Unpacking the challenges and potentials of the Ai-Han supersereal program in reducing stunting in Covalima Timor-Leste

Anita Joana Ferreira*, Sulistyaningsih, Anjarwati

Master of Midwifery Program, Faculty of Health Sciences, Universitas 'Aisyiyah Yogyakarta, Indonesia
Email: Anitajoanaferreira24@gmail.com

Abstract
Stunting is a chronic nutritional problem that severely affects physical growth, cognitive development, and future productivity. In Timor-Leste, nearly half of children under five are stunted, with the prevalence in Covalima District reaching 49%. Since 2004, the Ministry of Health has implemented the Ai-Han Supersereal Program, providing fortified supplementary food for pregnant and lactating women at risk of malnutrition. This study aimed to evaluate the implementation of the Ai-Han Supersereal Program in Covalima using the CIPP (Context, Input, Process, Product) evaluation model. A qualitative descriptive design was employed with purposive sampling, involving the Covalima Health Office director, nutrition program managers, health center heads, and program beneficiaries. Data were thematically analyzed using NVivo 12 Plus. Results indicated that the program was contextually relevant but constrained by limited human resources, transport facilities, and distribution mechanisms. The implementation process faced irregular distribution schedules and insufficient nutrition education. Despite these challenges, the program improved maternal nutrition knowledge and contributed to better nutritional outcomes. Conclusion: The study concludes that strengthening distribution management, enhancing health worker capacity, and continuous nutrition education are necessary for long-term effectiveness.

Keywords: ai-han supersereal; program evaluation; stunting

1. Introduction

Stunting remains a major global health concern, with around 148 million children worldwide affected in 2022, more than half of whom live in Asia (UNICEF, WHO, & World Bank, 2023). Southeast Asia ranks as the second-highest region after South Asia, with a prevalence of 25.7% (Sukamto, Hartono, & Mulyani, 2021).

In Timor-Leste, stunting prevalence is still alarming, with national rates of 47.1% and as high as 49% in Covalima District, surpassing the WHO threshold of 30% for a "very high" category (Timor-Leste Food and Nutrition Survey, 2020; Nomura, Bhandari, Matsumoto-Takahashi, & Takahashi, 2023). This high prevalence is further exacerbated by risk factors such as early marriage, adolescent pregnancy, and poor maternal nutritional status, which increase the likelihood of low birth weight infants (Widowati, Nurmala, Devy, & Kiswahono, 2024).

The long-term consequences of stunting are severe, including impaired cognitive development, poor educational attainment, and increased vulnerability to non-communicable diseases in adulthood (Thurstans, Sessions, Dolan, et al., 2022). In response, the Timor-Leste government launched the National Health Sector Nutrition Strategic Plan 2022–2026, outlining evidence-based interventions such as promoting healthy diets, micronutrient supplementation, food fortification, and multisectoral collaboration with international partners including UNICEF and WFP (UNICEF, 2022).

One flagship initiative is the Ai-Han Supersereal Program, initially supported by the World Food Programme (WFP) in 2004 and later managed fully by the government starting in 2014. The program provides fortified maize-soy blends enriched with vitamins and minerals to pregnant and lactating women in order to improve maternal nutrition and reduce stunting Olney, Leroy, Bliznashka, & Ruel, 2018; Leroy, Olney, & Ruel, 2018). However, despite long-standing implementation, persistent challenges remain, including irregular distribution, limited human resources, and insufficient integration of locally available foods (Zaidi et al., 2020; Ferreira & Sulistyaningsih, 2025).

To provide a comprehensive evaluation, this study applies the CIPP model (Context, Input, Process, Product), which allows for an in-depth analysis of program relevance, resource availability, implementation processes, and outcomes achieved. This approach is crucial for identifying both strengths and weaknesses of the program, while offering recommendations to strengthen stunting reduction strategies in Timor-Leste (Mason, Shrimpton, Saldanha, et al., 2014; Kohli, Nguyen, Avula, & Menon, 2020).

2. Methods

This research applied a descriptive qualitative approach using the CIPP evaluation framework (Context, Input, Process, Product). The framework was chosen to provide a comprehensive picture of program relevance, resource allocation, implementation, and outcomes.

2.1. Study Setting and Period.

The study was carried out in Covalima District, Timor-Leste, an area identified as having a high prevalence of stunting. Data collection was conducted between June and July 2025, during the ongoing implementation of the Ai-Han Supersereal Program.

2.2. Participants and Sampling.

A total of 24 participants were recruited through purposive sampling. They consisted of district health officials, program managers at health centers, frontline health workers, and pregnant or lactating women who were registered beneficiaries of the program. The inclusion criteria required participants to have direct involvement in program implementation or to be listed as recipients of the supplementary food.

2.3. Data Collection.

Information was obtained through semi-structured interviews, each lasting approximately 30–40 minutes. Supporting tools included audio recorders, field notes, and relevant program documents. In addition, secondary data were reviewed from official reports and guidelines. Prior to the interviews, informed consent was obtained from all participants.

2.4. Data Analysis.

The recorded interviews were transcribed verbatim and analyzed thematically. Coding, categorization, and theme development were conducted with the assistance of NVivo 12 Plus software, and findings were organized according to the four components of the CIPP model.

2.5. Trustworthiness of Data.

Several strategies were applied to ensure data credibility and dependability. Source triangulation was conducted by comparing information across participant groups, member checking was carried out to confirm the accuracy of findings with informants, and audit trails were maintained to document the entire research process in a transparent manner.

3. Results and Discussion

3.1. Results

3.1.1. Characteristics of Informants

This study involved 24 informants, consisting of health managers, health center heads, program staff, and beneficiaries. Their ages ranged from 19 to 59 years, with educational backgrounds from junior high school to bachelor's and diploma degrees in health-related fields. Most program managers had more than five years of experience, while the majority of beneficiaries had joined the program for about one year.

3.1.2. Results of Qualitative Data Analysis

Theme 1: Implementation of the Ai-Han Supersereal Program

Subtheme 1: Program Objectives

The program was aimed at fulfilling nutritional needs of pregnant and lactating women, increasing mothers' knowledge, and becoming part of the national strategy to reduce stunting.

"The purpose of this supplement program is to meet the nutritional needs of pregnant and lactating women." (Informant I1)

"This program is carried out to improve mothers' knowledge about nutrition during pregnancy." (Informant I17)

Subtheme 2: Implementation System

The system involved multiple stages, including request submission, distribution from regional warehouses, storage at district health offices, and delivery to health centers. However, delays sometimes occurred due to logistics.

"Distribution is carried out from the national warehouse, then stored at the district office before being sent to health centers." (Informant I10)

"If the stock is empty at district level, we must immediately submit a new request." (Informant I17)

Subtheme 3: Target Recruitment

Beneficiaries were identified through health checks, mainly MUAC <23 cm, followed by registration.

"We measure MUAC, only those below 23 cm are entitled to receive Supersereal." (Informant I20)

"First, we record candidates who fall into the malnutrition category based on MUAC measurements." (Informant I23)

Subtheme 4: Distribution of Ai-Han Supersereal

Distribution was conducted through health centers or directly handed to beneficiaries, with monthly allotments of around 6 kg.

"We distribute to each health center and then deliver food to the beneficiaries." (Informant I3)

"I usually receive 6 kilograms each month." (Informant I24)

Subtheme 5: Nutrition and Behavior Change Education

Education accompanied distribution, including counseling on consumption, ongoing health promotion, and cooking demonstrations.

"We provide education every time food is distributed, through health workers and outreach visits." (Informant I1)

"Yes, we show how to cook Supersereal with additional vegetables during demonstrations." (Informant I5)

Subtheme 6: Program Monitoring

Monitoring was conducted regularly at both operational and managerial levels.

"After food distribution, we conduct monthly follow-ups; if no improvement is seen, we refer them to medical staff." (Informant I3)

"I always supervise program activities; if beneficiaries really need help, I continue to support them." (Informant I22)

Subtheme 7: Program Impact

The program showed positive impacts in improved nutritional status, meal frequency, and knowledge.

"I saw a positive impact from increased weight and MUAC of pregnant women." (Informant I4)

"Before this program, mothers ate only once or twice a day; now they eat up to four times." (Informant I1)

Subtheme 8: Sustainability Expectations

Informants hoped for program continuity, consistent availability, and local production.

"We hope this assistance continues regularly and on time so that stunting prevention can succeed." (Informant I1)

"It would be better if we could produce Supersereal locally, so we don't depend on supplies from outside." (Informant I7)

Theme 2: Supporting Factors of the Program

Subtheme 1: Adaptation Strategies

Health workers applied adaptation strategies to maintain program continuity, including nutrition education, active follow-up, distribution coordination, and communication through phone reminders.

"We always provide education to mothers to consume nutritious foods at home, even without Supercereal." (Informant I7)

"We record their phone numbers, and when the food arrives, we call them so they can come to collect it." (Informant I11)

Subtheme 2: Community Acceptance

Mothers showed strong enthusiasm and willingness to participate, which became a key supporting factor for the program's success. Understanding of consumption rules also improved over time.

"When Supercereal is available, participation increases." (Informant I17)

Subtheme 3: External Support

International organizations such as WHO, UNICEF, and WFP, together with local NGOs, played an

important role in providing supplementary foods and technical assistance.
"WFP consistently supports our community, especially mothers facing stunting." (Informant I14)
Subtheme 4: Transportation
Availability of operational vehicles and support from SISCa community transport helped ensure food distribution to remote areas.
"If a malnourished pregnant woman lives far away, we bring her by ambulance." (Informant I17)
Theme 3: Program Inhibiting Factors
Subtheme 1: Infrastructure and Accessibility
Geographical barriers, such as long distances, poor road conditions, and limited transportation, significantly hindered program implementation. During rainy seasons, roads became impassable, further complicating distribution.
"Every rainy season, the roads are damaged, making it impossible to deliver food." (Informant I2)
Subtheme 2: Unavailability of Supersereal
Frequent stock-outs at district and health center levels disrupted distribution, sometimes lasting for months. This caused delays and irregular food supply for beneficiaries.
"Sometimes stock-outs occur for up to three months, forcing us to postpone distribution." (Informant I20)
Subtheme 3: Passive Role of Beneficiaries
Some beneficiaries showed limited awareness and engagement, with low motivation to follow nutrition guidance. In some cases, Supersereal was not consumed properly or even wasted.
"We found some recipients not consuming the food as advised." (Informant I5)
Subtheme 4: Human Resource Limitations
Health staff faced a heavy workload and role overlap, with insufficient personnel to manage nutrition-specific programs. Many centers lacked trained nutritionists.
"We have very limited staff, and most are handling multiple programs at once." (Informant I7)
Subtheme 5: Supersereal Quality
Quality issues included late delivery, damaged packaging, and even expired products, leading to dissatisfaction among beneficiaries.
"Sometimes the food arrives spoiled, so mothers refuse to consume it." (Informant I11)

3.2. Discussion

The Ai-Han Supersereal program was found to have clear objectives—meeting the nutritional needs of pregnant and lactating women, preventing stunting, and strengthening national nutrition strategies. Its tiered implementation system, including target identification, requisition, distribution, and monitoring, aligns with evidence that structured processes and anthropometric-based targeting improve program efficiency and impact (Dewey et al., 2017; Leroy, Olney, & Ruel, 2018; Juarez et al., 2021). Monthly distribution of 6 kg, supported by counseling and verification, reflects best practices where food supplementation combined with education significantly reduces stunting (Kohli, Nguyen, Avula, & Menon, 2020).

Supporting factors included adaptation strategies such as local food education and phone-based reminders, strong community acceptance, external support from WHO, UNICEF, WFP, and NGOs, as well as logistical assistance through operational vehicles and SISCa transport. These findings are consistent with studies emphasizing that flexible delivery, community engagement, and adequate logistics are critical to sustaining compliance and coverage (Leroy, Olney, & Ruel, 2018; Hoddinott, Ahmed, & Roy, 2018; Mutebi et al., 2022).

Nevertheless, several inhibiting factors were identified, including poor infrastructure and seasonal inaccessibility, frequent stock-outs, passive beneficiary behavior, limited human resources, and product quality issues. Such constraints reduce program effectiveness, echoing evidence that continuous supply, adherence, skilled frontline workers, and safe food storage are prerequisites for impact (Zaidi et al., 2020; Dewey et al., 2022; Kushi, Belachew, & Tamiru, 2023). Addressing these challenges through strengthened supply chains, enhanced counseling, HR investment, and quality assurance is essential to optimize and sustain the program's contribution to stunting prevention (Ashraf et al., 2024; Ferreira & Sulistyaningsih, 2025).

4. Conclusion

This study concludes that the implementation of the Ai-Han Supersereal Program in Covalima District has contributed positively to improving nutritional knowledge and access to nutritious food among pregnant and lactating women, with potential to reduce the risk of stunting. While the program's objectives align with local needs and are strengthened by cross-sector collaboration and international partners, several challenges remain, including limited infrastructure, stock-outs, inadequate human resources, product quality issues, and passive beneficiary behavior. The program's success and sustainability rely on strengthening supply chains, enhancing health workforce capacity, and ensuring timely, well-targeted distribution through logistic and external support.

References

UNICEF, World Health Organization, & World Bank. (2023). Level and trend in child malnutrition. World Health Organization. https://www.who.int/publications/i/item/9789240073791

Sukamto, I. S., Hartono, R. S., & Mulyani, S. (2021). Community health center worker perspectives on stunting risk factors and challenge of stunting prevention program: A qualitative study. Community Health. https://www.teikyomedicaljournal.com/volume/TMJ/44/05/community-health-center-worker-perspectives-on-stunting-risk-factors-and-challenge-of-stunting-prevention-program-a-qualitative-study-616bfe2cb81de.pdf

Nomura, K., Bhandari, A. K. C., Matsumoto-Takahashi, E. L. A., & Takahashi, O. (2023). Risk factors associated with stunting among children under five in Timor-Leste. Annals of Global Health, 89(1), 1–14.

Timor-Leste Food and Nutrition Survey. (2020). Timor-Leste food and nutrition survey. UNICEF. https://www.unicef.org/timorleste/reports/timor-leste-food-and-nutrition-survey

Widowati, S. W., Nurmala, I., Devy, S. R., & Kiswahono, A. D. (2024). Determinant of early marriage adolescent to risk giving birth child in case of stunting. Jurnal Promkes, 12(SI 1), 195–205.

Thurstans, S., Sessions, N., Dolan, C., et al. (2022). The relationship between wasting and stunting in young children: A systematic review. Maternal & Child Nutrition. https://onlinelibrary.wiley.com/doi/abs/10.1111/mcn.13246

UNICEF. (2022). Planu Estratéjiku Nasionál Nutrisaun Setór Saúde Ministério da Saúde (National Health Sector Nutrition Strategic Plan). UNICEF.

Olney, D. K., Leroy, J., Bliznashka, L., & Ruel, M. T. (2018). PROCOMIDA, a food-assisted maternal and child health and nutrition program, reduces child stunting in Guatemala: A cluster-randomized controlled intervention trial. The Journal of Nutrition, 148(9), 1493–1505.

Leroy, J. L., Olney, D., & Ruel, M. (2018). Tubaramure, a food-assisted integrated health and nutrition program, reduces child stunting in Burundi: A cluster-randomized controlled intervention trial. The Journal of Nutrition, 148(3), 445–452.

Zaidi, S., Das, J. K., Khan, G. N., Najmi, R., Shah, M. M., & Soofi, S. B. (2020). Food supplements to reduce stunting in Pakistan: A process evaluation of community dynamics shaping uptake. BMC Public Health, 20, 91–103. http://dx.doi.org/10.1186/s12889-020-09103-8

Ferreira, A. J., & Sulistyaningsih. (2025). Program kesehatan untuk mengurangi stunting di negara berkembang: Scoping review. Jurnal Health Education Science and Technology, 7(2), 119–132.

Mason, J. B., Shrimpton, R., Saldanha, L. S., et al. (2014). The first 500 days of life: Policies to support maternal nutrition. Global Health Action. https://www.tandfonline.com/doi/abs/10.3402/gha.v7.23623

Kohli, N., Nguyen, P. H., Avula, R., & Menon, P. (2020). The role of the state government, civil society, and programmes across sectors in stunting reduction in Chhattisgarh, India, 2006–2016. BMJ Global Health, 5(7). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7342433/

Dewey, K. G., Mridha, M. K., Matias, S. L., Arnold, C. D., Cummins, J. R., & Khan, M. S. A. (2017). Lipid-based nutrient supplementation in the first 1000 days improves child growth in Bangladesh: A cluster-randomized effectiveness trial. The American Journal of Clinical Nutrition, 105(4), 944–957. https://www.sciencedirect.com/science/article/pii/S0002916522048419

Juarez, M., Dionicio, C., Sacuj, N., Lopez, W., et al. (2021). Community-based interventions to reduce child stunting in rural Guatemala: A quality improvement model. International Journal of

Environmental Research and Public Health, 18(2), 773. https://www.mdpi.com/1660-4601/18/2/773

Mutebi, R. R., Ario, A. R., Nabatanzi, M., Kyamwine, I. B., Wibabara, Y., & Muwereza, P. (2022). Large outbreak of Jimsonweed (Datura stramonium) poisoning due to consumption of contaminated humanitarian relief food: Uganda, March–April 2019. BMC Public Health, 22(1), 1–10. https://doi.org/10.1186/s12889-022-12854-1

Hoddinott, J., Ahmed, A., & Roy, S. (2018). Randomized control trials demonstrate that nutrition-sensitive social protection interventions increase the use of multiple-micronutrient powders and iron supplements in rural pre-school Bangladeshi children. Public Health Nutrition, 21(9), 1753–1761.

Dewey, K. G., Arnold, C. D., Wessells, K. R., Prado, E. L., et al. (2022). Preventive small-quantity lipid-based nutrient supplements reduce severe wasting and severe stunting among young children: An individual participant data meta-analysis. The American Journal of Clinical Nutrition. https://www.sciencedirect.com/science/article/pii/S0002916523036572

Kushi, E. N., Belachew, T., & Tamiru, D. (2023). The impacts of okra consumption on the nutritional status of pregnant women, West Ethiopia. Food Science & Nutrition, 11(9), 5554–5564.

Ashraf, K., Huda, T. M., Ikram, J., Ariff, S., Sajid, M., Khan, G. N., et al. (2024). The effectiveness of nutritional interventions implemented through lady health workers on the reduction of stunting in children under 5 in Pakistan: The difference-in-difference analysis. Nutrients, 16(13), 1–14.