FOOD SECURITY EDUCATION THROUGH MODULAR LEARNING AND ITS IMPACT ON FOOD SELF-SUFFICIENCY AWARENESS IN BEDAHAN, DEPOK CITY

Khoirul ANWAR[1*], Vivilia Niken HASTUTI[2], Laras Anastasia HIDAYAT[3], Fandra Raditya NAUFAL[4], Revanza ELIZA[5], Fernando Gabriel KARAMOY[6]
[1,2,3,4,5,6] ***Sahid University, Jakarta, INDONESIA***
[*]***khoirul_anwar@usahid.ac.id***

ABSTRACT

Household food security is a strategic issue that requires special attention, particularly in urban areas with limited land and high dependence on external food sources. This community service program aimed to improve residents' knowledge and skills in achieving food self-sufficiency through a module-based education program using both educational and participatory approaches. The target group consisted of residents from RT 01 RW 06, Bedahan Subdistrict, Sawangan District, Depok City. The educational materials covered household food security concepts, zero food waste practices, and the implementation of aquaponics using buckets (Budikdamber). The results showed a significant increase in participants' knowledge, with average scores rising from 85.33 (pre-test) to 93.30 (post-test). Positive feedback and successful hands-on Budikdamber practices indicated that this approach effectively raised awareness and understanding of sustainable and independent food management. This program is expected to be replicable in other communities as a model for strengthening local food resilience.

Keywords: Food Security, Zero Food Waste, Budikdamber, Education, Participatory, Food Self-sufficiency.

1. INTRODUCTION

Food security is a condition in which households have consistent access to sufficient, safe, nutritious, and affordable food on a sustainable basis. It is not only a national issue but also a tangible challenge at the household level, particularly in rapidly urbanizing areas such as Depok City, where population growth and urban expansion are accelerating (Badan Ketahanan Pangan, 2019). Limited land availability and urban consumption patterns that favor convenience foods contribute to the declining quality of household food security. In the Bedahan Subdistrict of Sawangan District, Depok City, most residents rely heavily on markets for their food supply. Field observations revealed that only a small number of households utilize their home yards for food cultivation. This indicates a low level of awareness and skills among residents in achieving household-level food self-sufficiency (Rahmawati, 2022). Furthermore, many community members are still unfamiliar with the concept of wise household food waste management, which contributes to food wastage and reflects a lack of understanding of the zero-food waste principle.

Efforts to strengthen household food security can be implemented through educational interventions combined with hands-on practices. Mulyani and Lestari (2018) emphasize that direct education using participatory methods is more effective in influencing community knowledge and behaviour than verbal dissemination alone. Therefore, a practical and applicable educational model is required, such as training in *Budikdamber*—a method of cultivating fish and vegetables in buckets—which has been proven to generate independent and nutritious food sources. In addition to providing food, *Budikdamber* also supports space and resource efficiency and introduces the community to the concept of sustainable micro-scale agriculture. This concept is highly applicable in urban areas with limited land availability (Setiawan & Handayani, 2023). The educational activity also incorporates the zero food waste concept, encouraging households to manage food waste wisely through reuse or composting, thereby supporting the sustainability of family food systems.

The main target of this program was community representatives from RT 01 RW 06 in Bedahan, who hold a strategic role in disseminating knowledge and information within the broader community. According to Wahyuni (2019), the role of housewives is central to household food security, as they are directly responsible for food procurement, storage, preparation, and serving. With a well-targeted educational approach, it is expected that knowledge and skills related to food self-sufficiency will increase and be sustained in everyday practices. To ensure the success of this program, the community service team from the Nutrition Study Program, Faculty of Food Technology and Health, Universitas Sahid, collaborated with agricultural extension officers from the Depok City Food Security, Agriculture, and Fisheries Office (DKPPP). This collaboration was intended to synergize academic insights with field-based technical expertise. The program was conducted in the form of structured training and direct practice, supported by a printed educational module, enabling participants to gain not only theoretical knowledge but also practical skills that can be directly implemented at home.

Based on the above background, this community service initiative aims to enhance residents' understanding of food security, introduce the concept of zero food waste, and provide direct training in Budikdamber cultivation. It is

expected that this intervention will contribute positively to improving household food self-sufficiency and encourage behavioral changes toward more sustainable practices in managing household food resources.

2. METHOD

The method employed in this community service activity utilized both educational and participatory approaches to enhance the community's knowledge and skills related to food security. The educational approach was designed to provide conceptual understanding of food security, zero food waste, and the *Budikdamber* system, while the participatory approach was implemented through hands-on activities.

The activity was designed using one-group pre-test and post-test design. In this design, participants were given a pre-test before the educational session and a post-test after the activity to measure changes in knowledge. This approach is frequently used in community-scale educational interventions due to its simplicity and ability to demonstrate learning outcomes attributable to the intervention (Creswell, 2014). The primary data collection instrument was a closed-ended questionnaire consisting of 10 multiple-choice questions covering the three main topics in the module: household food security, the zero food waste concept, and Budikdamber practices. The validity and reliability of the questionnaire were assessed internally prior to deployment, following content validation procedures by experts in nutrition and food security. This instrument was used during both pre-test and post-test to measure knowledge improvement (Arikunto, 2013).

The educational content was developed in the form of a learning module consisting of three main sections: (1) Household Food Security, (2) Zero Food Waste Concept, and (3) Budikdamber. The module was designed based on andragogical principles, which emphasize the relevance of learning to adults and the importance of active engagement (Knowles, Holton, & Swanson, 2012). It was also presented using accessible language, visual illustrations, and case studies to ensure comprehension across diverse educational backgrounds.

Figure 1. The Module of Food Security as a media in this activity

The target group consisted of five (5) household community representatives from RT 01 RW 06, Bedahan Subdistrict, Sawangan District, Depok City. Participants were selected purposively based on their willingness to engage and their strategic roles within the community. According to Sugiyono (2017), purposive sampling is suitable for social programs involving subjects with specific characteristics relevant to the program's objectives.

The educational session was conducted on Saturday, January 11, 2025, over the course of a full day. The agenda consisted of several sessions, including opening remarks, pre-test, delivery of materials by the PKM team and extension agents from DKPPP Depok, group discussions, hands-on practice in *Budikdamber* setup, followed by a post-test and final evaluation. The activity took place at the residence of the RT 01 RW 06 Head, chosen for its adequate space and accessibility to residents.

During the hands-on *Budikdamber* practice, participants were divided into small groups, each guided by a facilitator. The facilitators provided instruction in bucket assembly, filling planting media, installing aeration systems, and planting vegetable seeds and catfish. Mulyani and Lestari (2018) found that practice-based learning significantly improves participants' practical skills compared to lecture-based methods alone. This session also provided opportunities for active discussion and inquiry among participants.

Following the activity, pre-test and post-test data were analyzed using descriptive quantitative analysis to assess knowledge improvement. This involved calculating the average scores before and after the training session. The score increase was used as a key indicator of the educational program's success. This analytical method is considered appropriate for community-based non-formal education programs due to its simplicity, efficiency, and ease of interpretation in empowerment contexts (Neuman, 2014).

3. RESULTS AND DISCUSSION

The community service activity conducted in RT 01 RW 06, Bedahan Subdistrict, Depok City, successfully engaged 5 household participants, consisting mainly of local community figures. Active participation was evident from the beginning of the program, starting from the pre-test session, material delivery, interactive discussions, to the hands-on practice of constructing the *Budikdamber* system. This high level of engagement indicates the participants' interest and need for food security education. This aligns with Wahyuni (2019), who stated that direct involvement in community-based educational programs is an early indicator of success in the community empowerment process. The participants not only attended the event but also actively engaged in discussions and raised questions throughout the sessions.

One key indicator of the program's success was the improvement in participants' knowledge scores after the educational intervention. The average pre-test score was 85.33, which increased to 93.30 in the post-test. This improvement demonstrates a significant increase in understanding of the topics delivered through the module. According to Arikunto (2013), a noticeable difference between pre-test and post-test scores is one of the main indicators of an educational program's effectiveness. This finding affirms that the educational approach, delivered through both modules and facilitators, effectively enhanced the participants' knowledge.

Table 1. Comparison of Pre-test and Post-test Scores

No	Test Type	Average Score
1	Pre-test	85,33
2	Post-test	93,30

The educational module used in this activity consisted of three main topics: household food security, the zero food waste concept, and Budikdamber practice. The module was designed using the andragogical approach, which is tailored to the characteristics of adult learners. Knowles, Holton, and Swanson (2012) emphasized that andragogy focuses on the relevance of material and the active involvement of learners to ensure effective learning. In this program, the materials were contextual, applicable, and easy to follow, which accelerated knowledge transfer to participants.The first section of the module addressed the importance of household food security. Participants were introduced to the understanding that food security is not solely the responsibility of the government but also of individuals and families. Many admitted that this was the first time they learned that food security involves availability, access, utilization, and stability at the household level. This is crucial since, according to FAO (2020), food security begins at the household level as the smallest unit within the national food system. Therefore, fostering awareness at the family level is a strategic step toward achieving food self-sufficiency.

The second topic, zero food waste, received highly positive feedback from the participants. Before the activity, most participants were unaware that food scraps could be reused or composted. Through the education session, they learned that unmanaged food waste contributes to carbon emissions and environmental pollution. According to Damayanti and Saputra (2021), zero food waste practices are integral to sustainable consumption and production patterns and play a significant role in long-term food security. Participants were also taught food storage techniques, how to utilize vegetable scraps, and the use of organic waste for plant fertilizers.

The hands-on component of the activity involved the construction of the Budikdamber system, an integrated aquaponic method of cultivating fish and vegetables in buckets. This activity was particularly appealing to participants due to its practical, innovative nature and its applicability in urban home settings. In groups, participants assembled buckets, filled them with water, introduced catfish fingerlings, and planted kangkung (water spinach) using simple

potting media. According to Mulyani and Lestari (2018), Budikdamber is a smart solution for urban families with limited land who wish to produce their own nutritious food.

Figure 2. Education activities using modules and *Budikdamber* systems

The main advantage of Budikdamber lies in its ability to simultaneously produce animal protein from fish and fiber- and vitamin-rich green vegetables. Moreover, the system is low-cost and easy to maintain. Participants were given guidance on how to set up and care for their Budikdamber systems, including fish feeding, water replacement, and periodic vegetable harvesting. This practical experience-built participants' confidence and instilled a belief that they could independently meet part of their food needs. Setiawan and Handayani (2023) noted that home-based agriculture like Budikdamber not only improves food security but also strengthens family economic resilience.

Discussions during the program revealed that participants had varied experiences and challenges in managing food at the household level. Several admitted that they had not paid much attention to food waste and often discarded leftovers. This program provided new perspectives on the importance of efficiency and food waste management. Rahmawati (2022) emphasized that changes in consumption behavior at the household level are greatly influenced by relevant and context-specific education tailored to the socio-economic conditions of the community. Furthermore, the educational approach used in this program emphasized two-way communication. Facilitators did not merely deliver materials; they also encouraged participants to share their experiences, ask questions, and express opinions. This strategy aligns with active learning methods, which have been proven to increase knowledge retention and conceptual understanding (Knowles et al., 2012). The participatory atmosphere made participants feel valued and motivated to engage further in the activities.

The program's effectiveness was also supported by collaboration between the academic team from Universitas Sahid and extension officers from the Depok City Office of Food Security, Agriculture, and Fisheries (DKPPP). This collaboration strengthened the quality of both the theoretical and practical aspects of the activity. According to

Suryani, Yuliana, and Sutapa (2020), synergy between universities and government agencies in community engagement programs enhances participant trust and the effectiveness of the interventions. This also opens up possibilities for program sustainability beyond the initial activity. In the final evaluation, most participants expressed satisfaction with the program and a willingness to participate in similar activities in the future. They also showed a commitment to implementing Budikdamber systems in their own homes and being more mindful in managing household food. This feedback indicates that the program had a positive impact not only on knowledge but also on attitudes and intentions to change. This supports the transtheoretical model of behavior change, which posits that awareness and knowledge are the first steps toward sustainable behavior modification (Prochaska & DiClemente, 1983).

The post-test results and discussion showed that most participants understood the importance of integrating local resource utilization and responsible consumption behavior. Food security was no longer viewed solely from the perspective of food availability but also through processing and waste reduction. Educational programs that touch on practical and personal aspects like these have been shown to produce tangible short-term impacts. Such initiatives should be sustained and expanded to other regions of Depok City. Moreover, this program presents opportunities for follow-up research and program replication. With the support of quantitative data (pre-test and post-test) and thorough documentation, the PKM team can design a larger-scale community-based Budikdamber development program as part of local food security strategies. Community service initiatives like this also reinforce the role of higher education institutions in directly contributing to society through relevant knowledge transfer.

Overall, the food security education program conducted in Bedahan, Depok City, made a positive contribution to enhancing community knowledge, skills, and attitudes toward food self-sufficiency. The use of structured modules, hands-on practice, and participatory approaches proved effective in supporting the learning process and facilitating behavior change. The success of this initiative demonstrates that community-based approaches are a viable strategy for addressing urban food security challenges.

CONCLUSION

The community service activity titled "Food Security Education Using Modules and Its Impact on Food Self-Reliance Knowledge in Bedahan, Depok City" has successfully enhanced residents' understanding of the importance of household food security, food waste management (zero food waste), and independent food cultivation practices through Budikdamber. The results of the pre-test and post-test demonstrated a significant increase in knowledge scores from 85.33 to 93.30, indicating that the participatory educational approach and the use of educational modules were highly effective in promoting residents' understanding. The approach not only provided theoretical knowledge but also fostered practical skills and critical awareness regarding food issues within the household environment. Positive responses from participants indicated that the material delivered was relevant to the needs and local context of the Bedahan community. This success highlights that active community involvement, cross-sector collaboration between academics and local government, and the development of practical educational materials are key factors in creating changes in knowledge and behavior toward food self-reliance. This activity holds great potential for replication in other areas as a community-based educational model to support sustainable local food security.

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