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# Anemia Screening and Health Education on Stunting Reduction Efforts

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**Abstract:** Stunting and anemia remain major public health problems in Indonesia, particularly in Maluku Province, where prevalence rates continue to exceed national targets. This community service program aimed to reduce the risk of stunting by integrating anemia screening with maternal health education in Dullah Laut and Tamadan Villages, Tual City. The program was implemented over three days and consisted of counseling sessions on nutrition, hygiene, and dietary practices; anemia screening; general health checks; and the distribution of vitamins to toddlers. Screening results showed that in Dullah Laut Village, only 21 children demonstrated good nutritional status, while 18 were categorized as poor, very poor, or bad. By contrast, in Tamadan Village, 35 children were in good nutritional condition, with only two classified as poor. Counseling activities engaged 57 mothers in Wab Village and 64 mothers in Debut Village, focusing on clean and healthy living behavior, worm infestation, anemia prevention, and toddler nutrition. These findings highlight the urgent need for targeted, community-based interventions to address nutritional challenges, particularly in areas with high poverty, sanitation problems, and limited parental knowledge. The integration of screening and health education through Posyandu proved to be an effective approach for enhancing maternal awareness and supporting early detection of anemia, with the potential to contribute to stunting reduction efforts in Southeast Maluku.

**Keywords:** Anemia, Stunting, Nutritional Status, Health Education, Maluku.

## Introduction

Nutrition plays a fundamental role in supporting children's growth and development, as it provides essential components required for physical growth, nervous system and brain development, as well as the enhancement of intellectual capacity and cognitive abilities. Adequate nutrition is therefore a key determinant in achieving optimal growth and development in line with an individual's genetic potential (Pinto, 2023).

Malnutrition, or undernutrition, is a health condition arising from an imbalance in nutrient intake, either in the form of deficiency or excess. It may occur when caloric, carbohydrate, protein, vitamin, or mineral intake is insufficient to meet the body's needs. Conversely, excessive nutrient intake can also result in adverse health consequences. Malnutrition not only hampers physical growth but also impairs organ function, immune competence, and cognitive development, particularly among children (Davis, Oaks, & Engle-Stone, 2020; Zhang & Ma, 2018).

Among children under five years of age, malnutrition is driven by a complex interplay of food availability, accessibility, and utilization, alongside the provision of health services. Risk factors include age, sex, birth weight, breastfeeding practices, and comorbidities during childhood (Drammeh, Hamid, & Rohana, 2019). One of the most prevalent forms of malnutrition worldwide is linear growth failure, or

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stunting (De Sanctis et al., 2021). Stunting is commonly associated with inadequate maternal nutrition during pregnancy, intrauterine growth restriction, lack of exclusive breastfeeding during the first six months of life, delayed or inappropriate introduction of complementary feeding, and impaired nutrient absorption caused by infectious diseases (Kramer & Allen, 2015; Prendergast & Humphrey, 2014).

In addition to stunting, malnutrition is closely linked to anemia in children. While undernutrition does not directly cause anemia, it may induce physiological changes that increase susceptibility to infections and chronic inflammation, both of which can contribute to anemia (Khanam, Nghiem, & Rahman, 2011).

Stunting represents a critical global health issue due to its profound impact on child health and development. Its prevalence is disproportionately higher in developing and low-income countries, at 22.4% and 35.2%, respectively (Titaley, Ariawan, Hapsari, Muasyaroh, & Dibley, 2019). In Indonesia, despite multiple intervention efforts, progress has remained below expectations. In 2022, the reduction in stunting prevalence was only 2.8%, falling short of the national target of 3–3.5% annually (Coordinating Ministry for Human Development and Culture, 2022). Furthermore, data from the 2013 Basic Health Research reported that anemia prevalence among Indonesian children and adolescents exceeded 50%, affecting 28% of children under five and 26% of those aged 5–14 years (Ministry of Health, 2013).

Regionally, the Indonesian Nutritional Status Survey (SSGI) indicated that the prevalence of stunting among children under five in Maluku was 26.1% in 2022, ranking the province 13th nationally (Ministry of Health, 2022). Preliminary surveys conducted by the Faculty of Medicine at Pattimura University in Southeast Maluku Regency, particularly within the service areas of the Wab and Debut Community Health Centers, further revealed that malnutrition and stunting persist as pressing health concerns. Data showed that in the Wab service area, 22 children were malnourished and 35 were stunted, whereas in Debut, 23 children were malnourished and 17 were stunted. These findings underscore the urgent need for comprehensive interventions to address nutritional challenges in the region.

One promising strategy to enhance parental knowledge of balanced nutrition is through education employing visual and interactive methods. Such approaches not only provide information on nutritional components but also emphasize the practical application of healthy dietary practices in daily life. By equipping parents with appropriate nutrition education and training in monitoring nutritional status, their capacity to meet children's nutritional needs can be significantly improved. Moreover, routine anemia screening serves as a vital measure for early detection, allowing timely interventions before the condition progresses. These combined strategies are expected to improve child nutrition and health outcomes while reducing the long-term consequences of stunting.

In light of these conditions, the community service team from the Faculty of Medicine, Pattimura University, implemented nutrition education and anemia screening programs for infants and young children in the Wab and Debut Community Health Center service areas. This initiative aimed to obtain a more comprehensive understanding of stunting and anemia prevalence while simultaneously providing direct interventions to mitigate these public health challenges.

## Method

The Community Service Program is scheduled to be implemented over a three-day period in two designated villages within Tual City, namely Dullah Laut Village and Tamadan Village. The program is planned for May 2024 and is designed as a collaborative initiative aimed at addressing pressing public health concerns, with particular emphasis on child nutrition, maternal health education, and early detection of anemia among toddlers.

*A. Implementation Stages*

1. Counseling
   Health counseling sessions focusing on nutrition, hygiene, and dietary practices will be implemented for mothers in Dullah Laut and Tamadan Villages. The primary objective of this activity is to enhance maternal knowledge and awareness regarding appropriate feeding and health practices that support optimal child growth and development. Counseling will be delivered through direct, interactive sessions and supported by the distribution of health education brochures to ensure the sustainability of knowledge transfer within the community.
2. Anemia Screening
   Anemia screening represents a central component of the program, given its strong correlation with child malnutrition.
   *Conceptual Basis:* Anemia is defined as a condition characterized by a reduction in red blood cell count or hemoglobin concentration below normal physiological levels, thereby diminishing the blood's capacity to transport oxygen effectively. This condition impairs oxygen availability in tissues, resulting in significant physiological and developmental consequences. According to Wong (2009:1115), anemia is among the most prevalent

pathological conditions in infancy and childhood and constitutes a major determinant of nutritional and developmental outcomes.

By integrating anemia screening into the community service activities, the program seeks to identify at-risk toddlers and establish an evidence-based foundation for interventions targeting malnutrition in Southeast Maluku Regency. Furthermore, health promotion and outreach activities accompanying the screening will function as an educational strategy to raise community-wide awareness on the significance of early detection and management of anemia.

3. Health Checks

Comprehensive health examinations will be conducted for children and toddlers. These examinations will include medical consultations facilitated by physicians and health professionals, thereby enabling mothers to obtain direct guidance concerning child health management. This stage is intended not only to identify existing health issues but also to foster trust and strengthen relationships between healthcare providers and community members.

4. Distribution of Vitamins

As a preventive intervention, vitamins will be distributed to children. This initiative aims to address micronutrient deficiencies, enhance immune system function, and promote healthy physical and cognitive development. The distribution process will be accompanied by brief counseling to ensure proper usage and to reinforce the importance of balanced nutrition.

*B. Partner Participation*

The success of the program is contingent upon the active involvement of multiple stakeholders. Initial collaboration has already yielded valuable baseline data, underscoring strong institutional support. Key partners include the Head of the Tual City Health Office, village governments, and Community Health Centers (Puskesmas). Their participation is expected to facilitate program coordination, resource mobilization, and the integration of program outcomes into local health development agendas.

Equally significant is the participation of community members, particularly mothers and caregivers, whose direct engagement is vital for ensuring that knowledge and practices introduced through the program are effectively internalized and sustained within households.

*C. Roles and Responsibilities of Team Members According to Competence*

1. Archivist and Administrator
   a) Manage program correspondence from initiation to completion.
   b) Prepare proposals, reports, and financial accountability documents in accordance with institutional standards.
   c) Establish communication with village governments and collect relevant data on community conditions.
   d) Coordinate logistical aspects, including transportation and scheduling.
2. Medical Team
   a) Design and structure the health outreach curriculum.
   b) Develop schedules and implement counseling activities based on professional expertise.
   c) Provide medical consultations and guidance during health checks.
3. Analysts and Field Workers
   a) Conduct anemia screening for infants and toddlers.
   b) Systematically collect, process, and analyze screening data to generate evidence-based findings.
   c) Contribute to the preparation of technical reports and recommendations for follow-up interventions.

## Result and Discussion

*General Condition of Infants and Toddlers in Dullah Laut Village*

Infants and toddlers in Dullah Laut Village remain highly vulnerable to **stunting** and **worm infections**. This conclusion is supported by several key data points and observations, as outlined below.

1. Stunting as a Persistent Public Health Concern

   At the city level, the prevalence of stunting in Tual City reached 32% in 2023, declining slightly to 30% in 2024, yet still far above the national average. These figures illustrate the persistence of stunting as a widespread health problem, which directly affects children in Dullah Laut Village (Dullah Utara District) and Tamedan Village.

   Socioeconomic conditions further exacerbate the problem. Low parental income is identified as a significant risk factor, compounded by limited knowledge and awareness of healthy lifestyles among parents and caregivers. Consequently, both economic and educational determinants of health remain major contributors to stunting in the community.

2. High Risk of Worm Infestation

   In addition to stunting, worm infestation represents another major risk for child health in the area. In North Dullah District, access to clean water remains

inadequate, and households frequently rely on water sources that are unsuitable for safe consumption. Poor sanitation conditions further amplify the risk of parasitic worm infections.

The relationship between worm infestation and stunting is well established: intestinal worms impair nutrient absorption, disrupt gastrointestinal health, and aggravate malnutrition, thereby increasing the likelihood of stunting. Given the significant sanitation challenges in Dullah Laut Village, it is highly probable that worm infections contribute substantially to the local burden of stunting.

3. Existing Monitoring and Interventions

Monitoring and intervention activities for child health are carried out primarily through Integrated Health Posts (Posyandu) and the Dullah Laut Community Health Center (Puskesmas). Records from the nutrition program as of December 2024 show that toddler growth monitoring is routinely conducted at the village level. However, the presence of these services does not guarantee full prevention of nutritional problems, as stunting and worm infestation remain prevalent.

Furthermore, although health initiatives such as the Occupational Health and Sports Program (Kesjaor) were implemented at the Dullah Laut Community Health Center in May 2025, these interventions are not specifically targeted toward addressing worm infestations, which limits their effectiveness in resolving this particular health issue.

*Summary of Infant and Toddler Conditions in Dullah Laut Village*

Based on the above analysis, the general condition of infants and toddlers in Dullah Laut Village can be summarized as follows:

- Stunting: Children remain at significant risk of stunting, consistent with city-level prevalence data. The primary contributing factors are economic hardship and poor sanitation.
- Worm Infestation: The risk of worm infection is high, particularly due to inadequate sanitation and limited access to clean water.
- Nutritional and Developmental Status: Malnutrition, anemia, and developmental delays remain prevalent, arising from inadequate nutritional intake and the compounding effects of worm infestations.
- Health Efforts: While health monitoring and interventions through Puskesmas and Posyandu are ongoing, existing programs have not fully addressed the dual burden of stunting and parasitic infections, necessitating more targeted and comprehensive community-based interventions.

*Nutritional Status Data of Children in Dullah Laut and Tamadan Villages*

The following findings are derived from screening examinations conducted to assess the nutritional status of children in Dullah Laut Village and Tamadan Village. These data provide an essential baseline for identifying the prevalence of nutritional problems and for determining the appropriate focus of community health interventions.

**Table 1.** Distribution of children's nutritional status by Community Health Center and village

| Name of Community Health Center | Name of Village | Child Nutritional Status | | | |
|---|---|---|---|---|---|
| | | Good | Poor | Very Poor | Bad |
| Dullah Laut | Dullah Laut | 21 | 4 | 2 | 2 |
| Tamedean | Tamedan | 35 | 2 | | |

The screening data demonstrate that several children in the target villages continue to experience malnutrition, underscoring the urgent need for health education interventions. Such educational efforts are essential to enhance parental knowledge, particularly among mothers, regarding appropriate nutrition, hygiene, and child feeding practices in order to prevent further cases of malnutrition.

**Picture 1**. The documentation of the community service team conducting nutritional status screening and providing health treatments for children identified with health problems during the activities.

**Picture 2**. Presents documentation of the community service team conducting health education activities with mothers in the villages. These sessions emphasized topics such as balanced nutrition, anemia prevention, worm infestation, and the importance of the first 1,000 days of life.

**Discussion**

The findings indicate clear differences between the two villages:

- In Dullah Laut Village, 21 children were categorized as having good nutritional status, while a substantial proportion (14 poor, two very poor, and two bad) exhibited varying degrees of malnutrition. Thus, almost half of the children screened demonstrated nutritional problems, reflecting a serious local health burden.
- In Tamadan Village, the situation was comparatively more favorable, with 35 children categorized as good and only two classified as poor. No cases of very poor or bad nutritional status were identified.

*The Role of Mothers and the First 1,000 Days of Life*

Mothers, as the primary caregivers of their children, hold a critical role in preventing nutritional deficiencies through early identification and timely interventions. However, due to insufficient knowledge and inappropriate feeding practices, many mothers are unable to fulfill this role effectively (Haldar, Viswanath, & Srivastava, 2024). Consequently, it is essential to provide comprehensive education and counseling on balanced nutrition and the importance of the first 1,000 days of life, a period regarded as the foundation for optimal child development.

The first 1,000 days of life—spanning from conception until a child's second birthday—are a crucial window of opportunity during which vital organs form and develop. Malnutrition during this period can result in irreversible consequences for physical growth and cognitive development (da Cunha, Leite, & de Almeida, 2015). The determinants of malnutrition can be grouped into direct and indirect causes. Direct causes include inadequate food intake, poor dietary diversity, suboptimal breastfeeding practices, insufficient maternal nutrition during pregnancy, and the high prevalence of infectious diseases. Indirect causes encompass household-level issues such as food insecurity, inadequate parenting, poor environmental sanitation, limited access to clean water, and insufficient basic health services. Broader determinants, including economic hardship, social crises, political instability, and natural disasters, further compromise household food security and contribute to poor nutritional outcomes in children (Mariati, Handi, & Hepilita, 2021).

*Stunting, Wasting, and Anemia as Indicators of Child Health*

Among the various manifestations of malnutrition, stunting and wasting serve as critical indicators of a community's nutritional and health status. Wasting refers to acute weight loss due to short-term or severe food deprivation, while stunting reflects chronic undernutrition that impedes linear growth during the early years of life (Sadler et al., 2022). Both conditions not only increase the risk of morbidity and mortality but also impair long-term human capital formation. Addressing these issues requires targeted policies and programs that enhance maternal capacity to provide optimal care, particularly during the period between pregnancy and a child's second birthday, when physical and cognitive development occurs most rapidly (Haddad et al., 2015). Government policies supporting maternal health, access to healthcare, nutrition education, and social assistance are therefore indispensable.

Anemia represents another pressing health issue linked to child malnutrition. It is associated with stunted growth, impaired cognitive development, weakened immunity, and heightened risks of disability, morbidity, and mortality (Matysiak, 2021). Globally, iron deficiency is recognized as the leading cause of anemia, and it remains one of the most significant contributors to child undernutrition (Kassebaum et al., 2014). Effective interventions include iron supplementation, food fortification, dietary diversification, and integrated strategies to manage common childhood illnesses. These measures are especially vital during the first two years of life to mitigate the risk of anemia and its long-term consequences (Mboya et al., 2023).

*Implications*

The importance of implementing these interventions cannot be overstated. Iron supplementation directly improves hemoglobin levels, while food fortification ensures the inclusion of essential micronutrients in the daily diet. Promoting dietary diversity further enriches the nutrient intake needed for children's optimal growth and development. Collectively, these measures form a comprehensive strategy that not only addresses immediate health concerns but also supports the broader goal of breaking the intergenerational cycle of malnutrition.

The disparities observed between the two villages underscore the multifactorial nature of child nutrition problems in Southeast Maluku. Several determinants are likely responsible for the higher prevalence of malnutrition in Dullah Laut Village compared to Tamadan Village:

1. Socioeconomic Conditions
   Dullah Laut Village has relatively higher levels of poverty and food insecurity, which limit access to adequate and diverse nutrition for children. Low parental income is also strongly associated with stunting and undernutrition, as highlighted in prior regional studies.
2. Sanitation and Health Environment
3. Poor sanitation and limited access to clean water increase the risk of worm infestation in Dullah Laut.

Parasitic infections impair nutrient absorption, thereby exacerbating malnutrition and potentially contributing to stunting. By contrast, Tamadan Village demonstrates comparatively better environmental conditions, which may explain the lower prevalence of poor nutritional outcomes.

4. Health Service Utilization and Knowledge
   Attendance at Posyandu (Integrated Health Posts) and maternal participation in nutrition-related programs play a critical role in determining child health outcomes. Although both villages maintain Posyandu services, the degree of parental knowledge, engagement, and compliance with health recommendations appears more limited in Dullah Laut.
5. Nutritional and Developmental Consequences
   Malnutrition during infancy and toddlerhood is strongly associated with anemia, impaired cognitive development, and long-term growth restrictions. The presence of multiple children with "very poor" and "bad" nutritional status in Dullah Laut suggests an urgent need for targeted interventions, including counseling, supplementation, and improved environmental health measures.

*Implications for Community Service*

These results emphasize the importance of community service interventions focusing on:

- Health education for mothers regarding balanced nutrition, prevention of worm infestation, and anemia awareness.
- Strengthening Posyandu activities, particularly in villages with higher malnutrition prevalence, through improved capacity of local cadres and regular follow-up.
- Distribution of micronutrient supplementation and vitamins to children at risk.
- Cross-sectoral collaboration to address underlying socioeconomic and environmental determinants, such as sanitation improvement and clean water access.

## Conclusion

The community service activities conducted in Dullah Laut and Tamadan Villages demonstrated that nutritional challenges remain a serious concern, particularly in Dullah Laut, where nearly half of the children screened were found to have poor nutritional status. Worm infestations, poor sanitation, low parental income, and limited health knowledge were identified as major contributing factors. By contrast, Tamadan Village presented a more favorable nutritional profile, although ongoing monitoring remains necessary. Counseling and education sessions involving mothers in Wab and Debut Villages further emphasized the importance of maternal knowledge in preventing malnutrition and anemia.

Overall, the integration of anemia screening with health education and vitamin distribution through community-based platforms such as **Posyandu** is both feasible and impactful. Strengthening maternal education, expanding screening coverage, and improving cross-sectoral collaboration on sanitation and clean water are recommended to address the root causes of malnutrition and stunting. These interventions, if sustained and scaled up, can significantly contribute to improving child health outcomes in Southeast Maluku.

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