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Increasing Awareness of Waste Cooking Oil Risks through Interactive Training in Desa Sumber Rejo

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Abstrak

Meningkatnya konsumsi minyak goreng telah menyebabkan peningkatan yang signifikan dalam produksi minyak goreng bekas (waste cooking oil/WCO), yang menimbulkan risiko kesehatan dan lingkungan yang serius. Pembuangan WCO yang tidak tepat berkontribusi terhadap pencemaran air dan tanah, sementara penggunaannya yang berulang-ulang dalam memasak telah dikaitkan dengan berbagai masalah kesehatan, termasuk penyakit kardiovaskular dan kanker. Program pengabdian masyarakat ini bertujuan untuk meningkatkan kesadaran ibu-ibu rumah tangga di Desa Sumber Rejo, Banyuasin, mengenai bahaya WCO melalui pelatihan edukasi. Pengabdian ini menggunakan pendekatan diskusi interaktif, dimulai dengan kuesioner untuk menilai pengetahuan awal peserta, diikuti dengan sesi sosialisasi, dan diakhiri dengan evaluasi post-test. Hasilnya menunjukkan bahwa sekitar 80% peserta tidak menyadari bahaya WCO sebelum pelatihan. Namun, penilaian pasca pelatihan menunjukkan peningkatan pemahaman yang signifikan, yang menyoroti efektivitas intervensi pendidikan yang ditargetkan. Program ini menggarisbawahi pentingnya upaya penyadaran berkelanjutan dan promosi praktik pengelolaan WCO yang berkelanjutan, seperti pemanfaatan kembali minyak jelantah menjadi biodiesel atau sabun, untuk mengurangi dampak negatifnya terhadap kesehatan dan lingkungan.

***Kata kunci**: Minyak Jelantah, Risiko, Sosialisasi Masyarakat*

Abstract

The increasing consumption of cooking oil has led to a significant rise in waste cooking oil (WCO) production, posing serious health and environmental risks. Improper disposal of WCO contributes to water and soil pollution, while its repeated use in cooking has been linked to various health issues, including cardiovascular diseases and cancer. This community service programme aimed to raise awareness among housewives in Desa Sumber Rejo, Banyuasin, regarding the dangers of WCO through educational training. The study employed an interactive discussion approach, beginning with a questionnaire to assess participants' prior knowledge, followed by a socialisation session, and concluding with a post-test evaluation. The results revealed that approximately 80% of participants were unaware of WCO hazards before the training. However, post-training assessments showed a significant improvement in understanding, highlighting the effectiveness of targeted educational interventions. This programme underscores the importance of continuous awareness efforts and the promotion of sustainable WCO management practices, such as its potential repurposing into biodiesel or soap, to mitigate its negative impact on health and the environment.

***Keywords**: Waste Cooking Oil, Risks, Community Education*

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1. INTRODUCTION

The volume of waste generated globally continues to increase significantly, reaching 2.017 billion tonnes per year (Beghetto, 2025; Damayanti et al., 2021). This surge aligns with evolving consumption patterns driven by population growth and urbanisation. One type of waste that is steadily increasing in production yet remains largely overlooked in management is waste cooking oil (WCO), or used cooking oil (Awogbemi et al., 2021). WCO refers to cooking oil used at high temperatures and is often disposed of directly into drainage systems without proper treatment (Foo et al., 2022).

Globally, large-population countries such as the United States and India generate approximately 1.2 million tonnes and 1.1 million tonnes of WCO per year, respectively (Beghetto, 2025; Kamaruzaman et al., 2022). In Indonesia, WCO production is estimated to reach nearly 1.2 million litres annually (Traction Energy Asia). Data from Indonesia's Central Statistics Agency (BPS) indicates that domestic cooking oil consumption continues to rise, reaching 2.32 million tonnes per year, particularly in households and Micro, Small, and Medium Enterprises (UMKM) (Alfakihuddin & Paratih, 2022).

In South Sumatra, UMKM, the culinary sector, such as the pempek industry, is among the largest consumers of cooking oil. Pempek, a traditional Palembang dish made from fish and sago flour, requires substantial amounts of oil for deep frying. Unfortunately, only 18.5% of the total national cooking oil consumption is successfully collected for recycling (Ministry of Energy and Mineral Resources, 2020). The low collection rate poses environmental risks due to uncontrolled disposal and health hazards from the repeated reuse of WCO.

From an environmental perspective, the large-scale disposal of WCO can lead to clogged drainage systems, soil and water contamination, and ecosystem disruption (Gong et al., 2024). Oil discharged into waterways can form a surface layer that hinders oxygenation, disrupts aquatic life, and accelerates water quality degradation. If it seeps into the soil, oil residues can contaminate groundwater sources, increase pollutant levels, and reduce soil fertility (Mustakim et al., 2020). These impacts are further exacerbated by the lack of adequate waste management systems, causing oil waste that could otherwise be repurposed to become a long-term environmental threat (Mannu et al., 2019).

From a health perspective, the uncontrolled reuse of WCO poses serious risks. Repeated heating of oil leads to thermal degradation, producing free fatty acids, free radicals, and toxic compounds such as aldehydes and acrolein (Gong et al., 2024). These compounds have been linked to various degenerative diseases, including cardiovascular conditions, cancer, metabolic disorders, and obesity (Beghetto, 2025). Consuming food fried in repeatedly used oil can also increase lipid peroxide levels in the body, contributing to premature ageing, chronic inflammation, and impaired organ function (Kumar et al., 2025).

Unfortunately, public awareness remains low. Studies by (Pinandita et al., 2023) and (Gong et al., 2024) show that only about 57% of Indonesians are aware of the dangers posed by WCO. This lack of knowledge is particularly concerning among households and UMKM operators, where reusing cooking oil is a common practice despite its risks.

Several previous community service (PkM) programs have attempted to tackle this issue by promoting awareness and practical reuse of WCO. For example, a program conducted by Ratnasari et al., (2022) introduced soap-making from used cooking oil, which successfully increased community participation and improved understanding of environmentally friendly oil disposal practices (Putri et al., 2024). However, many of these initiatives primarily emphasize technical training without incorporating a comprehensive understanding of the health and environmental risks associated with WCO, thereby limiting their effectiveness in promoting sustainable behavioral change within the community.

To address these issues, educational outreach and community-based interventions are essential. This community service activity in Desa Sumber Rejo, Banyuasin, was designed in direct response to these challenges, aiming to increase public awareness through interactive training. The activity builds on prior findings related to knowledge gaps and risk perception, and offers practical strategies for sustainable WCO management such as converting waste oil into soap to reduce its negative impact on human health and the environment.

2. METHOD

2.1. Observation

A site survey in Desa Sumber Rejo, Banyuasin Regency, South Sumatra, was conducted as an initial preparation for a community engagement programme on the hazards of Waste Cooking Oil (WCO) to health and the environment. Observations focused on the daily cooking activities of housewives, particularly in relation to the use and management of WCO.

2.2. Planning

The planning stage began with correspondence with the Head of the Neighbourhood Association (RT) and the Village Head of Sumber Rejo to obtain permission for the implementation of the Community Engagement Programme. This programme focused on raising awareness of the risks associated with WCO and was supported by the Chemistry Programme at Universitas Indo Global Mandiri.

A formal request for permission was submitted on 29 January March 2025, with the activity designed to involve 20 participants, primarily housewives. Based on the observations and objectives of the programme, participant selection was determined by the frequency of cooking oil usage in daily activities. This approach aimed to ensure that the awareness campaign would significantly impact participants' understanding of the risks and proper management of WCO.

2.3. Public communication

The programme will be implemented upon obtaining approval from the Village Head. A questionnaire consisting of 20 questions will be distributed to the 20 participants. Each question will earn 5 points, making the maximum possible score 100.

On 29 January 2025, each participant will sign the attendance list provided by the organising committee before receiving and completing the questionnaire. Once the questionnaire has been filled out, the session will continue with an educational segment delivered through an interactive discussion method. This discussion will focus on analysing the participants' questionnaire responses and presenting material on WCO, its safe usage limits, and the potential hazards and health risks associated with its use.

2.4. Evaluation

Following the educational session or awareness programme, an evaluation will be conducted based on analysing participants' questionnaire data (Subamia et al., 2021). The methodology includes data collection techniques, such as sample selection, validation, and the data collection process through questionnaires while considering the activity's location, time, and duration (Meturan et al., 2024; Pujiyanto et al., 2025).

The questionnaire consists of 20 yes-or-no questions distributed to 20 respondents from the group of housewives. The evaluation will be done by analysing the questionnaire scores to quantitatively measure respondents' knowledge and qualitatively assess their understanding of the risks associated with WCO usage.

Questionnaire:

1. Do you use more than 1 L of cooking oil per week?
2. Are you aware that cooking oil should not be reused multiple times?
3. Do you often reuse the same cooking oil to fry more than once?

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4. In your opinion, does reusing cooking oil multiple times have negative effects?
5. Do you know about the harmful compounds present in repeatedly used cooking oil?
6. Do you reuse cooking oil 2–3 times before replacing it?
7. Do you filter the cooking oil you use before reusing it?
8. Do you mix fresh oil with used oil when frying?
9. Are you aware that repeatedly using cooking oil can lead to health issues?
10. Do you know that improperly disposing of used cooking oil can cause environmental pollution?
11. Have you ever heard of "free radicals" in used cooking oil?
12. Do you agree that used cooking oil should be discarded after a single use?
13. Would you be willing to replace cooking oil more frequently for health reasons?
14. Where do you usually dispose of waste cooking oil?
15. Are you aware that waste cooking oil can be repurposed into other products?
16. Do you believe cost is the main factor for reusing cooking oil multiple times?
17. Does this awareness programme help reduce the practice of reusing cooking oil?
18. Do you know that used cooking oil is no longer safe for consumption?
19. After this training, are you interested in processing used cooking oil into other products (e.g., soap or biodiesel)?
20. After participating in this training, do you better understand cooking oil's health and environmental risks?
21. Do you know that used cooking oil is no longer safe for consumption?

3. RESULT AND DISCUSSION

On 29 January 2025, an awareness programme on the health and environmental risks of used cooking oil (WCO) was conducted for the community of Desa Sumber Rejo, as illustrated in the location map presented in Figure 1. The programme aimed to evaluate participants' initial knowledge and assess the impact of the awareness session through the questionnaire.

Figure 1. The location in Desa Sumber Rejo, Banyuasin, Sumatera Selatan (on Google Maps)

The respondents in this community service activity were primarily housewives, spanning various age groups from early adulthood to late elderly. As shown in Table 1, most participants (35%) were in their late adult years (36–45 years), followed by early adults (26–35 years) at 30%. Additionally, 20% of respondents were in the later elderly category (46–55 years), and 15% were aged 66 years and older. Notably, no participants fell within the late teenage group (17–25 years), reflecting the focus of this program on individuals with established household responsibilities.

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In terms of educational background, Table 1 illustrates that a significant proportion of participants had limited formal education. 25% had only completed elementary school, while 50% had attended junior high school. Only 5% had completed senior high school, and 20% had pursued higher education. These figures indicate that 75% of respondents had an educational level below senior high school, suggesting a need for increasing Awareness of the Risks of WCO to Health and the Environment.

Table 1. Characteristics of respondents participating in Educational Training for the Community in Desa Sumber Rejo, Banyuasin

Characteristics	Total	Percentage
Age		
Late teenager (17-25)	-	0
Early adult (26-35)	6	30
Late adult (< 45)	7	35
Later Elderly (46-55)	4	20
Later elderly >66	3	15
Education Level		
Elementary School	5	25
Junior High School	10	50
Senior High Scool	1	5
College	4	20
No formal education	-	0

The educational activity was conducted using a discussion-based approach to encourage active participation and engagement among attendees. The session began with an opening speech delivered by the implementation team from the Prodi Kimia at Universitas Indo Global Mandiri. This introduction aimed to provide an overview of the program's objectives and highlight the importance of raising awareness about the hazards of WCO to human health and the environment.

A questionnaire was distributed to assess participants' baseline knowledge before the educational session commenced (Figure 2). The questionnaire covered key aspects of WCO risks, including potential health effects, environmental impact, and proper disposal methods. As depicted in Figure 2, the participants diligently completed the questionnaire, with guidance from the PkM implementation team, to ensure that all questions were clearly understood. The respondents' results are shown in Table 2.

Figure 2. Participants filling out the questionnaire with assistance from the PkM implementation team

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Furthermore, the socialization activities were conducted, as shown in Figure 3, using an interactive discussion method focused on the hazards and risks posed by WCO. In the picture, the participants follow the socialization with enthusiasm and in a conducive atmosphere. The participants active participation in the discussion shows their high interest and awareness of the issues discussed, which is expected to increase their understanding and encourage behavioral changes in managing WCO more wisely and environmentally friendly.

Figure 3. Education of WCO risks, including its potential health effects, environmental impact, and proper disposal methods

However, as shown in Figure 4, most of the previous participants still disposed of WCO directly into the gutter without realizing its negative impact on the environment. This habit can cause water pollution and drainage channel blockage and increase greenhouse gas emissions due to oil degradation in the open environment. Therefore, through this activity, participants were given an understanding of more sustainable alternatives to WCO management, such as its utilization as raw material for biodiesel (Kolakoti et al., 2021) or environmentally friendly soap (Santoso et al., 2023). This socialization will increase participants' awareness and encourage real changes in the practice of WCO disposal in their environment (Atikawati et al., 2024).

Figure 4. Example of WCO disposal into drainage channels by the community

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Table 2. Scores from respondents questionnaires

No	Respondent's Initial Name	Score
1	SY	72
2	SM	36
3	RH	44
4	SP	56
5	SD	28
6	HR	60
7	SL	52
8	NS	80
9	FT	20
10	RO	80
11	MD	24
12	KK	36
13	EM	44
14	FD	44
15	MY	76
16	NH	48
17	RL	12
18	AS	48
19	ID	64
20	SI	52
Total	976	
Mean	48.8	
Minimum	12	
Maximum	80	
STD	19.579	

The results obtained from the respondents are presented in Table 2. The data shows that out of 20 respondents, scores varied from 12 to 80, with the maximum achievable score being 100. This range of scores reflects the significant differences in the respondents' understanding of the risks and hazards associated with waste cooking oil (WCO). he highest score obtained 80 indicates that some respondents had a good level of understanding, while the lowest score 12 reflects that certain participants still demonstrated a very low level of comprehension. Overall, the average level of understanding was 48.8%, suggesting that the participants initial awareness of the health and environmental risks associated with waste cooking oil (WCO) was generally low.

This finding supports previous studies by Pinandita et al., (2023) , which revealed that a significant portion of the Indonesian population lacks knowledge about the dangers of reusing and improperly disposing of WCO. This considerable difference in scores emphasizes the need for a more adaptive approach to delivering the material.

Therefore, the discussion method was chosen as a more interactive learning strategy to increase participant engagement and ensure a deeper understanding of the material presented. In addition, the wide variation in scores also indicates that most participants still have limitations in understanding and obtaining information about the hazards and risks of WCO to health and

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the environment. Thus, more comprehensive educational efforts are needed so that participants can be more aware of the negative impacts of WCO and the importance of proper management.

4. CONCLUSIONS

This study found that approximately 80% of housewives in Desa Sumber Rejo, Banyuasin had limited prior knowledge of the health and environmental risks associated with waste cooking oil (WCO), as reflected in the average pre-test score of 48.8%. These results highlight the urgent need for ongoing educational interventions to address the improper use and disposal of WCO. One of the main barriers identified was the lack of access to accurate and relevant information regarding the dangers of WCO prior to the activity. To ensure sustainable impact, future programs should not only focus on increasing awareness but also on empowering the community with practical skills to convert WCO into value-added products such as biodiesel, soap, or candles supporting both environmental responsibility and local economic development.

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