

Maternal Parenting Patterns and Their Association with Stunting Among Children Aged 24–59 Months in Tanah Toa Village, Bulukumba Regency

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ABSTRACT

Stunting remains a persistent problem in Tanah Toa Village, where high rates of growth faltering are closely linked to inadequate maternal parenting practices related to nutrition, hygiene, and health care. This study aimed to analyze the relationship between maternal parenting patterns including feeding practices, psychosocial stimulation, hygiene practices, environmental sanitation, and health service utilization and stunting among children aged 24–59 months in Tanah Toa Village, Bulukumba Regency. This cross-sectional study involved 111 mother–child pairs, with data collected from October to November 2020 using structured questionnaires and anthropometric measurements. Data were analyzed using the Chi-square test and binary logistic regression using SPSS version 26.0. The results showed significant associations between stunting and hygiene practices ($p = 0.003$), environmental sanitation ($p = 0.000$), health service utilization ($p = 0.049$), and overall maternal parenting patterns ($p = 0.000$). Multivariate analysis identified maternal parenting patterns as the most dominant factor influencing stunting ($p = 0.010$; OR = 0.124; 95% CI = 0.03 to 0.62). Children raised by mothers with good parenting practices were 0.124 times less likely to experience stunting compared to those raised by mothers with poor parenting. These findings highlight that comprehensive parenting which involves nutrition, hygiene, and health care plays a critical role in preventing stunting. Interventions should integrate nutrition education, maternal empowerment, and culturally grounded health promotion to accelerate stunting reduction at the community level.

Key Messages:

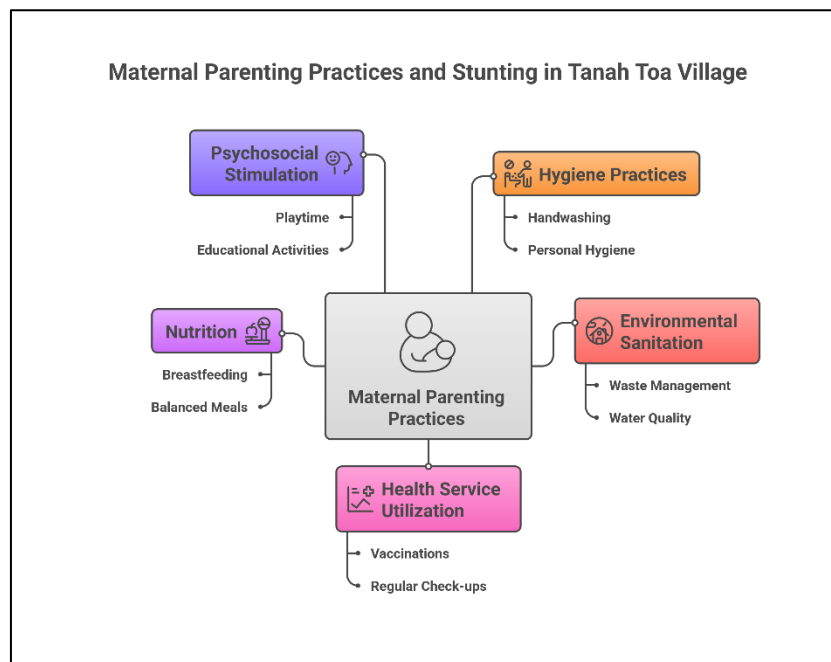
- Comprehensive maternal parenting practices—encompassing hygiene, environmental sanitation, and health service utilization—are the most dominant determinants of stunting in Tanah Toa Village, highlighting that interventions must prioritize maternal empowerment and culturally sensitive education to effectively reduce stunting rates.

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GRAPHICAL ABSTRACT



INTRODUCTION

Under-five children are the most vulnerable group to malnutrition, which compromises immunity, increases infection risk, and impairs physical and cognitive development (1, 2). Stunting, defined as height-for-age below -2 SD (3), reflects long-term nutritional deficits occurring from pregnancy through the first two years of life. Despite national progress (5), disparities remain significant, with South Sulawesi reporting a prevalence of 35.7% in 2018, Bulukumba Regency at 36.2%, and the Tanah Toa Community Health Center recording 29.0% in 2019, indicating a persistent local public health problem.

Tanah Toa, as an indigenous community with strong cultural norms, food taboos, and traditional caregiving beliefs, presents a unique context in which parenting behaviors, hygiene practices, and health-seeking patterns may differ from general populations. The UNICEF Conceptual Framework and Social-Ecological Model highlight maternal parenting practices as proximal determinants of child growth, where feeding behavior influences dietary adequacy, psychosocial stimulation supports neurodevelopment, hygiene practices reduce infection-related growth impairment, environmental sanitation affects pathogen exposure and nutrient absorption, and health service utilization ensures timely prevention and treatment of illness (6, 7). These interconnected pathways illustrate how maternal parenting shapes the risk of stunting beyond nutritional intake alone. However, evidence examining the combined influence of these behavioral and environmental determinants within indigenous contexts such as Tanah Toa remains limited.

Therefore, this study aims to analyze the relationship between maternal parenting practices including feeding behavior, psychosocial stimulation, hygiene, environmental sanitation, and health service utilization and stunting among children aged 24–59 months in Tanah Toa Village, Bulukumba Regency, to strengthen culturally grounded and family-based approaches to stunting prevention.

METHODS

This study employed a quantitative cross-sectional design to analyze the relationship between maternal parenting practices and the incidence of stunting among children aged 24–59 months in Tanah Toa Village, Kajang Subdistrict, Bulukumba Regency. The site was selected due to its indigenous cultural system (Ammatoa Kajang) and limited access to health information and services, making it a relevant location for studying stunting determinants.

The study population consisted of all under-five children aged 24–59 months residing in Tanah Toa Village, totaling 111 children. The exhaustive sampling technique was used, meaning that all individuals in

the population who met the inclusion criteria were included as study participants. The inclusion criteria included mothers with children aged 24–59 months, who had lived in Tanah Toa for at least six months, and who had consented to participate. Exclusion criteria included mothers who were absent during the survey after three visits and children with congenital abnormalities that affected growth.

Data were collected from October to November 2020. Primary data were obtained through a structured questionnaire developed by the researcher based on the conceptual framework of maternal care and adapted from the indicators used by the Indonesian Ministry of Health. The questionnaire covered four domains: feeding practices, hygiene and sanitation behavior, psychosocial stimulation, and utilization of health services. The questionnaire underwent content validation by three public health experts, with a content validity index (CVI) of 0.88. Internal consistency was tested using Cronbach's alpha ($\alpha = 0.83$), indicating good reliability. Enumerators were trained to ensure consistency in administering the questionnaire and performing anthropometric measurements.

Children's height was measured using a microtoise (accuracy 0.1 cm), following WHO Child Growth Standards. Data collection was conducted in collaboration with Posyandu officers to ensure the accuracy of measurements. Secondary data were also obtained from the South Sulawesi Provincial Health Office, Bulukumba District Health Office, and Tanah Toa Community Health Center regarding local nutritional status and stunting prevalence. Data were analyzed using IBM SPSS Statistics. Univariate analysis was employed to describe respondent characteristics and the distributions of variables. Bivariate analysis using the Chi-square test ($\alpha = 0.05$) was conducted to examine associations between variables, followed by binary logistic regression to identify the dominant factors influencing stunting.

This research was approved by the Health Research Ethics Committee, Faculty of Medicine and Health Sciences, UIN Alauddin Makassar (Approval No. B.037/KEPK-FKIK/X/2020). All respondents provided written informed consent, and confidentiality of participants' data was maintained throughout the study.

RESULTS

As shown in Table 1, most mothers in Tanah Toa Village, Kajang Subdistrict, Bulukumba Regency were within the 27–31 years age group (27.0%), had an elementary school education (43.2%), and the majority worked as housewives (94.6%). Among the children, the proportion of boys (54.1%) was slightly higher than that of girls (45.9%), and most children were in the 24–35 month age group (46.8%). Based on the height-for-age indicator, more than half of the children (52.3%) were stunted, while the remaining 47.7% had a normal nutritional status.

As shown in Table 2, most mothers demonstrated good feeding practices (91.9%), provided adequate psychosocial stimulation (89.2%), and maintained good hygiene behavior (91.9%). However, more than half of the respondents (51.4%) had poor environmental sanitation, and a small proportion (14.4%) showed limited utilization of healthcare services. Overall, the majority of mothers were categorized as having poor parenting practices (60.4%) compared to those with good parenting practices (39.6%).

As shown in Table 3, several components of maternal parenting practices were significantly associated with stunting among children aged 24–59 months in Tanah Toa Village, Bulukumba Regency. Hygiene practices demonstrated a strong association with stunting ($p = 0.003$; 95% CI: 1.70–2.55), where all children (100%) whose mothers had poor hygiene practices were stunted, compared to 48.0% among those whose mothers had good hygiene practices. Similarly, environmental sanitation exhibited a highly significant relationship ($p < 0.001$; OR = 6.65; 95% CI: 2.90–15.25), indicating that children living in households with poor sanitation were approximately 6.6 times more likely to experience stunting than those with good sanitation.

Furthermore, utilization of health services also showed a significant association with stunting ($p = 0.049$; OR = 3.20; 95% CI: 0.96–10.62), where 75.0% of children whose mothers had limited healthcare utilization were stunted compared to 48.4% among those with adequate utilization. The overall maternal parenting pattern exhibited the strongest association ($p < 0.001$; OR = 10.59; 95% CI: 4.26–26.30), indicating that children of mothers with poor parenting practices were approximately ten times more likely to be stunted than those raised by mothers with good parenting practices.

Table 1. Frequency Distribution of Respondents' Characteristics in Tanah Toa Village

Respondent Characteristics	Category	n	%
Maternal Characteristic			
Age (Years)	17-21	10	9.0
	22-26	23	20.7
	27-31	30	27.0
	32-36	21	18.9
	37-41	19	17.1
	42-46	3	2.7
	47-51	4	3.6
	52-56	1	0.9
Education level	No formal education	34	30.6
	Elementary school (or equivalent)	48	43.2
	Junior high school (or equivalent)	12	10.8
	Senior high school (or equivalent)	5	4.5
	Diploma	4	3.6
	Bachelor's degree	8	7.2
Occupation	Honorary staff	1	0.9
	Housewife	105	94.6
	Posyandu cadre	1	0.9
	Nurse	2	1.8
	Entrepreneur	2	1.8
Child Characteristics			
Sex	Male	60	54.1
	Female	51	45.9
Age (Months)	24-35	52	46.8
	36-47	32	28.8
	48-59	27	24.3
Nutritional status (Height-for-age)	Stunted	58	52.3
	Normal	53	47.7
Total		111	100

Table 2. Frequency Distribution of Maternal Parenting Practices and Supporting Factors

Variable	Category	n	%
Feeding practices	Poor	9	8.1
	Good	102	91.9
Psychosocial stimulation	Poor	12	10.8
	Good	99	89.2
Hygiene practices	Poor	9	8.1
	Good	102	91.9
Environmental sanitation	Poor	57	51.4
	Good	54	48.6
Utilization of health services	Poor	16	14.4
	Good	95	85.6
Overall maternal parenting pattern	Poor	67	60.4
	Good	44	39.6
Total		111	100

Table 3. Bivariate Analysis of the Relationship Between Maternal Parenting Practices and Stunting Among Children Aged 24–59 Months in Tanah Toa Village

Variable	Category	Stunted		Normal		Total		95% CI OR	P-value
		n	%	n	%	N	%		
Feeding practices	Poor	7	77.8	2	22.2	9	100	0.69–17.66	0.166
	Good	51	50.0	51	50.0	102	100		
Psychosocial stimulation	Poor	7	58.3	5	41.7	12	100	0.39–4.4	0.655
	Good	51	51.5	48	48.5	99	100		
Hygiene practices	Poor	9	100	0	0	9	100	1.70–2.55	0.003
	Good	49	48.0	53	52.0	102	100		
Environmental sanitation	Poor	42	73.7	15	26.3	57	100	2.90–15.25	0.000
	Good	16	29.6	38	70.4	54	100		
Utilization of health services	Poor	12	75.0	4	25.0	16	100	0.96–10.62	0.049
	Good	46	48.4	49	51.6	95	100		
Overall maternal parenting pattern	Poor	49	73.1	18	26.9	67	100	4.26–26.30	0.000
	Good	9	20.5	35	79.5	44	100		

In contrast, feeding practices ($p = 0.166$; 95% CI: 0.69–17.66) and psychosocial stimulation ($p = 0.655$; 95% CI: 0.39–4.43) did not demonstrate statistically significant associations with stunting. The 95% confidence intervals for significant variables did not cross the null value ($OR = 1$), confirming the robustness of these associations.

To further identify the dominant predictor after adjusting for potential confounders, significant variables from the bivariate analysis were included in the multivariate logistic regression model (Table 4). The results showed that maternal parenting pattern remained the most influential factor associated with stunting after adjustment ($p = 0.010$; $OR = 0.124$; 95% CI: 0.03–0.62).

Table 4. Multivariate Analysis of Factors Associated with Stunting Among Children Aged 24–59 Months in Tanah Toa Village

Variable	B	Sig. (p)	Exp (B)/OR	95% CI OR
Hygiene practices	-20.515	0.999	0.000	-
Environmental sanitation	-0.155	0.841	0.856	0.19–3.80
Utilization of health services	0.311	0.660	1.364	0.37–4.98
Overall maternal parenting pattern	-2.087	0.010	0.124	0.03–0.62

Dependent variable: stunting incidence (0 = normal, 1 = stunted)

Based on the results of multivariate analysis using binary logistic regression (Table 4), the maternal parenting pattern variable was significantly associated with stunting among children ($p = 0.010$; $OR = 0.124$; 95% CI = 0.03–0.62). This indicates that children raised by mothers with good parenting practices were 0.124 times less likely to experience stunting compared to those raised by mothers with poor parenting, after controlling for other variables.

Meanwhile, hygiene practices ($p = 0.999$), environmental sanitation ($p = 0.841$), and utilization of health services ($p = 0.660$) did not show significant associations with stunting ($p > 0.05$). Therefore, maternal parenting practices were identified as the most dominant factor influencing stunting incidence among children in Tanah Toa Village, Bulukumba Regency.

DISCUSSION

Association Between Feeding Practices and Stunting

The bivariate analysis revealed that feeding practices were not statistically significantly associated with stunting ($p = 0.166$). However, descriptively, 77.8% of children with poor feeding practices were stunted compared to 50.0% among those with good practices. This suggests that feeding alone does not determine linear growth, consistent with the UNICEF Nutrition Framework (2021), which views stunting as a multifactorial condition influenced by diet, infection, environment, and maternal status (8). Even with adequate feeding, poor sanitation or health conditions can hinder growth.

This non-significant result may reflect behavioral homogeneity or recall bias. Many families provide food adequate in quantity but low in dietary diversity, particularly in animal proteins and micronutrients such as iron and zinc (9). Similar findings were reported by Mulyani et al.(10) and Picauly et al. (11), who found that feeding practices alone are insufficient to reduce stunting prevalence without parallel improvements in sanitation, infection control, and household economic empowerment. Conversely, Baye, K (12) reported a significant association, suggesting that social context and the quality of local food systems play major roles in shaping child growth outcomes.

From a theoretical standpoint, these findings reaffirm that stunting results from chronic cumulative risks beginning from conception through the first two years of life (*life-course approach*). Feeding practices remain important; however, their impact is indirect and largely mediated by environmental health conditions and maternal nutritional status (13,14).

Association Between Psychosocial Stimulation and Stunting

There was no significant association between psychosocial stimulation and stunting ($p = 0.655$). Although 58.3% of children with low stimulation were stunted compared to 51.5% in the adequately stimulated group, this difference was not statistically significant. Psychosocial stimulation primarily supports cognitive and emotional growth rather than linear height development (7).

The lack of significance could result from subjective measurement of stimulation or limited variability among respondents (15,17). In culturally homogeneous settings like Tanah Toa, caregiving patterns often focus on basic care rather than structured stimulation (18). Previous evidence also shows that stimulation improves growth only when coupled with adequate nutrition and WASH conditions (20). According to the ecological model Bronfenbrenner, 1994, psychosocial care interacts with biological and environmental layers; when nutrition or sanitation is suboptimal, its impact on growth diminishes. Hence, stimulation remains essential but should be implemented alongside nutrition and health interventions for maximum benefit (22).

WASH Determinants: Hygiene and Environmental Sanitation

The results of this study demonstrated a significant association between Water, Sanitation, and Hygiene (WASH) factors and stunting among children under five in Tanah Toa Village, Bulukumba Regency. All children cared for by mothers with poor hygiene practices were stunted (100%), while only 48.0% of those with good hygiene were stunted ($p = 0.003$). Similarly, poor environmental sanitation showed a highly significant association with stunting ($p < 0.001$), with 73.7% of children in unsanitary households being stunted compared to 29.6% in adequately sanitized households. These findings collectively underscore that household hygiene behavior and environmental sanitation act synergistically as key determinants of child growth.

Biologically, inadequate WASH conditions increase exposure to enteric pathogens that cause diarrhea and environmental enteric dysfunction (EED) a chronic intestinal inflammation that impairs nutrient absorption and linear growth (15, 16, 19). Children living in environments lacking proper sanitation, handwashing facilities, or access to clean water are more prone to repeated infections that hinder the absorption of essential nutrients such as protein, zinc, and iron (17, 19). A study in Benin reported that children from households without basic sanitation or hygiene facilities were 1.27–1.35 times more likely to be stunted (17), while evidence from Indonesia and Myanmar showed that poor sanitation and unsafe drinking water increased stunting risk by 2.2–3.5 times (18, 19).

From an ecological health perspective, WASH factors reflect both behavioral and structural dimensions of household living conditions. Good hygiene depends not only on maternal awareness but also on infrastructure availability, including clean water, safe latrines, and waste management systems (20). In resource-limited or traditional settings like Tanah Toa, these facilities are often inadequate, and cultural habits may perpetuate risky sanitation practices such as open defecation. Consequently, poor WASH conditions should not be viewed solely as individual behavior but as indicators of socioeconomic and environmental deprivation that directly influence nutritional outcomes.

These findings are consistent with meta-analyses showing that integrated WASH interventions

substantially reduce stunting risk, particularly when combined with nutrition programs (21, 29, 30). Conversely, nutrition-only interventions have limited impact in environments with persistent fecal contamination, as EED continues to undermine nutrient utilization (22, 23). A study by Da Cruz et al. further supported this mechanism, reporting elevated intestinal inflammation biomarkers among children exposed to unsanitary environments, which correlated negatively with height-for-age z-scores (HAZ) (24).

However, the relationship between WASH and stunting is not purely linear. Improvements in sanitation yield optimal outcomes only when accompanied by consistent hygiene practices, clean water access, and effective waste management (25, 26). As Sahiledengle et al. demonstrated, enhancing sanitation coverage can reduce stunting prevalence by up to 35%, yet the effect diminishes if behavioral components are neglected (25). Thus, the WASH–nutrition nexus emphasizes the need for multisectoral coordination rather than fragmented program implementation.

Contextually, the study reveals that in indigenous communities like Tanah Toa, WASH functions as a structural determinant of child health. Economic constraints, low literacy, and limited access to infrastructure collectively restrict families' capacity to maintain hygienic living environments, perpetuating intergenerational malnutrition. Therefore, sanitation improvement should be integrated into broader social development and poverty alleviation strategies rather than confined to technical environmental health initiatives. In this regard, strengthening local infrastructure, promoting behavior change communication, and ensuring equitable access to clean water are essential for sustaining long-term reductions in stunting prevalence.

Association Between the Utilization of Health Services and Stunting

The study found a significant association between the utilization of health services and stunting among children under five in Tanah Toa Village, Bulukumba Regency ($p = 0.049$). Children whose mothers rarely accessed health services had a stunting prevalence of 75.0%, compared to 48.4% among those who regularly utilized these services. Adequate use of health services supports early detection of growth disorders and timely nutritional interventions through routine growth monitoring, immunization, and vitamin A supplementation (27). Regular visits to Posyandu enable health workers to track child growth, provide nutrition counseling, and manage infections promptly (28). Conversely, low utilization leads to delayed detection and recurrent infections, key contributors to stunting (29). This aligns with a study in Pakistan reporting that children with limited access to health services were two to three times more likely to be stunted (3). The quality of interactions during health visits also influences outcomes; responsive and family-centered services enhance maternal nutritional knowledge, feeding practices, and hygiene behaviors (30). However, socioeconomic constraints including cost, distance, and negative perceptions remain barriers to service use in many low-income households (31). Overall, the utilization of health services reflects both community awareness and the responsiveness of the health system in supporting preventive nutrition practices.

Association Between Maternal Parenting Patterns and Stunting

The analysis showed a significant relationship between maternal parenting patterns and stunting ($p = 0.000$). Among 67 mothers with poor parenting, 73.1% of children were stunted, whereas only 20.5% were stunted among children of mothers with good parenting. Parenting practices covering nutrition, hygiene, health care, and psychosocial stimulation directly influence child growth and development (32). Responsive caregiving reduces stunting risk by improving feeding and hygiene behaviors (33), while inadequate parenting increases susceptibility to growth delays (34). This finding is supported by studies showing that positive parenting reduces stunting risk and improves nutritional intake and hygiene practices (35, 36, 37). Nevertheless, some studies report no significant relationship in settings with severe structural deprivation, indicating that environmental and economic constraints may overpower behavioral factors (38). In other rural contexts, sanitation and water quality have been found to exert greater influence on growth outcomes (3). These results highlight that maternal parenting is crucial yet dependent on broader social and environmental support. Effective stunting prevention should integrate parenting capacity-building with improvements in nutrition access, sanitation, and health services.

Dominant Factors Influencing Stunting Incidence

Multivariate logistic regression (Table 4) identified maternal parenting patterns as the only factor significantly associated with stunting ($p = 0.010$; OR = 0.124; 95% CI = 0.03–0.62). Mothers with good parenting practices were 0.124 times less likely to have stunted children than those with poor parenting, after controlling for hygiene practices, environmental sanitation, and health service utilization. This underscores parenting as a key determinant in stunting prevention, as good parenting promotes adequate nutrition, hygiene, psychosocial stimulation, and proactive engagement with health services (36). The findings are consistent with previous studies demonstrating that poor maternal parenting increases stunting risk (39, 40). The lack of significance for hygiene, sanitation, and health service utilization in the multivariate model suggests that their effects may operate indirectly through parenting behaviors. The results align with Bronfenbrenner's Ecological Systems Theory and the UNICEF Caregiver Practices Framework, which position caregiving as a mediator between environmental conditions and child nutritional outcomes (41, 42). Therefore, strengthening maternal parenting through nutrition-focused education, Posyandu-based health promotion, and community empowerment is essential for sustainable stunting reduction.

STUDY LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design prevents the establishment of causal relationships between maternal parenting practices and stunting, as both exposure and outcome were measured simultaneously. Second, the study relied on self-reported data through structured questionnaires, which may be subject to recall bias or social desirability bias, particularly regarding feeding practices and hygiene behaviors. Third, the sample size was relatively small ($n = 111$) and limited to a single traditional community, which may restrict the generalizability of the results to other populations with different socio-cultural and environmental contexts. Despite these limitations, this study offers valuable insights into the multidimensional relationship between maternal caregiving, environmental health, and child growth, providing a basis for future longitudinal and interventional studies in similar settings.

CONCLUSION

This study concludes that maternal parenting practices are significantly associated with stunting among children aged 24–59 months in Tanah Toa Village, Bulukumba Regency. Factors such as hygiene practices, environmental sanitation, and utilization of health services were also related to stunting; however, maternal parenting practices emerged as the most dominant determinant after controlling for other variables. Mothers who demonstrated good parenting practices were substantially less likely to have stunted children compared to those with poor parenting practices. These findings emphasize that stunting prevention is not solely dependent on adequate nutrition but also on caregiving behaviors, hygiene, and access to health services, factors that collectively reflect the overall quality of child care.

It is recommended that stunting reduction programs prioritize strengthening maternal caregiving capacity through integrated nutrition education, enhanced awareness of hygiene and sanitation, and improved attendance at community health posts (Posyandu). Culturally sensitive interventions should be developed to enhance community acceptance and program effectiveness. Future research is encouraged to explore the mediating roles of socioeconomic and cultural factors in the relationship between parenting practices and child growth, thereby providing stronger scientific evidence for the design of sustainable community-based nutrition policies.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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