

Community Empowerment Through Moringa-Based Solid Bath Soap Production Training in Triharjo Village, Lampung

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Abstract

This community engagement program addressed the limited value-added utilization of moringa in Triharjo Village, Merbau Mataram Subdistrict, South Lampung Regency, Lampung Province, by providing practical training on producing moringa-based solid bath soap as a household product with economic potential. The program aimed to improve participants' knowledge and hands-on competence in safe soap-making, introduce a simple standardized procedure, and strengthen readiness for small-scale entrepreneurship. The activity began with coordination and needs identification with local stakeholders, followed by an interactive session on ingredients, safety, and basic formulation principles, and a guided workshop to produce solid soap using moringa powder. Post-training assistance was provided during molding, cutting, curing, and simple packaging. Evaluation used pre-activity and post-activity knowledge tests (30 participants), participant feedback, and basic product observations including appearance, aroma, texture, and acidity level after curing. Results indicated substantial knowledge improvement, with average correctness increasing from 51.1 percent to 86.7 percent, alongside increased participant confidence to reproduce the process independently. The training also resulted in feasible soap bar prototypes with homogeneous appearance and acceptable sensory characteristics for household use. In conclusion, moringa-based solid soap training effectively strengthened community capacity and produced a feasible prototype product, supporting follow-up mentoring toward consistent quality, improved packaging, and sustainable community-based microenterprise development.

Keywords: Community empowerment; Moringa oleifera; Solid bath soap; Skills training; Rural microenterprise

Abstract

Program pengabdian kepada masyarakat ini menjawab permasalahan terbatasnya pemanfaatan kelor bernilai tambah di Desa Triharjo, Kecamatan Merbau Mataram, Kabupaten Lampung Selatan, Provinsi Lampung, melalui pelatihan praktis pembuatan sabun mandi padat berbahan kelor sebagai produk rumah tangga yang memiliki potensi ekonomi. Program ini bertujuan meningkatkan pengetahuan dan keterampilan praktik peserta dalam pembuatan sabun yang aman, memperkenalkan prosedur sederhana yang terstandar, serta memperkuat kesiapan menuju kewirausahaan skala kecil. Kegiatan diawali dengan koordinasi dan identifikasi kebutuhan bersama pemangku kepentingan setempat, dilanjutkan sesi interaktif mengenai bahan, keselamatan kerja, dan prinsip dasar formulasi, serta lokakarya terbimbing untuk memproduksi

sabun padat menggunakan bubuk kelor. Pendampingan pascapelatihan diberikan pada tahap pencetakan, pemotongan, proses curing, dan pengemasan sederhana. Evaluasi dilakukan melalui uji pengetahuan sebelum dan sesudah kegiatan (30 peserta), umpan balik peserta, serta observasi dasar produk yang meliputi penampakan, aroma, tekstur, dan tingkat keasaman setelah curing. Hasil menunjukkan peningkatan pengetahuan yang substansial, dengan rata-rata ketepatan jawaban meningkat dari 51,1 persen menjadi 86,7 persen, disertai meningkatnya kepercayaan diri peserta untuk mereplikasi proses secara mandiri. Pelatihan juga menghasilkan prototipe sabun batang yang layak, berpenampakan homogen, dan memiliki karakteristik sensori yang dapat diterima untuk penggunaan rumah tangga. Kesimpulannya, pelatihan sabun padat berbahan kelor efektif memperkuat kapasitas masyarakat dan menghasilkan prototipe produk yang layak, serta mendukung pendampingan lanjutan untuk menjaga konsistensi mutu, meningkatkan pengemasan, dan mengembangkan usaha mikro berbasis komunitas secara berkelanjutan.

Kata kunci: Pemberdayaan masyarakat; *Moringa oleifera*; Sabun mandi padat; Pelatihan keterampilan; Usaha mikro pedesaan.

INTRODUCTION

Higher education institutions are expected to contribute not only through education and research, but also through community engagement activities that respond to real needs in society. In many rural areas, the main challenge is not the absence of natural resources, but the limited capacity to convert local commodities into higher value products. Triharjo Village, located in Merbau Mataram Subdistrict, South Lampung Regency, Lampung Province, has favorable agro-climatic conditions for agriculture, with a total area of 1,203.01 hectares, hilly topography, annual rainfall of 1,000–3,000 millimeters, and an average temperature of 32°C. Most residents work as farmers, supported by other economic activities; however, agricultural outputs are still largely sold as raw materials, indicating a clear need for processing innovation to increase added value and broaden market reach.

Local agricultural dynamics in Triharjo also show a transition in commodity selection. Since the end of 2016, farmer groups initially relied on citrus as a main crop, but productivity decreased after several years and many trees died. As a response, farmers began shifting toward other commodities, including Javanese chili and moringa. Based on initial coordination with village stakeholders and observations during program preparation, moringa plants are already found in the village and are cultivated on a limited household scale, such as in home yards and mixed garden areas. This indicates that moringa is not entirely absent nor cultivated in large commercial plantations; rather, it is available in a scattered and moderate manner, sufficient for household-level utilization but not yet managed intensively as a village flagship commodity. This condition is important because it shows that the community service program is directed at a resource that is locally available and accessible, while still requiring empowerment to increase its economic value.

Moringa leaves are a promising local commodity due to their high nutritional value and bioactive content. They are reported to be rich in protein, vitamins, minerals, and antioxidants (Shih *et al.*, 2011; Baldisserotto *et al.*, 2018; Nugrahani and Ayuwardani, 2023), and they can grow well under hilly land conditions and relatively hot climates, making them suitable for Triharjo's environment. In practice, however, the use of moringa by the community has remained relatively simple and limited, generally for household consumption, traditional use, or as a supplementary plant around the home. Its utilization as a processed product with higher economic value is still not widely developed. As a result, the local potential of moringa has not yet been optimally

transformed into products that can support household income generation or community-based entrepreneurship.

Beyond food applications, moringa also has potential as a value-added ingredient in natural products, including cosmetics. In the cosmetic context, moringa has been described as having anti-inflammatory benefits and antioxidant-related anti-aging potential (Ali, Akhtar and Chowdhary, 2014; Choi *et al.*, 2016; Satriyani, 2021). This strengthens the rationale for developing moringa-based personal care products that align with increasing consumer interest in natural and herbal-based products. For Triharjo Village, this opportunity is relevant because the available moringa resource, although not yet abundant on a commercial scale, is sufficiently present to serve as a practical starting point for community training and small-scale product development.

Despite this potential, several partner-related gaps have been identified in Triharjo, particularly in postharvest handling, product development, and marketing. Cultivation is not yet standardized, postharvest practices remain minimal, and moringa is still often perceived as an ordinary plant, leading to low motivation for intensive cultivation and systematic processing. In addition, moringa leaves have a short shelf life and deteriorate quickly without immediate processing, while hygienic and modern processing facilities are limited, resulting in inconsistent quality of derivative products. From a market perspective, moringa products are not widely recognized, branding and promotion capabilities remain weak, and marketing is still mostly local with limited online selling competence, further compounded by the lack of product legality and certification for broader distribution.

One practical pathway to strengthen value addition and community capacity is the development of moringa-based solid bath soap. Solid soap is a daily-use household product with relatively simple production steps that can be taught through hands-on training. Moringa incorporation into bar soap has been explored in formulation studies, supporting its feasibility as a community-scale prototype (Rizky, Purwati and Safitri, 2021; Listari, 2022). In the Triharjo program plan, moringa can be incorporated into soap-making by mixing oils with moringa extract or moringa powder, followed by the gradual addition of sodium hydroxide solution while stirring until homogeneous, then molding and curing before packaging. This approach supports both household self-reliance and an initial microenterprise pathway, because community involvement in production is expected to create new business opportunities and jobs, while improving the economic value of moringa-based products (Listari, 2022; Haryanto *et al.*, 2024).

Therefore, this community empowerment program was designed to improve community knowledge and practical skills in safe solid soap production using moringa as a local resource, while introducing a simple standardized procedure and basic readiness for product packaging and marketing. By clarifying the actual condition of moringa availability in Triharjo Village, namely that the plant is locally present but still underutilized and not yet intensively developed, the program becomes more targeted and context-based. In this way, the introduction presents not only the connection between village conditions and the proposed solution, but also the specific local potential that underpins the relevance of the community engagement activity.

GENERAL DESCRIPTION OF THE COMMUNITY, PROBLEMS AND TARGET SOLUTIONS

General description

Triharjo Village is administratively located in Merbau Mataram Subdistrict, South Lampung Regency, Lampung Province, Indonesia. Geographically, the village is situated in a rural highland-to-undulating area with hilly topography, a total area of 1,203.01 hectares, annual rainfall ranging from 1,000 to 3,000 millimeters, and an average temperature of approximately 32°C. These agro-

climatic characteristics support the growth of various agricultural commodities and make the village suitable for farming-based livelihoods. Most of the land is used for settlements, rainfed rice fields, dryland agriculture, and plantation areas, while the majority of residents work in the agricultural sector and related household-based economic activities.

The agricultural profile of Triharjo Village reflects a mixed farming system. The community cultivates several crops commonly found in rural production areas, including food crops, horticultural commodities, and plantation crops. Based on village conditions and community information obtained during the preparation stage of this program, some of the plants grown or utilized by the community include rice, chili, citrus, and moringa, in addition to other yard and mixed-garden plants that support household needs. Among these commodities, moringa represents a particularly important local resource because it is already known by the community and can grow well under local environmental conditions. However, moringa in Triharjo is generally found in home yards, small household plots, or mixed gardens, and has not yet been developed intensively as a large-scale commercial village commodity. This means that the potential of moringa in the village is available and accessible, but its utilization remains limited and has not yet been optimized into higher-value processed products.

In the daily context of the community, moringa leaves are generally recognized as a plant with household usefulness, especially for simple food use and traditional purposes. Nevertheless, community understanding regarding moringa as a raw material for value-added products, particularly personal care or cosmetic products, remains limited. This condition makes moringa a relevant commodity for community empowerment because the village already has a local resource base, but the knowledge, skills, and processing orientation needed to transform it into economically valuable products are still underdeveloped. Therefore, the empowerment activity is directed not toward introducing an entirely new commodity, but toward strengthening the community's capacity to utilize an existing local plant more productively.

This community engagement activity involved 30 members of the Family Welfare Movement (PKK) in Triharjo Village as the main target group. The participants were adult women in productive and socially active age groups, generally ranging from young adults to middle-aged women, who play central roles in household management, family welfare, and community social activities. The PKK group was selected because women's community organizations are strategic actors in disseminating practical knowledge, adopting household-based innovations, and initiating small-scale productive activities that can support family income. In the village context, PKK members are not only involved in domestic roles, but also in organizing community activities related to health promotion, food preparation, family welfare education, social gatherings, and neighborhood-level participation.

The role of PKK in Triharjo Village is highly relevant to the implementation of this program. PKK activities generally include participation in family welfare improvement, household food management, health-related education, support for clean and healthy living behavior, and involvement in community empowerment programs at the village level. Because of this organizational role, PKK members have strong potential to become agents of change in introducing practical innovations that can be reproduced at the household level and shared with other community members. Their involvement in the moringa-based soap training was therefore expected not only to improve individual participant skills, but also to encourage wider community diffusion of knowledge and strengthen the foundation for home-based microenterprise development.

Triharjo Village has both environmental and social capital that support the implementation of a moringa-based empowerment program. Environmentally, the village possesses land and climate conditions suitable for moringa growth, while socially, it has an active PKK group that can function as a community-based partner for skill transfer and follow-up assistance. However, because moringa has not yet been intensively cultivated or processed into standardized products, there remains a gap between local resource availability and its economic utilization. This gap underlies the importance of the present community engagement program as a targeted intervention to strengthen community capacity in transforming locally available moringa into a feasible household product with added value.

Tabel 1: Target description

Name of target	Characteristics of target	Amount	General problem or targets
Non-economic target	PKK women (Family Welfare Movement), household-based community group in Triharjo Village	30	Knowledge and skills gaps in value-added processing of moringa into safe household cosmetic products (education and health-related capacity building)

Problem

The main problem in Triharjo Village is the underutilization of moringa leaves as a local resource with added economic value. Moringa plants are already present in the village and are known by the community, but their use is still limited to simple and conventional purposes. In daily practice, moringa leaves are generally used as vegetables, for household consumption, or as a plant grown in home yards and mixed gardens. This indicates that the community is familiar with moringa mainly as an ordinary household plant, not yet as a resource that can be processed into derivative products with higher functional and economic value.

This condition is related to the limited knowledge of the community regarding the broader potential of moringa. The participants generally understood moringa as a food plant and, to some extent, as a traditional plant associated with health benefits. However, their knowledge of moringa as a raw material for value-added products, particularly personal care and cosmetic products such as solid bath soap, was still low. In addition, the community had limited understanding of postharvest handling, simple processing methods, hygienic production, basic formulation principles, and the safe use of supporting ingredients. As a result, moringa leaves available in the village had not yet been processed into products with better shelf life, practical usefulness, and market potential.

Another major issue is that moringa has not yet been optimized as a village-based commodity. In Triharjo, moringa grows in household yards and small garden areas, but it has not been cultivated or managed intensively as a superior local commodity. Consequently, its utilization remains sporadic and largely non-productive. Fresh moringa leaves are also perishable and require prompt handling and processing, yet the community has not had sufficient skills or assistance to carry out such processing in a structured way. This limits the continuity of moringa-based product development at the household level.

Therefore, the problems addressed in this community engagement program can be summarized into two main aspects. First, there is a knowledge and skills gap, namely limited community

understanding of moringa beyond its conventional use and limited practical competence in processing it into safe and feasible household products. Second, there is an economic utilization gap, namely that moringa has not yet been developed as a value-added local commodity that could support household productivity and community-based microenterprise. These conditions justify the implementation of moringa-based solid bath soap training, because the program directly responds to the actual situation in the village: moringa is available and recognized by the community, but its potential has not yet been optimally utilized.

The problems identified in Triharjo Village can be grouped into two main aspects, namely the knowledge and skills gap in processing moringa leaves and the limited economic utilization of moringa as a local resource. These problems and the corresponding solutions are summarized in Table 2.

Tabel 2: Problem and solution

No	Problem	solution	Indicators of goal
1	Knowledge and skills gap: Community knowledge of moringa leaves is still limited to conventional uses, such as vegetables, household consumption, and traditional purposes. Participants also have limited practical skills in postharvest handling, hygienic processing, basic formulation, and safe production of moringa-based solid bath soap.	Interactive education on the broader potential of moringa leaves, followed by guided hands-on training in safe moringa-based solid bath soap production, including ingredient introduction, formulation basics, hygiene, and safety procedures.	Increased pretest-posttest scores; improved participant understanding of moringa as a value-added raw material; increased ability and confidence to reproduce the key steps of safe soap-making correctly.
2	Economic utilization gap: Although moringa is available in household yards and mixed gardens in Triharjo Village, it has not yet been optimally utilized as a value-added local resource. Its use remains simple and occasional, and it has not been developed into feasible household products with economic potential.	Introduction of a simple standardized production procedure, mentoring during molding, cutting, curing, and basic packaging, as well as strengthening awareness of moringa-based soap as a feasible household and microenterprise product.	Participants are able to produce moringa-based solid bath soap prototypes with acceptable appearance and usability; increased awareness of moringa's economic potential as a locally available resource.

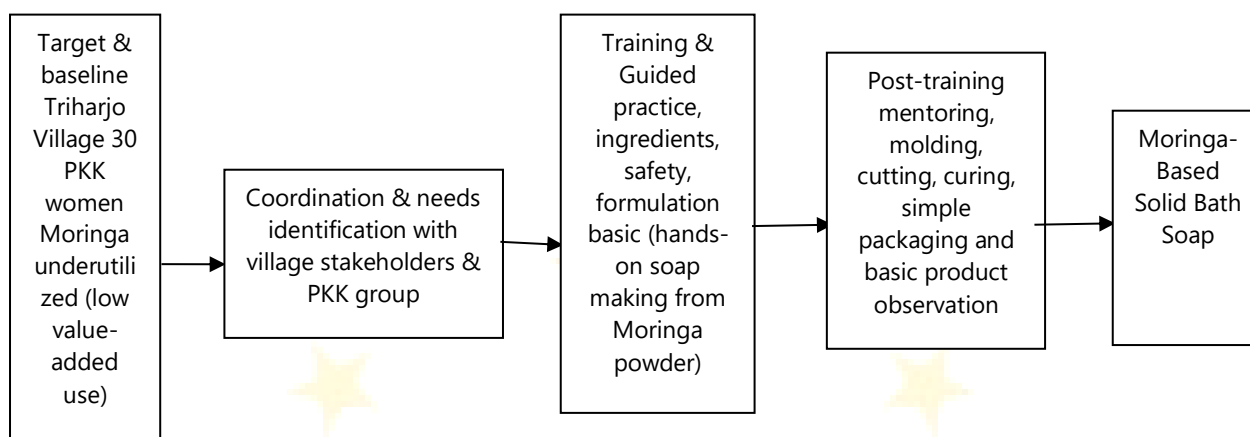


Figure 1: Flow of of innovation

Target solution

The intervention was designed as a sequential pathway from needs identification to prototype output and early microenterprise readiness. It began with coordination with village stakeholders and PKK representatives to confirm participant characteristics, training venue readiness, and priority needs. The next step was an interactive session to build foundational understanding of moringa's value-added potential and to introduce safe handling practices for ingredients, particularly during soap production. The core intervention was a learning-by-doing workshop where participants practiced producing moringa-based solid bath soap (and moringa-based face mask) under facilitator supervision, followed by mentoring during molding, cutting, curing, and simple packaging to strengthen consistency and readiness for household use. The outcome was expected to reach two levels: (1) strengthened community capacity (knowledge, skills, and safe behavior) and (2) feasible prototype products that can be improved through follow-up mentoring for consistent quality, better packaging, and sustainable community-based microenterprise development.

METHOD

This community engagement program used a community-based empowerment approach through education, hands-on training, mentoring, and evaluation. The activity involved 30 PKK women in Triharjo Village, Merbau Mataram Subdistrict, South Lampung Regency, Lampung Province, Indonesia. The implementation was carried out sequentially, starting from preparation and coordination with village stakeholders and PKK representatives, followed by socialization on the potential of moringa leaves as a value-added local resource and the basic principles of safe soap-making.

The core activity was guided practical training in producing moringa-based solid bath soap. Participants were introduced to the materials used, hygiene and safety precautions, and the basic formulation process. The practical session included preparation of the ingredients, mixing of moringa with the soap base, controlled addition of sodium hydroxide solution, stirring until homogeneous, molding, and curing. After the training, participants received mentoring during the finishing stage, including demolding, cutting, curing, and simple packaging, to strengthen their understanding of the complete production flow.

Data were collected through attendance records, direct observation during the training, documentation, participant feedback, and pretest-posttest assessment. Evaluation was conducted

at both process and outcome levels. Process evaluation focused on participant attendance, engagement, and adherence to hygiene and safety procedures. Outcome evaluation focused on changes in participant knowledge and understanding, as indicated by pretest-posttest results, as well as the successful production of moringa-based solid bath soap prototypes with acceptable appearance and usability.

Table 3: Procedure of community engagement implementation

Stage	Activities	Output
Preparation	Coordination with village stakeholders and PKK representatives; identification of local conditions, participant characteristics, schedule, and venue readiness	Implementation plan and participant readiness
Socialization	Delivery of material on moringa potential, value-added utilization, soap-making principles, and safety aspects	Increased participant understanding of moringa utilization and safe soap-making
Hands-on training	Demonstration and guided practice in producing moringa-based solid bath soap, including ingredient preparation, mixing, molding, and curing	Participants acquire practical soap-making skills
Mentoring	Assistance during demolding, cutting, curing, simple packaging, and product observation	Soap prototypes with acceptable initial appearance and usability
Evaluation	Attendance records, observation, documentation, participant feedback, and pretest-posttest	Data on participation, knowledge improvement, and product feasibility

RESULTS AND DISCUSSION

The moringa-based solid bath soap training was attended by 30 PKK women in Triharjo Village and was implemented through a brief concept and safety session followed by guided hands-on production. The practical learning process is illustrated in Figure 2, which documents the main stages of the activity, including the introduction of materials, safe handling practice, the mixing and stirring process, and molding of the soap batter under facilitator supervision. Through this learning-by-doing approach, participants were able to directly observe critical control points, particularly safety procedures when working with sodium hydroxide, and immediately apply them during group practice. As a tangible output, the activity produced moringa-based solid soap prototypes in molded bar form, ready for the curing stage and basic packaging preparation, as shown in Figure 3.

The results of this community engagement activity can be discussed based on the indicators used in the program evaluation, namely knowledge improvement, participant understanding of safe production practices, and the feasibility of the resulting soap prototypes. Learning outcomes were evaluated using a pretest-posttest instrument administered to all participants ($n = 30$) using the same six questions. Pretest results indicated that baseline knowledge was still uneven. Only 2 participants (6.7%) initially knew that moringa can be used as a cosmetic raw material such as bath soap (Question 1), and none of the participants (0%) stated that they could make solid soap independently using safe procedures (Question 2). Meanwhile, 15 participants (50.0%) correctly identified sodium hydroxide as a base used in soap making (Question 3), and 25 participants (83.3%) answered correctly regarding the safest mixing procedure for sodium hydroxide solution (Question 4). Understanding related to product use and skin feel was relatively higher at baseline: 23 participants (76.7%) correctly recognized that soap can still clean even with low foam (Question 5), and 27 participants (90.0%) correctly understood that overly harsh soap tends to make skin

feel dry or tight (Question 6). Overall, the total correct responses at pretest were 92 out of 180, corresponding to an average score of 51.1%.

After the training and hands-on practice (Figure 2), posttest results showed a clear improvement across all questions. Correct answers increased to 22 participants (73.3%) for Question 1 and 22 participants (73.3%) for Question 2, demonstrating a substantial increase in awareness that moringa can be processed into cosmetic products and greater readiness or confidence to reproduce the process. Knowledge that sodium hydroxide functions as the base in soap making rose to 22 participants (73.3%) (Question 3). Safety understanding became universal, with 30 participants (100%) answering correctly regarding the safest sodium hydroxide mixing procedure (Question 4). Likewise, all participants answered correctly for Questions 5 and 6 (each 100%), indicating that misconceptions about foam as a measure of cleansing power were corrected and that participants understood the signs of overly harsh soap on the skin. In total, posttest correct responses reached 156 out of 180, equivalent to an average score of 86.7%, reflecting a 35.6 percentage-point increase in overall knowledge.

The item-by-item improvement pattern supports the effectiveness of combining demonstration with direct practice. The largest gains occurred in Question 1 (6.7% → 73.3%) and Question 2 (0% → 73.3%), suggesting that the training successfully addressed the community's initial gap in recognizing moringa's value-added potential and strengthened participants' self-efficacy to produce solid soap at the household level. Safety knowledge reaching 100% (Question 4) highlights that emphasizing the correct mixing sequence and reinforcing it during practice is particularly impactful in community training contexts, which is important because safe handling is a prerequisite for sustainable adoption (Listari, 2022). The improvement to 100% in Questions 5 and 6 suggests that participants not only learned the production steps but also gained consumer-relevant understanding about product performance and skin comfort. This is relevant because the skin surface is naturally acidic and skin pH contributes to barrier function, so overly alkaline products may feel drying or tight on the skin (Lambers *et al.*, 2006; Schmid-Wendtner and Korting, 2006).

In addition to knowledge gains, the visual outputs shown in Figure 3 demonstrate the feasibility of producing moringa-based solid soap prototypes through a community training setting. The resulting products showed an acceptable initial appearance as household-scale prototypes and indicate that moringa leaves, which were previously used mainly in simple household ways, can be transformed into a more value-added product through appropriate training and assistance. This finding is consistent with prior studies that formulated bar soap using moringa leaf ingredients (Sabila Rosyidah, Yuniarti Dewi R and Rifqi Ferry Balfas, 2020a). The prototypes produced in this activity represent early-stage products that can still be improved through follow-up mentoring, particularly in standardizing curing time, ensuring repeatability of texture and appearance across batches, and strengthening packaging and labeling for better market acceptance. Future iterations may also incorporate a simple product quality checklist, such as uniformity, hardness after curing, and basic acidity measurement after curing, as well as a more structured pathway toward compliance if the village intends to scale up production beyond household use, since monitoring acid-base balance is commonly recommended when evaluating natural soaps for user comfort (Zdrada-Nowak, Aniołkowska and Deska, 2025).

Several practical challenges were also identified during implementation. At the beginning of the activity, participants showed varied baseline knowledge, particularly regarding moringa utilization beyond food and traditional purposes. Some participants were also initially unfamiliar with the technical terms and safety aspects involved in soap making, especially the proper handling of

sodium hydroxide. In addition, because the activity was conducted in a community setting using simple tools, product uniformity still depended greatly on facilitator guidance during mixing and molding. Nevertheless, these constraints did not hinder the achievement of the main program objectives. Instead, they indicate that one-time training is effective as an initial intervention, while continued mentoring remains important to improve participant independence, product consistency, and readiness for wider household-scale application.

The improvement in participant knowledge and understanding was measured using a pretest-posttest instrument administered to all participants. The comparison of correct responses for each question is presented in Table 4.

Table 4: Pretest and posttest correct responses (n = 30)

Question	Pretest n (%)	Posttest n (%)
Q1: Awareness: moringa as cosmetic raw material	2 (6.7)	22 (73.3)
Q2: Self-efficacy: ability to make solid soap safely	0 (0.0)	22 (73.3)
Q3: Concept: sodium hydroxide as base in soap making	15 (50.0)	22 (73.3)
Q4: Safety: safest sodium hydroxide mixing procedure	25 (83.3)	30 (100)
Q5: Product performance: cleansing vs foam	23 (76.7)	30 (100)
Q6: Skin feel: harsh soap effect	27 (90.0)	30 (100)



Figure 2: Implementation of moringa-based solid bath soap training for PKK participants in Triharjo Village, covering material introduction, safety instruction, supervised mixing, and soap molding practices



Figure 3: Early-stage moringa-based solid bath soap prototypes produced during the community training, showing the feasibility of household-scale product development

CONCLUSIONS AND SUGGESTIONS

This community engagement program successfully strengthened the capacity of PKK women in Triharjo Village in understanding and practicing the production of moringa-based solid bath soap through a combination of education, safety briefing, guided hands-on training, and mentoring. The activity demonstrated that moringa leaves, which had previously been utilized mainly for conventional household purposes, can be introduced as a value-added local resource for household personal care products. This was reflected in the improvement of participant knowledge, as shown by the increase in average pretest-posttest correctness from 51.1% to 86.7%, as well as in the successful production of feasible moringa-based solid soap prototypes.

The program also showed that community-based training can serve as an effective initial intervention to improve both knowledge and practical skills related to safe soap-making. In addition to increasing participant understanding of moringa utilization beyond food and traditional uses, the activity strengthened awareness of hygiene, safety, and the importance of correct production procedures in household-scale product development. The resulting soap prototypes provide an initial basis for the future economic utilization of moringa in Triharjo Village.

For sustainability, follow-up mentoring is recommended to improve participant independence and product consistency. Periodic assistance is needed to strengthen curing standardization, batch uniformity, simple product quality observation, and basic packaging and labeling practices. It is also recommended that village stakeholders and PKK management support the continuity of these activities through regular practice sessions and the formation of a small working group. In the longer term, support from relevant institutions will be important to strengthen business management, product development, and market readiness so that moringa-based solid bath soap can develop from a training output into a sustainable community-based microenterprise product.

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