



JURNAL SURYA

Jurnal Media Komunikasi Ilmu Kesehatan

Faculty of Health Sciences Universitas Muhammadiyah Lamongan
Volume 18 Issue 2 2026
e-ISSN: [2715-064X](#) p-ISSN: [1979-9128](#)



Community-Based Pharmaceutical Technology for Cooking Oil Valorization: A Pretest–Posttest Study

Aditya Sindu Sakti¹ , Amran Nur^{2*}, Bambang Tjiroso³ and Sandrawati⁴

1. Department of Natural Products Pharmacy, Faculty of Medicine and Health Sciences, Universitas Khairun, North Maluku, Indonesia
2. Department of Pharmacology and Toxicology, Faculty of Medicine and Health Sciences, Universitas Khairun, North Maluku, Indonesia
3. Department of Mechanical Engineering, Faculty of Engineering, Universitas Khairun, North Maluku, Indonesia
4. Department of Community and Social Pharmacy, Faculty of Medicine and Health Sciences, Universitas Khairun, North Maluku, Indonesia

ARTICLE INFORMATION

Article process

Submission: July 6, 2026
Revision : October 5, 2026
Accepted : October 7, 2026

Co-Author

Amran Nur
amran.nur@unkhair.ac.id
Department of Pharmacology
and Toxicology, Faculty of
Medicine and Health Sciences,
Universitas Khairun, North
Maluku, Indonesia

Cite this as:

Sakti, A. S., Nur, A., Tjiroso, B
& Sandrawati. (2026).
Community -Based
Pharmaceutical Technology for
Cooking Oil Valorization: A
Pretest–Posttest Study. SURYA:
J. Media Komunikasi Ilmu
Kesehatan, 18 (2), 87-106.
<https://doi.org/10.38040/js.v18i2.1546>

ABSTRACT

Introduction: Recycled cooking oil has been used to make soap, but it has environmental and health hazards. This study assessed the effectiveness of a community educational intervention to enhance the knowledge of used cooking oil management and soap production.

Methods: Nine women attended an educational session, demonstration, and hands-on soapmaking activity. Knowledge was assessed using a validated pre- and post-intervention questionnaire, and measures of satisfaction and confidence.

Results: The reliability of the questionnaire was high (Cronbach's $\alpha = 0.903$). Knowledge scores went from 66.7% to 98.9% – a 32.2 percentage point increase. Eight improved while 1 remained perfect. Overall satisfaction was 100% and 88.9% reported very high confidence in making their own soap.

Conclusion: The intervention was effective in improving short-term knowledge and practical confidence of used cooking oil recycling. It may improve household environmental health literacy and circular economy practices. Longer-term follow-up in larger controlled studies is needed to assess sustained outcomes and product safety.

Keywords: Community Empowerment, Environmental Health Literacy, Pharmaceutical Technology, Soap Production and Used Cooking Oil

INTRODUCTION

Used cooking oil constitutes an important household waste stream since improper reuse and disposal may lead to interlinked

public-health and environmental problems. This is particularly problematic in coastal communities where household waste can enter drainage and aquatic systems and where local livelihoods are closely linked

to the quality of the environment. In the Jailolo District, West Halmahera Regency, North Maluku, fisheries, small-scale culinary activities, marine tourism, and household-based enterprises are highly dependent on the surrounding environmental conditions (Rachman, Nur, Sakti, Sandrawati, et al., 2025; Sandi et al., 2025). Preliminary observations and community discussions in Gufasa Village suggest that used cooking oil generated from household cooking and small-scale food processing is often reused repeatedly for frying or discarded into soil, drains and nearby water channels. The quality of the oil can be damaged and the formation of undesirable degradation products can be increased by repeated heating. Disposal that is not controlled can clog drainage and cause soil and water pollution (Agustina et al., 2025; Astuty et al., 2026). Such practices are particularly problematic in coastal settlements where domestic waste streams can eventually reach aquatic and marine environments (Prabandari et al., 2024). Thus, the management of used cooking oil in Gufasa is a household environmental-health problem and a waste-disposal issue that requires a readily available channel for risk communication and resource recovery.

Community conversion of used cooking oil into soap has been increasingly promoted as such a strategy. Previous attempts have been soap-making training in households and women's groups, integrating used cooking oil utilisation with community empowerment, and placing valorisation within waste reduction and circular economy practices (Dewi et al., 2022; Fridayani et al., 2025; Hartini et al., 2025; Hastuti & Irma Maria Dulame, 2025; Hidayah et al., 2025; Hidyus et al.,

2024; Jayadi et al., 2025). Taken together, these studies show that soap making offers a technically accessible pathway for households to move used cooking oil from disposal to productive use. However, the existing literature is heterogeneous in its purposes and evaluations. Some of the interventions are aimed at environmental awareness; others at the successful making of soap or household economic opportunities. Many are reported primarily as training or community-service programs. Hence, the results of participation, completion of soap products or perceived benefits are often more visible than standardised assessment of what the Participants actually learn from the intervention. Less consistent evidence is also present in the literature regarding community members' knowledge of health risks associated with repeated oil use, environmental effects of disposal, principles of safe pretreatment and saponification, and the scientific basis of the valorisation process. Community implementation also faces practical challenges such as safe handling of alkaline materials, formulation consistency, access to suitable equipment, product-quality control, ongoing mentoring, and weak formal collection systems, which may limit the sustainability and transferability of one-off soap-making programs (Al Rosiif et al., 2026; Janah et al., 2025; Jayadi et al., 2025).

These limits suggest a more specific knowledge gap. The unanswered question is no longer whether used cooking oil can be converted into soap, since technical feasibility and possible community application have already been demonstrated. Rather, the question is whether soap-based valorisation can be

structured as a measurable environmental-health learning intervention which incorporates risk awareness with basic pharmaceutical and formulation principles. Pharmaceutical technology provides a suitable framework as the soap production at community level does not just provide a recipe but needs to translate the scientific principles on raw material preparation, formulation, saponification, material safety, hygiene, processing and quality-oriented handling into procedures that can be understood and applied by non-specialist Participants (Al Rosiif et al., 2026; Naemah et al., 2026; Widowati & Zamroni, 2023). This differentiation is especially important for Dasawisma members in Gufasa Village, where women's household groups are directly involved in food preparation, household waste handling, family health practices and community mobilisation (Hidayah et al., 2025; Juniabela et al., 2023). The current conceptualisation of used cooking oil valorisation as a formal educational intervention is one that brings together environmental-health knowledge with participatory discussion, supervised demonstration, and practical application, rather than placing Participants as passive recipients of environmental messages or soap-making demonstration attendees.

Therefore, this study was aimed to evaluate the short-term effect of a community-based pharmaceutical technology intervention on knowledge about used cooking oil management and soap-based valorisation of Dasawisma members in Gufasa Village. The intervention consisted of environmental-health education, participatory discussion, supervised demonstration of soap-making and hands-on practice. Knowledge was

assessed before and immediately after the intervention and participant satisfaction and perceived ability to make soap independently were also measured. Therefore, the present study extends mainly descriptive soap-making or waste-management schemes by adopting an evaluative pretest-posttest model and a validated knowledge tool to produce empirical evidence on immediate learning outcomes. The contribution is deliberately narrow: the study does not establish long-term behaviour change, sustained independent practice, or physicochemical safety of the resulting soap, but it provides preliminary evidence on whether basic pharmaceutical technology can be translated into an understandable and acceptable community-level environmental-health intervention. This study therefore provides a methodological basis for future studies that include larger samples, control groups, longer follow-up, behavioural indicators, and objective product quality assessment.

METHOD

Study Design and Setting

This was a community-based educational intervention study with pre-test and post-test design (Sakti, Dewi, et al., 2025). The research was conducted in Gufasa Village, Jailolo District, West Halmahera Regency, North Maluku, Indonesia. The intervention was conceptualised to be a model for environmental health education using community-based pharmaceutical technology through the introduction of the valorisation of used cooking oil into soap production at the household level. The intervention consisted of two structured sessions on the same day. The first session

was approximately 15 minutes, it was about environmental health education, occupational safety and health (K3), safe used cooking oil handling and introduction to the principles of soap production through saponification. The second session consisted of approximately 60 minutes of supervised hands-on soap making practice, to help participants with the preparation and production process of soap from used cooking oil.

Training was provided by educational materials, verbal explanations, demonstrations, and direct practical instruction. The facilitators taught them safety procedures, how to prepare materials, processing steps and proper handling in the production of soap. A structured approach was adopted which combined knowledge transfer and practical application for improving the understanding of used cooking oil management and its valorisation to household products for the Participants (Rachman, Nur, Sakti, Sandrawati, et al., 2025).

Participants and Recruitment

Participants were purposively recruited from active female members of the Dasawisma group in Gufasa Village. Eligible participants were women aged ≥ 18 years, permanent residents of the study area, involved in household cooking or domestic waste management, willing to participate in the intervention, and able to complete the pretest and posttest. Participants were excluded if they had previous formal training in used cooking oil valorization or soap production, were unable to participate safely, withdrew consent, or had incomplete pretest or

posttest data (Rachman, Nur, Sakti, Sandrawati, et al., 2025; Sakti, Do Toka, et al., 2026; Sakti, Nur, Hamid, et al., 2026). A total of 12 individuals were assessed for eligibility, of whom 4 were excluded and 9 were enrolled.

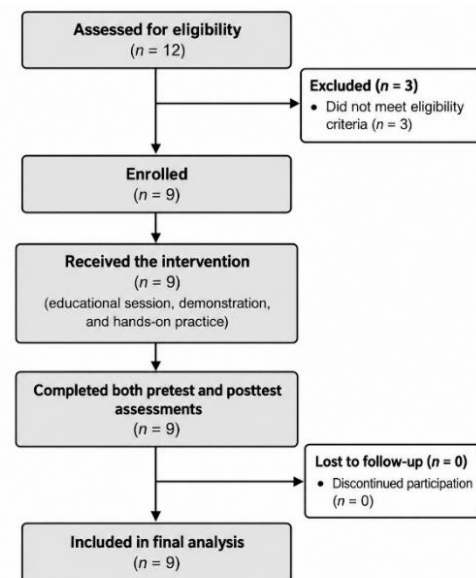


Figure 1. Participant Flow Diagram

Nine participants completed the intervention and were included in the final analysis. The sample was obtained using purposive sampling of eligible Dasawisma members available during the study period; therefore, no formal power calculation was performed.

Questionnaire Construction

A structured questionnaire was developed to measure changes in Participants knowledge regarding used cooking oil, its health and environmental effects, and its potential conversion into useful household products (Rachman, Nur, Sakti, Sandrawati, et al., 2025). The initial questionnaire consisted of 20 items covering several domains, including the definition of used cooking oil, risks associated with repeated use,

environmental impacts of improper disposal, household waste collection practices, soap production as a valorization strategy, and the role of women's community groups in promoting responsible waste management.

Before the main intervention, the questionnaire was subjected to validity and reliability testing using data obtained from 11 respondents who were not included in the main intervention participants. Item-total correlation analysis was conducted to evaluate item validity. Items were considered valid when the correlation with the total score was statistically significant. Items with non-significant correlations or non-estimable correlations due to constant responses were removed. This process resulted in 10 retained items (P4, P5, P8, P9, P13, P14, P16, P17, P18, and P20) from the original 20 items.

The internal consistency reliability of the retained items was assessed using Cronbach's alpha. Because the knowledge items were scored dichotomously, the reliability coefficient was interpreted as an internal consistency estimate of the retained scale. The final pre-test and post-test questionnaire consisted only of items that fulfilled the validity and reliability criteria (Rachman, Nur, Sakti, Sandrawati, et al., 2025; Sakti, Nur, Hamid, et al., 2026).

Measuring Changes in Knowledge

Knowledge was measured by 10 valid and reliable items of questionnaire. Each item was scored dichotomously, with 1 being given for a correct response and 0 for an incorrect response. The total knowledge score ranged from 0 to 10, with higher scores indicating better knowledge on used

cooking oil management and soap-based valorization. To facilitate interpretation, the total score was also expressed as a percentage ranging from 0 to 100. A pre-test was done before the educational and practical intervention to assess the baseline knowledge. The post-test was carried out right after the intervention in order to assess the alteration of knowledge following the program (Rachman, Nur, Sakti, & Tjiroso, 2025). The difference between post-test and pre-test scores was calculated as a measure of Participants knowledge change (Sakti, Nur, & Hamid, 2026). Missing data were checked before analysis. Participants with incomplete pre-test or post-test questionnaires were excluded from the paired analysis. In this study, all nine participants completed both assessments; therefore, no missing data were present in the final analysis.

Participant Satisfaction Assessment

Participant satisfaction with the training program was measured using the structured satisfaction questionnaire. The questionnaire assessed Participants perception of the clarity and usefulness of the material, the delivery, completeness of information, practical help, adequacy of tools and materials, applicability in daily life, willingness to recommend the program, perceived ability to make soap independently, and satisfaction with the training. Satisfaction categories were described in terms of frequencies and percentages of the responses (Sakti, Negara, et al., 2025).

Ethical Considerations

Ethical considerations were maintained throughout the study. Before participation,

all participants were informed about the objectives, procedures, potential benefits, and voluntary nature of the study. Written informed consent was obtained from all participants before data collection and intervention activities. Participants were informed that their participation was voluntary and that they had the right to withdraw from the study at any time without any consequences. All collected data were handled confidentially and used only for research purposes (Abbasinia et al., 2022; Al Habsi, 2024; Schwind et al., 2025).

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics version 21. Descriptive statistics were used to present participant characteristics, knowledge scores and satisfaction responses. Knowledge scores are presented as means and percentages. Prior to comparison of pre-test and post-test knowledge scores, the data distribution was checked using Shapiro–Wilk normality test due to small sample size. As the normality assumption was not fulfilled, the difference between knowledge scores at pre-test and post-test was analysed with the Wilcoxon signed-rank test for paired observations. Statistical significance was defined as a P value <0.05 (Sakti, Suwandi, et al., 2024).

RESULTS

Instrument Validity and Reliability

The first questionnaire included 20 items designed to assess participants' knowledge on the management of used cooking oil, its health and environmental risks and its potential valorisation into soap through

community-based pharmaceutical technology. Before the intervention, the Pearson item-total correlation analysis was performed to test the item validity of the questionnaire (Sakti, Octavia, et al., 2024). The validation sample consisted of 11 respondents who were not involved in the main intervention. The validity analysis showed that 10 of the initial 20 items met the validity criteria and were retained for the final knowledge assessment. The retained items were P4, P5, P8, P9, P13, P14, P16, P17, P18 and P20. The items showed statistically significant item-total correlations (correlation coefficients ranged from 0.764 to 0.986).

Changes in Participants Knowledge

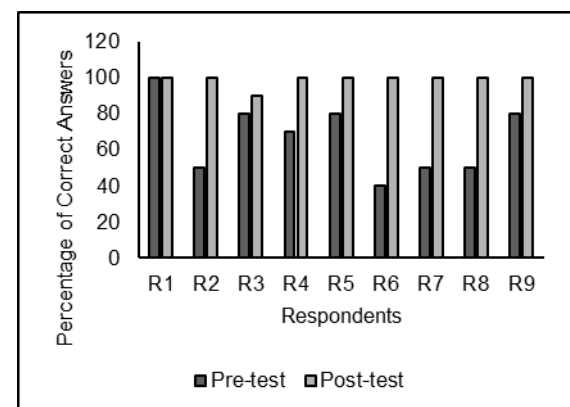


Figure 2. Comparison of Pre-Test and Post-Test Percentage of Correct Answers Across Respondents

Nine Participants completed pre-test and post-test assessment. The results of the description showed a clear improvement in knowledge after the educational and practical intervention. The percentage of correct responses increased from 66.7% at pre-test to 98.9% at post-test, with an absolute improvement of 32.2 percentage points.

Table 1. Pearson Item-Total Correlation Analysis of Retained Valid Questionnaire Items

Item	Pearson Correlation (r)	Sig. (p-value)	Decision
Q1	0.980	< 0.001	Valid
Q2	0.764	0.006	Valid
Q3	0.764	0.006	Valid
Q4	0.764	0.006	Valid
Q5	0.764	0.006	Valid
Q6	0.764	0.006	Valid
Q7	0.764	0.006	Valid
Q8	0.986	< 0.001	Valid
Q9	0.764	0.006	Valid
Q10	0.764	0.006	Valid

Item-Level Knowledge Improvement

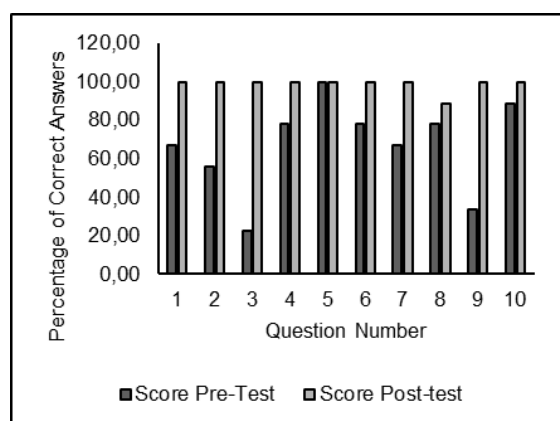


Figure 3. Pre-Test and Post-Test Performance Based on Percentage of Correct Answers by Question Item

The percentage of correct answers before intervention varied across items showing that baseline understanding of the topic was not uniform. Some items were already well understood before training, while others revealed substantial gaps in knowledge. Item 3 scored the lowest in the pre-test (22.2% correct answers), followed by the item 9 (33.3% correct answers). These items were the ones that improved the most after the intervention and went up

to 100% of correct answers in the post-test. This suggests that the intervention was able to target the areas of the weakest baseline knowledge. There were several other items that showed marked improvement. Item 2 increased from 55.6% to 100%, and items 1 and 7 from 66.7% to 100%. Item 4 and 6 increased from 77.8% to 100% and item 10 increased from 88.9% to 100%. Item 5 had 100% scores in both the pre-test and post-test, indicating that this knowledge was already well understood by participants before the intervention. Item 8 improved from 77.8% to 88.9% and was still the only item that did not achieve complete correct response after intervention. Overall results at the item level showed that the intervention improved total knowledge scores and reduced knowledge gaps for specific domains related to used cooking oil handling, environmental health risks, and valorization for soap making.

Participant Satisfaction with the Training Program

Participant satisfaction was measured on 10 indicators such as clarity of material, usefulness, delivery, practical assistance, adequacy of tools and materials, applicability in daily life, willingness to recommend the program, perceived ability to make soap independently and overall satisfaction of the training. The indicators of material clarity, material usefulness, delivery clarity, completeness of information, practical assistance, adequacy of tools and materials, and applicability in daily life were dominated by the “very satisfied” answers (Anwar & Naili Kamaliah, 2025). The program is also considered to be of high practical

usefulness by participants. For example, 88.9% of the Participants reported that they were very satisfied with their ability to make soap on their own after the training and 100% reported being very satisfied with the overall training program. The positive responses to willingness to recommend to family members or neighbors also showed positive responses, but this indicator had a slightly higher

proportion of “satisfied” responses than the other indicators. This suggests that while participants valued the program overall, future implementation could be enhanced by further follow-up support, repeated practice, or mentoring at the community level to bolster confidence in disseminating the practice beyond the training Participants (Setiawati et al., 2025).

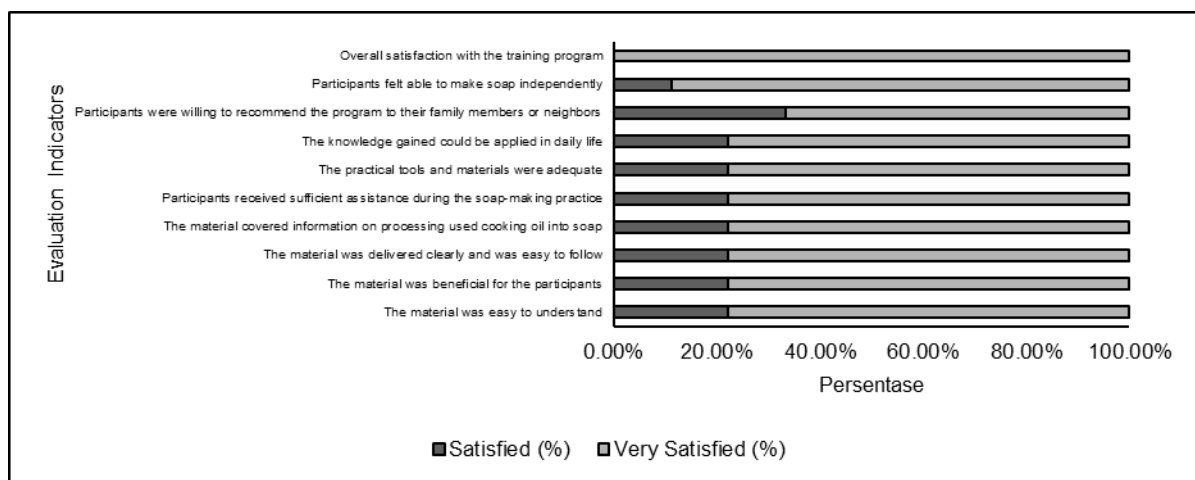


Figure 4. Participants Evaluation of Training Program Satisfaction Across Key Indicators

DISCUSSION

Instrument Validity and Reliability

Six items (P1, P3, P7, P12, P15, and P19) provided the respondents with the same answers, which led to correlation coefficients that could not be calculated. These items were dropped because they did not discriminate between respondents with different levels of knowledge and they were not variable. Four additional items (P2, P6, P10, and P11) were eliminated because of non-significant item-total correlations. These items were removed to increase the measurement accuracy of the final questionnaire by retaining only those items that have enough empirical validity (Anggraini et al., 2022; Taherdoost, 2022). Validity of

the 10 items chosen for the final pre-test and post-test questionnaire Excluded items are not presented in Table 1 because they did not fulfill the validity criteria and thus were not incorporated into the final measurement instrument.

The reliability analysis demonstrated good internal consistency of the questionnaire. The Cronbach's alpha for the original 20-item instrument was 0.903 (above the accepted threshold of 70) (Bujang et al., 2018; Kilic, 2016; Taber, 2018). This finding suggests that the questionnaire items were internally consistent in measuring the knowledge construct intended. However, several constant response and non-significant items justified the reduction of items (Gagnier et al., 2021; Shalihin et al.,

2024). Thus, the final knowledge instrument used in the pre-test and post-test analysis consisted of 10 items that were declared valid.

Changes in Participants Knowledge

Wilcoxon signed-rank test showed a significant difference between pre-test and post-test knowledge scores ($W = 0$, $p = 0.0078$) implying that knowledge scores of Participants significantly increased after the intervention (Chandler et al., 2025; Funa & Gabay, 2025; Jmaiel et al., 2025). This observation suggests that the intervention was associated with better understanding of used cooking oil management and soap-based valorisation among the Participants.

The biggest single improvements were made by those who were lowest at the start. For example, those who started with scores between 40 and 50% ended up with 100% scores after the intervention. This implies that the intervention was especially useful in tackling initial knowledge deficits. Participants with a relatively high baseline knowledge also improved, but to a smaller extent because their baseline scores were already close to the maximum (Kusumawati et al., 2025).

Item-Level Knowledge Improvement

The increase in knowledge obtained in this study shows that the knowledge gap regarding the management of used cooking oil can be reduced by using educational approaches combined with direct demonstration (Hastuti & Irma Maria Dulame, 2025). The intervention not only informed about the risks of a bad management of used cooking oils but also about its potential as a recoverable

household resource. This is relevant because environmental education that is based on abstract concepts or “warnings of risk” may not be effective in understanding and practical application (Azteria & Irfandi, 2023). In contrast, the current intervention linked environmental-health risks with a practical solution by showing the conversion of used cooking oil into soap based on basic pharmaceutical and formulation principles (Tuti et al., 2024). The combination of theoretical teaching and practical experience might have improved Participants understanding through a more contextualized and applicable learning experience (Widyawati & Hidayah, 2022).

Participant Satisfaction with the Training Program

The high satisfaction scores support the interpretation of the intervention being acceptable and contextually appropriate (Qu et al., 2022; Ronen et al., 2023). The Participants responded with satisfaction or high satisfaction for all indicators assessed. Overall satisfaction and perceived ability to make soap independently were the highest responses. This finding is important as educational interventions in community settings cannot be judged solely by knowledge gain (Nugraha et al., 2024). Factors that are important for determining whether an intervention can be sustained beyond the initial training session include acceptability, perceived usefulness, clarity of delivery, adequacy of tools and materials, and confidence for practical application (Jayadi et al., 2025). The strong satisfaction response suggests Participants found the program to be understandable, beneficial and relevant to everyday household practice. The meaning

of this finding is central to the role of Dasawisma members. Women's household groups have a strategic role in community-level waste management because they are intimately involved in cooking practices, domestic waste handling, family health routines, and communication at the neighborhood level (Sugiarti et al., 2026). The intervention targeted actors who are not only producers and managers of household used cooking oil, but also potential agents to diffuse knowledge by involving Dasawisma members. This community structure may be favourable for the spread of safer storage, less disposal into drains and small-scale product-oriented reuse practices. Thus, the results are consistent with the broader literature suggesting that household waste interventions are more likely to succeed if they build on existing community organizations and social trust rather than rely only on top-down waste-management messages.

The findings are especially pertinent as used cooking oil is generally treated as an ordinary domestic waste rather than as a material that represents both risk and value. In many households, used cooking oil is either reused again and again for frying or disposed of into drains, soil or surrounding water channels (Azteria & Irfandi, 2023). These practices are problematic from a public health and environmental point of view. Repeated heating can degrade the quality of cooking oil through oxidation, hydrolysis and the formation of unwanted compounds, while disposal into drainage or aquatic systems can lead to blockage of pipes, increased organic load, oxygen depletion, soil contamination and wider environmental degradation. In a coastal village like

Gufasa, where household waste streams may eventually reach drainage networks and nearshore ecosystems, the management of used cooking oil is therefore not only a domestic hygiene issue but part of a wider environmental health concern (Fauzi, 2025; Nurdin et al., 2025).

This view is in addition supported by the item-level results. The greatest gains were observed in the lowest performing items, especially those related to particular knowledge gaps on used cooking oil processing and environmental management. Items with low percentages of correct responses at baseline exhibited marked increases post-intervention, suggesting that the program was able to access areas in which Participants had little previous knowledge. The pattern suggests the intervention was not just reinforcing knowledge Participants already possessed but was filling specific conceptual gaps (Utami et al., 2025). Also a good signal for further program improvement is the fact that one item remained below 100% correct responses after the intervention. More emphasis may be required on more complex or less intuitive concepts, especially those related to safety, storage, processing standards, or the conditions under which used cooking oil can be converted into acceptable household products.

From Knowledge Enhancement to Sustainable Circular Practices

This research shows that community-based soap manufacturing can be used to transform used cooking oil into useful products that can help promote environmental health literacy and circular economy practices (Tanjung et al., 2025;

Jayadi et al., 2025). The intervention integrated pharmaceutical formulation principles with practical education, giving participants accessible knowledge and skills for valorization of household waste (Janah et al., 2025).

Despite the promising results, there are several limitations that deserve to be acknowledged. The small sample size (n=9), lack of control group and post-test measures taken immediately post-intervention limit generalizability and conclusions on long-term behavioral change. The final 10-item questionnaire was shown to be reliable with high internal consistency, but further validation with larger samples is still needed (Hartini et al., 2025; Liswardani et al., 2025). Moreover, the participants' confidence in the production of soap was not confirmed by objective assessments of the quality of the product, pH, skin compatibility or safety.

Future studies should include larger controlled samples, long term follow-up, behavioral assessments and standardized product safety testing. Community programs should also include waste collection and supervised soap-making training, quality control, packaging and ongoing mentoring. Women's household groups' involvement can improve sustainable waste management, environmental awareness, and livelihood options, especially in coastal communities (Meylani et al., 2025; Sugiarti et al., 2026; Tanjung et al., 2025).

CONCLUSION

The results of this study show that pharmaceutical technology-based community interventions can improve environmental health knowledge and

encourage the practice of the circular economy among Dasawisma members. The education and hands-on soap-making activities raised the participants' knowledge from 66.7% to 98.9% with high satisfaction. The findings highlight the opportunity for converting used cooking oil into useful household products and empowering women's groups to promote sustainable waste management in coastal communities. However, the small sample size, lack of a control group, immediate post-test assessment and lack of soap quality and safety testing limit the findings to short-term knowledge improvement. Future studies should involve larger controlled studies, long-term behavioral assessments, and evaluations of product safety. Standardized training, quality control and community mentoring are also recommended to support sustained implementation.

REFERENCES

- Abbasinia, M., Babaii, A., Kazemnejad, M., & Amiri, N. Z. (2022). Researchers' Experiences of Obtaining Informed Consent to Participate in Human Research and Its Facilitating Factors: A Qualitative Study. *Health, Spirituality and Medical Ethics*, 9(4), 187–196. <https://doi.org/10.32598/hsmej.9.4.206.1>
- Agustina, J., Syahnaz, C., Nugrahaini, A. D., Humaidi, T. R., & Widarso, R. A. (2025). Pemanfaatan Minyak Jelantah Menjadi Sabun Cuci Pakaian: Program Pengabdian Masyarakat untuk UMKM di Sekitar Kampus Politeknik Negeri Jember PSDKU Sidoarjo. *BESIRU: Jurnal Pengabdian Masyarakat*, 2(2), 203–209. <https://doi.org/10.62335/besiru.v2i2.88>
- Al Habsi, S. S. (2024). Ethical Considerations in Obtaining Informed Consent in Research Participation. *International Journal of Educational Contemporary Explorations*, 1(1), 24–33.

- https://doi.org/https://doi.org/10.69481/DI_VL1152
- Al Rosiif, M. M., Ghaniyyu, M. H., Maharani, M., Fauzy, M. R., Gayatri, N. A., Listiyana, F. U. E., Fauzan, A., Intan, S., Mutia, Apriliani, A. P., & Permatasari, P. (2026). Pembuatan Sabun dari Minyak Jelantah sebagai Upaya Pengelolaan Limbah Rumah Tangga di Desa Jatiroyo melalui Kegiatan Kuliah Kerja Nyata. *Jurnal Akademik Pengabdian Masyarakat (JAPM)*, 4(3), 124–139.
- Anggraini, F. D. P., Aprianti, A., Setyawati, V. A. V., & Hartanto, A. A. (2022). Pembelajaran Statistika Menggunakan Software SPSS untuk Uji Validitas dan Reliabilitas. *Jurnal Basicedu*, 6(4), 6491–6504.
<https://doi.org/10.31004/basicedu.v6i4.3206>
- Anwar, R., & Naili Kamaliah. (2025). Membangun Pengalaman Belajar yang Menyenangkan: Optimalisasi Faktor-Faktor Penentu Kepuasan Peserta Pelatihan. *Diklat Review : Jurnal Manajemen Pendidikan Dan Pelatihan*, 8(3), 353–362.
<https://doi.org/10.35446/diklatreview.v8i3.1898>
- Astuty, E., Sulfiana, S., & Tanihatu, G. E. (2026). Edukasi Dampak Penggunaan Minyak Jelantah Bagi Kesehatan dan Pelatihan Pembuatan Sabun dari Limbah Minyak Jelantah. *Abdi: Jurnal Pengabdian Dan Pemberdayaan Masyarakat*, 8(1), 291–297.
<https://doi.org/10.24036/abdi.v8i1.1773>
- Azteria, V., & Irfandi, A. (2023). Peningkatan Pengetahuan Masyarakat Dalam Mengolah Minyak Jelantah. *Media Abdimas*, 2(1), 95–98.
<https://doi.org/10.37817/mediaabdimas.v2i1.2684>
- Bujang, M. A., Omar, E. D., & Baharum, N. A. (2018). A Review on Sample Size Determination for Cronbach's Alpha Test: A Simple Guide for Researchers. *Malaysian Journal of Medical Sciences*, 25(6), 85–99.
<https://doi.org/10.21315/mjms2018.25.6.9>
- Chandler, B. M., Cawthorn, M., Huffling, L., & Legee, L. M. (2025). Formal and Non-formal Education in Institutes of Higher Education Positively Impact Sustainability Knowledge and Attitudes. In W. Leal Filho, J. Newman, A. Lange Salvia, L. Viera Trevisan, & L. Corazza (Eds.), *North American and European Perspectives on Sustainability in Higher Education* (pp. 493–516). Springer Cham.
https://doi.org/10.1007/978-3-031-80434-2_28
- Dewi, N. A. K., Kristina, M., Puastuti, D., & Andriyani, N. (2022). Pelatihan Pembuatan Sabun dari Minyak Jelantah. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM)*, 5(10), 3427–3438.
<https://doi.org/10.33024/jkpm.v5i10.7127>
- Fauzi, R. (2025). Pemberdayaan Masyarakat Melalui Pelatihan Pembuatan Sabun Cair dari Minyak Jelantah untuk Meningkatkan Ekonomi Masyarakat Desa Gayam Kecamatan Gondang Wetan Kabupaten Pasuruan. *Social Science Academic*, 867–874.
- Fridayani, H. D., Darumurti, A., Mutmainah, N. F., Mawaddah, H., & Widayarsi, S. (2025). Pemanfaatan Minyak Jelantah untuk Produksi Sabun: Solusi Inovatif untuk Pengurangan Limbah dan Ekonomi Sirkular. *Jurnal SOLMA*, 14(2), 2651–2665.
<https://doi.org/10.22236/solma.v14i2.18530>
- Funa, A. A., & Gabay, R. A. E. (2025). Bridging the Gap among Knowledge, Attitudes, and Behaviors toward Sustainable Development through I-STEM-PBL-ESD. *International Journal on Studies in Education*, 7(2), 288–303.
<https://doi.org/10.46328/ijonse.317>
- Gagnier, J. J., Lai, J., Mokkink, L. B., & Terwee, C. B. (2021). COSMIN Reporting Guideline for Studies on Measurement Properties of Patient-Reported Outcome Measures. *Quality of Life Research*, 30(8), 2197–2218.
<https://doi.org/10.1007/s11136-021-02822-4>
- Hartini, E., Kurniatie, M. D., & Izzati, D. N. (2025). Innovation in the Utilization of Used Cooking Oil Waste into Soap in Pendrikan Kidul Village, Semarang. *Community Empowerment*, 10(2), 253–260.
<https://doi.org/10.31603/ce.12265>
- Hastuti, W., & Irma Maria Dulame. (2025). Optimalisasi Pemanfaatan Limbah Minyak Jelantah melalui Pelatihan Pembuatan Sabun Cair Ramah Lingkungan di Kelurahan Rawajati. *Jurnal Abdi*

- Masyarakat Nusantara, 3(2), 36–45.
<https://doi.org/10.61754/jurdiasra.v3i2.162>
- Hidayah, N., Elma, M., Zulfadhilah, M., Yusri, Akbar, J., Yunandar, Rahma, A., Ghani, R. A., Assyaifi, Z. L., Zahrattunnisa, G., Irawan, A., Hadi, N., Madhony, A. G., Faisal, A., Viviana, Asyiah, Susfarwanti, A., Karima, H., Ramadhan, A., & Busairi, A. (2025). Optimalisasi Peran PKK dalam Peningkatan Ekonomi Rumah Tangga melalui Produksi Sabun dari Minyak Jelantah. DIMAS: Pengabdian Kepada Masyarakat, 1(1), 61–69.
- Hidyus, S. A., Ghinari, N., Sherlian, A. P., Gustaman, F. A., & Margono, S. (2024). Pemanfaatan Limbah Minyak Jelantah sebagai Sabun Cuci Padat untuk Pemberdayaan Ibu-Ibu PKK Desa Karangwuni Kecamatan Weru Kabupaten Sukoharjo. Jurnal Bina Desa, 6(3), 344–353.
<https://doi.org/https://doi.org/10.15294/jurn.albinadesa.v6i3.13102>
- Janah, N. N., Apriani, I., & Asbanu, G. C. (2025). Pemanfaatan Limbah Cair Minyak Jelantah sebagai Sabun Menggunakan Metode Cold Process. Jurnal Rekayasa Lingkungan, 25(1), 33–41.
<https://doi.org/10.37412/jrl.v25i1.378>
- Jayadi, A., Sukmawati, R. A., Rasyied, A., Rizhan, A., Sholeha, D. F., Septyana, D. S., Norhasanah, H., Avisha, I., Maisum, MS, M. S., Al Mu'min, M. R., & Risna. (2025). Pelatihan Pembuatan Sabun Cuci Piring dari Minyak Jelantah untuk Ibu-Ibu PKK di Kecamatan Gambut. Abdi Laksana: Jurnal Pengabdian Kepada Masyarakat, 6(2), 382–389.
<https://doi.org/https://doi.org/10.32493/abdi.laksana.v6i2.48822>
- Jmaiel, H. A., Abukhait, R. O., Mohamed, A. M., Shaaban, T. S., Al-khresheh, M. H., & AL-Qadri, A. H. (2025). The role of ChatGPT in enhancing EFL students' ESP writing skills: an experimental study of gender and major differences. Discover Education, 4(1), 240.
<https://doi.org/10.1007/s44217-025-00700-6>
- Juniabala, S. R., Oktaviana, S. D., Agatha, C., Dewi, C. A., & Handayani, W. (2023). Status Pengelolaan Minyak Jelantah di Kota Salatiga dan Identifikasi Faktor-Faktor yang Mempengaruhinya. Jurnal Pengelolaan Lingkungan Berkelanjutan (Journal of Environmental Sustainability Management), 7(1), 54–70.
<https://doi.org/10.36813/jplb.7.1.54-70>
- Kilic, S. (2016). Cronbach's Alpha Reliability Coefficient. Journal of Mood Disorders, 6(1), 47–48.
<https://doi.org/10.5455/jmood.20160307122823>
- Kusumawati, I., Puspitasari, H. P., Soesilawati, P., Izzah, Z., Fitria, A. L., Ramadhani, F. A., Rullyansyah, S., Pratama, Y. A., Pattymahu, C. V. P., Gamar, F. H. I., & Ruzainah Ali. (2025). Effect of Integrated TOGA-Nutrition Education on Stunting Prevention Knowledge among Health Volunteers and Adolescents in Lamongan, Indonesia: A Pre-Post Intervention Study. JURNAL FARMASI DAN ILMU KEFARMASIAN INDONESIA, 12(3), 342–354.
<https://doi.org/10.20473/jfiki.v12i32025.342-354>
- Liswardani, S., Sulistyo, S., & Anam, C. (2025). Efektivitas Workshop terhadap Pengetahuan Penggunaan Alat, Bahan Kimia dan Keselamatan dan Kesehatan Kerja (K3) di Laboratorium Bagi Mahasiswa. Indonesian Journal of Laboratory, 7(3), 92–95.
<https://doi.org/10.22146/ijl.v7i3.83129>
- Meylani, C. P., Oktavia, M. A., Hastuti, L., & Kusnanto, D. (2025). Program Pembinaan Mahasiswa Wirausaha (P2MW) Pemanfaatan Minyak Jelantah sebagai Sabun Cuci Eco Friendly. To Maega: Jurnal Pengabdian Masyarakat, 8(1), 151–164.
<https://doi.org/10.35914/tomaega.v8i1.2975>
- Naemah, D., Naemah, D., Satriadi, T., Rudy, Gt. S., Aryadi, M., & Rahmadi, A. (2026). Pemanfaatan Minyak Jelantah sebagai Bahan Pembuatan Sabun untuk Mendorong Perilaku Ramah Lingkungan di Masyarakat. Jurnal Pembelajaran Pemberdayaan Masyarakat (JP2M), 7(1), 90–100.
<https://doi.org/https://doi.org/10.33474/jp2m.v7i1.24336>
- Nugraha, R. A., Ernayanti, N., Muliawati, D., Fauzi, R. K. R., Rahmawati, A. D., Pamungkas, F. S. A., Khasanah, W. N., Wulandari, N. D., Putri, F. A., Zahra, S. A., & Studyanto, A. B. (2024). Pelatihan

- Pembuatan Sabun Cuci Piring Dari Minyak Jelantah Kepada Warga Desa Sidowayah Klaten. *Jurnal Pengabdian Masyarakat Bangsa*, 2(8), 3593–3597. <https://doi.org/10.59837/jpmba.v2i8.1524>
- Nurdin, I. N., Juahardin, Putra, A. K., & Dustan. (2025). Edukasi Pembuatan Sabun Cuci dari Minyak Jelantah pada Generasi Z. *DedikasiMU: Journal of Community Service*, 7(4), 591–602. <https://doi.org/10.30587/dedikasimu.v7i4.11018>
- Prabandari, A. S., Rokhmah, L. N., Sari, A. N., Pramonodjati, F., & Utami, N. A. (2024). Penyuluhan Bahaya Penggunaan Minyak Goreng Bekas Pakai terhadap Kesehatan pada Ibu-Ibu PKK di Kelurahan Purbayan Kecamatan Baki Sukoharjo. *BESIRU: Jurnal Pengabdian Masyarakat*, 1(4), 181–188. <https://doi.org/10.62335/g59age11>
- Qu, L., Chen, H., Miller, H., Miller, A., Colombi, C., Chen, W., & Ulrich, D. A. (2022). Assessing the Satisfaction and Acceptability of an Online Parent Coaching Intervention: A Mixed-Methods Approach. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.859145>
- Rachman, E. S., Nur, A., Sakti, A. S., Sandrawati, S., & Tjiroso, B. (2025). Pemberdayaan Ibu Dasawisma melalui Pengelolaan Minyak Jelantah menjadi Sabun Herbal Lokal di Kelurahan Cobodoe. *ABDI UNISAP: Jurnal Pengabdian Kepada Masyarakat*, 3(2), 410–416. <https://doi.org/10.59632/abdiunisap.v3i2.508>
- Ronen, K., Mugo, C., Kaggiah, A., Seeh, D., Kumar, M., Guthrie, B. L., Moreno, M. A., John-Stewart, G., & Inwani, I. (2023). Facilitated WhatsApp Support Groups for Youth Living With HIV in Nairobi, Kenya: Single-Arm Pilot Intervention Study. *JMIR Formative Research*, 7, e49174. <https://doi.org/10.2196/49174>
- Sakti, A. S., Dewi, B. S., Pasi, N. I. H. L., Marhamah, Wahyu, A. P., Nurrohman, D. H., Farihin, M. A., & Wahida, N. Al. (2025). Peningkatan Literasi Penggunaan Obat melalui Edukasi Pengenalan Logo Obat bagi Siswa SMP Muhammadiyah 04 Pangkatrejo. *Nusantara: Jurnal Pengabdian Kepada Masyarakat*, 5(4), 578–594. <https://doi.org/10.55606/nusantara.v5i4.698>
- Sakti, A. S., Do Toka, W., Sandrawati, Nur, A., Abdullah, A., Imam, F. R. S., Yulimanida, H., Muhammad, A., & Hidayat, F. (2026). Penguatan Ketahanan Kesehatan Masyarakat Pascabencana melalui Intervensi Kesehatan Terpadu dan Edukasi Berbasis Komunitas di Aceh Tamiang. *Jurnal Masyarakat Mandiri (JMM)*, 10(2).
- Sakti, A. S., Negara, S. B. S. M. K., Mayangsari, F. D., Rokhman, A., Fadel, M. N., Zuhri, M. S., Imtiyaz, M. T. Z., Setianingsih, E. R., Nurin, E. F., Mutamimah, S., & Adhimi, C. S. (2025). Peningkatan Pemahaman Kader Nasyiatul Aisyiyah tentang Pengelolaan Obat Aman melalui Edukasi DAGUSIBU Berbasis Komunitas di Kabupaten Lamongan. *JMM (Jurnal Masyarakat Mandiri)*, 9(4), 3364–3376. <https://doi.org/10.31764/jmm.v9i4.3200>
- Sakti, A. S., Nur, A., & Hamid, A. (2026). Pendekatan Integratif Berbasis Edukasi dan Pendampingan untuk Pemulihan Pascabencana di Kabupaten Tapanuli Selatan. 6(3), 2207–2216.
- Sakti, A. S., Nur, A., Hamid, A., Sandrawati, & Sundari. (2026). Pendekatan Integratif Berbasis Edukasi dan Pendampingan untuk Pemulihan Pascabencana di Kabupaten Tapanuli Selatan. *Jurnal Abdi Masyarakat Indonesia*, 6(3), 2207–2216. <https://doi.org/10.54082/jamsi.2866>
- Sakti, A. S., Octavia, D. R., Sari, P. D. P., Fadhila, S. N., Wibowo, A. W., Sholichatin, H., Akhyar, M., Maharani, T. A., Lutfiana, E., & Putri, A. W. (2024). Implementasi Mikrobiologi Farmasi, Upaya Pencegahan dan Penanganan Dini Demam Berdarah Melalui Kegiatan Penyuluhan di Lamongan. *JMM (Jurnal Masyarakat Mandiri)*, 8(2), 2237–2250. <https://doi.org/10.31764/jmm.v8i2.2224>
- Sakti, A. S., Suwandi, J. K., Octavia, D. R., Kusumo, D. W., & Amin, M. S. (2024). The Influence of Educational Interventions on Drug Classification Knowledge in Wanar Village Communities, Pucuk Sub-District, Lamongan District. *Medical Sains: Jurnal Ilmiah Kefarmasian*, 9(1), 77–84. <https://doi.org/10.37874/ms.v9i1.769>
- Sandi, Muharam, I. N., Putri, A. A., Hakim, H., Pramudhita, A., Az'Zahra, S. S.,

- Mustika, A., Tamangunde, A., Leksana, M. A. S., Alfazri, I., Sinduano, S. M., Ghozali, M., & Atmaja, S. A. (2025). KKN Sebagai Upaya Pengembangan Potensi Desa: Optimalisasi UMKM, Pendidikan, dan Lingkungan di Desa Cimenyan. *Jurnal Pengabdian Masyarakat Dan Riset Pendidikan*, 4(1), 4384–4391. <https://doi.org/10.31004/jerkin.v4i1.231>
- Schwind, V., Zelalem Tadesse, N., Silva da Cunha, E., Hamidi, Y., Sanjar Sultani, S., & Sehr, J. (2025). A Scoping Review of Informed Consent Practices in Human–Computer Interaction Research. *ACM Transactions on Computer-Human Interaction*, 32(4), 1–60. <https://doi.org/10.1145/3721284>
- Setiawati, A. S., Ciptaningtyas, R., Setyawati, S. P., Sari, K. I. P., Maulidiana, L., Pakaya, M., Hanum, L., Sugiharto, B., Ninsiana, W., & Yulianingsih, L. (2025). Strengthening the Role of PKK Members in Maintaining Family Health in Jomblangan Village. *Jurnal Medika: Medika*, 4(1), 325–330. <https://doi.org/https://doi.org/10.31004/mtvz8z78>
- Shalihin, M. S. E., Hashi, A. A., Che Ahmad, A. Bin, Musa, R., Yusof, N. Mohd., Ahmad, A., & Ismail, M. F. M. (2024). Reliability and Construct Validity of Maqasid Shariah Knowledge Questionnaire. *Asian Journal of Medicine & Health Sciences*, 7(2), 184–195. <https://doi.org/10.70672/pm4hjr91>
- Sugiarti, S., Lestari, J., Indriawati, I., & Rahmawati, F. (2026). Pemanfaatan Minyak Jelantah Menjadi Sabun Menjadi Sabun Bernilai Guna Sebagai Upaya Mengurangi Dampak Pencemaran Lingkungan. *Jompa Abdi: Jurnal Pengabdian Masyarakat*, 5(1), 81–88. <https://doi.org/10.57218/jompaabdi.v5i1.2529>
- Taber, K. S. (2018). The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Taherdoost, H. (2022). Designing a Questionnaire for a Research Paper: A Comprehensive Guide to Design and Develop an Effective Questionnaire. *Asian Journal of Managerial Science*, 11(1), 8–16. <https://doi.org/10.51983/ajms-2022.11.1.3087>
- Tanjung, K., Aina, P. N., Sarumpaet, D. R. C. P., Hutasoit, A. B., Siagian, A. M., Manullang, G. A., Damanik, R., Sari, A. N., Sinurat, V., Siregar, N. H. Y., & Nasution, S. P. (2025). Pelatihan Pembuatan Sabun dari Minyak Jelantah sebagai Upaya Pemberdayaan Masyarakat. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10(4), 2477–2483
- Tuti, M., Kurniati, Y., & Paludi, S. (2024). Pemberdayaan Ekonomi Masyarakat melalui Edukasi Pengolahan Minyak Jelantah dari Limbah Menjadi Produk Bernilai Tinggi. *Prima Abdika: Jurnal Pengabdian Masyarakat*, 4(4), 711–722. <https://doi.org/10.37478/abdika.v4i4.4689>
- Utami, D. C., Palupi, H. T., & Arifin, A. Z. (2025). Peningkatan Kesadaran Masyarakat tentang Bahaya Minyak Jelantah melalui Kegiatan Sosialisasi di Desa Dayurejo, Prigen, Pasuruan. *PEDULI: Jurnal Ilmiah Pengabdian Pada Masyarakat*, 9(1), 49–57. <https://doi.org/10.37303/peduli.v9i1.71>
- Widowati, I. G. A. R., & Zamroni, M. (2023). Indonesia Facing Challenges of Pharmaceutical Care Implementation in Community Pharmacies: A Legal Perspective. *Jurnal Hukum Prasada*, 10(2), 69–79. <https://doi.org/10.22225/jhp.10.2.2023.69-79>
- Widyawati, F., & Hidayah, A. N. (2022). Upaya Pengolahan Limbah Rumah Tangga dalam Pelatihan Pembuatan Minyak Jelantah Menjadi Sabun Cuci di Desa Uma Beringin. *Bima Abdi: Jurnal Pengabdian Masyarakat*, 2(2), 40–46. <https://doi.org/10.53299/bajpm.v2i2.194>