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Improving Knowledge and Skills in Healthy Agro-Marine Food Processing among Indonesian Immigrant Communities in Malaysia

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Abstract

Fish and other agro-marine products are important sources of high-quality protein, essential amino acids, omega-3 fatty acids, vitamins, and minerals. However, immigrant communities may experience changes in dietary habits due to limited access to familiar food ingredients, affordability issues, and adaptation to new food environments. This community service program aimed to improve nutritional literacy and practical skills in healthy agro-marine food processing among Indonesian immigrant communities in Kuala Lumpur, Malaysia. The program was conducted in June 2024 through collaboration among Management and Science University, Universiti Muhammadiyah Malaysia, the Muhammadiyah Special Branch (PCIM) of Malaysia in Kuala Lumpur, and the community service team. The activity involved 20 participants and was implemented through five stages: socialization, practical training, technology application, evaluation assistance, and sustainability planning. Program outputs included nutrition education on fish consumption, demonstrations of healthier processing methods such as steaming, boiling, and grilling, introduction of fish-product diversification, utilization of agro-marine by-products, a processing guidebook, and digital learning materials. Evaluation through observation, discussion, and participant feedback indicated that the program helped participants understand the nutritional value of fish and recognize healthier and more economically productive processing alternatives. Continuous mentoring is recommended to strengthen long-term dietary improvement and community-based entrepreneurship.

Keywords: agro-marine products; community service; fish processing; immigrant communities; nutritional literacy

INTRODUCTION

Fish and other agro-marine products have an important role in food security because they provide dense nutrition and are relatively accessible sources of animal protein in many coastal and low- and middle-income contexts. Fish supply high-quality protein, essential amino acids, long-chain omega-3 polyunsaturated fatty acids such as EPA and DHA, vitamins A, D, and B12, and minerals such as iodine, iron, zinc, selenium, and calcium (Gibson et al., 2020; De Bruyn et al., 2021; Noreen et al., 2025). Regular fish intake has also been associated with reduced cardiovascular risk, lower total mortality, and support for brain and child neurodevelopment (Torfadottir & Ulven, 2024; Shahabi et al., 2024; Noreen et al., 2025).

For immigrant communities, healthy food practices are often shaped by dietary acculturation. Migration can change food availability, cooking routines, family consumption patterns, and access to familiar ingredients. Some migrant groups attempt to maintain traditional dietary practices while adapting recipes to available ingredients in the host country (Lee et al., 2022). These adaptations may be positive when they encourage dietary

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diversity, but they may also increase dependence on processed, energy-dense foods when healthy ingredients are less accessible or more expensive (Zheng et al., 2024; Zheng et al., 2025; Varre et al., 2025).

Access, affordability, and knowledge of food processing strongly influence fish consumption. Even in fish-producing or fish-consuming regions, households may reduce fish intake when prices increase, markets are distant, or storage and processing facilities are limited (De Bruyn et al., 2021; Issifu et al., 2022; Onumah et al., 2020). In this context, community-based education is needed not only to promote fish consumption but also to introduce healthy, practical, and economically viable processing techniques.

Previous studies have shown that culturally adapted nutrition programs can improve food knowledge, cooking skills, and healthier eating habits. Community interventions combining nutrition education, cooking demonstrations, group discussions, and home-based or digital support have been reported to improve knowledge and encourage healthier food practices among immigrant and low-income populations (Scarinci et al., 2020; Rascón et al., 2022; French et al., 2024; Mohamed-Bibi et al., 2025). These findings suggest that nutrition education becomes more effective when it is participatory, culturally relevant, and connected with daily food practices.

Based on this background, the present community service program was designed to improve knowledge and practical skills in healthy agro-marine food processing among Indonesian immigrant communities in Malaysia. The program focused on three interrelated aims: increasing awareness of the nutritional value of fish, strengthening practical skills in healthy fish processing and product diversification, and encouraging the economic utilization of agro-marine products and by-products through digital learning and continuous mentoring.

METHOD

Program Setting and Participants

This community service program was conducted in Kuala Lumpur, Malaysia, in June 2024. The program was implemented through collaboration among Management and Science University (MSU), Universiti Muhammadiyah Malaysia (UMAM), Muhammadiyah Special Branch (PCIM) of Malaysia (PCIM) in Kuala Lumpur, and the community service team. The participants were members of the Indonesian immigrant community in Kuala Lumpur. A total of 20 participants attended the activity. The target group was selected because immigrant communities often face changes in food access, dietary habits, and food-processing practices after living in a new sociocultural environment.

Program Design

The program was implemented through five stages: socialization, training, technology application, evaluation assistance, and sustainability planning. Each stage was designed to connect nutritional knowledge with practical food-processing skills and community-based economic opportunities.

Table 1:
Stages of the Community Service Program

Stage	Activity and Purpose	Evidence/Output
Socialization	Nutrition education on fish and healthy consumption	Material, discussion, documentation
Training	Practice of healthy fish processing and product diversification	Demonstration and product documentation
Technology application	Guidebook and digital learning material	Guidebook and video link
Evaluation assistance	Observation, discussion, and participant feedback	Evaluation notes and feedback
Sustainability	Mentoring and follow-up planning	Mentoring plan

Evaluation Technique

Evaluation was conducted using descriptive methods. The team observed

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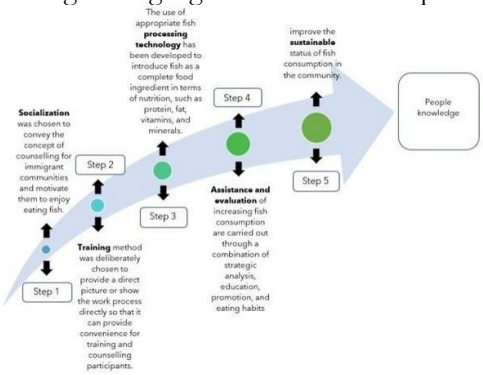
participant involvement during socialization and training, collected responses during question-and-answer sessions, and reviewed participants' understanding of healthy fish-processing practices. The evaluation focused on participant engagement, awareness of the nutritional value of fish, recognition of healthier processing methods, and initial understanding of product diversification and by-product utilization.

RESULTS AND DISCUSSION

Program Implementation and Participant Involvement

Figure 1:
Community Service Method for Strengthening Agro-Marine Consumption



Source: Adapted from program documentation

The community service program was implemented as a participatory activity that included nutrition education, product-processing demonstrations, distribution of learning resources, and discussion. Participants were introduced to fish as a nutrient-rich source of protein, omega-3 fatty acids, vitamins, and minerals. The program also emphasized that healthy processing is necessary to preserve nutritional quality and reduce dependence on high-fat, energy-dense foods.

The program structure helped participants connect scientific information about fish nutrition with concrete processing practices. This is important for immigrant communities because migration may influence food choices, access to familiar ingredients, and cooking habits. By presenting fish-processing practices in a culturally relevant format, the program provided participants with practical alternatives for maintaining healthier dietary practices in Malaysia.

Improvement of Nutritional Literacy

Figure 2:
Socialization Program on Nutritional Literacy and Healthy Fish Consumption

Source: Personal documentation

The socialization session emphasized that fish is a nutrient-rich food source containing high-quality protein, omega-3 fatty acids, and essential micronutrients. Participants were introduced to the role of fish consumption in supporting cardiovascular health, child development, and general nutritional adequacy. This knowledge is important because dietary changes among immigrant communities may lead to reduced consumption of traditional healthy foods and increased consumption of processed foods.

During the discussion, participants were encouraged to reflect on their own fish-consumption habits and the challenges they face in accessing or processing agro-marine products. The activity indicated that participants gained better awareness of the nutritional benefits of fish and healthier processing techniques. Participants were also able to

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relate the information presented in the session to their daily food practices and to identify practical alternatives for preparing fish in healthier ways.

Healthy Processing Skills and Product Diversification

The training session introduced practical methods for processing fish and other agro-marine products. The program emphasized healthier techniques such as steaming, boiling, and grilling because these methods are generally better at preserving nutritional quality than deep frying. The training also introduced product diversification, enabling agro-marine products to be processed into more varied and acceptable forms.

A guidebook entitled *Pengantar Teknologi Penanganan dan Pengolahan Hasil Perairan* was introduced as a learning resource. The guidebook served as a reference for safe handling, preservation, and processing of aquatic products. The availability of this material is useful because participants can revisit the information after the training and use it as a basis for independent practice.

Figure 3:
Guidebook on Handling and Processing Aquatic Products Used as a Learning Resource

Source: Community service team documentation

Digital Learning and Community Outreach

Digital outreach was used to support the program's sustainability. The community service team developed digital learning material on various fish-processing techniques. This approach allows participants and wider community members to access the training content beyond the face-to-face activity. Digital material is especially useful for immigrant communities whose schedules and mobility may limit participation in continuous offline mentoring.

The digital learning material also supports knowledge dissemination. Participants who were unable to attend the full session or who need repeated guidance can revisit the material independently. Its availability extends the reach of the program and provides a practical reference for applying fish-processing techniques in household and community settings.

Figure 4:
Digital Learning Material on Various Fish-Processing Techniques Developed by the Community Service Team

Source: Digital learning material developed by the community service team

Economic Valorization of Agro-Marine By-products

In addition to promoting healthy consumption, the program introduced the economic potential of agro-marine by-products. Participants learned that by-products such as crab shells, fish bones, heads, skin, and other processing residues can be transformed into value-added products when handled properly. One

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example introduced in the program was the processing of crab shells into seasoning powder.

The utilization of by-products is relevant because fish and other marine products often generate waste from heads, bones, viscera, skin, shells, and other parts. When processed appropriately, these materials may become useful sources of protein, minerals, flavoring ingredients, or other value-added products. This dimension connects nutritional education with entrepreneurship by showing that healthy food processing can also support household income and community-based marketing.

Summary of Program Outcomes

Table 2:
Summary of Community Service Outcomes

Component	Concrete Output	Evidence/Documentation
Nutritional literacy	Presentation on fish nutrition and healthy consumption	Presentation material, discussion notes, and activity documentation
Processing training	Demonstration of steaming, boiling, grilling, and product diversification	Demonstration documentation and product photos
Guidebook	Reference on handling and processing aquatic products	Guidebook used as a participant learning resource
Digital outreach	Video material on fish processing	Digital learning material and dissemination documentation
Economic empowerment	Introduction to by-product utilization	Product examples and follow-up discussion
Sustainability	Mentoring plan and follow-up communication	Mentoring plan and communication records

Sustainability and Follow-up Mentoring

The sustainability of the program depends on continuous mentoring and the availability of healthy, affordable, and culturally acceptable agro-marine products in the community. Nutrition education alone is insufficient if participants lack access to ingredients, tools, recipes, and follow-up support. Therefore, the program recommends continued mentoring through digital communication, periodic sharing of processing practices, and the development of simple community-based product trials.

For sustainability, follow-up activities can prioritize regular mentoring, documentation of product trials, and simple monitoring of participants' application of healthy processing practices. Such follow-up can help ensure that the knowledge and skills introduced during the program continue to support healthier consumption patterns and community-based economic initiatives.

CONCLUSION

The community service program on healthy agro-marine food processing provided culturally relevant nutrition education and practical training for Indonesian immigrant communities in Kuala Lumpur, Malaysia. The program helped participants recognize the nutritional value of fish, understand healthier processing methods, and explore the economic potential of agro-marine product diversification and by-product utilization. The activity also produced practical outputs, including a guidebook and digital learning material that can support independent learning after the program.

The program showed positive participant engagement and increased awareness of healthy fish consumption and processing practices. Further implementation may strengthen impact monitoring through structured feedback, skill observation, and follow-up mentoring. Continuous mentoring is recommended to support sustainable dietary practices and community-based entrepreneurship using agro-marine products.

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