Cooking Oil Waste Management for Safety and Benefit

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Abstract. Used cooking oil (UCO) is household waste almost always produced daily. If consumed continuously, it can harm the body and trigger various diseases. Used cooking oil problems also occur in households in Turi District, Sleman. The program aims to improve knowledge and skills in using used cooking oil waste to create more valuable goods, with target partners of the 'Aisyiyah Branch Leadership (PRA) Donokerto I, Turi, with 30 participants. Community service is carried out through several methods, namely socialization, extension courses, demonstrations, training, practice, and mentoring. Evaluation is carried out during and after activities, with pre-tests and post-tests, and the products produced are assessed. Community service increased the knowledge and skills of 'Aisyiyah's members in managing used cooking oil to turn it into more valuable goods. The participation rate of participants in various activities reached 90%. The knowledge of 'Aisyiyah members about the dangers of using cooking oil, based on the results of the pre-test and post-test, increased from a score of 67 to 83 (on a scale of 100), and most participants (90%) stated that they would change the pattern of used cooking oil management from what was previously only thrown away to be processed into aromatic candles and hand soap.

1 Introduction

Every human activity in life every day almost always produces waste (garbage), including agricultural activities such as salak and coconut waste [1], organic waste from traditional markets [2], and even household activities such as kitchen waste [3] so that it can pollute the environment [4]. The amount or volume of garbage is proportional to the level of consumption by humans (Wahda et al., 2020). One household waste almost always generated daily is used cooking oil (UCO) or container cooking oil (incarnation). Fever oil is a fried oil heated repeatedly [6]. In the community, consuming foods that contain high enough oil, including fried foods, tends to be preferred over boiled foods to produce more and more used food.

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Many fried food sellers often use cooking oil to fry food with oil conditions no longer suitable for consumption. The frequent use of cooking oil causes a decrease in oil quality, such as brown color and the emergence of a pungent or rancid odor that can endanger the body's health [7]. Used cooking oil, if consumed continuously for an extended period, can harm the body because it contains very high saturated fatty acids that can trigger various diseases that cause death, such as coronary heart disease, stroke, increased lipid levels, especially blood cholesterol, hypertension, can even trigger cancer [6]. Using cooking oil at a particular time impacts health due to fat cell deposition in the small intestine, blood vessels, heart, and liver [8].

Every household produces used cooking oil because the use of cooking oil is one of the primary needs of the community [9]. The UCO potential of households and micro business units in Indonesia is significant, reaching 13 million tons of used cooking oil, equivalent to 16.2 billion liters, with the contribution of large cities in the Java-Bali area reaching 207,170.65 Kiloliters per year. In Yogyakarta, it is estimated to be around 3 thousand KL (February 2020). This number will always grow with the increasing number of food-based households and cottage industries. After repeated use, used cooking oil is usually discharged into the ground/water bodies, which can harm the environment and humans [11]. One liter of used cooking oil can pollute 1 million liters of surface water, and if it enters the river, it can pollute and kill water biota, causing a water crisis (February 2020).

Used cooking problems also occur in the households of 'Aisyiyah members who are members of the 'Aisyiyah Branch Leaders (Pimpinan Ranting' Aisyiyah–PRA) Donokerto I. PRA Donokerto 1 is one of the autonomous organizations of Muhammadiyah within the Muhammadiyah Branch of Turi located in Kembangarum, Donokerto, Turi, Sleman, Yogyakarta. Active members of the PRA Donokerto I are around 40 people and have work programs in da'wah, education, economy, and environment. So far, the activities carried out mainly to carry out da'wah programs are recitation every Sunday at the Darul Falah Ngemplak Kembangarum Mosque, Turi, which is its secretariat. Other activities that are carried out regularly to welcome the holy month of Ramadan every year are cheap food bazaars, grand recitations of healthy roads, and compensation for widows and orphans, in collaboration with the Muhammadiyah Branch Leaders and the Darul Falah Mosque [12].

Most of the members of the household of PRA Donokerto I produce used cooking oil and dispose of it in the environment without any environmentally sound control. This situation is exacerbated by the lack of public knowledge about the impact of used cooking oil on health and the environment. So that used cooking oil is not disposed of carelessly, which can cause environmental pollution, it is necessary to manage it properly. Used cooking oil has the potential to be managed so that it not only does not pollute the environment but also becomes a variety of valuable goods.

To achieve this goal, there must be an innovation in using cooking oil waste for products of economic value. Innovation is provided in the form of knowledge transfer to the public about the dangers of using used cooking oil and the use of used cooking oil waste in various products through extension activities. Training is carried out for members of 'Aisyiyah Turi to perform and be skilled at processing used cooking oil waste into valuable products. All of these activities can be packaged in a community service program that aims to increase the knowledge, insight, and skills of PRA Donokerto I, Turi members in utilizing used cooking oil waste in various valuable products. This program is also helpful in productive economic activities and da'wah bil hal.

2 Methodology

The program was conducted in Turi, Sleman, DIY for three months from February up to April 2024, with the main target partners being the leaders and members of the PRA Donokerto I, whose performance will be improved by around 25 people, who are also supported by the 'Aisyiyah Branch Leaders (Pimpinan Cabang' Aisyiyah–PCA) Turi. This program is also supported by Universitas Muhammadiyah Yogyakarta and Universitas Muhammadiyah Magelang, including lecturers and students.

The program is carried out through community development and a participatory approach because it is considered more effective. The community development approach is designed to empower communities by making them both agents and goals and increasing their involvement in development for their benefit. The participatory approach is an approach that aims to increase direct community participation by placing the community as the leading actor of development.

Several methods are used, which are carried out in several stages, which include counseling, training, mentoring, and monitoring evaluation to achieve the objectives according to the problems faced and ensure the sustainability of the used cooking oil management program in PRA Donokerto I Turi (Figure 1).

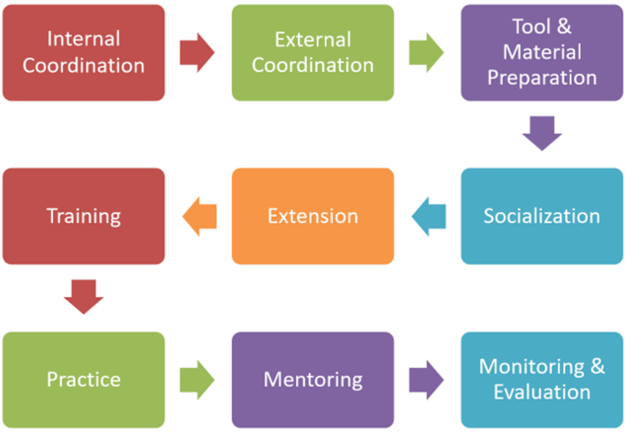

Fig 1. Stages of the activities

In the initial stage, coordination is carried out both internally and externally. Internal coordination is carried out by the implementation team, lecturers, students, and implementing assistants to equalize perceptions and prepare various things before implementation in the field. The Implementation Team, both lecturers and students, carries out internal coordination. In contrast, external coordination is carried out between the Implementation Team and the target partner, PRA Donokerto I Turi. This coordination is carried out to discuss each party's schedule, place, participants, duties and responsibilities, and other things that must be prepared during community service activities.

After an agreement, various equipment and materials used during activities are prepared, both administrative technical in the field and those related to documentation. Socialization of activities and counseling on the dangers of cooking oil use and its utilization were held with the resource persons of the Implementation Team. After the partners gain insight and knowledge, they will be trained and practice using used cooking oil for various valuable products with trainers from the Implementation Team. To ensure the sustainability and success of the program, mentoring, and coaching are carried out by visiting partners periodically, as well as monitoring and evaluation.

Evaluation is carried out during and after the activity. Assessment during the activity is carried out by looking at participants' involvement and participation in various activities. Measurements of changes in knowledge about the dangers of using and utilizing used

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cooking oil are carried out by pre-test and post-test. At the same time, the scariness is measured during practice, and the quality of used cooking oil processed products is assessed.

3 Results and Discussion

3.1 Coordination

Internal coordination of the Implementation Team, namely lecturers and students from both UMY and Unimma, is carried out to design various activities, including stages, schedules, and tasks for each member of the Implementation Team. Furthermore, external coordination was carried out with partners, namely PRA Donokerto I, to discuss participants, schedules, and preparation of tools and materials.

3.2 Completion of Tools and Materials

The main tools used for the program are heating stoves, glass and glass bowls, and container pans for making aromatic candles and soap. The ingredients prepared include used cooking oil, KOH as a substitute for caustic soda (NaOH), stearin, essential oil, and so on (Figure 2).

Fig 2. Materials and tools used for practice

3.3 Socialization

Socialization of activities outlines the activities to be carried out: background, goals, benefits, participants, forms of activities, and community participation. The Head of the Implementation Team carried out the socialization. It was attended by the target partners, namely the mothers of 'Aisyiyah PRA Donokerto I, as many as 30 people. During the Explanation, the community responded positively by following the counseling carefully and asking various questions. The results of identification and analysis before the activity (pre-test) showed that all participants knew what cooking oil meant, and participants used oil for frying 2-4 times. Each household's cooking oil ranges from 250-1,000 ml in one week. Participants know the dangers of using used cooking oil, which can cause various human health problems, including increased body cholesterol levels, blood vessel disorders, carcinogens, etc. Most of the used cooking oil produced is discharged into the environment, and only a few use it for lubricating oil or fuel because most (85%) participants do not know how to use it for more valuable goods.

3.4 Extension Course

The extension course aims to increase public knowledge and insight about the impact of used cooking oil on health. It was conducted by gathering program participants with material about the mechanisms of damage to used cooking oil and the dangerous effects of using used cooking oil on human health. Speakers from the Faculty of Health, Universitas Muhammadiyah Magelang, carried out the extension course. During the discussion, there were many responses and questions from participants.

3.5 Training

After the target partners gain knowledge and insight into the impact of using used cooking oil, training on the use of used cooking oil in used cooking oil and hand soap is carried out. The training began with resource persons from the Universitas Muhammadiyah Yogyakarta explaining the potential use of used cooking oil in various valuable items, including jelantik candles, hand soap, bath soap, and so on. Furthermore, the demo and training were carried out outdoors because it used a chemical compound (potassium hydroxide), which is volatile (volatile) and has a pungent odor. The demonstration and training showed various materials and tools to process cooking oil used in aromatic candles and hand soap (Figure 5). Furthermore, the trainer gives examples or does demonstrations step by step, starting from heating used cooking oil, mixing it with potassium hydroxide, which is safer for humans than caustic soda [13], deodorizing until printing jelantik candle in a container, which was followed attentively by participants.

3.6 Practice and Mentoring

After the trainer provides explanations and examples, participants carry out independent practice while still being guided and monitored by the Implementation Team. Some participants processed using cooking oil, as exemplified by the trainer, and some others carried out packaging practices for the final processing results. During the cooking oil processing practice carried out by participants, the Trainers provide assistance and evaluation by providing direction and input to improve the results.

3.7 Monitoring and Evaluation

Monitoring aims to accompany and provide input to the mothers of PRA Donokerto I in correctly processing used cooking oil. Evaluations are conducted during and at the end of the program. Assessment during the process was carried out by looking at the involvement and activities of participants, which showed that 90% of participants participated in a series of activities from beginning to end, actively participated in discussions, and carried out used cooking oil processing practices.

The final evaluation is carried out by providing a pre-test and post-test, which shows the results of increased knowledge about used cooking oil and its dangers to human health. Participants who scored between 50–60 decreased from 10% to zero, those who scored between 70–80 decreased from 35% to 20%, and those who scored between 90–100 increased from 50% to 80% (Figure 3), with an overall increased from a score of 67 before the activity to 83 after the activity (on a scale of 100). In addition, after knowing how to process used cooking oil, most participants (90%) stated that they would change the pattern of used cooking oil management from what was previously only thrown away to be processed into used cooking wax and hand soap.

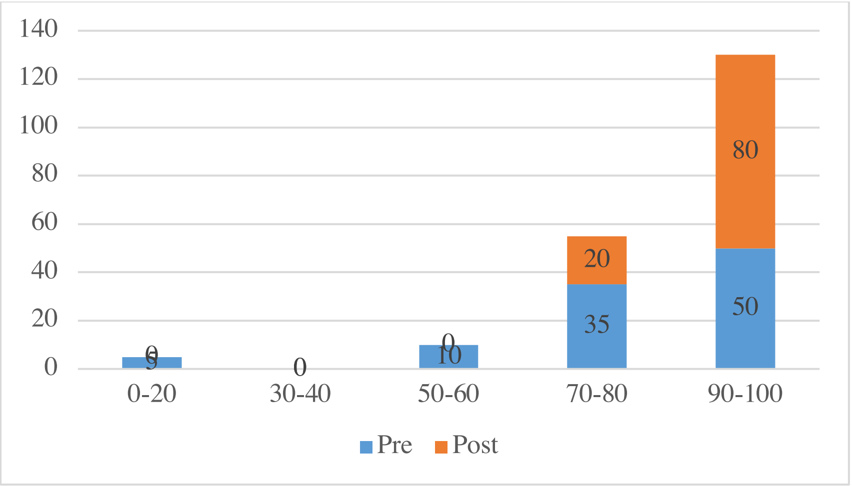

Fig. 3. Participants' pre-test and post-test scores

The results of this aromatherapeutic jelantik candle can also provide benefits such as repelling mosquitoes naturally so that they are safe for the environment [14]. To ensure the program's sustainability, various equipment, and supporting materials for used cooking oil processing were handed over to be utilized by members of PRA Donokerto I. In addition, motivation and an overview of the economic potential of used cooking oil processing were also given. Used cooking oil management like this can help reduce environmental damage due to good waste handling [15].

Overall, the PRA Donokerto and I members showed high enthusiasm for participating in community service programs. The only obstacle is that some chemicals are available on the market in large quantities, making them more expensive. However, with the help of chemicals from the Universitas Muhammadiyah Yogyakarta as initial capital and the procurement of materials to PRA Donokerto I can solve these problems. Nevertheless, there is still a need for continuous coaching and mentoring, especially from the chairman of the PRA and the Economic Assembly.

4 Conclusions

Community service at PRA Donokerto I Turi improved the knowledge and skills of 'Aisyiyah members in managing used cooking oil to make it more valuable. Participant's participation rate in various activities reached 90%, and the knowledge of 'Aisyiyah members about the dangers of using cooking oil increased from a score of 67 before the activity to 83 after the activity (on a scale of 100). After participating in the program, most participants (90%) stated that they would change the pattern of used cooking oil management from what was previously only thrown away to be processed into jelantik wax and hand soap. Continuous coaching and mentoring must be carried out to improve the program's success, especially by the Head of the PRA Donokerto I and the Economic Assembly.

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