IMPLEMENTATION OF THE “CESS-GAMMARA” PROGRAM TO PREVENT STUNTING AND WASTING IN CHILDREN: A CASE STUDY FROM JENEPONTO, INDONESIA

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ABSTRACT

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| Background: Stunting and wasting are two major nutritional problems that hinder children's growth and development, especially in eastern Indonesia. Jeneponto Regency, South Sulawesi, is one of the areas with the highest prevalence of stunting nationally, which is exacerbated by low nutritional literacy and inappropriate feeding practices. Objective: Implement the CESS-GAMMARA Program as a community-based nutrition education intervention to prevent stunting and wasting by increasing mothers' knowledge and skills in providing breast milk and complementary feeding. Method: This study is a quasi experimental study that has been implemented since 2023 at the Nutrition Clinic of Lanto Dg Pasewang Hospital with 126 toddlers as participants. Activities include individual nutrition education, anthropometric measurements, 24-hour food recalls, and the preparation of meal plans based on the 3U3S approach (3 main meals, 3 snacks), accompanied by the provision of eggs, formula, and regular assistance. Results: A total of 14 children were declared cured, 62 children improved, 3 did not improve, and 47 were lost to control. Statistical tests showed a significant relationship between nutrition education, increased intake, and child growth status. The 3U3S approach was considered easy to understand and apply. Conclusion: CESS-GAMMARA is effective in improving the nutritional status of toddlers and can be a community nutrition education model that can be widely replicated. |

*Keywords: Stunting, Wasting, Nutritional Education.*

1. INTRODUCTION

The problem of stunting and wasting is still a serious challenge in public health development in Indonesia, especially in the toddler age group, which is a crucial period in the human life cycle. Stunting is a condition of failure to thrive in children due to chronic malnutrition that occurs from pregnancy to the age of two years, which is characterized by a child's height that is below the standard for their age.1 Meanwhile, wasting is a condition of acute malnutrition indicated by a body weight that is not appropriate or too low compared to the child's height, often due to insufficient food intake or repeated infections.2 These two conditions not only reflect nutritional inadequacy but are also important indicators of social inequality, low quality of care, and weak basic health care systems.2

Based on the results of the 2022 Indonesian Nutritional Status Study (SSGI), the stunting rate in Indonesia was recorded at 21.6%, while wasting was 7.7%. However, in several regions, especially in eastern Indonesia, these figures far exceed the national average.2 One of the areas in the spotlight is Jeneponto Regency, South Sulawesi Province. Based on data from the South Sulawesi Provincial Health Office and the latest SSGI report, Jeneponto is among the top 10 regencies with the highest prevalence of stunting in Indonesia, reaching more than 35%. This figure indicates that more than a third of children in Jeneponto experience growth disorders that have the potential to affect their physical, cognitive, and productivity development in the future. 3,4

Child health issues in Jeneponto are very complex and interrelated. In addition to high stunting and wasting rates, the region also faces challenges in terms of the availability of equitable access to health services, low public knowledge about parenting patterns and balanced nutrition, limited sources of nutritious food, and cultural factors and habits that do not support healthy parenting practices. The low coverage of exclusive breastfeeding and the provision of complementary foods that do not meet nutritional standards are also significant contributors to this condition. Many mothers in rural areas of Jeneponto have not received adequate education about the importance of breast milk as the main source of nutrition for babies up to six months of age, as well as a lack of knowledge in preparing complementary foods that meet the needs of child growth.5

In responding to these challenges, an intervention approach is needed that is not only curative but also promotive and preventive. One of the efforts made is through the CES-GAMMARA program (preventing stunting and wasting with adequate nutrition through BREAST MILK and FOOD SUPPLEMENTATION for cheerful and active children), which was initiated as part of a community service program. This program aims to strengthen the capacity and awareness of the community in overcoming nutritional problems through comprehensive education on the importance of balanced nutrition, BREAST MILK, and FOOD SUPPLEMENTATION. The main targets of this program are pregnant women, breastfeeding mothers, mothers with toddlers, and posyandu cadres who have a strategic role in providing counseling and assistance.

CES-GAMMARA is designed by prioritizing participatory and local culture-based principles, so that educational messages can be effectively received by the community. Activities in this program include community-based nutrition counseling, skills training in making FOOD SUPPLEMENTATION from nutritious and affordable local food ingredients, simulations of proper feeding of infants and toddlers, and increbreast milkng the capacity of posyandu cadres as the spearhead of public health services. In addition, this program also encourages the formation of nutrition-conscious communities at the village level to create sustainable efforts to reduce stunting and wasting in Jeneponto.

Through the implementation of this program, it is expected that there will be an increase in nutritional literacy in the community, behavioral changes in healthier childcare practices, and strengthening the role of the community in creating an environment that supports optimal growth and development of children. This intervention is not only intended to answer short-term problems, but also as a long-term investment in creating a healthy, intelligent, and productive generation in Jeneponto Regency.

The purpose of this community service activity is to implement the CES-GAMMARA program as a preventive measure stunting and wasting in toddlers in Jeneponto Regency through balanced nutrition education, increbreast milkng mothers' knowledge and skills in providing breast milk and complementary feeding, and empowering health cadres and local communities to create an environment that supports optimal child growth and development.

2. material and methods

The CES-GAMMARA program is implemented as a form of innovation in nutritional education to prevent stunting and wasting in Jeneponto Regency, involving various parties such as health workers at Lanto Dg Pasewang Hospital, the Health Office, and PKK cadres. This program has been running since 2023 and continues to run sustainably. The main targets of this program are toddlers who experience growth disorders and mothers or caregivers with limited knowledge about healthy eating patterns. The total number of participants who have been served is 126 children, most of whom come from families at risk of malnutrition.

The program is implemented at the Nutrition Clinic of Lanto Dg Pasewang Hospital. Patients do not need to register themselves, because they will be registered directly by officers if they are found to have nutritional problems. The service process is carried out individually, starting with anamnesis, anthropometric measurements (weight and height), and evaluation of food consumption using the 24-hour food recall method. Based on the results of the evaluation, each child is given a personalized meal plan or meal schedule that is adjusted to their age needs using the 3U3S approach (3 main meals and 3 snacks).

The method used in this program is a combination of ongoing nutrition education, direct training, and individual mentoring. Education is delivered with a simple approach so that it is easy for participating mothers to understand, with a focus on the importance of breast milk, complementary feeding, and fulfilling balanced nutrition through ebreast milkly accessible local foods. The program also provides physical support in the form of eggs and nutritional formula, as part of an effort to increase children's nutritional intake (Figure 1).

Evaluation is conducted periodically through re-monitoring of food recall, weight (BB), and height (TB) of children at each visit. The evaluation results show that this approach encourages significant changes in children's eating patterns and improves their nutritional status gradually. In addition, the success of the program is strengthened by the active participation of health workers and cadres, as well as cross-sector collaboration, especially with the Health Office and community organizations such as PKK.

The 3U3S method has proven to be an educational tool that is easy to deliver, easy to remember, and easy to practice, making it very effective in communities with varying levels of literacy. This makes the CES-GAMMARA Program an innovative model in community-based nutrition education and stunting and wasting prevention interventions.

3. results and discussion

The implementation of the CES-GAMMARA Program in Jeneponto Regency has shown significant results in efforts to prevent stunting and wasting in toddlers through a nutritional education approach with the 3U3S method (3 Utama, 3 Selingan). This program has served 126 toddlers since its launch in 2023. Of that number, 14 toddlers were declared cured, 62 children experienced improvements in nutritional status, 3 children have not shown any progress, and 47 children were declared lost control. In this study, anemia was not examined; however, the results still reflect the success of a simple nutritional education approach, personalized meal schedules, and ongoing support as effective methods for improving children’s nutritional status.

The 3U3S method introduced in this program has succeeded in facilitating the delivery of information to mothers of toddlers and caregivers. Education is delivered individually at the Nutrition Clinic of Lanto Dg Pasewang Hospital, with steps including: anamnesis, anthropometric measurements, 24-hour food recall, preparation of meal plans according to the child's age, and provision of practical and easy-to-follow nutritional education. Patients go home with a meal plan, nutritional formula, and eggs as part of daily intake support.



**Figure 1. CESS-GAMMARA implementation process.**(a) Registration and data collection; (b) initial assessment; (c) education and demonstration of sustainable nutrition programs; (d) physical assistance with nutritious food; (e) periodic monitoring and further evaluation.

The children’s body weight was ranging from 7 to 8.4 in the baseline data then increased to 11 to 12.7 after 3 months follow up. Statistically, the results of the correlation test showed a significant relationship between compliance in following nutrition education and increased food intake (coefficient value r = 0.452; p = <0.001). Increased food intake based on food recall was also significantly related to increased body weight (r = 0.448; p = <0.001) and height (r = 0.277; p <0.001). This shows that the success of nutrition intervention is not only determined by the education itself, but also by the active involvement of participants in practicing the knowledge gained in everyday life (Table 1).

Table 1. Correlation between nutritional variables and the success of the CES-GAMMARA program

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| **NO** | **RELATIONSHIP BETWEEN VARIABLES** | **CORRELATION COEFFICIENT** | **p VALUE** |
| 1 | The relationship between control compliance (receiving nutritional education) and increased intake (food recall) | 0.452 | <0.001 |
| 2 | The relationship between increased food recall and increased body weight | 0.448 | <0.001 |
| 3 | The relationship between increased food recall and increased height | 0.277 | <0.001 |

In addition to quantitative results, the program also recorded various positive testimonials from participating mothers. They stated that the 3U3S approach is easy to remember, easy to understand, and easy to practice. Education that is personal and based on the child's individual needs is considered very helpful in improving the family's daily eating patterns. One example of success can be seen in the toddler growth chart, which shows a consistent increase in weight and height during the program.

Support from various parties, including the Jeneponto District Health Office and PKK cadres, played a major role in the success of this program. Cross-sector collaboration strengthens service coverage and accelerates the dissemination of correct nutritional information to the community. Overall, the results of the implementation of the CES-GAMMARA program show that a simple, easy-to-understand, and structured community-based nutrition education approach can have a significant impact on improving children's nutritional status. This model can be replicated in other areas with similar challenges, as a national strategic effort to reduce stunting and wasting rates.

Stunting is a serious public health problem in Indonesia and other developing countries. This condition describes chronic growth failure in children due to long-term malnutrition, especially during the first 1000 days of life, starting from conception to age two. The impact of stunting is not only seen from the physical side, such as shorter height than the standard for age, but also touches on cognitive aspects, brain development, disease susceptibility, and in the long term, the productivity and quality of a nation's human resources.3.6

To make sure the results can be interpreted within a globally recognized model of malnutrition, the UNICEF Nutrition Framework was used. The model divides malnutrition into three levels of causation: immediate, underlying, and basic. Immediate causes include disease and inadequate diet; underlying causes include food insecurity, poor maternal and child care, and lack of access to health services; dan basic causes include broader social, political, and economic factors.7

The problem of stunting is closely related to the nutritional aspect. Various studies have shown that deficiencies in macronutrients such as energy and protein, and micronutrients such as iron, calcium, vitamin A, vitamin C, and zinc contribute significantly to the incidence of stunting in children. One study in Central Jakarta revealed that children with insufficient iron intake had a five times greater risk of experiencing stunting compared to children with adequate iron intake. Iron is important not only to support physical growth but also to support endurance and cognitive development. Likewise, calcium and vitamin C play a role in the formation of bones and tissues, and zinc supports the production of growth hormones. Therefore, improving nutrition through the consumption of balanced nutritious foods, especially those derived from animal protein and foods high in micronutrients, is a fundamental element in efforts to prevent stunting. However, stunting is not only a matter of food availability, but also concerns aspects of behavior and parenting in the family. Inappropriate parenting patterns—such as providing complementary feeding too early or too late, providing food that is not appropriate for age, lack of parental understanding of the importance of sanitation and health, and limited access to health services—are important factors that contribute to perpetuating stunting in society.4,7,8The low level of parental education, especially mothers, greatly influences the way they view children's health and nutrition. Many parents still have a misconception, such as considering stunting a hereditary condition or something normal for children from poor families.9,10

Health education is one of the interventions that has proven effective in increbreast milkng public awareness and knowledge about stunting. Providing education to young women—who will later become mothers—has been shown to increase their knowledge about the importance of nutrition, personal hygiene, prevention of early marriage, consumption of iron tablets, and a healthy lifestyle. In a study conducted in Islamic boarding schools, the use of educational media such as animated videos and booklets succeeded in increbreast milkng adolescent knowledge by almost 64% and changing their attitudes towards preventing stunting positively. This approach is important because adolescents are a group that is in a period of searching for identity and forming long-term habits. Education from a young age has a great opportunity to form healthy living behaviors that are carried into adulthood and applied in their child-rearing patterns in the future. 3,11,12

Equally important is education that targets mothers directly. The results of the study showed that after being given counseling on stunting, mothers' knowledge increased significantly. Before the intervention, most respondents only had a moderate level of knowledge, but after the intervention, many showed a good understanding. This confirms that information provided in the right and repeated manner can change knowledge and behavior, especially when delivered by competent health workers or educators. However, the biggest challenge of the education program is sustainability. Often, interventions stop after one or two meetings without any follow-up. Behavioral changes do not happen instantly. Therefore, regular follow-up is an important component in ensuring that the information that has been provided is truly applied in everyday life. This follow-up can be in the form of home visits by health cadres, routine monitoring of child growth and development at the integrated health post, strengthening education through digital media, and involving community and religious leaders in conveying key messages about the importance of preventing stunting.1.6

Thus, preventing stunting requires an integrated approach between adequate nutritional fulfillment, implementation of appropriate parenting patterns, ongoing health education, and regular monitoring of child growth and development. Effective interventions are not only based on one-way counseling, but also those that are able to form a learning ecosystem and social support in the family and community environment. Only with collective and continuous efforts can Indonesia achieve the target of reducing stunting rates and produce a healthy, intelligent, and competitive generation in the future.10.12

4. Conclusion

The CES-GAMMARA program with a nutritional education approach through the 3U3S method (3 Utama, 3 Selingan) has proven effective in improving the understanding, skills, and behavior of mothers and caregivers in providing appropriate feeding to prevent stunting and wasting in Jeneponto Regency. The results of the program showed an increase in children's nutritional intake, accompanied by gradual improvements in weight and height. Education delivered in a personal and simple manner, supported by intensive mentoring and cross-sector collaboration, played a major role in the success of the intervention. This program provides an adaptive and applicable community empowerment model to support efforts to reduce stunting and wasting rates sustainably, and has the potential to be replicated in other areas with similar characteristics.

AcknowledgEments

None

Competing interests

Authors have declared that no competing interests exist

Authors’ Contributions

SP: design the work, AMRYP: writing the manuscript. SH: conceptual framework, RJ: data collection, FA: data analysis.

Consent (where ever applicable)

All authors declare that ‘written informed consent was obtained from the patient’s parents for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal."

Ethical approval (where ever applicable)

All authors hereby declare that all study processes have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.”

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models.

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