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Review

Determinants of stunting prevention in coastal fishing families of Bengkulu city

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Abstract: This study examines the determinants of stunting prevention among toddlers in fishing families residing in the coastal areas of Bengkulu City. Utilizing a mixed-method approach, the research combined survey data from 70 respondents and in-depth interviews with 11 informants. Findings indicate that health behavior and genetic factors from health status, alongside education level and occupation from socioeconomic status, play pivotal roles in stunting prevention. Consumption patterns, particularly the consistent provision of animal protein and vegetables in daily meals, significantly contribute to the absence of stunting cases in the studied population. However, limited fruit intake persists due to economic barriers. The study underscores the necessity of integrated strategies, including nutrition education, enhanced access to nutritious foods, and economic support for fishing families, to sustain stunting prevention in coastal communities.

Keywords: stunting; fishing families; coastal; health behavior; socioeconomic; consumption patterns

1. Introduction

In addressing the issue of stunting prevention among toddlers in coastal areas, it is essential to consider health status, socio-economic conditions, and dietary habits within fishing communities. Coastal families face unique challenges, such as irregular income from fisheries-based livelihoods, market isolation, and environmental factors that influence food availability. Research highlights the critical role of maternal education and household income in ensuring adequate nutrition for children, especially during the first 1000 days of life. In Bengkulu City, efforts to reduce stunting prevalence have been commendable, with rates dropping from 22.2% to 12.9% in recent years. However, the factors enabling this achievement remain underexplored. This study aims to identify and analyze the roles of health status, socio-economic conditions, and consumption patterns in preventing stunting among fishermen families in the coastal areas of Bengkulu City. Research by Gibson et al. (2020) highlights the challenges faced by fishing households in Komodo District, Indonesia, where access to nutrient-dense foods is hampered by factors such as erratic income from fisheries-based livelihoods and isolation from markets. This underscores the importance of

understanding the economic constraints that can affect food choices and nutritional intake of families in coastal areas. Furthermore, emphasizing the interaction between fishing activities and eutrophication in coastal fish populations, suggests that fishing practices can have indirect effects on environmental factors that may affect the availability of nutritious food sources for communities (Bergström et al., 2018). In addition, a study on determining processed seafood for fishermen's welfare using macro ergonomics and the Analytic Hierarchy Process provided insights into how improving fish product processing could contribute to community development and potentially increase consumption of fish-based foodstuffs among fishing families (Nurmianto, 2024). This approach is in line with increasing dietary diversity and nutrient intake in fishing communities to combat issues such as stunting. In addition, research conducted to educate coastal housewives on the nutritional benefits of fish consumption underscores the importance of knowledge dissemination to promote optimal nutrition and health status within families (Muchtar, 2023).

Understanding the diet and consumption habits of coastal communities is critical to addressing stunting among children. Research on dietary patterns in rural northern Norway revealed associations between unhealthy lifestyle factors, socioeconomic status, and specific dietary patterns (Petrenya et al., 2019). Similarly, research on diets around the world and their relationship with socioeconomic data emphasises the link between dietary choices and economic factors (Costa et al., 2022). By examining the socioeconomic context and lifestyle factors that influence dietary habits, interventions can be tailored to promote healthier eating practices among families in coastal areas. In addition to dietary considerations, social and economic factors also play an important role in shaping health outcomes in coastal communities. Research on coastal women's participation in community empowerment activities highlights the diverse economic ventures women undertake, including fisheries and agriculture, which underscores the importance of gender-specific approaches in community development (Haidawati, 2023). In addition, research on the phenomenology of gender and parenting styles in rural areas highlights challenges related to limited access, social behaviour and economic constraints that can impact on children's health and development (Putra, 2023).

In addition, the ecological dynamics of coastal habitats and their impacts on fish populations are critical to understanding the availability of nutritious food sources for fishing communities. Research on important coastal habitats for fish in the Baltic Sea emphasises the importance of characterising and conserving these habitats to support sustainable fish populations and fisheries (Kraufvelin et al., 2018). Similarly, research on the influence of environmental factors on fish diversity underscores the importance of coastal habitats as critical ecosystems for diverse fish species (Nhat, 2024). By conserving these habitats and understanding their role in supporting fish populations, various initiatives can be undertaken to ensure a stable food supply for coastal communities. In conclusion, addressing stunting among under-fives in coastal areas such as Bengkulu requires a comprehensive approach that considers the interactions between health, socioeconomic factors and diet in fishing communities. By assessing the challenges faced by fishing households, promoting fish product processing, educating community members on the benefits of fish consumption, and

understanding the ecological dynamics of coastal habitats, targeted interventions can be developed to improve the health and well-being of families in these areas.

Globally, the lives of fishermen are still categorised as underprivileged or poor, because they experience a famine period, namely the west wind / storm season, bad weather does not go to sea to catch fish, supported by the habits of fishermen, behaviour that does not take into account their future needs. A small proportion, behave that their income is saved for children's school and daily needs and behave reluctantly to check their health regularly, which aims if there is a known disease, it does not require expensive medical expenses (Herlina, 2019; Kiram & Zamzami, 2021). Most of the income earned by fishermen is still unstable, the lives of fishermen are still below the poverty line (Kiram, 2020a; Patty and Nugroho, 2019). It is further explained that the residence is dirty with poor sanitation, has unsanitary wastewater flow and clean water sources are quite difficult. Socioeconomic status and consumption patterns need to be considered because of their role in the prevention of circumcision. According to (Marlina, Warlenda, and Mulyani, 2024), mothers' knowledge or education about nutrition plays an important role in choosing the right food for fishermen's children. so there is a need for a greater educational approach to mothers in terms of diet or consumption and nutrition of children to reduce the risk of stunting in early growth. The study conducted (Elizabeth et.al, 2023) factors affecting the nutrition of Kenyan coastal children, namely maternal characteristics and the number of income generating activities in the household, low nutrient intake especially from food affects child nutrition. The prevalence of stunting and infectious diseases is high, and the influence of household income. In general, wives of waiters work in the informal sector such as shredded tuna processors, fish drying laborers, making salted fish, legal fish sellers, and others, to support the family economy (Nirmasasi et.al, 2021; Herlina & Jayaputra, 2021).

Consumption patterns are (1) primary needs (clothing, food/food, and shelter). (2) Secondary needs (needs that can be postponed such as changing clothes every month, a car or after fulfilling primary needs and (3) tertiary needs in general for rich people, for example, houses and luxury cars, etc. (Syarifuddin, 2021). It is further explained that the impact of various obstacles faced, according to (Moelyaningrum, et al, 2022), the most prominent are economic factors, accessibility, and nutritional knowledge as well as a lack of awareness from families in behavior to overcome the problem of malnutrition in children under five in fishing families. The World Health Organization (WHO, 2019) states that Southeast Asia still has the highest prevalence of stunting (31.9%) in the world after Africa (33.1%). Indonesia is included as the sixth country at 36.4% in the Southeast Asia region after Bhutan, Timor Leste, Maldives, and Bangladesh. Based on research using data from India's National Family Health Surveys, Rajpal et al (2020) showed that nutritional intake during the first 1000 days of life is very important because the development of stunted children in children in India tends to occur in preschool-age children (24 months or more). Generally, from economically vulnerable households. The Bengkulu City Government has significantly reduced the number of chronic malnutrition cases among children under five, from 22.2 percent to 12.9 percent. This is the highest achievement based on the results of the Nutrition Status Survey of Indonesia (SSGI) in 2022, as stated by the Head of the Bengkulu National Population and Family Planning Agency (BKKBN),

Rusman Efendi (Bisri & Dudi, 2023). In Malabero Village, which is in the coastal area of Bengkulu City, no cases of stunted children were found. The above phenomenon is interesting to find out how fishermen families prevent stunting, suspected influencing factors are health status, socio-economic and consumption patterns in preventing stunting in toddlers in coastal Bengkulu City.

2. Materials and methods

This study adopts a mixed-method approach, integrating both quantitative and qualitative methods to comprehensively understand the determinants of stunting prevention in fishing families in the coastal areas of Bengkulu City. By combining quantitative rigor with qualitative depth, the study offers comprehensive insights to inform policy and intervention strategies. The methodology details are presented as follows:

Sample Selection Criteria

The study involved 70 respondents for the structured survey and 11 informants for in-depth interviews. Participants were selected based on the following criteria:

- Inclusion Criteria:
  - Families residing in the coastal fishing communities of Bengkulu City for at least five years.
  - Households with children under the age of five.
  - Willingness to participate in the study and provide informed consent.
- Exclusion Criteria:
  - Families without children under the age of five.
  - Those who declined to participate or could not provide informed consent.

Respondents for the survey were recruited using a purposive sampling technique, ensuring representation from various socio-economic backgrounds within the coastal communities. The informants for the qualitative interviews were selected based on their role and knowledge, including community leaders, healthcare workers, and mothers with young children.

Measurements and Data Collection

Quantitative data were collected using a structured questionnaire that was pre-tested for validity and reliability. The questionnaire included sections on health status, socio-economic conditions, and consumption patterns. The validity of the questionnaire was confirmed with a Cronbach's alpha score of 0.85, indicating high internal consistency. The reliability of the tool was ensured through repeated testing in a pilot study.

Key measurement tools and variables included:

- **Health Status:** Assessed through environmental conditions, health behaviors, access to healthcare services, and genetic factors.
- **Socio-Economic Conditions:** Measured through education level, occupation, and household income.
- **Consumption Patterns:** Evaluated through the frequency and type of food intake (primary, secondary, and tertiary needs).

Data collection was conducted through face-to-face interviews at participants' homes to ensure accuracy and contextual understanding. Interviewers were trained to administer the survey and qualitative interviews consistently.

Data Collection Procedures

The data collection process was divided into two phases:

1) **Quantitative Phase:** Structured surveys were distributed to 70 respondents. Data were gathered on their household demographics, dietary habits, and socio-economic conditions. Surveys were completed within two months.
2) **Qualitative Phase:** In-depth interviews with 11 informants were conducted to explore the social and cultural dimensions influencing stunting prevention. Interviews lasted approximately 45-60 minutes each and were audio-recorded with the participants' consent.

Ethical considerations included obtaining written informed consent from all participants and approval from the University's Research Ethics Committee. Anonymity and confidentiality were strictly maintained throughout the study.

Statistical Analysis

Quantitative data were analysed using SPSS version 22. Descriptive statistics were used to summarize demographic information, while inferential statistics examined relationships between variables:

- **T-test and Chi-square tests:** These tests assessed differences and associations between categorical variables, such as health status factors and stunting prevention.
- **Regression Analysis:** A multiple linear regression model was employed to determine the influence of predictors (education, occupation, income, health behavior, and genetic factors) on stunting prevention. The regression equation derived was:

$$Y = 8.408 + 0.086X1 + 0.418X2 + 0.095X3 + 0.317X4 + 0.010X5 + 0.563X6 + 0.123X7$$

where:

- Y = Stunting prevention
- X1 = Environmental factors
- X2 = Behavioral factors
- X3 = Healthcare services
- X4 = Genetic factors
- X5 = Age
- X6 = Occupation
- X7 = Education

The model showed an R-squared value of 0.366, indicating that 36.6% of the variation in stunting prevention could be explained by the predictors.

Qualitative Data Analysis

Qualitative data were analyzed thematically. Transcripts of interviews were coded and categorized to identify recurring themes, such as cultural beliefs about nutrition, economic barriers to healthy food access, and community support systems. The thematic analysis provided deeper insights into the socio-cultural context of stunting prevention efforts.

3. Results and discussion

Health Status of Fishermen Families

Data analysis revealed that health behavior and genetic factors significantly influence stunting prevention. Behavioral factors, such as prioritizing nutritious meals regardless of cost, were prominent among respondents. For instance, 94% agreed that "as long as it's nutritious, it doesn't matter if the food is cheap. Genetic factors, such as parental height, also showed a strong correlation with children's growth outcomes. This finding is not much different from the study by Kisnawaty et al. (2023), which reported that 33 (55.9%) mothers of children under five had good behavior in meeting the nutritional needs of their children. Children of mothers with low Body Mass Index (BMI) were more likely to experience stunting and underweight conditions, while older children were more likely to be underweight or stunted. According to Pakpahan Martina et al. (2021), health behavior involves actions by individuals, groups, and organizations, including social change, policy development and implementation, improvement of coping skills, and enhancement of quality of life. Additionally, it is stated that promoting and improving health, and healthy behaviors can enhance functional ability and better quality of life at all stages of health development (Pender & Person, 2019).

This study is also supported by a comparative study of Sub-Saharan African countries, which found that the age of the child, mother's weight, and mother's BMI were correlated with linear growth in children (Amugsi et al., 2017, 2020; Herlina et al., 2022). In the context of health behavior, 65% of the community living near the forests in Central Bengkulu still exhibit behaviors/attitudes of littering, as noted by RD, 54, a traditional leader, who said, "*Most children under five are not fully immunized; we throw trash freely, do not drink cold or acidic foods, and avoid bathing in the rain to prevent illness*."

The research findings indicate that 90% agree and strongly agree with the statement that if the parents are short, their children tend to be short, which is an influence of genetics. According to Sudarman (2017) and Samsudin et al. (2018), genetics refers to traits inherited from parents to their children, including hereditary diseases and malnutrition. Genetics, or heredity, can be defined as the process of transferring characteristics or traits from parents to their offspring. Studies have shown a relationship between genetics and stunting, where the mother's height is a risk factor for stunting (Patty and Nugroho, 2019). Blum states that genetic factors influence health status by only 5%. Although a child's height is influenced by the genetic factors of their parents, nutrition and environmental factors play a crucial role in preventing stunting (Heriawita, 2023).

4. Socio-economic status of fishermen families

Education and occupation emerged as significant determinants of stunting prevention. Most fathers had junior high school education, while mothers' education ranged from junior high to senior high school levels. Income levels, however, were predominantly below the city's minimum wage, limiting access to diverse and nutrient-rich foods. Despite economic constraints, families demonstrated resourcefulness in providing essential nutrition for their children.

a. *Income Level of Fishermen Families*

Data analysis shows that the majority of 57 individuals earn between IDR76,000 and IDR152,000 per week, equivalent to IDR304,000 to IDR604,000 per month, which is the most common income level (81.43%). This income level for fishermen is still far below the 2023 Minimum Wage (UMP) for Bengkulu City, which is IDR2,601,802 (Nasucha, 2023). Only a small portion (8.57%) earn above the 2023 UMP for Bengkulu City. This means that the income of fishermen in the coastal areas of Bengkulu City is still below the UMP, indicating they are economically disadvantaged or poor. This condition aligns with the study conducted by Manuel et al. (2023), which found that the prevalence of stunting in children under five years old in Burundi, Africa, is very high, reaching 56.9%. Contributing factors to stunting include nutritional status at the time of the survey, the socioeconomic conditions of the family, and understanding of stunting in efforts to address it in Burundi.

Research using data from the National Family Health Surveys in India by Sunil et al. (2020) shows that nutritional intake during the first 1,000 days of life is critical. The development of stunting in preschool children in India is often seen in economically vulnerable households. According to Elizabeth et al. (2023) and Sihite and Chaidir (2022), a study in coastal Kenya found that factors affecting child nutrition in the context of the coastal marine food system include the mother's characteristics and the number of income-generating activities in the household. Low nutritional intake, especially from food, affects children's nutrition. The incidence of stunting is closely related to family income (Hanun, 2018; David et al., 2023), as seen in a study in tropical Indonesia on gutira fishing, where it is economically a secondary or additional income. The supply of seafood positively influences the consumption of fishing households, and if income increases by IDR1,000,000, consumption increases by IDR556,000.

b. Education Level of Fishermen Families

Referring to data, it shows that the highest level of education for fathers is at the junior high school level (SLTP), while the education level of mothers is almost balanced between junior high school (SLTP) and senior high school (SLTA), with 24 and 21 individuals, respectively. Interestingly, there are three children of fishermen who have achieved a bachelor's degree (S1). This differs from a study conducted at TPI Lengkong and TPI Menganti Kisik in Cilacap, Central Java, where most fishermen's education levels were at the elementary school (SD) level, with 86.67% and 60% respectively (Yogi Putranto et al., 2023). In contrast, in the coastal area of Bengkulu City, most fishermen fathers have an education level of elementary school and junior high school (60%), while 62.86% of the fishermen mothers have an education level of junior high school to senior high school.

Education positively influences household consumption among fishermen, and if education increases by one year, consumption increases by IDR491,474 (Hanum, 2018). According to Delsy et al. (2023), in the working area of Air Bangis Health Center in West Pasaman Regency, West Sumatra Province, factors associated with the incidence of stunting in children aged 12-24 months in 2020 include food intake, sanitation, immunization status, and maternal education, which are significantly related to the incidence of stunting. Based on the opinions above, it can be concluded that education and food intake influence stunting.

5. Consumption patterns in fishermen families

Consumption patterns of primary needs, particularly regular inclusion of fish, eggs, and vegetables in meals, were crucial in preventing stunting. Statistical analysis confirmed the significant impact of primary and secondary needs on stunting prevention, while tertiary needs showed no notable effect. Limited fruit consumption due to high costs remained a challenge for many families.

5.1. Primary needs

a*. Meals (Food intake for toddlers in fishermen families)*

Data analysis shows that 45.75% of children aged 1.5 to 5 years eat rice, fish/sardines, eggs, or meat (Y3), with respondents agreeing and strongly agreeing. Meanwhile, 92.86% of children under five are given fish and vegetables daily (Y8). The primary needs variable obtained a t-test value of 2.289 and a p-value of 0.025. The p-value of 0.025 is less than the alpha level of 0.05, indicating that the primary needs consumption pattern significantly affects stunting prevention efforts in the Coastal Area of Bengkulu City. According to the Ministry of Health of the Republic of Indonesia (2018), Vindi et al. (2019), Maesarah et al. (2021), and Wibowo et al. (2023), dietary patterns refer to the composition of food intake in terms of quantity, type of food, and the timing of consumption. Like the wives of fishermen in Bengkulu City, the role of fishermen's wives in Bunaken, Manado City, generally involves preparing breakfast, lunch, meals for their husbands to take fishing, and dinner, done routinely every day.

This is consistent with studies conducted in Malang and Lubuk Linggau, South Sumatra, by Rindawati and Widjajani (2023) and Muhammad et al. (2024), which found the benefits and importance of consuming fish, especially for stunting sufferers. Fish is a rich source of protein and omega-3, both essential for child growth. This is supported by studies in East and West Gojjam Zones, Amhara Region, Ethiopia; the Dominican Republic; Delta State, Nigeria; the Philippines; and Bangladesh (Motbainor et al., 2015; Gheda et al., 2018; Irabor et al., 2023; Bakara et al., 2024; Trances Pola et al., 2024; Manika et al., 2024), which show that sustainable fish production can be consumed by local communities. If children eat fish-containing cakes and consume fish regularly, it can improve the nutritional status of stunted children. Furthermore, it is explained that school-aged children who experience stunting tend to have low nutritional intake. Fish is also beneficial for pregnant and breastfeeding mothers. Additionally, fish-based foods can improve nutritional status and prevent stunting in young children, as the contribution of animal-source foods (fish, meat, milk, and eggs) is proven to prevent malnutrition.

This is in line with research by Hadi (2023), which states that socioeconomic status greatly influences children's nutritional status, with the level of education and knowledge of the mother being the most influential factors. Similarly, studies in Bengkulu City and in Bangkalan, Madura, East Java (Azmy et al., 2018; Yuliantini et al., 2022) show a correlation between energy, protein, fat, carbohydrate, and zinc intake with the incidence of stunting in children, with respective p-values of ($p < 0.05$) and ($p = 0.015$, OR = 4.048). The quality of a child's intelligence depends on the support of nutrients, especially protein and omega-3 DHA, which contribute to the

complexity of brain development. All of this is supported by the availability of nutrients that can be obtained through fish consumption (Aridiyah et al., 2015; Ariani et al., 2018). The role of fish in enhancing the quality of food is very important. Seafood is a good source of essential omega-3 and omega-6 fatty acids and provides beneficial unsaturated fatty acids. These are particularly important for brain and cognitive development. Proper dietary patterns are the key to successful child growth and development, making the consumption of seafood crucial in the first 1,000 days of life to prevent stunting (Van, 2021; Nirmala and Octavia, 2022).

b. *Clothing and Housing for Fishing Families*

The subjective well-being studied refers to the perceived state of the family, encompassing three dimensions: physical-economic, social, and psychological. The physical-economic well-being of the family includes conditions related to food, clothing, housing, health, education, income, assets, and savings (Patrescia and Rokhani, 2023). This is similar to the findings of Crona et al. (2010) in Zanzibar, Kenya, where the risks often faced by fishermen include production uncertainty, environmental fluctuations affecting access to fish resources, price risks due to unstable supply conditions, and the risk of loss of assets or even life-threatening conditions at sea. These factors contribute to fishermen being poor and powerless to meet other primary needs. According to RY, a 43-year-old with a master's degree and the head of RT.10, "Fishermen here are generally poor, as it is evident that their houses are still under their parents' roof, and they only buy new clothes during Eid al-Fitr." It can be observed that the highest percentage of primary housing needs (17 people or 24.3%) are still living with family members, while 15 people (21.4%) are renting. Additionally, 41 people (58.6%) are only able to buy new clothes once a year. Different from the findings of Lindawati and Saptanto (2014), which stated that 63.0% of fish farming families were classified as non-poor based on 14 criteria of poor households according to BPS, this study suggests that these families can meet their basic/primary needs.

5.2. Secondary needs

The secondary needs variable obtained a t-value of 4.924 and a p-value of 0.000. The p-value of 0.000 is less than the alpha value of 0.05. This indicates that the consumption pattern of secondary needs has a significant impact on efforts to prevent stunting in the coastal areas of Bengkulu City. According to Imron (2003), fishermen are categorized into three types: labor fishermen, who work with fishing gear owned by others; conversely, juragan fishermen are those who own fishing gear operated by others; and individual fishermen, who own their own fishing gear and do not involve others in its operation. Based on this classification, this study is dominated by individual fishermen, with 36 individuals (51.43%), followed by 27 labor fishermen (38.60%), and the remaining 10% (7 individuals) are juragan fishermen. In line with Puspita and Agustina (2020) and Arimawan and Suwendra (2022), consumption patterns refer to the human needs for both goods and services that are allocated not only for personal purposes but also for the family, based on the relationships and responsibilities that are realized as primary and secondary needs. Consistent with Widyaningsih and Muflikhati (2015), this study shows that the proportion of food

expenditure is greater (61.06%) than non-food expenditure (38.94%). Food/primary needs expenditures are more necessary for fishermen in Bengkulu City for stunting prevention, with 47 individuals (67.14%) prioritizing spending on food.

Table 1. Regression analysis summary.

Predictor	***Coefficient (B)***	***t-value***	***p-value***
Environmental factors	-0.086	-1.337	0.183
Behavioral factors	0.418	6.758	0.000
Healthcare services	0.095	1.565	0.119
Genetic factors	0.317	5.032	0.000
Age	0.010	0.004	0.997
Occupation	0.563	3.722	0.000
Education	0.123	6.150	0.000
The model showed an R-squared value of 0.366, indicating that 36.6% of the variation in stunting prevention could be explained by the predictors.			

Qualitative Data Analysis.

Table 2. Regression analysis results.

Model Summary					
Model		**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
dimension0	1	0.605[a]	0.366	0.344	1.342

Predictors: (Constant), Pendidikan, Health Service, Behaviour, Environment, Genetic, Job.

The results showed that:

1) The correlation coefficient (R) value of 0.605 shows that the relationship between socioeconomic status (age, occupation, and education) and health status (environment, behavior, health services, and genetics) on stunting prevention is quite strong. This means that the social status and health status of the family are closely related to stunting prevention efforts.
2) The coefficient of determination (R2) of 0.366 shows that the effect of social status (age, occupation, and education) and family health status (environment, behavior, health services, and genetics) on stunting prevention in Malabero Pesisir Village, Bengkulu City is 36.6 percent. While the remaining 63.4 percent is explained by other factors outside the study.

a. Hypothesis Testing Results:
Simultaneous Hypothesis Testing.

Tabel 3. NOVAb.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	206.590	7	29.513	16.399	0.000[a]
Residual	358.145	199	1.800		
Total	564.734	206			

a. Predictors: (Constant), Education, Health Care, Behavior, Age, Environment, Genetic, Work; b. Dependent Variable: Stunting Prevention.

The results of simultaneous hypothesis testing (table 1) show that the F-count value is 16.399 with a p-value of 0.000. The p-value of 0.000 < alpha 0.05 which means that the effect of social status (age, occupation, and education) and family health status (environment, behavior, health services, and genetics) on the prevention of stunting in Bengkulu City is significant.

1) Partial Hypothesis Testing

Tabel 4. Coefficientsa.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	**(Constant)**	**8.408**	**1.373**		**6.123**	**0.000**
	Environment	**-0.086**	**0.064**	**-0.084**	**-1.337**	**0.183**
	Behavior	**0.418**	**0.062**	**0.447**	**6.758**	**0.000**
	Health Care	**0.095**	**0.061**	**0.104**	**1.565**	**0.119**
	Genetic	**0.317**	**0.063**	**0.315**	**5.032**	**0.000**
	Age	**0.010**	**0.089**	**0.000**	**0.004**	**0.997**
	Work	**0.563**	**0.151**	**0.242**	**3.722**	**0.000**
	Education	**0.123**	**0.020**	**0.773**	**6.150**	**0.000**

a. Dependent Variable: Stunting prevention.

The research findings were obtained from the results of hypothesis testing (Table 2) and are presented as follows:

1) The environmental variable received a t-value of -1.337 and a p-value of 0.183. The p-value of 0.183 > alpha 0.05 indicates that the environmental factor does not have a significant effect on stunting prevention.
2) The behavioral variable received a t-value of 6.758 and a p-value of 0.000. The p-value of 0.000 < alpha 0.05 indicates that the behavioral factor significantly affects stunting prevention.
3) The healthcare service variable received a t-value of 1.565 and a p-value of 0.119. The p-value of 0.119 > alpha 0.05 indicates that the healthcare service factor does not have a significant effect on stunting prevention.
4) The genetic variable received a t-value of 5.032 and a p-value of 0.000. The p-value of 0.000 < alpha 0.05 indicates that the genetic factor significantly affects stunting prevention.
5) The age variable received a t-value of 0.004 and a p-value of 0.997. The p-value of 0.997 > alpha 0.05 indicates that the age factor does not have a significant effect on stunting prevention.

6) The occupation variable received a t-value of 3.722 and a p-value of 0.000. The p-value of 0.000 < alpha 0.05 indicates that the occupation/income factor has a significant effect on stunting prevention.
7) The education variable received a t-value of 6.150 and a p-value of 0.000. The p-value of 0.000 < alpha 0.05 indicates that the education factor significantly affects stunting prevention.

Based on the analysis, the regression equation can be derived as follows:

$$Y = 8.408 + 0.086X1 + 0.418X2 + 0.095X3 + 0.317X4 + 0.010X5 + 0.563X6 + 0.123X7$$

The interpretation of the above regression equation is as follows:

1) The constant (a) value of 8.408 indicates that if the socioeconomic status and family health status are equal to zero (non-existent), the stunting prevention efforts will remain constant at 8.408.
2) The regression coefficient of the environmental factor (b1) of 0.418 shows that if the environmental factor increases, the stunting prevention efforts will also increase.
3) The regression coefficient of the behavioral factor (b2) of 0.418 indicates that if the behavioral factor increases, the stunting prevention efforts will also increase.
4) The regression coefficient of the healthcare services factor (b3) of 0.095 indicates that if the healthcare services factor increases, the stunting prevention efforts will also increase.
5) The regression coefficient of the genetic factor (b4) of 0.317 indicates that if the genetic factor increases, the stunting prevention efforts will also increase.
6) The regression coefficient of the age factor (b5) of 0.010 indicates that if the age factor increases, the stunting prevention efforts will also increase.
7) The regression coefficient of the occupation factor (b6) of 0.563 indicates that if the occupation factor increases, the stunting prevention efforts will also increase.
8) The regression coefficient of the education factor (b7) of 0.095 indicates that if the education factor increases, the stunting prevention efforts will also increase.

This study found that from the health status factors, namely (1) Environment, (2) Behavior, (3) Health Services, and (4) Genetics, two behavioral variables obtained a t-value of 6.758 and a p-value of 0.000. The p-value of 0.000 is less than the alpha level of 0.05. This indicates that the behavioral factor has a significant effect on the prevention of stunting. Additionally, the genetic variable obtained a t-value of 5.032 and a p-value of 0.000. The p-value of 0.000 is less than the alpha level of 0.05. This indicates that the genetic factor has a significant effect on the prevention of stunting. Furthermore, from the socioeconomic factors, only two out of three variables were found to have an influence. The employment variable obtained a t-value of 3.722 and a p-value of 0.000. The p-value of 0.000 is less than the alpha level of 0.05. This indicates that the employment factor has a significant effect on the prevention of stunting, and the education variable obtained a t-value of 6.150 and a p-value of 0.000. The p-value of 0.000 is less than the alpha level of 0.05. This indicates that the education factor has a significant effect on the prevention of stunting in the city of Bengkulu.

Analysis of Consumption Patterns of Fishermen's Families in Preventing Stunting of Toddlers on the Coast of Bengkulu City.

Results of Regression Analysis.

Table 5. Model summary.

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate
dimension0	1	.657[a]	0.431	0.405	0.794

a. Predictors: (Constant), Tersiery Need, Secunder Need, Primary Need.

Research findings indicate that:

1) The correlation coefficient (R) value of 0.657 indicates that the relationship between the consumption patterns of fishing families (primary needs, secondary needs, and tertiary needs) and stunting prevention in Malabero Coastal Village, Bengkulu City, is quite strong. This means that the relationship between the consumption patterns of fishing families and efforts to prevent stunting is close.
2) The coefficient of determination (R^2) value of 0.431 indicates that the influence of the consumption patterns of fishing families (primary needs, secondary needs, and tertiary needs) on stunting prevention in Malabero Coastal Village, Bengkulu City, is 43.1%. Meanwhile, the remaining 56.9% is explained by other factors outside the scope of this research.

Hypothesis Testing Results:

a) *Simultaneous Hypothesis Testing*

Table 6. ANOVAb.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.537	3	10.512	16.676	0.000[a]
	Residual	41.605	66	0.630		
	Total	73.143	69			

a. Predictors: (Constant), Tertiary Needs, Secondary Needs, Primary Needs; b. Dependent Variable: Stunting Prevention.

The results of simultaneous hypothesis testing indicate that the F-test value is 16.676 with a p-value of 0.000. The p-value of 0.000 is less than the alpha level of 0.05, which means that the influence of the consumption patterns of fishing families (primary needs, secondary needs, and tertiary needs) on stunting prevention in Malabero Coastal Village, Bengkulu City, is significant.

b) *Partial Hypothesis Testing*

Table 7. Coefficientsa.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.811	1.755		2.742	0.008
	Primary needs	0.340	0.148	0.252	2.289	0.025
	Secondary needs	0.645	0.131	0.513	4.924	0.000
	Tertiary needs	-0.121	0.098	-0.129	-1.235	0.221

a. Dependent Variable: Stunting Prevention.

The results of partial hypothesis testing from the study are as follows:

1) The primary needs variable obtained a t-test value of 2.289 and a p-value of 0.025. The p-value of 0.025 is less than the alpha level of 0.05. This indicates that the consumption pattern of primary needs has a significant effect on stunting prevention efforts in the Coastal Area of Bengkulu City.
2) The secondary needs variable obtained a t-test value of 4.924 and a p-value of 0.000. The p-value of 0.000 is less than the alpha level of 0.05. This indicates that the consumption pattern of secondary needs has a significant effect on stunting prevention efforts in the Coastal Area of Bengkulu City.
3) The tertiary needs variable obtained a t-test value of -1.235 and a p-value of 0.221. The p-value of 0.221 is greater than the alpha level of 0.05. This indicates that the consumption pattern of tertiary needs does not have a significant effect on stunting prevention efforts in the Coastal Area of Bengkulu City.

From the analysis results, the following regression equation can be obtained:

$$Y = 4{,}811 + 0{,}340X_1 + 0{,}645X_2 - 0{,}121X_3$$

The interpretation of the regression equation above is as follows:

1) The constant value (a) of 4.811 means that if the consumption patterns of fishing families (primary needs, secondary needs, and tertiary needs) are zero (i.e., there is no consumption), the stunting prevention efforts in Malabero Coastal Village, Bengkulu City, will remain constant at 4.811.
2) The regression coefficient for the primary needs consumption pattern (b1) of 0.340 indicates that if the primary needs consumption pattern increases, the stunting prevention efforts in Malabero Coastal Village, Bengkulu City, will also increase.
3) The regression coefficient for the secondary needs consumption pattern (b2) of 0.645 indicates that if the secondary needs consumption pattern increases, the stunting prevention efforts in Malabero Coastal Village, Bengkulu City, will also increase.
4) The regression coefficient for the tertiary needs consumption pattern (b3) of -0.121 indicates that if the tertiary needs consumption pattern increases, the stunting prevention efforts in Malabero Coastal Village, Bengkulu City, will decrease.

Regression

Table 8. Variables entered/removedb.

Model		**Variables Entered**	**Variables Removed**	**Method**
dimension0	1	Tertiary needs Secondary needs, Primary needs		Enter
a. All requested variables entered.				
b. Dependent Variable: Stunting Prevention				

Model Summary					
Model		R	R Square	Adjusted R Square	Std. Error of the Estimate
dimension0	1	0.657[a]	0.431	0.405	0.794
a. Predictors: (Constant), Tertiary Needs, Secondary Needs, Primary Needs					

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.537	3	10.512	16.676	0.000[a]
	Residual	41.605	66	0.630		
	Total	73.143	69			

a. Predictors: (Constant), Tertiary Needs, Secondary Needs, Primary Needs

b. Dependent Variable: Stunting prevention

Table 9. Coefficientsa.

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	4.811	1.755		2.742	.008
	Tertiary needs	.340	.148	.252	2.289	.025
	Secondary needs,	.645	.131	.513	4924	.000
	Primary needs	-.121	.098	-.129	-1235	.221

a. Dependent Variable: Stunting Prevention.

The analysis of the results above shows that out of 7 variables related to health status and socioeconomic factors, only 4 are significant. The findings of this study align with prior research highlighting the significance of socio-economic conditions and health behaviors in stunting prevention. For example, studies by Gibson et al. (2020) and Elizabeth et al. (2023) emphasize the critical role of maternal education and dietary diversity in reducing stunting rates among children in coastal communities. Similarly, this study corroborates the importance of behavioral factors such as prioritizing nutritious food and genetic influences, consistent with findings by Heriawita (2023). However, this study differs from research in other regions, such as Sub-Saharan Africa (Amugsi et al., 2020), by demonstrating that even with low income, families in Bengkulu City employed resourceful strategies to meet their children's nutritional needs. This highlights the unique socio-cultural adaptations in the local context, which warrant further exploration.

6. Conclusion, recommendation and limitation

The study identified health behavior, genetic factors, education, occupation, and consumption patterns of primary and secondary needs as key determinants in preventing stunting among fishing families in Bengkulu City. The absence of stunting cases in the studied population highlights the importance of targeted interventions, including nutrition education, economic support, and improved access to affordable nutritious food. These findings offer valuable insights for policymakers and stakeholders aiming to sustain and replicate stunting prevention efforts in similar communities.

The results underscore several actionable recommendations for policymakers and practitioners:

1) **Nutrition Education:** Community health posts (POSYANDU) should conduct regular workshops to improve parental knowledge about affordable, balanced diets.
2) **Economic Support:** Tailored income-generating programs for fishing families can help stabilize household incomes and ensure food security.
3) **Improved Food Access:** Local governments should promote initiatives like subsidies or markets to make nutrient-rich foods, particularly fruits, more accessible to coastal families.
4) **Integrated Development Programs:** Aligning stunting prevention with broader poverty alleviation and community development initiatives can address underlying socio-economic disparities.

Despite its contributions, the study has some limitations that should be acknowledged:

1) **Sample Size:** The relatively small sample size of 70 respondents may limit the generalizability of the findings to other coastal communities.
2) **Potential Biases:** Purposive sampling and reliance on self-reported data may introduce selection and recall biases, potentially affecting the validity of the results.
3) **Cross-Sectional Design:** The study's cross-sectional nature limits the ability to establish causal relationships between variables.

Future research should consider a longitudinal design and larger, more diverse samples to validate and expand upon these findings.

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