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Influence of Family Environment on Stunting Prevention among Toddlers in Huristak Public Health Center, Padanglawas Regency

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Abstract

Background: *Stunting is a condition of impaired growth and development in toddlers caused by chronic malnutrition over a prolonged period. One of the key factors influencing the occurrence of stunting is the family environment. This includes parenting practices, the level of nutritional knowledge, and the availability and utilization of healthcare facilities. This study aims to analyze the influence of family environmental factors, including parenting practices, maternal nutritional knowledge, household sanitation, clean water availability, and access to healthcare services, on stunting prevention among toddlers in the working area of Huristak Public Health Center, Padanglawas Regency.*

Method: *This research was an observational study with a cross-sectional design. A total of 286 mothers with toddlers were selected using purposive sampling. The study collected primary data through structured questionnaires and anthropometric measurements, including toddler height/length-for-age, maternal characteristics, parenting practices, nutritional knowledge scores, household sanitation conditions, availability of clean water, and utilization of healthcare services. Data were analyzed using chi-square tests and logistic regression.*

Results: *This study finds that the availability of clean water (p = 0.001), household sanitation conditions (p = 0.001), maternal nutrition education (p = 0.001), and access to basic healthcare services (p = 0.001) have a significant influence on stunting prevention among toddlers. The most influential variable is access to basic healthcare services OR= 15.695).*

Conclusion: *It is recommended that stunting prevention efforts focus on improving access to basic healthcare services, supported by enhancements in sanitation, clean water availability, and nutrition education.*

Keywords*: Family environment, Stunting prevention, Toddlers.*

INTRODUCTION

Stunting is a condition of growth failure in toddlers caused by chronic malnutrition that occurs over a long period, especially during the first 1,000 days of life.[1] One important factor that affects stunting is the family environment. This includes parenting style, nutritional knowledge, and access to healthcare services. When families provide adequate and balanced nutrition and regularly monitor their child's growth, the risk of stunting can be greatly reduced.[2]

According to data from the World Health Organization, the prevalence of stunting among toddlers in Indonesia is recorded at 21.5%.[3] This figure is further supported by the 2023 Indonesian Health Survey, which indicates that the stunting rate among toddlers in Indonesia remains notably high.[4] In North Sumatra, the stunting rate has dropped from 21.1% last year to 18.9% in 2023. Padang Lawas Regency saw a similar decrease, from 35.8% in 2022 to 17.7% in 2023. However, data from the Huristak Public Health Center in 2025 shows that 35 toddlers are short, thirteen are very short, twenty have malnutrition, and one is severely malnourished. Although the decline in stunting rates is a positive sign, more effort is needed. Without consistent and thorough prevention, stunting could rise again.[5]

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Parents, especially mothers, play a key role in raising children. A mother's knowledge about the importance of exclusive breastfeeding, nutritious complementary foods, and monitoring a child's growth is crucial for the toddler's nutritional status.[6] Lack of knowledge about children's dietary needs or awareness of the importance of immunization and regular check-ups at posyandu can increase the risk of stunting. Therefore, providing nutrition education to families, especially mothers, is a key strategy in preventing stunting.[7]

In addition, the family's economic condition also plays a major role in stunting prevention. Families with low income often struggle to meet their children's nutritional needs adequately.[8] Many of these families also live in areas with poor sanitation and limited access to clean water, which can lead to frequent infections and worsen a child's nutrition. Therefore, stunting prevention efforts should not focus only on toddlers but also aim to improve the overall well-being of families.[9]

Social factors within the family, such as eating habits, cultural practices, and support among family members, also influence child nutrition and stunting.[10] A supportive family environment, where members help each other in child care and share awareness about the importance of nutrition, is more likely to keep toddlers healthy. On the other hand, families with internal conflict or parents who neglect their child's diet can still face stunting issues, even if they are financially stable.[11]

Previous evidence indicates that stunting is strongly influenced not only by inadequate dietary intake but also by family environmental determinants, including parenting practices, maternal nutritional knowledge, poor sanitation, unsafe water, and limited use of healthcare services, which increase children's vulnerability to infection and growth failure.[12] Studies in low- and middle-income countries have further confirmed that household sanitation, maternal education, and caregiving practices are significant predictors of child linear growth, while inadequate environmental conditions substantially elevate the risk of stunting.[13] However, most previous studies examined these factors separately or focused primarily on socioeconomic or clinical aspects, with

limited comprehensive analysis integrating multiple family environmental components within one model, particularly at the primary healthcare level. Evidence from rural community settings therefore remains insufficient to guide targeted prevention strategies. To address these gaps, this study simultaneously evaluates multiple family environmental factors and identifies the most dominant predictors of stunting prevention.[14] The novelty of this research lies in its integrated, household-based approach that combines parenting, knowledge, sanitation, water access, and healthcare utilization within a single analytical framework in the working area of Huristak Public Health Center,

Padanglawas Regency, providing context-specific evidence for local intervention planning.

Stunting cannot be addressed by one sector alone; it requires collaboration across health, education, social, and economic sectors. The government plays an important role in ensuring that nutrition intervention programs both specific and broad reach all parts of society, especially vulnerable groups and those living in remote areas.[15] In addition, strengthening the role and skills of posyandu cadres, nutrition counselors, and frontline health workers is crucial to ensure that child growth education and monitoring are done effectively, thoroughly, and continuously.[16] Therefore, this study aims to analyze the influence of the family environment on stunting prevention among toddlers in the working area of Huristak Public Health Center, Padanglawas Regency.

METHOD

Participants and Study Design

This study employed an observational method with a cross-sectional design to examine the influence of the family environment on stunting prevention among toddlers in the working area of Huristak Public Health Center, Padang Lawas Regency. The study population consisted of 1,011 mothers with toddlers, from which a sample of 286 respondents was selected using purposive sampling. Inclusion criteria were: (1) mothers with children under five years of age residing within the working area of the health center, (2) willingness to participate in the study, (3) residence in the Huristak Public Health Center area for at least the past six months, and (4) ability to communicate effectively in either Indonesian or a local language understood by the researcher. Exclusion criteria included: (1) mothers with communication disorders or mental health conditions that hindered completion of the questionnaire, and (2) participants who did not complete the required data or withdrew before the data collection process was completed.

Measurements and Procedure

Data were collected from toddlers and their mothers in the working area of Huristak Public Health Center, Padanglawas Regency. The outcome variable was stunting status, measured using height/length-for-age Z-scores (HAZ) based on WHO Child Growth Standards, where children with HAZ < −2 SD were classified as stunted and those ≥ −2 SD as non-stunted. The independent variables included parenting practices, assessed through a questionnaire on feeding, hygiene, and caregiving behaviors and categorized as good or poor; maternal nutritional knowledge, measured using knowledge questions and classified as good or low; household sanitation, determined by observation of latrine availability, waste management, and environmental cleanliness and categorized as adequate or inadequate; clean water availability, defined by the household's main water source and classified as safe or unsafe; and access to healthcare services, measured by the utilization of posyandu or health facilities and ease of access and categorized as adequate or limited; and stunting preventuon efforts. Stunting prevention efforts were operationally defined as a set of actions undertaken by mothers to support optimal child growth and prevent chronic malnutrition. These efforts included: (1) providing exclusive breastfeeding for the first six months, (2) giving appropriate complementary feeding according to the child's age, (3) ensuring regular growth monitoring at posyandu or healthcare facilities, (4) completing basic immunization, (5) maintaining personal and environmental hygiene, and (6) utilizing healthcare services when the child is ill. These indicators were assessed through a structured questionnaire using dichotomous (yes/no) responses. Respondents who fulfilled most of these indicators were categorized as "carried out stunting prevention efforts," while those who did not were categorized as "not carried out." Demographic covariates included maternal age, maternal education level, household income, child age, and child sex. The questionnaire was developed based on relevant literature and standard maternal and child health indicators. Its content was reviewed by experts to ensure clarity and appropriateness. A pilot test was conducted among mothers outside the study area. All items met the validity criteria, and reliability testing showed Cronbach's alpha values above 0.70, indicating good internal consistency. Therefore, the questionnaire was considered valid and reliable for data collection. Data were collected through structured interviews, observation, and anthropometric measurements. Each questionnaire response was converted into numerical scores. For parenting practices, nutritional knowledge, and healthcare utilization, correct or appropriate answers were scored 1 and incorrect or inappropriate answers were scored 0. The total scores were summed and converted into percentages, then categorized as good/adequate or poor/low based on the cut-off point. Household sanitation and clean water availability were assessed using an observation checklist and coded as adequate (1) or inadequate (0). Stunting status was determined by measuring the child's height or length and calculating the height-for-age Z-score according to World Health Organization standards, where values below −2 SD were classified as stunted.

Statistical Analysis

Data analysis was conducted using chi-square tests to assess associations between categorical variables, followed by logistic regression to identify predictors of stunting prevention.

RESULT

Table 1 presents the characteristics of 286 mothers with toddlers residing in the working area of the Huristak Public Health Center, Padanglawas Regency. Most respondents were aged 28–31 years (32.5%). The majority had a senior high school education (54.5%). In terms of occupation, more than half were farmers (53.1%). The dominant ethnic group was Batak (96.5%). Regarding environmental conditions, 51.4% of respondents lacked access to clean water, and 61.5% lived in households with poor sanitation. More than half of the mothers (55.6%) reported receiving inadequate nutrition education. Access to basic health services was relatively balanced, with 53.1% stating that services were easy to access. Finally, 60.1% of respondents reported having carried out stunting prevention efforts, while 39.9% had not. In this study, stunting prevention efforts reflect the implementation of key preventive practices, including appropriate feeding, growth monitoring, hygiene maintenance, and utilization of health services (Table 1)

Table 1. Distribution of Characteristics of Mothers with Toddlers in the Working Area of Huristak Public Health Center, Padanglawas Regency (n=286)

Mother's characteristics	Frequency (n)	Percentage (%)
Age (years)		
24 – 27	65	22.7
28 – 31	93	32.5
32 – 35	87	30.4
36 – 39	34	11.9
40 – 43	7	2.4
Total	286	100
Education level		
Junior high school	97	33.9
Senior high school	156	54.5
Diploma/Bachelor's degree	33	11.5
Total	286	100
Occupation		
Housewife	111	38.8
Farmer	152	53.1
Entrepreneur	15	5.2
Honorary Worker	8	2.8
Total	286	100
Ethnicity		
Batak	276	96.5
Javanese	10	3.5
Total	286	100
Availability of clean water		
No	147	51.4
Yes	139	48.6
Total	286	100
Household sanitation condition		
Not proper	176	61.5
Proper	110	38.5
Total	286	100
Nutrition education received by mother		
Inadequate	159	55.6
Adequate	127	44.4
Total	286	100
Access to basic health services		
Difficult to access	134	46.9
Easy to access	152	53.1
Total	286	100
Stunting prevention efforts		
Not carried out	114	39.9
Carried out	172	60.1
Total	286	100

Table 2 illustrates the influence of various family environment factors on stunting prevention efforts among toddlers in the working area of Huristak Public Health Center, Padanglawas Regency. Among mothers who did not perform stunting prevention efforts, 58.5% reported a lack of access to clean water. In contrast, only 20.1% of those who took preventive actions had no access to clean water. The data showed a significant association between clean water availability and stunting prevention efforts ($p < 0.001$) did. The results indicate a strong relationship between household sanitation and stunting prevention ($p < 0.001$). Of the mothers with inadequate nutrition education, 52.8% did not engage in stunting prevention, while 47.2% did. However, among mothers with adequate nutrition education, 23.6% did not engage in stunting prevention, and 76.4% took preventive actions. There was a significant positive correlation between nutrition education and stunting prevention ($p < 0.001$). The mothers who had difficult access to basic health services showed a high percentage of 71.6% not performing stunting prevention efforts, while only 28.4% were involved in such efforts. On the other

hand, mothers with easy access to health services demonstrated a much higher percentage (88.2%, or 134) of taking stunting prevention measures. The association between access to health services and stunting prevention was highly significant (p < 0.001) (Table 2)

Table 2. Influence of The Family Environment on Stunting Prevention among Toddlers in The Working Area Of Huristak Public Health Center, Padanglawas Regency

Family environment factor	Stunting prevention efforts		Total	P-value
	Not done	Done		
Availability of clean water				
No	86 (58.5%)	61 (41.5%)	147	
Yes	28 (20.1%)	111 (79.9%)	139	0.001
Total	114 (39.9%)	172 (60.1%)	286	
Household sanitation condition				
Not Proper	85 (48.3%)	91 (51.7%)	176	
Proper	29 (26.4%)	81 (73.6%)	110	0.001
Total	114 (39.9%)	172 (60.1%)	286	
Nutrition education received by mother				
Inadequate	84 (52.8%)	75 (47.2%)	159	
Adequate	30 (23.6%)	97 (76.4%)	127	0.001
Total	114 (39.9%)	172 (60.1%)	286	
Access to basic health services				
Difficult to access	96 (71.6%)	38 (28.4%)	134	
Easy to access	18 (11.8%)	134 (88.2%)	152	0.001
Total	114 (39.9%)	172 (60.1%)	286	

*The chi-square test. Significant p < 0.05.

Table 3 shows that the availability of clean water (p = 0.000), household sanitation condition (p = 0.923), nutrition education received by the mother (p = 0.009), and access to basic health services (p = 0.000) were analyzed. Among these four variables, the variable with the greatest impact on stunting prevention efforts is access to basic health services (OR = 15.695) (Table 3)

Table 3. Multivariate Analysis of the The Factors Influencing Stunting Prevention Efforts Among Toddlers in the Working Area Huristak Publich Health Center, Padanglawas, Regency

Variable	B	Standard Error	P-value	OR	95% CI	
					Lower	Upper
Availability of clean water	1.374	0.333	0.000	3.951	2.055	7.597
Household sanitation condition	-0.041	0.428	0.923	0.960	0.415	2.221
Nutrition education received by mother	1.101	0.419	0.009	3.006	1.323	6.831
Access to basic health services	2.753	0.340	0.000	15.695	8.063	30.552
Constant	-7.030	0.901	0.000	0.001		

*Multiple logistic regression. Significant p < 0.05.

DISCUSSION

The Influence of Access to Clean Water on Stunting Prevention Efforts

In this study, stunting prevention efforts refer to practical actions performed by mothers in daily child care, including appropriate feeding practices, hygiene maintenance, routine growth monitoring, and healthcare utilization. These integrated efforts are essential in reducing the risk of chronic malnutrition and supporting optimal child development. The availability of clean water is a crucial factor in supporting environmental health and child growth. Clean water is needed for various household purposes, such as cooking, drinking, washing, and maintaining personal hygiene. When access to clean water is limited, the risk of spreading infectious diseases like diarrhea, worm infections, and gastrointestinal infections increases, which can negatively impact a child's nutrient absorption.[17] Disrupted nutrient absorption is one of the main causes of stunting, as children do not receive optimal nutritional intake, even if their diet is good.[18]

The long-term consequences of inadequate access to clean water extend beyond adverse effects on children's health, influencing the overall quality of life and well-being of the entire family. Children living in environments with poor sanitation and limited access to clean water are more vulnerable to recurrent infections. This condition weakens their immune system and slows down their growth and development process.[19] Therefore, stunting prevention interventions are not sufficient with nutritious food alone; they must also involve improvements in the environmental conditions, particularly the provision of adequate clean water.[20]

The results of the study show that among the 147 mothers with toddlers who reported no access to clean water, 58.5% did not carry out stunting prevention efforts. In contrast, among the 139 mothers who reported having access to clean water, only 20.1% did not engage in stunting prevention efforts. This study found that the availability of clean water significantly influences stunting prevention efforts. Consistent with previous research, this study also found a significant relationship between sanitation and the availability of clean water with stunting incidence (p=0.047).

The Influence of Household Sanitation Conditions on Stunting Prevention Efforts

Poor household sanitation conditions, such as the lack of proper toilets, improper waste disposal, and unhygienic living habits, significantly contribute to the increased risk of infectious diseases in children, particularly diarrhea and worm infections. These illnesses can interfere with nutrient absorption in the body, thereby hindering a child's growth and development. In the long term, repeated exposure to infections can lead to chronic malnutrition, ultimately resulting in stunting.[22] Therefore, improving household sanitation is a key step in preventing stunting. Communities need to be educated about the importance of environmental hygiene, the use of clean water, and healthy and hygienic living practices. Government and healthcare provider interventions, such as providing proper sanitation facilities and conducting environmental health campaigns, are essential to help families create a healthy living environment, which is a fundamental foundation for supporting optimal child growth and development.[13]

The results of the study show that among 176 mothers with toddlers who reported poor household sanitation conditions, 48.3% did not make efforts to prevent stunting. Meanwhile, among 110 mothers who reported proper sanitation conditions, only 26.4% did not make prevention efforts. Statistical analysis indicates that household sanitation conditions significantly affect stunting prevention efforts. This study is consistent with previous research, which found that poor household sanitation was associated with 21 cases of severely stunted toddlers. Furthermore, a significant relationship was identified between household sanitation and stunting, with a p-value of 0.004.[23]

The Influence of Maternal Nutrition Education on Stunting Prevention Efforts

Nutrition education received by mothers plays an important role in preventing stunting, as mothers are the main caregivers and food providers for their children. Mothers with good nutrition knowledge are more likely to provide balanced meals, choose nutritious foods, and understand the importance of exclusive breastfeeding and appropriate complementary feeding. On the other hand, a lack of understanding about children's nutritional needs can lead to improper feeding, which may hinder a child's growth and development.[24] Therefore, improving nutrition education for mothers, especially during pregnancy and early childhood, is an effective strategy to reduce stunting. Health education programs at health centers or posyandu can provide mothers with accurate and practical information about healthy eating for children. When mothers understand good nutrition, the risk of chronic malnutrition can be reduced early, helping children grow and develop properly.[25]

The study showed that among 159 mothers who reported receiving inadequate nutrition education, 52.8% did not carry out stunting prevention efforts. Meanwhile, among 127 mothers who received adequate nutrition education, only 23.6% did not take prevention measures. Statistical analysis showed that nutrition education received by mothers has a significant influence on stunting prevention efforts. This finding is consistent with previous research. The results of the paired sample t-test showed that nutrition education had a significant effect on mothers' understanding, with a p-value of 0.000. This indicates that nutrition education interventions can effectively improve mothers' awareness of the importance of nutrition for their children's health.[4]

The Influence of Access to Basic Healthcare Services on Stunting Prevention Efforts

Good access to basic health services, such as posyandu, public health centers, and immunization services, plays a key role in preventing stunting in toddlers. These services provide regular check-ups, growth monitoring, nutritional supplements, and education on proper child care. When families can easily access health services, early detection of stunting risks is possible, allowing for timely interventions to prevent long-term growth issues.[26] Conversely, limited access due to geographical, economic, or informational barriers can prevent families from receiving the services they need. This leads to delays in addressing nutritional and health issues, which are key triggers of stunting. Therefore, strengthening the healthcare system to reach even remote village areas and increasing public awareness to encourage more proactive use of basic health services are crucial steps in comprehensive stunting prevention.[27]

The research findings show that out of 147 mothers with toddlers who stated that access to basic health services was difficult, 71.6% did not carry out stunting prevention efforts. In contrast, among the 139 mothers with toddlers who stated that access to basic health services was easy, only 11.8% did not carry out stunting prevention efforts. Statistical analysis indicates that access to basic health services significantly affects stunting prevention efforts.

CONCLUSION

The study shows that the family environment has a significant influence on stunting prevention efforts among toddlers in the working area of the Huristak Public Health Center, Padanglawas Regency. Key contributing factors include access to clean water, household sanitation, maternal nutrition education, and access to basic healthcare services. It is recommended that health centers strengthen family-based education and outreach programs, particularly targeting mothers, and enhance routine child growth monitoring to ensure more effective and sustainable stunting prevention. This study has several limitations, particularly regarding time and data collection. Many independent variables that could influence stunting prevention efforts were not analyzed due to time and resource constraints. Data were collected through interviews and questionnaires, but these methods have limitations, such as high subjectivity and less optimal responses from some participants due to time and focus constraints.

ETHICS APPROVAL

Ethical clearance for this study was obtained from the Komisi Etik Penelitian Kesehatan (KEPK) Universitas Prima Indonesia with approval number 021/KEPK/UNPRI/II/2015. Informed consent was obtained from all participants prior to data collection.

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COMPETING INTEREST

All authors declare that they have no conflicts of interest related to this study.

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UNDERLYING DATA

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

DECLARATION OF ARTIFICIAL INTELLIGENCE USE

We confirm that there is no artificial intelligence (AI) used at any stage of the study, including data collection, analysis, visualization, etc. All work in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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