

**EFFECTIVENESS OF THE FOOD SELF-RELIANCE SCHOOL MODEL IN
STRENGTHENING HOUSEHOLD FOOD SECURITY AS A STRATEGY FOR
STUNTING PREVENTION AT DESA OINLASI,
KABUPATEN TIMOR TENGAH SELATAN
(Efektivitas Model Sekolah Kemandirian Pangan dalam Memperkuat Ketahanan
Pangan Rumah Tangga sebagai Strategi Pencegahan Stunting di Desa Oinlasi,
Kabupaten Timor Tengah Selatan)**

**^{1*}Mariana Dinah Charlota Lerik; ²Santhy Chamdra; ³Siska Elvani; ⁴Yakobus C.W.
Siubelan; and ⁵Doppy Roy Nendissa**

¹Department of Psychology, Faculty of Public Health, Universitas Nusa of Cendana,
Indonesia

^{2,3,4,5}Department of Agribusiness, Faculty of Agriculture, Universitas of Nusa Cendana,
Indonesia

*Corresponding author: mdinah.lerik@staf.undana.ac.id

ABSTRACT

Stunting remains one of the major human development challenges in Indonesia, particularly in regions characterized by high poverty rates and low household food security. Efforts to reduce stunting have predominantly focused on health interventions, while the integration of nutrition literacy, local resource utilization, and community economic empowerment into a comprehensive intervention model has received limited attention. This study aimed to analyze the effectiveness of the Food Self-Reliance School Model in improving nutrition literacy, strengthening household food security, and enhancing community economic empowerment in Oinlasi Village, South Central Timor Regency, Indonesia.

The study employed a mixed-methods approach using a one-group pretest-posttest evaluative design. Data were collected through observations, interviews, documentation, and pretest-posttest assessments involving 32 participants, consisting of teachers, students, parents, and community health volunteers (*Posyandu* cadres). The program included nutrition education, school garden development, home garden utilization, household-scale fish farming, and training on local food processing.

The findings revealed that the program improved participants' nutrition literacy with an N-Gain score of 0.60 (moderate category), expanded the utilization of home gardens, increased household food diversification, and promoted value-added food processing based on home garden products. The integration of nutrition education, food production, and community economic empowerment contributed positively to strengthening household food security and encouraging healthier dietary behaviors within the community.

The Food Self-Reliance School Model can be considered a promising community empowerment approach for strengthening household food security and supporting accelerated stunting prevention strategies in rural areas.

Keywords: community empowerment; food self-reliance school; household food security; nutrition literacy; stunting.

Stunting masih menjadi salah satu tantangan utama pembangunan manusia di Indonesia, khususnya di wilayah dengan tingkat kemiskinan tinggi dan ketahanan pangan rumah tangga yang rendah. Upaya penurunan stunting selama ini lebih banyak berfokus pada intervensi kesehatan, sementara integrasi literasi gizi, pemanfaatan sumber daya lokal, dan pemberdayaan ekonomi masyarakat ke dalam model intervensi yang komprehensif masih kurang mendapat perhatian. Penelitian ini bertujuan untuk menganalisis efektivitas Model Sekolah Mandiri

Pangan dalam meningkatkan literasi gizi, memperkuat ketahanan pangan rumah tangga, dan mendorong pemberdayaan ekonomi masyarakat di Desa Oinlasi, Kabupaten Timor Tengah Selatan, Indonesia. Penelitian ini menggunakan pendekatan metode campuran (*mixed-methods*) dengan desain evaluatif *one-group pretest-posttest*. Pengumpulan data dilakukan melalui observasi, wawancara, dokumentasi, serta penilaian *pretest* dan *posttest* yang melibatkan 32 peserta, terdiri dari guru, siswa, orang tua, dan kader kesehatan masyarakat (kader Posyandu). Program ini mencakup edukasi gizi, pengembangan kebun sekolah, pemanfaatan pekarangan rumah, budidaya ikan skala rumah tangga, dan pelatihan pengolahan pangan lokal. Hasil penelitian menunjukkan bahwa program ini meningkatkan literasi gizi peserta dengan skor N-Gain sebesar 0,60 (kategori sedang), memperluas pemanfaatan pekarangan rumah, meningkatkan diversifikasi pangan rumah tangga, serta mendorong pengolahan pangan bernilai tambah berbasis hasil pekarangan. Integrasi antara edukasi gizi, produksi pangan, dan pemberdayaan ekonomi masyarakat berkontribusi positif terhadap penguatan ketahanan pangan rumah tangga dan mendorong perilaku pola makan yang lebih sehat di tengah masyarakat. Model Sekolah Mandiri Pangan dapat dianggap sebagai pendekatan pemberdayaan masyarakat yang menjanjikan untuk memperkuat ketahanan pangan rumah tangga dan mendukung strategi percepatan pencegahan stunting di wilayah perdesaan. Kata kunci: pemberdayaan masyarakat; sekolah kemandirian pangan; ketahanan pangan rumah tangga; literasi gizi; stunting.

1. INTRODUCTION

Stunting remains one of the major public health and human capital development challenges in Indonesia. This condition is not only associated with impaired physical growth in children but also has long-term consequences for cognitive development, productivity, and the quality of human resources. The Indonesian Government has implemented various nutrition-specific and nutrition-sensitive interventions to reduce stunting prevalence. However, significant challenges persist, particularly in regions characterized by high poverty rates, household food insecurity, and limited access to essential public services (Ministry of Health of the Republic of Indonesia, 2025; World Health Organization [WHO], 2024; United Nations Children's Fund [UNICEF], 2024).

East Nusa Tenggara Province is among the regions in Indonesia that continues to experience relatively high rates of stunting and poverty. South Central Timor Regency, one of the regencies in East Nusa Tenggara, is predominantly characterized by dryland agriculture, where most households rely on subsistence farming for their livelihoods. Such conditions increase household vulnerability to food insecurity. In addition, the poverty rate in South Central Timor Regency remains high at 25.18%, while its Human Development Index (HDI) remains below the provincial average. These conditions indicate that poverty, low human development, and limited access to nutritious food continue to pose major development challenges requiring integrated and multisectoral interventions.

Previous studies have demonstrated that stunting is influenced not only by inadequate dietary intake but also by household food security, educational attainment, dietary practices, environmental sanitation, and household socioeconomic conditions. Households with limited access to nutritious food and low nutrition literacy are more likely to experience difficulties in meeting children's nutritional requirements. Therefore, accelerating stunting reduction requires a multisectoral approach that extends beyond health service interventions by strengthening household food security, improving nutrition education, and promoting community economic empowerment (Ruel et al., 2022; Food and Agriculture Organization [FAO], 2023; World Bank, 2023; UNICEF, 2024).

One promising strategy is the integration of nutrition education with local food production through schools and households. Schools play a strategic role as learning centers capable of shaping children's knowledge, attitudes, and healthy lifestyle behaviors from an early age. At the same time, school gardens and home gardens provide practical opportunities for students and communities to produce food, recognize the diversity of local food resources, and apply the principles of balanced nutrition in their daily lives. Previous studies have consistently reported that school garden-based nutrition education improves nutrition literacy, increases fruit and vegetable consumption, and promotes healthier dietary behaviors among students (Christian et al., 2021; Davis et al., 2023; FAO, 2022).

Beyond improving nutrition knowledge, the utilization of home gardens contributes significantly to household food security and family economic resilience. Home gardens enable households to produce a variety of food commodities, including vegetables, fruits, herbs, medicinal plants, and small-scale animal protein sources. Such diversification not only enhances household food availability but also reduces food expenditures and creates opportunities for developing local food-based enterprises. Several studies have shown that the success of home garden programs largely depends on continuous community assistance, active participation of target groups, and the integration of nutrition education, food production, and community economic empowerment (Ashby et al., 2022; Ritter et al., 2024; Lin et al., 2024; FAO, 2023).

Nevertheless, most previous studies have evaluated nutrition education, school gardens, home garden utilization, and community economic empowerment as separate interventions. Research integrating these components into a comprehensive school- and community-based intervention model to support accelerated stunting reduction, particularly in priority areas such as South Central Timor Regency, remains limited. This gap highlights the need for a community empowerment model capable of simultaneously strengthening nutrition literacy, household food security, and community economic capacity within a single integrated intervention framework.

Based on these considerations, there is a need to develop a sustainable community empowerment model that integrates nutrition education, local resource utilization, and household capacity building. The Food Self-Reliance School Model was developed as an alternative community-based approach that connects schools, families, and local communities to strengthen household food security while supporting efforts to accelerate stunting prevention.

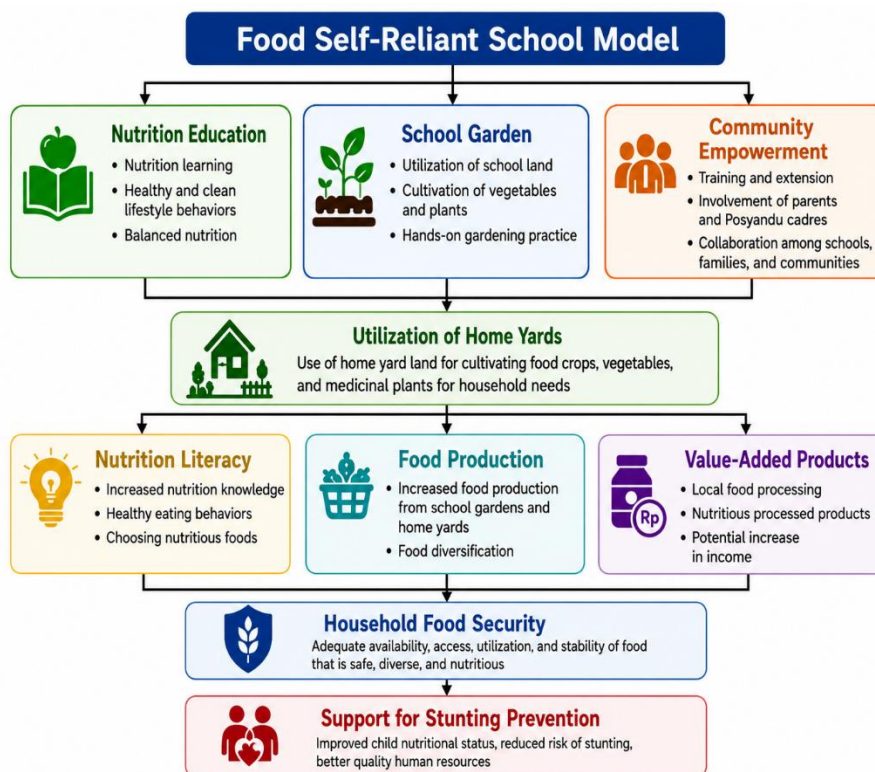


Figure 1. Conceptual Framework of Community Empowerment through the Food Self-Reliant School Model

Based on these conditions, this study evaluates the effectiveness of the Food Self-Reliance School Model as a community empowerment approach that integrates nutrition education, school gardens, home garden utilization, household-scale fish farming, and the development of local resource-based food enterprises. The novelty of this study lies in the development and evaluation of an integrated intervention model that simultaneously links nutrition literacy, household food security, and community economic empowerment within a single community-based approach to strengthen household food security and support accelerated stunting prevention in rural areas. Accordingly, this study aims to analyze the effectiveness of the Food Self-Reliance School Model in improving nutrition literacy, strengthening household food security, and enhancing community economic empowerment in stunting-priority areas.

2. MATERIALS AND METHODS

2.1 Research Design

This study employed a mixed-methods approach using an evaluation research design that integrated quantitative and qualitative methods. The quantitative approach was applied to measure changes in respondents' conditions before and after program implementation using a one-group pretest-posttest design, while the qualitative approach was used to explore the program implementation process, behavioral changes, and community participation through observations, interviews, and document analysis (Creswell & Creswell, 2018; Sugiyono, 2022).

The one-group pretest-posttest design was selected because it enables researchers to evaluate changes occurring after the implementation of an intervention within a single target group without the use of a control group (Fraenkel et al., 2019).

2.2 Study Area and Research Period

The study was conducted in Oinlasi Village, South Mollo District, South Central Timor Regency, East Nusa Tenggara Province, Indonesia. The study site was selected purposively because the village is designated as one of the priority areas for stunting reduction, possesses considerable potential for home garden development that has not yet been optimally utilized, and serves as the implementation site of the Food Self-Reliance School Program under the Thematic Community Service Program (*Kuliah Kerja Nyata—KKN*) of Universitas Nusa Cendana.

Data collection was conducted throughout the program implementation period, beginning with the baseline assessment, followed by program implementation, and ending with the evaluation of program outcomes.

2.3 Population and Respondents

The study population consisted of all participants involved in the implementation of the Food Self-Reliance School Program, including teachers, students, parents, and *Posyandu* (Integrated Health Service Post) community health volunteers in Oinlasi Village.

Respondents were selected using purposive sampling based on the following criteria:

1. participated in all stages of the program;
2. agreed to participate as research respondents;
3. completed both the pretest and posttest assessments; and
4. were actively involved in home garden utilization or local food processing activities.

This sampling approach was employed to ensure that respondents adequately represented the target population receiving the complete intervention, thereby enabling the observed changes to accurately reflect the effectiveness of the program.

Purposive sampling was considered appropriate because respondents were intentionally selected based on their active participation throughout the program and their ability to provide information relevant to the research objectives (Sugiyono, 2022).

2.4 Research Variables

The effectiveness of the Food Self-Reliance School Model was evaluated based on three principal variables: nutrition literacy, household food security, and community economic empowerment.

Table 1. Research Variables, Indicators, and Measurement Techniques

Vable	Indicators	Measurement Techniques
Nutrition Literacy	Knowledge of balanced nutrition, utilization of local food resources, healthy dietary behavior	Pretest–posttest assessment, questionnaire
Household Food Security	Home garden utilization, food diversification, continuity of food production	Observation, interviews, documentation
Community Economic Empowerment	Processing of home garden products, household food enterprises, perceived economic benefits	Interviews, observation, documentation

Source: Prepared by the authors (2026).

2.5 Data Collection

This study utilized both primary and secondary data.

Primary data were collected through field observations, structured interviews using questionnaires, pretest and posttest assessments, and documentation of all activities conducted during the implementation of the Food Self-Reliance School Program.

Secondary data were obtained from village government documents, school reports, reports of the Food Self-Reliance School Program, publications of the Central Bureau of Statistics (*Badan Pusat Statistik*), the Indonesian Nutritional Status Survey (*Survei Status Gizi Indonesia*), and other relevant scientific literature.

The use of multiple data collection techniques served as a methodological triangulation strategy to enhance the validity and credibility of the research findings (Creswell & Creswell, 2018).

2.6 Data Analysis

Data were analyzed using descriptive quantitative analysis, supported by qualitative analysis. Quantitative analysis was employed to evaluate improvements in nutrition literacy, household food security, and community economic empowerment, while qualitative analysis was used to strengthen the interpretation of the quantitative findings through observations, interviews, and documentation.

(1) Nutrition Literacy Analysis

Changes in participants' nutrition literacy were assessed using pretest and posttest scores. The magnitude of improvement was calculated using the percentage increase and the Normalized Gain (N-Gain) proposed by Hake (1999).

$$\text{N-Gain} = \frac{S_{\text{post}} - S_{\text{pre}}}{S_{\text{max}} - S_{\text{pre}}}$$

Where:

- S_{post} = posttest score
- S_{pre} = pretest score
- S_{max} = maximum possible score

Table 2. N-Gain Interpretation

N-Gain Value	Interpretation
> 0.70	High
0.30–0.70	Moderate
< 0.30	Low

If the data satisfied the assumption of normality, differences between pretest and posttest scores were analyzed using the paired-samples t-test. Otherwise, the Wilcoxon signed-rank test was applied (Field, 2018). Descriptive statistics, percentage changes, and N-Gain values were used to evaluate the effectiveness of the program.

(2) Household Food Security Analysis

The effectiveness of the program in strengthening household food security was analyzed using the percentage change in each indicator before and after program implementation.

The percentage change was calculated using the following equation:

$$\text{Percentage Change} = \frac{X_2 - X_1}{X_1} \times 100\%$$

Where:

- X_1 = condition before program implementation
- X_2 = condition after program implementation

The indicators analyzed included:

- home garden utilization;
- diversity of food commodities produced;
- harvesting frequency; and
- reduction in household food expenditures.

(3) Community Economic Empowerment Analysis

The effectiveness of community economic empowerment was analyzed descriptively using the percentage change for each indicator.

The percentage was calculated as follows:

$$P = \frac{f}{N} \times 100\%$$

Where:

- P = percentage;
- f = number of respondents;
- N = total number of respondents.

The analysis covered:

- the number of households processing home garden products;
- the number of locally processed food products;
- the number of households initiating food-based enterprises; and
- respondents' perceptions of the program's economic benefits.

The quantitative findings were subsequently interpreted using evidence obtained from observations, interviews, and documentation to provide a more comprehensive understanding of the effectiveness of the Food Self-Reliance School Model.

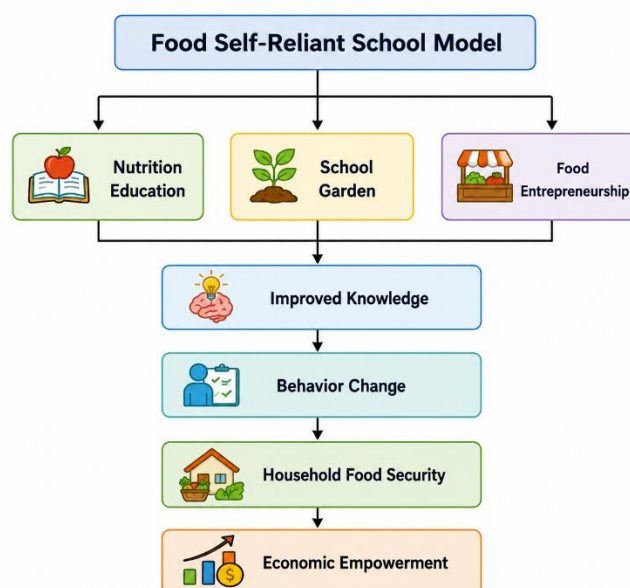


Figure 2. Conceptual Framework of the Food Self-Reliance School Model

Description

Figure 2 illustrates the conceptual framework of the Food Self-Reliance School Model, which consists of three integrated components: nutrition education, school food gardens, and food-based entrepreneurship. These components are implemented simultaneously as a comprehensive intervention to improve participants' nutrition knowledge, strengthen food production skills, and foster entrepreneurship based on local food resources.

The integration of these components is expected to enhance participants' knowledge, which subsequently promotes positive behavioral changes in meeting household food needs. Such behavioral changes are anticipated to strengthen household food security by improving food availability, accessibility, and utilization. Ultimately, improved household food security is expected to contribute to community economic empowerment through reduced household food expenditures, increased productivity, and the development of local food-based enterprises.

3. RESULTS AND DISCUSSION

3.1 Respondent Characteristics

The implementation of the **Food Self-Reliance School Model** involved **32 respondents**, consisting of teachers, students, parents, and *Posyandu* (Integrated Health Service Post) community health volunteers in Oinlasi Village, South Mollo District, South Central Timor Regency. The involvement of these stakeholder groups was intended to ensure that nutrition education, home garden utilization, and household food security interventions were implemented not only within the school environment but also extended to the household level.

Table 2. Characteristics of the Research Respondents

Respondent Characteristics	Number (Persons)	Percentage (%)
Teachers	8	25.0
Students	15	46.9
Parents	8	25.0
<i>Posyandu</i> community health volunteers	1	3.1
Total	32	100.0

Source: Primary data processed by the authors (2026).

Based on Table 2, students constituted the largest respondent group, accounting for 15 participants (46.9%), followed by teachers and parents with eight respondents (25.0%) each, while one respondent (3.1%) represented the *Posyandu* community health volunteers. This composition indicates that the Food Self-Reliance School Model primarily targets students as the main beneficiaries of knowledge and behavioral change, supported by teachers as learning facilitators and parents as key actors in implementing healthy food practices at the household level.

Teachers played a central role in classroom instruction and practical learning activities, while parents and *Posyandu* community health volunteers supported the adoption of healthy lifestyles and home garden utilization within households. This collaboration demonstrates that strengthening household food security requires synergy among the education, health, and family sectors (McDermott et al., 2013; FAO, 2023).

The involvement of multiple stakeholder groups represents an essential element of community-based food and nutrition programs. Interventions that combine multiple components and actively engage participants generally produce stronger improvements in household food security and dietary adequacy than single-component interventions (Steinke et al., 2023). Previous studies have likewise emphasized that integrated interventions, community empowerment, and active community participation are critical determinants of successful food and nutrition programs (Steinke et al., 2023; FAO, 2023).

A participatory approach also enables each stakeholder group to contribute according to its respective capacity. Teachers and schools facilitate educational activities, *Posyandu* volunteers reinforce health and nutrition promotion, while parents ensure that program

activities are implemented consistently at the household level. Such collaboration is essential because food security and nutrition challenges cannot be addressed by a single sector alone but require integrated efforts across agriculture, health, education, social protection, and community empowerment (McDermott et al., 2013; FAO, 2023).

Although respondents represented diverse stakeholder groups, the number of participants in each category was not proportional because respondents were selected based on their participation in the program rather than to represent the demographic composition of Oinlasi Village. Therefore, the respondent characteristics presented in this study primarily reflect the program implementers and beneficiaries rather than the demographic profile of the entire village population.

Overall, the respondent composition demonstrates that the Food Self-Reliance School Model emphasizes collaboration among schools, families, and primary health services. Such collaborative approaches have been shown to improve the effectiveness of food and nutrition interventions compared with interventions targeting only a single beneficiary group (Steinke et al., 2023; FAO, 2023). The synergy among teachers, parents, and *Posyandu* volunteers enables nutrition education to extend beyond the classroom into household food and nutrition practices.

3.2 Effectiveness of the Food Self-Reliance School Model on Nutrition Literacy

Improving nutrition literacy was one of the primary objectives of implementing the Food Self-Reliance School Model. In this study, nutrition literacy refers not only to participants' understanding of balanced nutrition principles but also to their ability to apply this knowledge when selecting food, utilizing local food resources, preparing nutritious meals, and adopting healthier dietary practices within their households. Nutrition literacy was enhanced through nutrition education sessions, practical menu planning based on balanced nutrition guidelines, demonstrations of local food processing, and experiential learning activities conducted in school and home gardens.

The effectiveness of the program was evaluated through **pretest and posttest assessments** covering four principal indicators: knowledge of balanced nutrition, understanding of local food resources, fruit and vegetable consumption, and home garden utilization as a household food source. The evaluation results are presented in Table 3.

Table 3. Changes in Participants' Nutrition Literacy Before and After Program Implementation

Indicator	Before Program	After Program	Increase (%)	N-Gain*
Knowledge of balanced nutrition	61.8	84.7	37.1	0.60
Understanding of local food resources	58.3	82.5	41.5	0.58
Fruit and vegetable consumption	63.2	81.9	29.6	0.51
Home garden utilization	55.6	86.3	55.2	0.69
Average	59.7	83.9	40.5	0.60

Note: N-Gain values were calculated based on pretest and posttest scores. Effectiveness categories followed Hake (1999): low (<0.30), moderate (0.30–0.70), and high (>0.70).

Source: Primary data processed by the authors (2026).

As presented in Table 3, all nutrition literacy indicators improved following the implementation of the Food Self-Reliance School Model. The average nutrition literacy score increased from 59.7 to 83.9, representing an improvement of 40.5%. The average N-Gain value of 0.60 indicates a moderate level of effectiveness, suggesting that the intervention substantially enhanced participants' nutrition literacy.

The greatest improvement occurred in home garden utilization, whereas the smallest increase was observed in fruit and vegetable consumption. This finding suggests that behavioral changes related to practical activities were more readily achieved than changes in daily dietary habits, which are influenced by multiple factors, including established eating patterns, household purchasing power, and year-round food availability. These results indicate that improvements in knowledge do not necessarily translate immediately into optimal dietary behavior, highlighting the importance of continuous mentoring and follow-up support.

The observed improvements in nutrition literacy were likely attributable to the experiential learning approach adopted in the program. Participants were not only exposed to theoretical instruction but also actively engaged in planting, crop management, harvesting, and processing locally available foods into nutritious meals. Such hands-on learning experiences enabled participants to better understand the relationship between food production, dietary diversity, and household nutrition, thereby facilitating the practical application of acquired knowledge in everyday life.

These findings are consistent with previous studies demonstrating that school garden-based nutrition education improves nutrition knowledge, dietary diversity, and students' willingness to consume fruits and vegetables. Christian et al. (2021), Davis et al. (2023), and Ritter et al. (2024) similarly reported that integrating nutrition education with gardening activities provides a more effective learning experience than conventional classroom-based instruction. Furthermore, Ritter et al. (2024) found that combining nutrition education with home garden utilization enhances community participation while promoting the sustainability of positive behavioral changes.

The success of the program was also supported by the active involvement of teachers, parents, and *Posyandu* community health volunteers. Teachers served as learning facilitators within the school environment, whereas parents and *Posyandu* volunteers reinforced the adoption of healthy practices at the household level. This collaboration strengthened the transfer of nutrition knowledge from schools to families.

Nevertheless, improved nutrition literacy alone does not automatically guarantee better nutritional outcomes. Adequate nutrition knowledge must be supported by sufficient food availability, household economic capacity, access to health services, proper sanitation, and appropriate childcare practices. Therefore, nutrition education interventions should be integrated with strategies aimed at strengthening household food security and community economic empowerment to ensure long-term and sustainable behavioral change (Ruel et al., 2022; FAO, 2023; UNICEF, 2024).

Overall, the findings demonstrate that the Food Self-Reliance School Model effectively improved participants' nutrition literacy through the integration of nutrition education, practical food production activities, and local food utilization. Improved nutrition literacy represents an important foundation for promoting healthier dietary behaviors and supporting stunting prevention efforts. However, sustained improvements require better access to nutritious foods and stronger household economic capacity to ensure the long-term sustainability of program outcomes.

The improvement in nutrition literacy is expected to encourage communities to make greater use of local resources in meeting household food needs. Therefore, the effectiveness of the Food Self-Reliance School Model was further evaluated based on changes in household food security following program implementation.

3.3 The Food Self-Reliance School Model in Strengthening Household Food Security

Household food security is one of the key indicators used to evaluate the effectiveness of the Food Self-Reliance School Model. The program aims not only to improve community nutrition knowledge but also to promote behavioral change through the utilization of home

gardens as a sustainable source of household food. This approach is expected to enhance food availability, increase dietary diversity, and reduce household dependence on purchasing food from external sources.

The program was implemented through the establishment of school gardens, the utilization of home gardens, the cultivation of food crops, medicinal plants, culinary herbs, and small-scale household fish farming. All activities were carried out using a participatory approach involving teachers, students, parents, and *Posyandu* (Integrated Health Service Post) community health volunteers. Consequently, the learning process extended beyond the school environment and was implemented at the household level. The evaluation results for household food security indicators are presented in Table 4.

Table 4. Changes in Household Food Security Indicators Before and After Program Implementation

Indicator	Before Program	After Program	Change (%)
Households utilizing home gardens (%)	42.3	81.5	92.7
Average number of cultivated food commodities (types)	3.1	7.4	138.7
Households harvesting vegetables weekly (%)	18.5	67.7	266.0
Households consuming home garden products (%)	31.5	78.5	149.2
Households reducing vegetable purchases (%)	24.6	71.5	190.7

Source: Primary data processed by the authors (2026).

Table 4 shows that all household food security indicators improved following the implementation of the Food Self-Reliance School Model. The proportion of households utilizing home gardens increased from 42.3% to 81.5%, indicating that community members increasingly used the land surrounding their homes for household food production. In addition, the average number of cultivated food commodities increased from 3.1 to 7.4 crop types, reflecting greater diversification of household food production.

Greater crop diversification contributed to improved household food availability. Prior to program implementation, most home gardens contained only one or two crop species. Following the intervention, households cultivated a wider variety of vegetables, culinary herbs, medicinal plants, and other horticultural crops. This increased diversity enabled households to access a more varied food supply throughout the year, thereby improving their ability to meet daily nutritional requirements.

These improvements were accompanied by increased harvesting frequency and greater utilization of home garden produce for household consumption. Most respondents reported that a substantial proportion of their daily vegetable needs was supplied from their own gardens, resulting in reduced purchases of vegetables from local markets. These findings suggest that home garden utilization not only increased food production but also strengthened household access to nutritious foods through self-production. Consequently, the benefits of the program were reflected not only in the increased number of cultivated crops but also in positive behavioral changes regarding household food consumption practices.

The increased utilization of home gardens can largely be attributed to the program's hands-on implementation strategy. Rather than relying solely on classroom-based education, participants received practical training and continuous technical assistance in crop cultivation, plant management, the application of organic fertilizers, and post-harvest management. This sustained mentoring enhanced participants' confidence in developing and maintaining home gardens as reliable household food sources.

The findings of this study are consistent with previous research indicating that home garden utilization is an effective strategy for strengthening household food security, particularly in rural areas. Home garden programs have been shown to improve household food availability, increase dietary diversity, and reduce vulnerability to food price fluctuations (Ashby et al., 2022; FAO, 2023). Similarly, Blakstad et al. (2020) reported that integrating home gardening with nutrition education produced greater improvements in dietary diversity than interventions focusing solely on increasing food production. These findings suggest that strengthening household food security requires an integrated approach combining knowledge enhancement, practical skills development, and continuous community support.

In addition to improving food availability, home garden utilization also generated economic benefits for participating households. Harvested produce reduced the need to purchase vegetables and culinary herbs, thereby lowering household food expenditures. Although this study did not quantify the monetary value of these savings, most respondents reported that home gardens supplied a substantial proportion of their household food requirements. These findings demonstrate that home gardens serve a dual function as both a source of household food and a means of strengthening household economic resilience.

Given that much of South Central Timor Regency consists of dryland agricultural areas, home garden development represents a promising strategy for improving household food security. Nevertheless, the long-term sustainability of the program depends on adequate water availability, access to quality seeds, continuous technical assistance, and sustained community participation. Therefore, ongoing support from village governments, schools, agricultural extension services, and community institutions remains essential to ensure that home garden activities continue after the program has been completed.

Overall, the findings indicate that the Food Self-Reliance School Model contributed positively to strengthening household food security by increasing home garden utilization, promoting food production diversification, improving household food availability, and reducing dependence on purchased food. These improvements provide an important foundation for community-based food security development while simultaneously supporting stunting prevention through improved household access to more diverse and nutritious foods.

The strengthening of household food security also created opportunities for communities to develop value-added food products derived from home garden produce. Therefore, the effectiveness of the Food Self-Reliance School Model was further evaluated based on changes in community economic empowerment following program implementation.

3.4 The Food Self-Reliance School Model in Promoting Community Economic Empowerment

In addition to strengthening household food security, the Food Self-Reliance School Model was designed to enhance community economic capacity by promoting the utilization of home garden products as value-added food commodities. Economic empowerment was implemented through training on local food processing, household enterprise mentoring, and the introduction of marketing strategies for products derived from locally available resources. This approach aimed to ensure that home garden produce was not only consumed by households but also utilized as an additional source of family income.

In this study, community economic empowerment was evaluated based on changes in the number of households processing home garden products, the diversity of processed food products, community participation in product marketing, and respondents' perceptions of the program's economic benefits. The evaluation results are presented in Table 5.

Table 5. Changes in Community Economic Empowerment Indicators Before and After Program Implementation

Indicator	Before Program	After Program	Change (%)
Households processing home garden products (%)	12.3	46.9	281.3
Number of processed food product types	2	8	300.0
Households marketing fresh or processed products (%)	9.2	35.4	284.8
Perceived economic benefits (score 1–5)	2.8	4.3	53.6

Source: Primary data processed by the authors (2026).

As shown in Table 5, all indicators of community economic empowerment demonstrated positive improvements following the implementation of the Food Self-Reliance School Model. The number of households processing home garden products increased almost fourfold compared with the pre-program condition. In addition, the diversity of processed food products expanded considerably, ranging from fresh vegetables and chili sauce to various locally processed foods and value-added products derived from home garden produce. These findings indicate that community members increasingly utilized agricultural products not only for household consumption but also as commodities with economic value.

The increase in home garden product processing reflects a shift in community perceptions regarding the utilization of local resources. Before the program, home garden produce was generally consumed directly or sold in fresh form with relatively low added value. Following the training, participants developed a better understanding of simple processing techniques that could improve product quality, extend shelf life, and increase market value. These changes demonstrate that the empowerment process not only enhanced participants' knowledge but also strengthened their capacity to utilize local resources more productively.

The training activities also introduced basic entrepreneurial principles, including raw material selection, hygienic food processing, simple packaging techniques, and product marketing. Although most enterprises remained at the household scale, these activities provided participants with valuable initial experience in developing local food-based businesses. Consequently, the success of the program should not be measured solely by the increased number of processed products but also by the improvement of participants' skills, confidence, and motivation to initiate productive economic activities.

The findings of this study are consistent with previous research demonstrating that local food-based enterprises can improve household economic capacity when supported by appropriate training, continuous mentoring, and the effective utilization of local resources. The World Bank (2023) emphasized that transforming agricultural products into value-added commodities represents an effective strategy for increasing rural household income. Likewise, Ashby et al. (2022) reported that home garden utilization contributes not only to household food security but also creates opportunities for small-scale household enterprises through the sale of fresh produce and processed food products. These findings highlight the complementary relationship between economic empowerment and household food security in promoting sustainable community development.

Nevertheless, this study did not directly measure changes in household income before and after program implementation. Therefore, economic empowerment in this study was primarily assessed based on improvements in community capacity, increased processing of home garden products, diversification of local food products, and the emergence of household-based entrepreneurial activities. Future studies should incorporate more comprehensive economic indicators, such as changes in net household income, business profitability, and household expenditure efficiency, to provide a more robust evaluation of the program's economic impacts.

For communities in South Central Timor Regency, the development of enterprises based on home garden products offers considerable potential because most raw materials are readily

available within the local environment. With sustained technical assistance, improved access to financial resources, strengthened community institutions, and expanded marketing networks, local food processing activities have the potential to evolve into viable microenterprises capable of improving household livelihoods. Therefore, collaboration among local governments, village administrations, universities, agricultural extension services, and community organizations remains essential to ensuring the long-term sustainability of the program.

Overall, the findings indicate that the Food Self-Reliance School Model not only strengthened household food security but also promoted community economic empowerment by improving food processing skills, encouraging the utilization of home garden products as value-added commodities, and stimulating the development of household-scale food enterprises. The integration of nutrition education, food production, and economic empowerment makes this model more comprehensive than interventions focusing exclusively on food production or nutrition education.

These findings further demonstrate that the benefits of the Food Self-Reliance School Model extend beyond improvements in nutrition knowledge and food production. The program also strengthens community capacity to manage local resources independently and sustainably. This provides an important foundation for discussing the broader implications of the Food Self-Reliance School Model as a community-based strategy for accelerating stunting prevention in rural areas.

3.5 Implications of the Food Self-Reliance School Model as a Community-Based Strategy to Support Stunting Prevention

The findings indicate that the Food Self-Reliance School Model contributed positively to improving nutrition literacy, strengthening household food security, and promoting community economic empowerment. These three components are closely interconnected and form a community-based empowerment system that supports stunting prevention by addressing factors that influence the quality of household food consumption. Therefore, the success of the model should not be measured solely by improvements in participants' knowledge or increases in food production, but also by changes in community behavior in utilizing local resources to meet household food needs.

One of the principal strengths of the Food Self-Reliance School Model is its integration of multiple sectors within a mutually reinforcing intervention. Nutrition education delivered through schools improved participants' understanding of the importance of consuming nutritious foods and utilizing local food resources. This knowledge was subsequently applied through school gardening and home garden activities, enabling participants to gain direct experience in food production. The resulting produce was then used to meet household consumption needs or processed into value-added products. This integration demonstrates that improvements in nutrition literacy, household food security, and economic empowerment are not independent processes; rather, they reinforce one another in supporting community development.

From a food security perspective, the Food Self-Reliance School Model strengthens the four major dimensions of food security defined by the FAO: availability, access, utilization, and stability. Home garden utilization increases food availability at the household level, reduced food expenditures improve household economic access, enhanced nutrition literacy promotes better food utilization, and the sustainability of home garden cultivation contributes to a more stable food supply across seasons. These four dimensions show that the program not only increases food production but also strengthens the household food system more comprehensively.

The findings also demonstrate that schools can function as centers of community empowerment. Schools are generally regarded primarily as formal educational institutions; however, this study shows that they can also serve as learning platforms that connect students, teachers, parents, *Posyandu* community health volunteers, village governments, and local communities within an integrated program. Through this approach, the knowledge acquired by students extends beyond the school environment and is transferred into family life, thereby broadening the program's impact within the community.

Nevertheless, the findings should not be interpreted as evidence that the Food Self-Reliance School Model directly reduced stunting prevalence. This study evaluated changes in supporting factors associated with stunting prevention, namely nutrition literacy, household food security, and community economic capacity. Reductions in stunting prevalence are also influenced by other factors, including maternal health status, infant and young child feeding practices, environmental sanitation, access to health services, and household socioeconomic conditions. Therefore, the Food Self-Reliance School Model is more appropriately positioned as a nutrition-sensitive intervention that supports accelerated stunting reduction through strengthened household food security and community empowerment.

This study has several limitations that should be considered when interpreting the findings. First, the study employed a one-group pretest-posttest design without a comparison group; therefore, the observed changes cannot be attributed solely to the program with complete certainty. Second, the observation period was relatively short, limiting the assessment of the long-term sustainability of home garden utilization and household food enterprises. Third, the study did not measure changes in dietary intake using standardized instruments or assess changes in children's nutritional status; therefore, the direct effect of the program on stunting reduction could not be determined. Future studies should use longer observation periods, include comparison groups, and measure dietary intake and child nutritional status to provide a more comprehensive evaluation of the effectiveness of the Food Self-Reliance School Model.

Overall, the findings suggest that the Food Self-Reliance School Model is a promising community empowerment approach for rural areas, particularly those characterized by high poverty, food insecurity, and stunting prevalence. The integration of nutrition education, home garden utilization, and household economic strengthening provides a strong foundation for community-based food security development. With support from local governments, village administrations, schools, universities, and other stakeholders, the model has the potential to be replicated as a supporting strategy for accelerating stunting prevention in South Central Timor Regency and in other areas with similar characteristics.

4. CONCLUSION

The findings indicate that the implementation of the Food Self-Reliance School Model contributed positively to improving nutrition literacy, strengthening household food security, and promoting community economic empowerment in Oinlasi Village, South Central Timor Regency. Improvements in nutrition literacy were reflected in participants' increased understanding of balanced nutrition, the utilization of local food resources, and the importance of consuming diverse and nutritious foods. The learning approach, which combined nutrition education with practical activities through school and home gardens, encouraged knowledge improvement while strengthening the adoption of healthy behaviors at the household level.

The **Food Self-Reliance School Model** also contributed to stronger household food security by increasing home garden utilization, expanding the diversity of cultivated food commodities, improving household food availability, and reducing dependence on purchased vegetables. In addition to improving food availability, home garden utilization generated

economic benefits through reduced household food expenditures and the development of local resource-based food processing activities.

In terms of economic empowerment, the program improved community skills in processing home garden products into value-added commodities and created opportunities for the development of household-scale food enterprises. The integration of nutrition education, food production, and enterprise development demonstrates that the **Food Self-Reliance School Model** does not focus solely on increasing production but also strengthens the community's capacity to utilize local potential independently.

Overall, the study suggests that the **Food Self-Reliance School Model** can be considered an alternative community empowerment approach for strengthening household food security in areas with similar socioeconomic characteristics and as a supporting strategy for accelerating community-based stunting prevention. The model strengthens key factors related to stunting prevention through improved nutrition literacy, household food security, and community economic empowerment, and therefore has the potential to be replicated in other rural areas with similar socioeconomic conditions.

Recommendations

The sustainability of the Food Self-Reliant School Model requires continued support from local governments, village administrations, schools, agricultural extension officers, healthcare professionals, and community organizations through continuous mentoring, provision of production inputs, and strengthening of community institutions. Future research should employ longer observation periods, include comparison groups, and assess changes in dietary intake and the nutritional status of children under five years of age to enable a more comprehensive evaluation of the model's contribution to accelerating stunting reduction.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the financial support provided by Universitas Nusa Cendana through its Internal Research Grant Program. The authors also sincerely thank the Rector and university leadership for sponsoring this research. Appreciation is extended to the Government of Oinlasi Village, the participating schools, teachers, students, parents, *Posyandu* community health volunteers, and all community members whose cooperation and active participation contributed significantly to the successful implementation of this study.

REFERENCES

- Ashby, J., Polar, V., Baldivia, J., & Martinez, M. (2022). *Home gardens and household food security: A systematic review. Food Security, 14*(5), 1247–1264.
- Badan Pusat Statistik Kabupaten Timor Tengah Selatan. (2024). *Indikator Kesejahteraan Rakyat Kabupaten Timor Tengah Selatan 2024*. BPS Kabupaten Timor Tengah Selatan.
- Badan Pusat Statistik Kabupaten Timor Tengah Selatan. (2024). *Statistik Daerah Kabupaten Timor Tengah Selatan 2024*. BPS Kabupaten Timor Tengah Selatan.
- Badan Pusat Statistik Provinsi Nusa Tenggara Timur. (2024). *Provinsi Nusa Tenggara Timur dalam Angka 2024*. BPS Provinsi Nusa Tenggara Timur.
- Blakstad, M. M., Mosha, D., Bellows, A. L., et al. (2020). Home gardening improves dietary diversity and household food security in rural Tanzania. *Public Health Nutrition, 23*(15), 1–10.
- Christian, M. S., Evans, C. E. L., Hancock, N., & Nykjaer, C. (2021). School gardening interventions and their impact on children's dietary behaviour: A systematic review. *Public Health Nutrition, 24*(8), 2105–2118.

- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
- Davis, J. N., Pérez, A., Asigbee, F. M., et al. (2023). School garden-based interventions and children's nutrition outcomes: A systematic review. *Nutrients*, 15(3), 615.
- Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). Sage Publications.
- Food and Agriculture Organization. (2022). *School food and nutrition framework*. FAO.
- Food and Agriculture Organization. (2023). *The State of Food Security and Nutrition in the World 2023*. FAO.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.
- Hake, R. R. (1999). *Analyzing change/gain scores*. Indiana University.
- Kementerian Kesehatan Republik Indonesia. (2025). *Hasil Survei Status Gizi Indonesia (SSGI) Tahun 2024*. Badan Kebijakan Pembangunan Kesehatan.
- Lin, B. B., Philpott, S. M., & Jha, S. (2024). Community gardens and urban food systems: Contributions to food security and community resilience. *Agriculture and Human Values*, 41(2), 415–430.
- McDermott, J., Johnson, N., Kadiyala, S., Kennedy, G., & Wyatt, A. J. (2013). Agriculture and household nutrition: Linking agricultural production to improved nutrition. *Food Security*, 5(1), 45–60.
- Ritter, T., Mockshell, J., Garrett, J., Ogutu, S., & Asante-Addo, C. (2024). A process evaluation of a home garden intervention. *Agriculture & Food Security*, 13, Article 44. <https://doi.org/10.1186/s40066-024-00499-9>
- Ruel, M. T., Quisumbing, A. R., & Balagamwala, M. (2022). Nutrition-sensitive agriculture: What have we learned so far? *Global Food Security*, 33, 100633.
- Saaka, M., Awini, S., Kizito, F., & Nang, E. (2024). Relationship between home garden ownership and the consumption of fruits and vegetables. *Public Health Nutrition*, 27(1), e46. <https://doi.org/10.1017/S1368980024000272>
- Steinke, J., Habtemariam, L. T., Kubitza, C., Maczek, M., Altincicek, B., & Sieber, S. (2023). Stronger food and nutrition security impacts from more intense project participation: Evidence from a multi-country intervention program. *The Journal of Development Studies*, 59(6), 873–893. <https://doi.org/10.1080/00220388.2023.2182684>
- Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- United Nations Children's Fund. (2024). *Indonesia national nutrition programme review*. UNICEF.
- World Bank. (2023). *Food Security Update*. World Bank.
- World Health Organization. (2024). *Levels and trends in child malnutrition*. World Health Organization.