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Analysis of the Role of the Sustainable Food Yard Program (P2L) in Enhancing Household Food Security and Welfare in Nagan Raya Regency

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Abstract: This study aims to examine the role of the Sustainable Food Yard Program (*Pekarangan Pangan Lestari*—P2L) in strengthening household food security and improving household welfare in Nagan Raya Regency, Aceh Province, Indonesia. Specifically, the study evaluates the effectiveness of program implementation, assesses changes in household food expenditure before and after participation in the program, and identifies the food security status of beneficiary households based on selected socioeconomic characteristics. A quantitative survey design was employed involving 92 beneficiary households selected through purposive sampling from a population of 291 program participants. Primary data were collected through structured questionnaires, in-depth interviews, field observations, and documentation, while the data were analyzed using descriptive evaluative analysis, the Wilcoxon Signed-Rank Test, and cross-tabulation analysis. The findings reveal that the implementation of the P2L Program achieved an effectiveness level of 70.4%, indicating that the program was implemented effectively. Furthermore, participation in the program significantly reduced household food expenditure by 21.6%, with the average monthly expenditure declining from IDR 1,154,348 to IDR 905,435 ($Z = -8.464$; $p < 0.05$). The analysis also indicates that 67.4% of beneficiary households were classified as food secure. Higher levels of food security were observed among households that had participated in the program for more than two years and those capable of marketing surplus produce from their home gardens. These findings demonstrate that the P2L Program contributes substantially to enhancing household food security while simultaneously improving economic welfare through the productive utilization of home gardens.

Keywords: Food Security, Household Welfare, Home Garden Utilization, Sustainable Food Yard Program (P2L), Wilcoxon Signed-Rank Test.

INTRODUCTION

Food security is a strategic global issue that continues to receive serious attention from various countries and international organizations. According to *the Food and Agriculture Organization* (FAO, 2021), food security is achieved when everyone has physical, social, and economic access to sufficient, safe, and nutritious food to lead a healthy and productive life. This issue concerns not only food availability but also accessibility, supply stability, and

adequate food quality for all segments of society. Globally, food insecurity remains a major challenge, particularly in developing countries that are vulnerable to climate change, economic instability, and social conflicts that can disrupt the entire food system (Fajarsari et al., 2024).

At the national level, Indonesia—an agrarian country with a large population—faces serious challenges in achieving equitable and sustainable food security. The Central Statistics Agency (BPS) notes that the prevalence of inadequate food consumption in Indonesia continues to fluctuate, influenced by various factors such as regional disparities in food distribution, poverty, limited agricultural infrastructure, and low dietary diversification among the population (Dahiri, 2023). To address these issues, the central government has formulated various strategic policies, one of which involves strengthening household-based food security programs that leverage the potential of backyard gardens as productive and sustainable sources of local food (Hafizah et al., 2024).

Aceh Province still faces various challenges in achieving optimal and sustainable food security. These issues concern not only food availability but also aspects of accessibility, distribution, and food utilization at the household level. Nagan Raya Regency, as one of the districts in Aceh Province, also experiences food security conditions that tend to fluctuate over time. This indicates that ensuring stable food security in the region still requires serious attention and more targeted efforts from various relevant stakeholders (Baharuddin et al., 2026; Utari & Mayarni, 2023). This situation can be further examined through data on the prevalence of inadequate food consumption during the 2017–2025 period presented in Table 1, which shows annual changes in the adequacy of community food consumption.

Table 1. Prevalence of Inadequate Food Consumption in Nagan Raya Regency

Year	Prevalence of Inadequate Food Consumption (Percent)
2017	6.48
2018	11.24
2019	10.91
2020	7.64
2021	4.75
2022	5.95
2023	3.43
2024	6.91
2025	7.08

Source: Central Statistics Agency, 2026

The data in Table 1 show that the problem of food consumption shortages in Nagan Raya Regency remains unstable. Therefore, we need a more stable and sustained program to improve community food security. Although the P2L program has been implemented in Nagan Raya Regency to strengthen food security and improve household welfare, the fact is that the rate of insufficient food consumption in 2024 and 2025 has increased again. This means we need to conduct further research on how the P2L program affects food security and the well-being of beneficiary households in Nagan Raya Regency (Auwalina & Wasil, 2026; Setyowati, 2025). In this way, the program can continue to be developed more effectively and sustainably.

The central government, through the Food Security Agency, implemented the Sustainable Food Garden Area program from 2010 to 2019. This program aimed to utilize backyard land so that every household could meet its own food needs. In 2020, the Sustainable Food Garden Areas (KRPL) program was renamed the Sustainable Food Gardens (P2L) program. This change made the program broader and more effective in utilizing land (Putri et

al., 2023). The Sustainable Home Garden Program is designed to help the government address the issues of stunting, food-insecure areas, and food security in general by utilizing home gardens, unused land, and vacant lots to produce nutritious food. As a result, each household can meet its nutritional needs and potentially increase family income (Nisa & Triani, 2024).

Table 2. List of P2L Beneficiaries

No.	Subdistrict	Village	Group Name	No. of Members
1	East Seunagan	Mon Bateu	Mugo	35
2	Seunagan	Cot Kumbang	Lhok Kumbang	38
3	Seunagan	Blang Baro	Umpoh Tutong	51
4	Suka Makmue	Blang Sapek	Saban Pakat	32
5	Kuala Pesisir	Padang Panyang	Anugerah Rezeki	15
6	Kuala Pesisir	Kuala Trang	Bina Tani	30
7	Tadu Raya	Natural Resources	Cambodia	30
8	Tripa Makmur	Drien Tujoeh	Bina Sama	26
9	Tripa Makmur	Kabu	Sabena	19
10	Darul Makmur	Kayee Uno	Udep Sare	15
Total				291

Source: *Nagan Raya Regency Department of Agriculture, 2026 (processed)*

According to data from the Nagan Raya Regency Agriculture Office (2026), the Sustainable Home Garden Program (P2L) has been implemented in 10 Women Farmers' Groups (KWT) spread across several subdistricts, benefiting a total of 291 households. This program provides support in the form of seeds, production inputs, technical assistance, and training to beneficiary groups so they can optimally utilize their backyard plots as a source of family food (Solana, 2022; Yahya et al., 2023). This scope of beneficiaries indicates that the P2L Program has been implemented quite extensively in Nagan Raya Regency. However, the program's broad coverage does not necessarily correlate with its success in enhancing food security and household well-being; therefore, the program's effectiveness still requires empirical evaluation.

In Nagan Raya Regency, the P2L program is implemented as a strategic measure to strengthen community food security, particularly through the utilization of backyard plots for growing vegetables, chili peppers, and other daily food staples. This program involves the central role of Women Farmers' Groups (KWT) in managing backyard farming activities, processing produce, and marketing products. In addition to increasing food availability, the program also aims to drive economic growth and curb regional inflation by stabilizing food prices (Antara News, 2024). Based on the findings of Hikmawati *et al.* (2025), in the village of Mekarjaya, Baito subdistrict, South Konawe Regency, the P2L program has proven effective in improving household food security, with the community giving positive assessments of the program's clarity, targeting accuracy, achievement of objectives, and the changes it has brought about. This study examines how the P2L program helps households meet their food needs and improve their well-being in Nagan Raya Regency.

METHODS

This research was conducted in Nagan Raya Regency, Aceh Province, from February to June 2026, using a quantitative approach focused on households participating in the Sustainable Food Garden Program (P2L). The study focused on three objectives: evaluating the effectiveness of the P2L program's implementation, analyzing the program's economic impact on household food expenditures, and identifying the food security status of beneficiaries. The study population consisted of 291 households organized into 10 P2L groups, while a sample of 92 respondents was selected using *purposive sampling* based on the criteria of being P2L

beneficiaries, utilizing backyard land, and being willing to participate as respondents (Judijanto et al., 2024; Waruwu et al., 2025).

The research data consisted of primary and secondary data. Primary data were collected through questionnaires, semi-structured interviews, field observations, and documentation, while secondary data were obtained from the Central Statistics Agency, the Department of Agriculture, the Department of Food Security, and various official reports of the P2L Program. The P2L Program (X) and Household Well-being (Y2) variables were measured using a 1–5 Likert scale, while the Household Food Security (Y1) variable was measured using *the Household Food Insecurity Access Scale* (HFIAS), which consists of nine items with scores ranging from 0 to 27 to classify the level of household food security.

Data analysis was conducted using three complementary approaches. Evaluative descriptive analysis was used to assess the effectiveness of the P2L Program's implementation based on the percentage of target achievement and descriptive statistics. The Wilcoxon Signed-Rank Test was used to analyze differences in household food expenditures before and after participating in the program, while cross-tabulation analysis was used to describe the distribution of food security status based on household characteristics, such as income level, orientation toward utilizing backyard garden produce, and duration of participation in the P2L Program.

RESULTS AND DISCUSSION

Results of the Wilcoxon Signed-Rank Test

Hypothesis testing for differences in food expenditures before and after participating in the P2L Program was conducted using the Wilcoxon Signed-Rank Test. The results of the difference test are shown in the following table:

Table 3. Results of the Test for Differences in Household Food Expenditures

Z	-8.464	
Asymp. Sig. (2-tailed)	0.000	Significant

Source: Processed primary data (2026)

Based on the table above, the results of the Wilcoxon Signed-Rank Test show a Z-value of -8.464 with an Asymp. Sig. (2-tailed) value of 0.000. This significance value, which is far smaller than the significance level of 0.05 ($p < 0.05$), indicates that H_0 is rejected; therefore, it can be concluded that there is a highly significant difference in household food expenditures before and after participating in the P2L Program in Nagan Raya Regency.

A negative Z-score (-8.464) indicates that the direction of the change is downward; that is, food expenditures after participating in the P2L Program were lower than before participating in the program. The absolute value of Z, which reaches 8.464, indicates that this difference is not due to chance but reflects a real and consistent impact of utilizing backyard garden produce on reducing household food expenditures. This finding empirically proves that the P2L Program has had a significant economic impact on beneficiary households in Nagan Raya Regency. The reduction in food expenditures—averaging Rp248,913 per month, or 21.6%—occurred because households were able to meet a portion of their daily food needs, particularly vegetables and fresh food items, through their own backyard garden produce without having to purchase them at the market. These results align with the findings of Ardian (2026) in Palembang City, who concluded that the P2L Program has been proven to help households save on food expenditures, thereby contributing to the sustainable strengthening of household-level food security. Similar findings were also reported by Qorib (2024) in Padang City, who found that the utilization of backyard land through the P2L Program contributes to reducing the burden of household expenditures on food.

From the perspective of the *Sustainable Livelihoods Framework* proposed by Chambers and Conway (1992), savings on food expenditures constitute a form of strengthening household financial capital. When households are able to reduce the proportion of their expenditures on food, the allocation of income to other needs—such as education, health, and productive investments—will increase, which in turn has the potential to drive a more comprehensive improvement in household well-being in the long term (Budiawati et al., 2025; Susanti et al., 2025).

Overview of Food Security Status Based on Household Characteristics

To complement the economic impact analysis tested using the Wilcoxon Signed-Rank Test, this section presents a descriptive overview of the distribution of household food security status based on three main characteristics: income level, orientation toward the use of backyard garden produce, and duration of participation in the P2L Program. This cross-tabulation analysis aims to provide a deeper understanding of the profiles of households classified as Food Secure or Food Insecure in Nagan Raya Regency.

Food Security Status by Income Level

The distribution of household food security status by income level is presented in the following table.

Table 4. Food Security Status by Income Level

Income	Food-Insecure	%	Food Secure	%	Total	%
Rp1–2 million	12	29.3	29	70.7	41	100%
Rp2–3.5 million	15	39.5	23	60.5	38	100%
> Rp3.5 million	3	23.1	10	76.9	13	100%
Total	30	32.6 %	62	67.4%	92	100%

Source: Processed primary data (2026)

Based on the table above, the highest proportion of food-secure households is found in the income group earning more than Rp3.5 million per month, at 76.9% (10 out of 13 households). The income group of Rp1–2 million per month ranks second with a food security rate of 70.7% (29 out of 41 households), while the income group of Rp2–3.5 million per month has the lowest food security rate at 60.5% (23 out of 38 households) (Fadhiela et al., 2024).

An interesting finding is that the lowest-income group (Rp1–2 million) actually has a higher proportion of food-secure households (70.7%) compared to the middle-income group (Rp2–3.5 million), which stands at only 60.5%. This pattern is not entirely linear, contrary to the theory that higher income leads to greater food security. This situation can likely be explained by differences in the orientation of backyard garden produce utilization, where low-income households tend to prioritize self-consumption to meet the family's food needs, while middle-income households may be more oriented toward selling backyard garden produce to supplement their income, resulting in a less optimal direct impact on food security (Marhamah et al., 2022).

Nevertheless, the highest-income group (>Rp3.5 million) still exhibits the largest proportion of food-secure households (76.9%), confirming that adequate income remains a key supporting factor in ensuring household food security. This finding aligns with Coates et al. (2007), who state that household economic capacity is one of the primary determinants of access to sufficient and diverse food (Murgayanti et al., 2025; Nurlinda et al., 2026). In the

context of the P2L Program, higher income enables households not only to rely on backyard produce but also to continue purchasing complementary food items not produced in the backyard, thereby ensuring that diverse and nutritious dietary needs are met more comprehensively.

Food Security Status Based on Orientation Toward the Utilization of Backyard Produce

The orientation of backyard garden produce utilization is a key aspect that illustrates how beneficiary households allocate the produce from the P2L Program. The distribution of food security status based on utilization orientation is presented in the following table.

Table 5. Food Security Status Based on Orientation of Backyard Produce Utilization

Orientation	Food Insecure	%	Food Secure	%	Total	%
Personal Consumption	10	41.7	14	58.3	24	100%
Mixed	17	31.5	37	68.5	54	100%
Usage	Not Food-Safe	%	Food-Safe	%	Total	%
Majority sold	3	21.4	11	78.6	14	100%
Total	30	32.6%	62	67.4%	92	100%

Source: Processed primary data (2026)

Based on the table above, a very interesting finding shows that the proportion of food-secure households actually increases as the orientation toward selling backyard produce increases. The group that primarily sells its backyard produce has the highest proportion of food-secure households at 78.6% (11 out of 14 households), followed by the mixed group at 68.5% (37 out of 54 households), while the group that consumes all of its backyard produce for its own needs has the lowest proportion of food-secure households at 58.3% (14 out of 24 households) (Yumna et al., 2026).

This pattern indicates that the sale of backyard produce is not a factor that undermines food security, but rather an indicator of the program's success. Households able to sell a significant portion of their backyard produce demonstrate that their family's food needs have already been met, allowing excess production to be allocated for sale to supplement income. In other words, the surplus produce sold serves as evidence that these households have achieved food self-sufficiency through their backyards. Conversely, households that consume all their backyard produce for their own needs are likely still at the stage of meeting basic needs, where the entire backyard production is required to cover food shortages and has not yet generated a surplus that can be marketed. This finding aligns with the second objective of the P2L Program, which emphasizes increasing household income through market-oriented food production (Marwah & Irdyanti, 2026). Furthermore, the sale of surplus backyard produce can also be viewed as a form of contribution to broader community food security, as the availability of fresh vegetables and local foodstuffs in the market increases thanks to the active participation of households benefiting from the P2L Program. This finding also reinforces the results of a study by Hikmawati et al. (2025), which concluded that the P2L Program is not only effective in increasing household food availability but also capable of boosting income through the provision of market-oriented food.

Food Security Status Based on Duration of Participation in the P2L Program

The duration of participation in the P2L Program reflects the level of experience households have in utilizing their backyard plots as a food source. The distribution of food security status based on duration of program participation is presented in the following table.

Table 6. Food Security Status Based on Duration of Participation in the P2L Program

Duration of P2L Participation	Food Insecure	%	Food Secure	%	Total	%
1–2 Years	15	36.6	26	63.4	41	100%
>2 Years	15	29.4	36	70.6	51	100%
Total	30	32.6%	62	67.4%	92	100%

Source: Processed primary data (2026)

Based on the table above, households that have participated in the P2L Program for more than 2 years have a higher proportion of food-secure households, namely 70.6% (36 out of 51 households), compared to households that have only participated in the program for 1–2 years, which have a food-secure proportion of 63.4% (26 out of 41 households). This 7.2 percentage point difference indicates a trend: the longer a household participates in the program, the greater the likelihood of achieving food security status.

This difference in proportions indicates that the duration of participation plays a role in supporting the achievement of household food security. Respondents who have participated in the program for more than 2 years have more mature experience in managing their home gardens, understanding crop cultivation cycles, and utilizing harvests more optimally for both consumption and sale. The accumulation of knowledge and skills gained during program participation enables households to gradually increase the productivity of their home gardens, which ultimately leads to improved food availability at the household level.

These findings support the argument by Auwalina & Wasil (2026) within the *Sustainable Livelihoods Framework*, which states that sustainable livelihoods require sufficient time for households to develop their adaptive capacity in response to intervention programs. In line with this, Hikmawati et al. (2025) also found that the duration of participation by members of the Women Farmers' Group in the P2L Program is positively correlated with increased household food security, as the accumulated experience enables members to optimize the use of available land and production resources more efficiently.

Nevertheless, it should be noted that even the 1–2-year group already showed a fairly high proportion of food-secure households (63.4%), indicating that the impact of the P2L Program on food security has begun to be felt from the early years of participation. This suggests that mentoring and training during the program's growth phase have been sufficiently effective in equipping beneficiaries with the basic farming skills needed to improve household food availability.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the research findings, the Sustainable Food Garden Program (P2L) in Nagan Raya Regency has been implemented effectively, with an effectiveness rate of 70.4%. Training and outreach were the indicators with the highest achievement levels, while the availability of production inputs was the aspect with the lowest achievement level. These findings indicate that the program's implementation has gone well according to the beneficiaries, although improvements in the provision of production inputs and consistency in field monitoring are still needed to optimize the program's success.

The P2L program has been shown to have a significant economic impact on beneficiary households. Results from the Wilcoxon Signed-Rank Test indicate a highly significant difference between food expenditures before and after participating in the program ($Z = -8.464$; $p < 0.05$). Average food expenditures decreased from Rp1,154,348 to Rp905,435 per month, representing a savings of Rp248,913 (21.6%). All respondents experienced a decrease in food

expenditures, indicating that the use of home gardens reduces household consumption costs through self-sufficient food production.

The food security status of beneficiary households also showed positive results, with 67.4% of respondents falling into the food-secure category. Cross-tabulation analysis revealed that food security is influenced not only by income level but also by the orientation of backyard produce utilization and the duration of program participation. Households that are able to sell surplus garden produce and have participated for more than two years tend to have a higher proportion of food-secure households, indicating that sustained participation and the optimal utilization of garden produce contribute to strengthening household food security.

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