby residents. The available records do not specify activity dates, participant numbers, or selection criteria. This article is therefore a descriptive report of implementation.

Preparation began with contact with Mrs. Asti, the recitation group leader. Preliminary discussions addressed objectives, topics, technical arrangements, and potential participation. The team prepared educational materials, communicated the activity to the community, and processed moringa leaves into crackers before the meeting. The program used the four-part 4M approach described in the activity account: education, cultivation, processing, and distribution of seedlings and products.

The education component used a lecture followed by questions and answers about stunting, moringa leaves, food preparation, and cultivation. The team explained the cracker ingredients and preparation method and distributed the prepared products and seedlings. Pudding and croquettes were also prepared for children in the learning group. The report draws on the narrative account and photographs. No structured knowledge assessment, sensory evaluation, nutrient analysis, household follow-up, or anthropometric assessment was reported. The analysis distinguishes documented outputs from possible benefits requiring further measurement.

RESULT AND DISCUSSION

Figure 1 documents the education meeting with the women's group. The lecture and question-and-answer format provided an opportunity to discuss moringa processing and cultivation. The available record does not permit an estimate of attendance or knowledge gain. A cluster randomized study in Southeast Sulawesi assessed feeding practices and child nutrition following an education intervention (Effendy et al., 2020). Indonesian studies using booklets (Sriwiyanti et al., 2022), animated materials (Purnamasari et al., 2022), and social media (Simanjuntak et al., 2022) also illustrate ways to assess educational outcomes. Their findings cannot be treated as evidence of an effect from KELUPAS.



Figure 1. Education meeting with the women's Yasin recitation group.

Prepared moringa crackers were distributed to the women's group, as shown in Figure 2. The students explained the ingredients and preparation process. This gave participants a food example alongside the lecture, but distribution does not demonstrate preference, recipe adoption, or continued consumption. Research with infants and caregivers has assessed acceptance of moringa-containing complementary foods directly (Boateng et al., 2018), underscoring the distinction between offering a product and measuring its acceptance.



Figure 2. Distribution of moringa crackers to the women's group.

Figures 3 and 4 show cracker preparation and the packaged product. The activity account describes using moringa leaves as a topping in place of ingredients such as peanuts or mung beans in similar traditional crackers. A related community service report describes moringa chips as a village product in Klampokan (Septiyono et al., 2021). These examples concern food innovation; they do not establish a clinical benefit.



Figure 3. Preparation of moringa leaf crackers.



Figure 4. Packaged moringa leaf crackers.

Product evaluation should use the actual recipe. Experiments on moringa cookies examined protein, iron, and sensory characteristics (Novitaroh et al., 2022). Studies of biscuits with leaf and flower powders (KC et al., 2022), moringa-fortified biscuits (Syamsiah et al., 2022), and cookies combining moringa and mung bean flours (Puspitadini & Budiono, 2023) examined formulation-dependent properties. Another cookie study found that acceptance varied with leaf powder inclusion (Fapetu et al., 2022). Nutrient values or preferences from those products cannot be assigned to the Payaroba crackers without testing.

Processing also warrants documentation. Experiments examined changes in leaf constituents after drying (Ademiluyi et al., 2018), compared drying methods and quality attributes (Kumar et al., 2024), and assessed dried leaf powder in bakery products (Khaled et al., 2024). The Payaroba account does not provide ingredient quantities, processing conditions, portion sizes, or storage records. Recording these variables would support reproducible production and assessment of the finished foods.

Seedlings were distributed to support household cultivation (Figure 5). Connecting food preparation with access to planting material offered an opportunity for continued household use. No follow-up data were available on planting, seedling survival, harvesting, or consumption, so sustained adoption cannot be established.



Figure 5. Distribution of moringa seedlings.

The team also prepared moringa pudding and croquettes for children in the Umami Muliani learning group (Figures 6 and 7). These products provided additional examples of leaf processing. The record describes preparation and distribution but contains no systematic feedback from children or caregivers and no measurements of consumption.



Figure 6. Moringa pudding prepared for distribution.



Figure 7. Moringa croquettes prepared for distribution.

Published pudding experiments assessed the effects of leaf flour on sensory characteristics and mineral content (Afriza et al., 2023), and the effects of sugar variation on sensory responses (Silahoy et al., 2021). These studies suggest relevant measurements for future product development. Evaluation in Payaroba would require defined recipes, appropriate feedback procedures, and analysis of the complete food.

The program's contribution to stunting prevention must be interpreted cautiously. A randomized trial in Ghana found no significant improvement in infant hemoglobin concentration or growth indicators after four months of the tested moringa supplementation regimen compared with the control food (Boateng et al., 2019). That trial did not evaluate KELUPAS, but it illustrates why a moringa ingredient alone cannot establish a growth benefit. KELUPAS measured neither dietary intake nor child growth and provides no estimate of its effect on stunting.

The documented contribution was the combination of community education, familiar food examples, and seedling distribution through existing local groups. Future evaluation should record attendance and implementation dates, standardize recipes, assess product acceptance, and follow household preparation and consumption. Changes in knowledge should be measured separately from changes in dietary practices. Any assessment of child growth would require an appropriate design, qualified measurement, and sufficient follow-up.

CONCLUSION

KELUPAS introduced moringa leaf processing and cultivation through community education in Payaroba Village. Documented outputs included an education meeting, cracker preparation and distribution, seedling distribution, and pudding and croquettes for

children. These activities provide examples for locally organized food diversification, but do not establish improvements in nutritional status or prevention of stunting. Subsequent work should document participation, standardize recipes, and assess product composition, acceptability, and household use before drawing conclusions about longer-term benefits.

BIBLIOGRAPHY

- Ademiluyi, A. O., Aladeselu, O. H., Oboh, G., & Boligon, A. A. (2018). Drying alters the phenolic constituents, antioxidant properties, α -amylase, and α -glucosidase inhibitory properties of *Moringa oleifera* leaf. *Food Science & Nutrition*, 6(8), 2123–2133. <https://doi.org/10.1002/fsn3.770>
- Afriza, R., Yuska, D., & Yuniarti, E. (2023). *Moringa oleifera* addition to puding on organoleptic test and nutritional content. *Jurnal Ilmiah Kesehatan (JIKA)*, 5(1), 170–180. <https://doi.org/10.36590/jika.v5i1.399>
- Boateng, L., Nyarko, R., Asante, M., & Steiner-Asiedu, M. (2018). Acceptability of complementary foods that incorporate *Moringa oleifera* leaf powder among infants and their caregivers. *Food and Nutrition Bulletin*, 39(1), 137–148. <https://doi.org/10.1177/0379572117708656>
- Boateng, L., Quarpong, W., Ohemeng, A., Asante, M., & Steiner-Asiedu, M. (2019). Effect of complementary foods fortified with *Moringa oleifera* leaf powder on hemoglobin concentration and growth of infants in the Eastern Region of Ghana. *Food Science & Nutrition*, 7(1), 302–311. <https://doi.org/10.1002/fsn3.890>
- Effendy, D. S., Prangthip, P., Soonthornworasiri, N., Winichagoon, P., & Kwanbunjan, K. (2020). Nutrition education in Southeast Sulawesi province, Indonesia: A cluster randomized controlled study. *Maternal & Child Nutrition*, 16(4), Article e13030. <https://doi.org/10.1111/mcn.13030>
- Fapetu, A. P., Karigidi, K. O., Akintimehin, E. S., Olawuwo, T., & Adetuyi, F. O. (2022). Effect of partial substitution of wheat flour with *Moringa oleifera* leaf powder on physical, nutritional, antioxidant and antidiabetic properties of cookies. *Bulletin of the National Research Centre*, 46(1), Article 53. <https://doi.org/10.1186/s42269-022-00746-8>
- Grosshagauer, S., Pirkwieser, P., Kraemer, K., & Somoza, V. (2021). The future of *Moringa* foods: A food chemistry perspective. *Frontiers in Nutrition*, 8, Article 751076. <https://doi.org/10.3389/fnut.2021.751076>
- KC, Y., Bhattarai, S., Shiwakoti, L. D., Paudel, S., Subedi, M., Pant, B. R., Paudel, M., Dhugana, S., Bhattarai, S., Tiwari, T., Koirala, N., Aljarba, N. H., Alkahtani, S., El-Saber Batiha, G., Shiwakoti, R., & Upadhyaya, J. (2022). Sensorial and chemical analysis of biscuits prepared by incorporating *Moringa* flower powder and leaf powder. *International Journal of Food Properties*, 25(1), 894–906. <https://doi.org/10.1080/10942912.2022.2069807>

- Khaled, B. M., Das, A. K., Alam, S. M. S., Saqib, N., Rana, M. S., Sweet, S. R., Naznin, T., Hossain, M. P., Sardar, S., Hossain, Z., Marzan, S., & Yesmin, A. (2024). Effect of different drying techniques on the physicochemical and nutritional properties of *Moringa oleifera* leaves powder and their application in bakery product. *Applied Food Research*, 4(2), Article 100599. <https://doi.org/10.1016/j.afres.2024.100599>
- Kumar, A., Kumar, A., Rout, R. K., & Rao, P. S. (2024). Drying kinetics and quality attributes analysis of Moringa (*Moringa oleifera*) leaves under distinct drying methods. *Journal of Food Process Engineering*, 47(1), Article e14530. <https://doi.org/10.1111/jfpe.14530>
- Laksono, A. D., Wulandari, R. D., Amaliah, N., & Wisnuwardani, R. W. (2022). Stunting among children under two years in Indonesia: Does maternal education matter? *PLOS ONE*, 17(7), Article e0271509. <https://doi.org/10.1371/journal.pone.0271509>
- Novitaroh, A., Sulistiani, R. P., Isworo, J. T., & Syadi, Y. K. (2022). Sifat sensoris, kadar protein dan zat besi pada cookies daun kelor. *Jurnal Gizi*, 11(1), 32–44. <https://doi.org/10.26714/jg.11.1.2022.32-44>
- Oyeyinka, A. T., & Oyeyinka, S. A. (2018). *Moringa oleifera* as a food fortificant: Recent trends and prospects. *Journal of the Saudi Society of Agricultural Sciences*, 17(2), 127–136. <https://doi.org/10.1016/j.jssas.2016.02.002>
- Purnamasari, N. I. W., Supariasa, I. D. N., Komalyana, I. N. T., & Riyadi, B. D. (2022). Pengaruh penyuluhan gizi dengan media animasi pencegahan stunting terhadap pengetahuan dan sikap pengurus insan genre Majapahit. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 5(12), 1578–1584. <https://doi.org/10.56338/mppki.v5i12.2769>
- Puspitadini, M., & Budiono, I. (2023). Substitusi tepung daun kelor (*Moringa oleifera* L.) dan tepung kacang hijau (*Vigna radiate* L.) pada cookies sebagai alternatif makanan tambahan ibu menyusui. *Indonesian Journal of Public Health and Nutrition*, 3(1), 50–58. <https://doi.org/10.15294/ijphn.v3i1.55362>
- Septiyono, E. A., Dwi, M. N., & Puspita, A. A. (2021). Keripik kelor (*Moringa oleifera*) sebagai produk unggulan Desa Klampokan, Bondowoso, Jawa Timur dalam mencegah stunting. *Panrita Abdi – Jurnal Pengabdian pada Masyarakat*, 5(3), 274–281. <https://doi.org/10.20956/pa.v5i3.8058>
- Silahoy, F., Smith, A., & Liline, S. (2021). Evaluation of organoleptic pudding Moringa leaf (*Moringa oleifera*) based on variations add sugar. *RUMPHIUS Pattimura Biological Journal*, 3(1), 007–010. <https://doi.org/10.30598/rumphiusv3i1p007-010>
- Simanjuntak, M., Yulianti, L. N., Rizkillah, R., & Maulidina, A. (2022). Pengaruh inovasi edukasi gizi masyarakat berbasis social media marketing terhadap pengetahuan, sikap, dan perilaku dalam upaya pencegahan stunting. *Jurnal Ilmu Keluarga dan Konsumen*, 15(2), 164–177. <https://doi.org/10.24156/jikk.2022.15.2.164>
- Sriwiyanti, Hartati, S., Aflika F, D., & Muzakar (2022). Effectiveness of nutritional education on knowledge and adolescent attitudes about stunting in high school. *Journal of Applied Nursing and Health*, 4(1), 16–22. <https://doi.org/10.55018/janh.v4i1.30>

- Sultana, S. (2020). Nutritional and functional properties of *Moringa oleifera*. *Metabolism Open*, 8, Article 100061. <https://doi.org/10.1016/j.metop.2020.100061>
- Syamsiah, M., Yuliani, Adriana Imansyah, A., & Trihaditia, R. (2022). Uji organoleptik dan kandungan nutrisi biskuit dengan bahan fortifikasi tepung kelor (*Moringa oleifera*) untuk penanganan stunting. *Agrivet : Jurnal Ilmu-Ilmu Pertanian dan Peternakan (Journal of Agricultural Sciences and Veteriner)*, 10(2). <https://doi.org/10.31949/agrivet.v10i2.3822>
- World Health Organization. (2024, March 1). *Malnutrition*. <https://www.who.int/news-room/fact-sheets/detail/malnutrition>