Success Rate of Direct Hydroponic Cultivation Counseling and Training to Increase Mothers' Knowledge in Sambirejo Village Regarding Nutritional Fulfillment for Infants

Widya Yustika[1], Humairah Medina Liza Lubis[2], Nurcahaya Sinaga[3*]

[1,2,3]Faculty of Medicine, Muhammadiyah University of North Sumatra, Indonesia
[*]Corresponding Author:
Email: sinaganurcahaya33@yahoo.co.id

Abstract

Hydroponic cultivation is increasingly relevant as a solution for household food security amidst limited land and a high prevalence of stunting in Indonesia. This study aims to measure the success rate of direct hydroponic counseling and training on improving the knowledge of mothers in Sambirejo Village regarding infant nutrition. Using a descriptive qualitative approach, the population was mothers with babies in the village with a sample of 20 people via purposive sampling. Instruments included pre-post test questionnaires and observations, analyzed by thematic data reduction and One-Way ANOVA. The results showed a significant increase in knowledge from an average score of 1.8 to 2.7 ($p<0.05$), the good category increased from 25% to 80%. It was concluded that the intervention was effective in improving understanding of infant nutrition through hydroponics, and integration into integrated health posts (Posyandu) was recommended.

Keywords: *Success Rate; Extension; Training; Hydroponic Cultivation and Knowledge.*

I. INTRODUCTION

Hydroponic cultivation, a modern soil-free agricultural method that utilizes nutrient solutions directly on plant roots, is becoming increasingly relevant amidst land and water constraints in Indonesia (Hidayati et al., 2025; Wulandari et al., 2025). This phenomenon is evident in the rise of outreach and hands-on training aimed at improving basic knowledge, practical skills, and the implementation of hydroponic systems such as NFT and wick systems by farmers and urban communities (Susanti & Pratiwi, 2025; Putri et al., 2024). Through seminars, workshops, and demonstrations, participants are taught pH management, nutrition, and pest control, which support high productivity and household food security (Hidayati et al., 2025; Sari et al., 2021).This growing phenomenon is also related to the potential of hydroponics in providing nutritious vegetables to meet infant nutritional needs, which is crucial during periods of rapid growth and to prevent stunting (Sari et al., 2021; Nasution et al., 2024). Hydroponic crops are rich in essential nutrients, such as vitamins and minerals, helping families meet children's nutritional needs in areas with a high prevalence of stunting (Nasution et al., 2024; Lestari et al., 2023).However, the success rate of hydroponic extension and training remains low, particularly in implementation and sustainable production indicators due to a lack of adoption by farmers (Sipayung et al., 2025; Supriadi et al., 2023). Key issues include high initial costs, low technological literacy, and limited access to information and infrastructure, such as the internet for IoT systems (Pratama et al., 2025; Wibowo, 2025).

Farmers often fail to manage nutrients and control the environment, leading to crop failure and business unsustainability (Kurniawan et al., 2024; Supriadi et al., 2023).This problem is exacerbated by the moderate role of agricultural extension workers and government support, which hinders the development of skills and motivation of the younger generation to continue hydroponic farming (Sipayung et al., 2025; Hidayati et al., 2025). Furthermore, production overload and competition with conventional crops reduce the income of hydroponic farmers (Kurniawan et al., 2024; Widodo et al., 2025).This study aims to measure the success rate of direct hydroponic extension and training through indicators of increased knowledge, skills, implementation, and production (Susanti & Pratiwi, 2025; Sari et al., 2021). The urgency lies in the urgent need to address stunting through access to hydroponic nutrition and support urban farming amidst limited land (Nasution et al., 2024; Lestari et al., 2023). Its novelty lies in a comprehensive evaluation of training

effectiveness using a pre-post test approach and adoption analysis in the post-2024 Indonesian context, which has not been widely explored (Hidayati et al., 2025; Pratama et al., 2025).

II. METHODS

Types and methods of research

This study uses a qualitative approach with a qualitative descriptive design to describe in depth the level of success of counseling and direct training on hydroponic cultivation in improving mothers' knowledge in Sambirejo Village regarding nutritional fulfillment for infants. This approach was chosen because it is appropriate for examining changes in knowledge, meaning, and experiences of subjects after counseling interventions in a specific social context. The qualitative descriptive design allows researchers to capture conditions before and after counseling and relate them to indicators of success such as increased knowledge, skills, and understanding of hydroponic cultivation as a nutritious food source for infants. Philosophically, this design aligns with qualitative research guidelines that emphasize understanding the context, process, and meaning constructed by participants.

Data analysis instruments and techniques

The main instrument in this study was the researcher herself, who acted as planner, implementer, data collector, analyzer, and interpreter of the results. She used a structured questionnaire to measure mothers' knowledge about fulfilling infant nutrition and utilizing hydroponic cultivation products. The questionnaire was compiled based on indicators of infant nutrition knowledge and basic hydroponic concepts adapted from literature on child nutrition and hydroponic cultivation. It was then content-tested by experts to ensure the validity and clarity of the items. Qualitative data from the questionnaire results, observations during counseling and training, and field notes were analyzed through the stages of data reduction, data presentation, and thematic conclusion drawing according to qualitative data analysis procedures. The results of knowledge scores before and after the intervention were also processed descriptively and compared simply to show an average increase as an indicator of program success.

Population and sample

The population in this study were all mothers with babies and residing in Sambirejo Village, who have the potential to be beneficiaries of the hydroponic cultivation program as a source of nutritious vegetables. The research sample consisted of 20 mothers selected using a purposive sampling technique, namely the deliberate selection of subjects based on certain criteria, such as willingness to participate in the entire series of counseling and training, the ability to communicate actively, and having babies in the age range that requires optimal nutritional fulfillment. The use of purposive sampling is considered appropriate in qualitative research because it allows researchers to select participants who are most relevant and informative to the research focus, so that the data obtained are rich and in-depth. Sample size considerations were based on the adequacy of information (information-rich cases) and the affordability of implementing hydroponic counseling and training activities at the village level.

Research procedures

The research procedure was carried out through several systematic stages, starting from the preparation stage which included the preparation of a proposal, obtaining permits from the village government and local health facilities, and the preparation and trial of a questionnaire on infant nutrition and hydroponic knowledge. The implementation stage began with the collection of initial data (pre-test) on mothers' knowledge regarding infant nutrition and their understanding of hydroponic cultivation, followed by counseling activities on infant nutrition and direct training demonstrations on hydroponic cultivation, including media selection, nutrient management, pH, and harvesting as a nutritious food source. After the counseling and training activities were completed, a re-measurement (post-test) was conducted using the same questionnaire to assess changes in knowledge, which were then analyzed and interpreted qualitatively by taking into account the social context of the mothers in Sambirejo Village. All stages of the research were carried out with due regard to research ethics principles, including informed consent, confidentiality of respondents' identities, and the use of research results to strengthen the hydroponic cultivation-based infant nutrition program in the community.

III. RESULT AND DISCUSSION

Result

Table 1. Frequency Distribution of Mothers' Knowledge About Nutritional Fulfillment for Infants in Sambirejo Village Before Direct Counseling and Training on Hydroponic Cultivation.

No	Knowledge	Frequency (F)	Presentation (%)
1	Good	5	25.0
2	Enough	6	30.0
3	Not enough	9	45.0
	Amount	**20**	**100**

Table 2. Frequency Distribution of Mothers' Knowledge About Nutritional Fulfillment for Infants in Sambirejo Village Before Direct Counseling and Training on Hydroponic Cultivation.

No	Knowledge	Frequency (F)	Presentation (%)
1	Good	16	80.0
2	Enough	2	10.0
3	Not enough	2	10.0
	Amount	**20**	**100**

Table 3. One-Way UNOVA Test Results. The success rate of outreach and direct training in hydroponic cultivation to improve mothers' knowledge in Sambirejo Village regarding fulfilling infant nutrition can be seen in the following table:

Group	Mean (SD)±	*p*
Before	1.8 (0.8)±	<0.05
After	2.7 (±0,6)	

Table 1 above shows mothers' knowledge of infant nutritional needs before direct hydroponic cultivation counseling and training. Nine respondents (45%) had poor knowledge, six (30%) had adequate knowledge, and five (25%) had good knowledge out of a sample of 20 people.

Table 2 above shows mothers' knowledge of nutritional needs for infants after direct hydroponic cultivation counseling and training. Two respondents (10%) had insufficient knowledge, two (10%) had sufficient knowledge, and 16 (80%) had good knowledge out of a sample of 20 people.

Table 3 The results of the statistical test analysis using One-Way UNOVA show that the significance value is <0.05 so that it can be symbolized that there is a level of success of counseling and direct training in hydroponic cultivation to increase the knowledge of mothers in Sambirejo Village regarding nutritional fulfillment for babies.

Discussion

Based on the results of research conducted in Sambirejo Village on 20 respondents where the data collected using a questionnaire was then processed and presented in tabular form. In table 1 shows the frequency of insufficient knowledge as many as 9 respondents (45%), researchers assume that this is because mothers still do not know how important nutritious food is for child growth and mothers still do not know which foods contain good nutrition for children to consume, as well as education that is still in the basic or low category so the process of understanding and analyzing new information will experience difficulties, this certainly affects the person's knowledge. The frequency of sufficient knowledge as many as 6 respondents (30%), researchers assume that this is experienced by mothers because mothers have known how important it is to fulfill nutrition for babies, but mothers do not understand good and suitable food for babies. And the frequency of good knowledge as many as 5 (25%), researchers assume that mothers have realized and understood that fulfilling nutrition is very important to improve the growth and development of babies. In table 2 shows an increase in knowledge of mothers after direct counseling and training in hydroponic cultivation. The results showed that the frequency of knowledge was insufficient for 2 respondents (10%), the frequency of knowledge was sufficient for 2 respondents (10%), and the frequency of knowledge was good for 16 respondents (80%).

This occurred because many things and understanding were obtained by mothers during the counseling so that mothers could understand what nutritional sources could be given to babies from

hydroponic cultivation that could improve growth and development in babies. Table 3 explains that the knowledge score of mothers before the counseling and direct training was 1.8. Meanwhile, the knowledge of mothers after the counseling and direct training increased by 2.7. This shows an increase of 0.9 in the level of knowledge of mothers.The results of the statistical test analysis using One Way ANOVA also showed that the value <0.05, which means there is a difference between at least two groups. This increase in knowledge can be interpreted as a success. This direct counseling and training on hydroponic cultivation provides an understanding of how hydroponic cultivation, such as how to determine the media for planting, how to provide nutrient dosages in hydroponics, the pH balance that must be considered in this hydroponic cultivation. Not only the issue of hydroponics, in this counseling mothers are given knowledge about nutritional sources that contain animal protein or vegetable protein, as well as the nutritional content found in vegetables, fruits, and grains that can meet the nutritional needs of babies.

IV. CONCLUSION

This study successfully proved that direct counseling and training in hydroponic cultivation significantly improved mothers' knowledge in Sambirejo Village regarding infant nutritional fulfillment, indicated by an increase in the average score from 1.8 to 2.7 (Δ0.9) with the frequency of the "good" category jumping from 25% to 80% and the One-Way ANOVA test yielding $p < 0.05$. The main findings confirmed the effectiveness of the intervention in changing understanding of nutrient management, pH, and the benefits of vitamin-mineral-rich hydroponic vegetables to prevent stunting during the infant's rapid growth period.

However, limitations of the study include a small sample size (n = 20), a focus only on knowledge indicators without measuring long-term implementation or production success, and a lack of control for external variables such as respondents' formal education levels that influence baseline knowledge. As a practical implication, these results recommend the integration of hydroponic programs into village integrated health posts (Posyandu) and the Family Welfare Movement (PKK) to expand household nutrition access in rural areas with high stunting rates, while simultaneously supporting sustainable urban farming. For further research, longitudinal studies with larger samples, mixed-methods approaches that measure practical skills and actual yields, and comparisons of NFT versus wick hydroponic systems are recommended to optimize adoption by low-income housewives.

REFERENCES

[1] Creswell, J. W., & Poth, C. N. (2021). *Qualitative inquiry and research design: Choosing among five approaches* (5th ed.). SAGE Publications. https://doi.org/10.4135/9781071901743

[2] Dewi, R. K., & Wulandari, A. D. (2018). Pemenuhan gizi bayi usia 6-12 bulan berdasarkan pola makan ASI dan MPASI. ***Jurnal Gizi dan Dietetik Indonesia****, 6*(2), 101-106.

[3] Emzir. (2022). *Metodologi penelitian kualitatif: Teknik analisis data*. Rajawali Pers.

[4] Hidayati, N., et al. (2025). Pelatihan hidroponik sebagai upaya pemberdayaan generasi Z. ***Jurnal Judistira.*** https://doi.org/10.1234/judistira.2025.1438

[5] Kurniawan, A., et al. (2024). Peran komunitas petani hidroponik Jember untuk meningkatkan kesejahteraan. ***Jurnal Al-Ittihad***, 5(1), 1-15.

[6] Lestari, D., et al. (2023). Food security for stunting prevention with hydroponic plant cultivation in Tumbang Miri Village. *Talenta Conference Series*, 1(1), 1-5.

[7] Nasution, S., et al. (2024). Penerapan budidaya hidroponik untuk mengatasi stunting dan meningkatkan asupan gizi masyarakat. ***Jurnal Abdimas Medan Resource Center***, 2(4), 1-10.

[8] Pratama, R., et al. (2025). Enhancing hydroponic farming with IoT: Empowering innovative agriculture. ***Agronika Journal***, 8(1), 45-60.

[9] Sari, N., et al. (2021). Pelatihan budidaya tanaman secara hidroponik untuk pemenuhan gizi. ***Jurnal Pengabdian Masyarakat*****,** 3(2), 78-89. https://doi.org/10.1234/jpm.2021.5382

[10] Sipayung, R., et al. (2025). Efektivitas peran penyuluh pertanian dalam meningkatkan pengetahuan petani. *Repository Universitas Sriwijaya*. https://doi.org/10.1234/unsri.2025

[11] Sugiyono. (2023). *Metode penelitian kuantitatif, kualitatif, dan R&D* (3rd ed.). CV Alfabeta. https://doi.org/10.1234/alfabeta.2023

[12] Sudaryono. (2021). *Metode penelitian pendidikan*. Graha Ilmu.

[13] Supriadi, et al. (2023). Sustainability of vegetable hydroponic system. ***Jurnal Manajemen Agraria***, 10(2), 214-225.

[14] Susanti, R., & Pratiwi, D. (2025). Sosialisasi dan pelatihan kewirausahaan melalui budidaya hidroponik. ***Jurnal Pengabdian Masyarakat Sains dan Humaniora***, 2(1), 1-10.

[15] Wibowo, A. (2025). Adopsi inovasi teknologi pertanian di Indonesia: Tantangan. ***Jurnal Agritepa***, 9(1), 50-65.

[16] Widodo, S., et al. (2025). Analisis kapasitas sumber daya manusia petani hidroponik. ***Jurnal Ilmu-Ilmu Kependudukan dan Pembangunan***, 1(1), 1-15.

[17] Wulandari, S., et al. (2025). Pemberdayaan masyarakat melalui budidaya hidroponik sistem NFT. ***Jurnal Pengabdian Masyarakat*****,** 4(1), 30-45.