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Food Security and Stunting Incidences in the Coastal Areas of Indonesia

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Abstract

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BACKGROUND: Food insecurity is a condition determined by limited or uncertain access to nutritious food for active, healthy, disproportionate people or community of people who are not prepared to anticipate. Stunting in coastal areas such as Indonesia is still severe at 30.8%, higher than the global data at 22.2%. Stunting in sub-Saharan Africa is 34.5%, Ethiopia is 52.4%, and Congo is 40%. The World Health Organization has determined that nutritional problems in a country should be <20% since it leads to impaired growth, development, and degenerative diseases in later adulthood.

AIM: This study aimed to identify the risk factors of the determinant of food security and stunting in the Indonesian Coastal regions.

METHODS: This review was conducted by collecting literature from various publications or articles in English and Indonesian, using the online database of PubMed, ScienceDirect, ProQuest, and manual searching using Google Scholar in reputable journals since the 2000s regarding factors related to or influencing factors can determine food security and the occurrence of stunting in the Indonesian Coastal regions.

RESULTS: Several studies pointed out that one of the causes of stunting in children is the lack of good nutrition for an extended period and often not realized by the parents until their children reach over 2 years old and look stunted. Based on the results of the literature review, it shows that the risk factors for stunting in coastal areas of Indonesia include birth length at risk of 16.43 times, low maternal education at risk of 3.27 times, children living in villages at risk of 2.45 times, LBW at risk 4.5 times, no ANC at risk of 3.4 times, no immunization at risk of 6.38 times, and not exclusively breastfed at risk of 4.0 times.

CONCLUSION: The results of this synthesis that consistently become risk factors for stunting in children in coastal areas are family socio-economic status (family income), mother's education, low birth weight, premature birth, non-exclusive breastfeeding, length of birth, and macronutrient and micronutrient deficiencies. Those are given the complex risk factors for stunting.

Introduction

Increasing food security is a top priority in development because food is the most basic need for humans, so it plays a very important role in national economic growth [1]. Food security occurs when all people continuously, physically, socially, and economically have access to adequate/sufficient, nutritious, and safe food that meets their food needs and food choices for an active and healthy life [2].

The quality of food consumption in households describes the affordability of households to access food and can see the adequacy of household nutrition. Nutritional quality can be influenced by the level of food availability, namely the type and amount of food consumed [3]. Nutrition plays an essential role in achieving optimal growth, including developing one's brain and intelligence so that, in the end, it also affects the quality of human resources [4]. Food security and nutritional status of children under five have an

era relationship [5]. Growth has a significant impact on nutritional intake on people's food communities. Consumption patterns are generally influenced by various factors: socio-cultural factors, demographics, economic factors, and lifestyle factors [6]. The question is whether food security is also an essential factor in reducing stunting.

The concept and understanding of food security develop according to the complexity of the problem from time to time; The dimensions of food security are so broad that many indicators are needed to measure them; achieving food security, food availability, and ownership approaches need to be considered, and for sustainable food security, a new paradigm is needed [1].

Research by Rathnayake *et al.* [7] in Sri Lanka shows that the diversity of food consumption can be used as an indicator that can represent the nutritional adequacy of the community. Previous research conducted by Capanzana *et al.* [8] in coastal households in the Philippines found that the prevalence of wasting

in children aged 0–60 months was 7.9% in coastal households. Derso *et al.* [9] stated that the prevalence of stunting (58.1%) and wasting (917.0%) in children aged 6–24 months in Ethiopia correlated with gender and parental income. Research on children under five in Kenya showed the prevalence of stunting from 26.3% to 34.7%. Compared to normal growth, the average household with stunted children was significantly different in the dietary diversity score and household food insecurity access (HFIAS) but not agricultural biodiversity. This shows the potential for using DDS and HFIAS as proxy measures for stunting [10].

Rah *et al.* [11] found that in rural Bangladesh, the decrease in the diversity of food consumption is one of the strong causes of the high incidence of malnutrition in children. Shinsugi *et al.* [12] revealed that the factors associated with stunting in children are household food security and socio-economic status. Meanwhile, Kuiper *et al.* [13] research addressing demographic change is the key to policymakers' projections to address the impact of food security by promoting the production of sustainable food. These studies inform that food security in an area correlates with the incidence of stunting in such areas as Kenya and Bangladesh. The problem of stunting is experienced by most children in poor and developing countries such as Indonesia. The prevalence of stunting in South Africa was 18.6%, Ethiopia: 26.4%, Nigeria: 22.2%, and Indonesia: 30.8%. Stunting in Somalia is specifically and temporally heterogeneous [14].

Coastal areas have potential with the natural wealth of coastal areas [15]. However, a previous study [16] shows that the poor nutritional status of under fives in fishing families is 80% greater than in farming families. The tendency of stunting in fishing families is quite common in low economic status [17]. Communities in coastal areas depend on the utilization of marine resources so that the food consumed is mainly in the form of animal protein other than rice as a staple food. Research by Baculu dan Jufri [18] showed that the level of protein intake of 96.43% is sufficient for toddlers on the coast of Donggala Regency. The dominant factor for stunting in coastal areas is the low protein adequacy [19].

The prevalence of household food insecurity and child malnutrition is greater for households in coastal areas compared to agricultural areas and municipalities [20], while the indicator of household food security and fisherman households shows a relatively better degree of food security compared to rice farming households [21]. Household food security is associated with stunting in children under two years old [22].

Indonesia is experiencing multiple nutritional problems, such as the problem of undernutrition and overnutrition in children under five. The National Movement for the Acceleration of Nutrition Improvement in the First Thousand Days of Life framework was carried out through specific and sensitive nutrition interventions by both the health and non-health sectors

to overcome this problem [23].

The quality of growth in the first 1000 days of life is one of the focuses in health development. The importance of fulfilling nutritional needs will also determine the optimal quality of growth and development. The critical period is the growth failure that occurs in this period, affecting the quality of health in the future [24]. Failure to grow (growth faltering) is reflected in the state of height and weight in children. Children who have experienced stunting are advised to eat more, more varied foods but still pay attention to energy intake so that they are not excessive to avoid the risk of obesity as adults [24]. Nutrition problems, if not handled, will cause more significant problems; the Indonesian people can experience a lost generation. To overcome this nutritional problem, in 2010, the United Nations launched the Scaling Up Nutrition program, which is a joint effort of the government and society to realize the vision of being free of food insecurity and malnutrition (zero hunger and malnutrition), through strengthening awareness and commitment to ensure public access to nutritious food.

Stunting has a long risk, namely non-communicable diseases in adulthood, although it can still be corrected at an early age. Efforts to reduce nutrition problems must be addressed cross-sectoral in all lines. Mothers and prospective mothers must be equipped with knowledge about nutrition and pregnancy and exclusive breastfeeding for healthy maternity mothers. Breastfeeding is not exclusive [25].

Policies and overcoming stunting nutrition problems in Indonesia must be handled cross-sectorally on all fronts. Mothers and brides-to-be must be equipped with sufficient knowledge about nutrition, pregnancy, and exclusive breastfeeding for healthy maternity mothers. Furthermore, breastfeeding complementary food must be optimally understood by mothers and health workers [26]. In the 1000 Days of First Life movement, specific and sensitive interventions are needed to tackle the problem of malnutrition. Specific interventions are carried out by the health sector, such as providing vitamins, additional food, and others. Meanwhile, sensitive interventions are carried out by the non-health sector, such as the provision of clean water facilities, food security, health insurance, poverty alleviation, and others [23]. The International Food Policy Research Institute report states that food security affects the food supply in Indonesia [27].

Energy is one indicator of macronutrients needed by toddlers [28]. This study shows that energy intake is associated with stunting under five. This study shows that energy intake is associated with stunting under five. Less risky energy intake is 6.111 times the incidence of stunting under five in the Karanganyar sub-district. This follows previous research [29], which stated that inadequate energy intake was associated with the risk of stunting in toddlers. In addition to causing poor nutritional status, energy intake is

also related to the level of development of stunted children. Children under five with stunting have a low level of development compared to those with normal nutritional status [30], [31]. Stunting is influenced by a lack of macro- and micronutrient intake in the long term; besides, it is influenced by environmental, socio-economic factors, and intrauterine growth retardation [32].

Protein has a major role in growth in children under five. Protein intake affects plasma levels of insulin growth factor I (IGF-I), bone matrix proteins, growth factors, and calcium and phosphorus, which play an important role in bone formation [10]. Insufficient protein intake is associated with the risk of stunting 5160 times than adequate protein intake in children under five. The following research states that stunted children have a lower protein intake than normal children [33]. Protein intake is related to serum transthyretin (TTR), serum amino acids, and serum IGF-1, which have a role in the growth and linear development of toddlers [34]. Therefore, quality protein intake is needed to increase the linear growth of stunting toddlers [31].

Fish is protein with a good iron absorption level. The protein content in fish reaches 18% and consists of essential amino acids. According to the Indonesian Food Exchange List (In Indonesia: Data Bahan Makanan Penukar, abbreviated as DKBM), one serving of fresh fish (50 g) contains 10 g of protein. The Total Diet Study in 2014 reported the average consumption of the fish and processed groups in the children aged 5–12 years, about 70.7 g/person/day, with the highest percentage coming from marine fish as much as 37.9 g/person/day or equivalent to 54% of the total fish consumption and followed by the fish group. It accounts for 38% of the total consumption of fish, or about 26.9g/person/day. The annual report of the Ministry of Maritime Affairs and Fisheries shows that fish consumption per capita per year has increased from 2010 to 2014. In 2010, fish consumption was still at 30.48 kg/capita/year and increased to 38.14 kg/cap/year. In 2014, the highest growth reached 8.32% per year. The Ministry of Health's explanation shows that parents' education level is one of the main determinants of stunting problems. Therefore, nutrition education can be one solution to prevent stunting [35].

One of the solutions to the problems described above can be done through nutrition education for eating fish. Fish is a source of protein that can be easily obtained but its consumption is still quite low among people. This study aims to analyze the effect of providing nutrition education on mothers' knowledge about stunting prevention in the Indonesian Coastal regions.

Therefore, the problem of food security and stunting in coastal areas is interesting because the long-term impact is related to the quality of human resources. They may suffer from degenerative disease disorders in the future, the medium-term impact is related to low intellectual and cognitive abilities, and the

short-term impact is the risk of morbidity and mortality in infants and toddlers. The purpose of this review is to identify what risk factors can determine food security and stunting in the Indonesian coastal areas.

Methods

This review was conducted by collecting literature from various publications or articles in English and Indonesian using the online database of PubMed, ScienceDirect, ProQuest, and manual searches using Google Scholar in reputable journals since the 2000s regarding factors associated with the determinant of food security and stunting in the Indonesian Coastal regions with the keywords food security, stunting, and coastal areas. The number of articles obtained was estimated to be 50, including publications other than English and Indonesian. Seventeen studies revealed the risk factors that can determine food security and the occurrence of stunting in the Indonesian Coastal region related or changes that affect (determinants) food security and the incidence of stunting. The determinants of food security studied include knowledge of nutrition, socio-demographic, and economic factors. There were seven samples from the seven studies that examined food security, the diversity of family, or household food consumption, while about ten other studies examined the determinants of the incidence of stunting in society and food consumption in children in the coastal areas of Indonesia. This review depended not only on these 17 studies but also on various related studies. Furthermore, the articles were summarized in a table to compare the study locations, methods of data collection and measurement of food security, statistical analysis methods, the determinant factors analyzed, and the analysis results.

Results and Discussion

The summary of this review on food security and stunting in coastal areas is briefly presented in Table 1. Several studies have analyzed the factors of food security and the incidence of stunting in coastal areas of Indonesia. Very limited research has analyzed the nutritional knowledge factor.

Food security

The condition of household food security experienced a significant difference from food insecure families to very food insecure families. This increase in food insecurity presents many potential health impacts. Food insecurity is negatively associated with health

Table 1: Summary of studies on food security and stunting in the coastal region

Authors	Location	Stunting determinant	Method	Findings
Haris Nur Ashar and Janianton Damanik (2021) [35] and Janianton Damanik, (2021) [36] Basri et al. (2021) [28]	Trimurti Village, Bantul Regency The working area of Tanah Kali Kedinding Health Center, Surabaya	Food insecurity and family food security strategies Birth length, history of exclusive breastfeeding, family income, mother's education, and knowledge of maternal nutrition	Qualitative Case-control study	The food security strategies taken by the poor in dealing with food insecurity are changing their diet, changing their work patterns, and owing them food or money 16 yrs related to stunting in toddlers are birth length, history of exclusive breastfeeding, family income, mother's education, and maternal nutrition knowledge
Hidayat et al. (2021) [35]	Cireureup Health Center, Cimahi City	Carbohydrates, proteins, fats, calcium, zinc, and the use of GIAS applications	Cross-sectional study	Comparison of macronutrients, zinc, calcium in stunting and non-stunting children aged 12–24 months can be distinguished using the GIAS application
Femidio and Muniroh (2020) [37]	Coastal Area of Probolinggo Regency	Feeding parenting, energy, protein, and zinc adequacy levels	Case-control study	Parenting feeding patterns and adequate energy, protein, and zinc levels are less at risk for children under five experiencing stunting
Ikhtiarti et al. (2019) [17]	Brebes coastal area	Environmental sanitation, history of infectious diseases, knowledge of caregivers, infectious diseases, energy intake	Case-control study	There is a relationship between environmental sanitation, history of infectious diseases, caregiver's knowledge, infectious diseases, energy intake, and stunting incidence
Cahyati and Yunastuti (2019) [33] Sumarmi et al. (2018) [20]	Coastal and mountainous areas Bongkong Environment, Central Sijai South Sulawesi, Indonesia Household food insecurity, stunting, Indonesia's geography	Intake of energy, protein, Fe, and Zn Java area: Coastal and limestone: Pasuruan, Lamongan, Gresik, Pamekasan Agricultural areas, and municipalities: Ngawi Madiun, Blitar and Banyuwangi	Case-control study Cross-sectional study	The dominant risk factor for stunting in coastal areas is protein intake, and in mountainous areas is Fe intake The prevalence of food insecurity and child malnutrition is greater for households in coastal and limestone areas than agricultural areas and municipalities
Syabandini et al. (2018) [38]	Tambak Lorok Village, Tanjung Mas District, Semarang City	LBW, infection, energy adequacy, education protein, mother's knowledge, income, nutrition parenting, exclusive breastfeeding practice	Case-control study	6 The risk factors for stunting in children aged 6–24 months are low birth weight, a history of infection, and a low level of protein adequacy
Leo et al. (2018) [19]	Indonesia's mountain and coastal areas	Energy adequacy, protein adequacy, Fe and Zn	Cross-sectional study	Risk factors for stunting in coastal areas include low levels of protein adequacy, low Fe adequacy, and low levels of Zn adequacy
Taher and Zaghloul (2018) [39]	National Nutrition Institute, Mesir. NS	Socio-economic, Mother's education, formula milk, and protein intake	Case-control study	Mother's education, formula feeding, morbidity, milk intake, and protein intake are significant for stunting
Batiro et al. (2017) [40]	Kindo Didaye woreda, Wolaita Zone, Southern Ethiopia	Sources of drinking water, ARI, early initiation of breastfeeding, immunization	Case-control study	The risk factors for stunting are infectious diseases such as diarrhea, ARI, delay in breastfeeding, not immunization, animal-based food deficiency, unsafe water sources
Sari et al. (2016) [41]	Puger Wetan Fisherman Village, Puger District, Jember Regency	Energy intake, protein, fat, carbohydrates, nutritional status	Cross-sectional study	There is a significant relationship between the level of consumption of energy, protein, fat, and carbohydrates with nutritional status (body height/age index)
Masrin et al. (2014) [22]	Sedayu District, Bantul, Yogyakarta	Food security, the incidence of stunting, maternal height, and history of LBW	Case-control study	Household food security is related to stunting in children aged 6–23 months
Rah et al. (2010) [11]	Low dietary diversity is a predictor of child stunting in rural Bangladesh	165,111 toddlers aged 6–59 months	Surveillance	The food diversity score was constructed by summing the number of days each of the nine food groups was consumed. Half of the children are stunted. In all groups, breastfed children were more likely to have limited diversity. Low socio-economic status is more likely to experience a decrease in diversity (Po 0.05). Reduced dietary diversity is a strong predictor of stunting in rural Bangladesh
Sukiyono et al. (2008) [21] Pramono et al. (2016) [42]	Fishermen and farmers in Muko-muko district, Bengkulu Province Zinc intake, zinc levels, and stunting in school children on the coast of Semarang	Status of women, household income, and household economic base 70 children aged 9–12 years and are natives of the coastal areas	Simple random study Cross-sectional study	Indicators of household food security, fisherman households show relatively better food security than rice farming households 70% of the subjects are at risk of insufficient dietary zinc intake based on the EAR, and the serum zinc level of all subjects in this study is <65 mg/dl. A total of 47.1% of children are short. The risk of insufficient zinc intake still contributes to zinc deficiency in the coastal schoolchildren population. Zinc status is significantly different between stunted and normal children
Fikadu et al. (2014) [43]	Factors associated with stunting among children of age 24–59 months in Meskan district, Gurage Zone, South Ethiopia: A case-control study	Cases: 121 stunting children, while 121 controls are not stunting children	Control-case study	The number of family members, number of children under five in the household, mother's occupation, duration of exclusive breastfeeding, duration of breastfeeding, and complementary feeding methods were independently related to stunting. Public health interventions working to improve child nutrition should consider these determinants
Lusiana and Martianto, (2014) [16]	Determinant factors related to nutritional events Less in toddlers aged 12–59 months in Mulyasari village, Losari District, Cirebon District	ARI disease, weaning age, level of knowledge of caregivers of toddlers, levels of energy and protein intake	Cross-sectional study	There is a relationship between the incidence of ARI disease, weaning age, level of knowledge of caregivers of toddlers, levels of energy, protein intake with the incidence of malnutrition
Alpharesy et al. (2012) [44]	Fisherman's Household Labor in the Kampak Coastal Area, West Bangka Regency	The level of household income and expenditure patterns	Survey study	Household spending patterns Kampak coastal labor fishermen consist of food and nonfood expenditures. The fishing households of the coastal laborers of Kampak spend 83% of their household expenditures on food needs. The percentage of food expenditure that is greater than the percentage of expenditure of nonfood shows households with low levels of welfare

ARI: Acute respiratory infections, EAR: Estimated average requirement, GIAS: Android-based Stunting Child Nutrition Application, LBW: Low birth weight

outcomes. Food insecure households have very low food security, characterized by eating disorders and reduced food or hunger [6].

The status of household food security and the nutritional status of their family members are the outputs

of household production, where resources are needed as inputs [18]. Research shows the proportion of food insecure fishing households reaches 88%. Fishing households in Muko-Muko Regency are classified as food insecure households reaching 81.1% [20].

Socio-economic conditions are closely related to the availability of family food, where poor food availability can increase the risk of 3.64 times of stunting children. The low availability of food threatens to reduce the consumption of diverse and nutritionally balanced, and safe foods at the household level. In the end, it will impact the severity of community nutrition problems, including stunting in toddlers [45].

Socio-economic status is related to stunting, so the local government must improve socio-economic status related to stunting in children aged 1–3 years [46].

Research shows a significant relationship between healthy environmental sanitation and the nutritional status of children under five. In Indonesia, the prevalence of very short and short toddlers is 29.9% [47].

Stunting is an indicator of children's well-being and an accurate reflection of social inequality. Linear growth failure serves as a marker of pathological disorders associated with increased morbidity and mortality, loss of physical growth potential, decreased neurodevelopment and cognitive function, and an increased risk of chronic disease in adulthood. The physical and neurocognitive damage that accompanies stunted growth poses a major threat to human development [1], [48].

Stunting occurs due to factors of family socio-economic status (family income), mother's education, low birth weight (LBW), premature birth, non-exclusive breastfeeding, birth length, and macro- and micronutrient deficiencies [49]. The environment has a major influence on energy and nutrient intake [12].

Another factor related to the occurrence of stunting is exclusive breastfeeding. The risk of becoming stunted is 3.7 times higher in infants who are not exclusively breastfed than those who are exclusively breastfed [44]. Studies have shown that children who do not receive colostrum have a higher risk of stunting [50]. Breast milk is a deep fat emulsion a solution of protein, lactose, and salt secreted by both the side of the mammary glands of the mother, suitable for babies [2], [51].

There are various strategies to overcome stunting problems; one of the strategies in achieving food security is food diversification which can be done with the local food development program to increase the availability, quality, and diversification, such as environmental conservation, healthy lifestyles, utilization of local biological resources, and public awareness [52], [53]. Food consumption has a relationship with the socio-economic and cultural community; it may affect the nutritional intake of the community and individuals [54].

According to Rachman *et al.* (2020:166), stunting is caused by a lack of energy and protein intake in the long term, starting from pregnancy. Therefore, integrated nutrition education related to stunting

and PEM and community empowerment to tackle stunting and PEM needs to be carried out. Adequate protein intake during the golden period (infants up to 2 years of age) is important in preventing stunting. A study in Bangkalan Regency, Madura, showed that toddlers with inadequate protein intake had a higher risk of experiencing stunting compared to toddlers with adequate protein intake from the recommended nutritional adequacy rate (RDA). One source of protein that is widely available at a reasonably affordable price is fish. Research in Rowosari, Semarang, showed that fish consumption was significantly correlated with the incidence of stunting [35].

Stunting is caused by a lack of energy intake and protein intake in the long run, starting from pregnancy. Therefore, integrated nutrition education related to stunting and PEM and community empowerment to overcome stunting and PEM need to be done. However, fish consumption among toddlers is still low because fish is still the second source of protein after meat. Fish consumption is low because the fish processing level is more often fried only; to increase fish consumption, it may require additional skills to process and serve fish suitable for young consumers. Lack of knowledge about how to cook fish is one of the obstacles in consuming fish. Through this study, the researchers wanted to educate about stunting and how to overcome it [55].

According to Sari *et al.*, adequate protein intake will provide amino acids needed by the body to build bone matrix and affect bone growth because protein functions to modify the secretion and action of the osteotropic hormone IGF-1 so that protein intake can modulate the genetic potential of achieving peak bone mass. Provision of adequate nutritional intake affects normal growth patterns to be caught up. The prevalence of stunting in children with low protein intake was 1.87 times greater than in children with adequate protein intake [10].

Community-based interventions need to be formulated and implemented to improve children's health. At the individual level, interventions should educate mothers about proper nutrition and the need to utilize health services. At the community level, the health-care system should facilitate public health interventions [56].

The research of Tasya Watania, Nelly Mayulu, and Shirley ES Kawengian [57] argues that the role of parents, especially mothers, is very important in fulfilling children's nutrition since the children need parental attention and support in facing challenging fast growth and development. Getting good nutrition requires good nutritional knowledge from parents to provide a balanced menu of choices. A person's level of nutritional knowledge affects attitudes and behavior in food selection. A mother who has poor nutritional knowledge and attitudes will significantly affect her child's nutritional status, and it will not be easy to choose nutritious food for her child and family.

Inadequate knowledge of nutrition, lack of knowledge about good eating habits, and lack of understanding of the nutritional contribution of various types of food will cause problems in intelligence and productivity, especially in toddlers or children aged between 1 and 5 years.

Stunting in infancy can continue and is at risk of growing short in adolescence. Children who are stunted at an early age (0 and 2 years) and remain short at 4–6 years of age have a 27 times risk of staying short before entering puberty; on the other hand, children whose growth is normal at an early age may experience growth faltering at the age of 4–6 years and have a 14 times risk of growing short at pre-pubertal age. Therefore, intervention is still needed even after passing the First 1000 Days of Life to prevent the increasing growth of stunting [26].

The prevalence of stunting among toddlers aged 24–59 months in Aceh, No. 39 Sumatra, South Sumatra, and Lampung is 44.1%. Associated with the incidence of stunting is that children under five have LBW and have low levels of energy, fat, and protein intake. More than half the height of mothers in the four provinces is short, and families with low economic status have many household members and have unprotected drinking water sources [28].

When viewed based on the WHO conceptual framework, it shows a comprehensive review of articles on food security and the determinants of stunting in children in coastal areas of Indonesia. This literature review shows that the risk factors for stunting in coastal areas of Indonesia are food security, nutritional intake, maternal height, premature birth, low birth weight, birth length, low maternal education, knowledge, infectious diseases, and family socioeconomic.

Conclusion

Identification and review of several articles can be concluded that the consistent risk factors for stunting in coastal areas are family socio-economic status (family income), maternal education, LBW, premature birth, non-exclusive breastfeeding, birth length, and macronutrient and micronutrient deficiencies. Given the complexity of the risk factors for stunting, it is suggested that the strengthening of the First 1000 Days of Life program system can be developed to become part of the culture and social life in the community so that the interventions carried out can be sustainable. Efforts to reduce nutrition problems must be handled cross-sectorally on all lines so that the policies that have been carried out can effectively reduce the incidence of stunting in coastal areas.

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