ORIGINAL RESEARCH ARTICLE

Critical Factors Affecting Toddlers Development in Indonesia: Shaping Early Childhood Growth

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ABSTRACT

Background: Padang City, the capital of West Sumatra Province, is a central referral area with a high concentration of children. However, the Early Detection and Intervention Stimulation of Growth and Development Stimulation (SDIDTK) service at the Ikur Koto Public Health Center recorded the lowest achievement rate for toddler services at 66%, alongside the highest prevalence of developmental disorders (2.6%). This study aimed to identify factors associated with the growth and development status of toddlers in the Ikur Koto Public Health Center area in 2024.

Methodology: This quantitative study was conducted in August 2024 using a cross-sectional design with 64 toddlers selected through probability sampling. Data were collected using validated questionnaires and analyzed using chi-square tests for bivariate analysis and logistic regression for multivariate analysis. Ethical approval was obtained before the commencement of the study.

Results: The results showed that maternal awareness (p = 0.010), environmental sanitation (p = 0.002), and a history of low birth weight (p = 0.002) were significantly associated with the growth and development status of toddlers. Environmental sanitation was identified as the dominant factor (POR = 19.105).

Conclusions: Improving toddlers' growth and development requires promoting environmental sanitation and empowering mothers to actively engage in stimulation and training activities that enhance psychological and motor skills development.

Keywords: Development, Growth, Toddlers, Low Birth Weight

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INTRODUCTION

The growth and development of children are crucial for well-being and the prosperity of a nation.[1-2] The early period of a child life is considered the "golden years," during which physical, cognitive, and emotional development occurs.[3-4] This period greatly influences later stages of life, making early childhood development a priority for national development.[5] According to the United Nations Children's Fund (UNICEF), poverty affects nine out of ten children, with significant consequences on health, education, and nutrition. The World Health Organization (WHO) estimates that approximately 22% of children under the age of five worldwide are stunted, a condition hindering proper growth and development. Indonesia, in particular, faces a severe stunting problem with a prevalence of 31.8%, ranking as the second-highest in Southeast Asia.[6-7]

In 2022, the stunting rate in West Sumatra Province was 25.6%, exceeding the national target of 20%.[8] Padang City, the capital of West Sumatra, had a stunting prevalence of 19.5%.[9] However, the rate of child development, measured through the Early Detection and Intervention of Growth and Development Stimulation (SDIDTK), has not met expectations. SDIDTK achievement rates were below target namely 37.17% for infants and 66% for toddlers.[10] These low rates suggest significant gaps in the quality of early childhood development services, especially at the Ikur Koto Public Health Center, which reported the lowest achievement for infants and the highest prevalence of developmental delays in toddlers.[9-11]

Environmental factors, including nutrition and sanitation, play a crucial role in toddlers' development. Malnutrition can cause developmental issues, such as delays in motor skills and cognitive abilities.[12-14] Birth weight, which reflects prenatal health, is also a significant determinant of early childhood development.[15-17] Padang City has experienced an increase in low birth weight cases, which contributes to a higher risk of stunting and developmental problems in children.[18] Moreover, maternal knowledge and the home environment, including factors such as hygiene and sanitation, are crucial in early childhood growth.[19-20] Inadequate sanitation remains a significant challenge, with only 80% of households in Indonesia having access to safe sanitation, far below the Ministry of Health's target of 100%.[21] In West Sumatra, the percentage is reportedly even lower, estimated at 68%.[9]

Given the significant challenges in early childhood development, particularly in regions such as Ikur Koto, understanding the critical factors affecting toddler development is essential. High rates of stunting, nutritional issues, and developmental delays observed in the area make this study crucial for addressing these challenges. Therefore, this study aimed to contribute towards evidence-based practices and inform local health policies designed to improve early childhood development in Indonesia by identifying the key factors influencing child growth and development.

The objective of this study is to identify and analyze the factors associated with the growth and development status of toddlers within the Ikur Koto Public Health Center, Padang City, Indonesia. The study focuses on maternal knowledge, environmental sanitation, nutritional status, and low birth weight. The results will provide evidence-based recommendations to enhance child health outcomes in the region through targeted interventions. This study was conducted in 2024 in line with national and local efforts to improve early childhood development and reduce disparities in health services and outcomes.

METHODOLOGY

A cross-sectional design was used to investigate factors affecting the growth and development of toddlers (children aged 1-3 years) in the Ikua Koto Public Health Center area, Padang City. The study population consists of all toddlers within the working area of the Ikua Koto Public Health Center, totaling 410. The sample size was calculated using the Lemeshow formula, a commonly used method to estimate sample sizes for population studies. A proportion of 0.744 was adopted for the target population based on a previous study.[22] The formula was applied to determine an adequate sample size of 64 respondents. The sample was selected through probability sampling, ensuring representative inclusion of toddlers residing within the health center's working area.

Inclusion criteria for respondents were toddlers living with mothers in the Ikur Koto subdistrict, in good health, and willing to participate in the study. Exclusion criteria included toddlers who were sick or undergoing treatment for infectious diseases such as measles, dengue fever, malaria, and tuberculosis.

Data were collected through questionnaires administered to mothers of toddlers, focusing on variables related to growth and development. The key variables include:

Growth Status: Defined as the increase in physical size, measured using the weight-for-length indicator on the Growth Monitoring Chart. According to the WHO Child Growth Standards, growth status is classified as "normal" when the measurement falls within the acceptable range (-2 SD to +2 SD), "underweight" when below -2 SD, and "overweight" when above +2 SD.

Development Status: Measured using the Pre-Screening Development Questionnaire developed by the Ministry of Health of Indonesia and assesses aspects such as motor skills, language, and social independence. Development status is considered "appropriate" when the number of affirmative answers is greater than eight, and "inappropriate" when fewer than eight answers are affirmative.

Low Birth Weight: WHO defines low birth weight to be less than 2500 grams (5.5 pounds). Birth weight is categorized as "normal" for toddlers weighing ≥2500 grams and "LBW" for those weighing <2500 grams at birth.

Environmental Sanitation: Assessed through a questionnaire evaluating the household sanitation conditions. The sanitation status is categorized as "standardized" when the total score meets or exceeds the median, and "non-standardized" when below the median.

Parental Income: The monthly household income was assessed and categorized based on the Regional Minimum Wage (RMW) of West Sumatra, which refers to the minimum wage established by local governments in Indonesia. Income is considered "sufficient" when it meets or exceeds the RMW and "insufficient" when falls below. The RMW in West Sumatra is IDR 2,811,449, which is approximately USD 185 per month.

Maternal Education: The highest level of education attained by the mother, categorized as "low" (up to junior high school) or "high" (senior high school and higher).

Maternal Knowledge: Assessed using a questionnaire adapted.[23] Knowledge is categorized as "good" when the total score is ≤8 and "poor" when above 8.

All questionnaires were validated through expert reviews for content validity and tested for reliability using Cronbach's alpha, which showed acceptable consistency. Statistical analysis was conducted using appropriate software, with chi-square tests to assess associations between variables and logistic regression to identify factors significantly influencing growth and development.

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Public Health, Andalas University, under approval number B/53/UN.16.12.D/PT.01.00/2024. Informed consent was obtained from all respondents before inclusion.

RESULTS

The study was conducted among mothers who were enrolled in Posyandu (integrated health services) in the Koto Panjang Ikur Koto subdistrict of Padang City. The total sample size was 64 mothers, with the characteristics shown in Table 1. The results showed that more than half of the respondents were aged 26-35 years, totaling 42 (65.6%). Almost no respondents were over 45 years old, with only 3 (4.7%). More than half of the mothers had male toddlers, accounting for 34 (53.1%), while less than half had females, with a frequency of 30 (46.9%).

Table 1: Characteristics of Respondents

Characteristics of Respondents	Respondents (n=64) (%)
Mother's Age (years old)	
18-25	8 (12.5)
26-35	42 (65.6)
36-45	11 (17.2)
>45	3 (4.7)
Child's Age (months)	
12-14	9 (14.1)
15-17	8 (12.5)
18-20	4 (6.2)
21-23	8 (12.5)
24-29	24 (37.5)
30-35	11 (17.2)
Child's Gender	
Male	34 (53.1)
Female	30 (46.9)

Table 2. Distribution of the Growth and Development Status of Toddlers

Growth and Development	Participants(%)
Appropriate	52 (81.2)
Inappropriate	12 (18.8)
Total	**64 (100)**

Table 3. Chi-Square Test of Risk Factors and Development of Toddlers

Variable	Growth and Development			OR (95 % CI)	p- value
	Inappropriate (%)	Appropriate (%)	Total (%)		
History of LBW					
LBW	4 (80)	1 (20)	5 (100)	25.500 (2.520 -258.08)	0.002
Normal	8 (13.6)	51 (86.4)	59 (100)	Ref	
Environmental Sanitation					
Non-standard	11 (36.7)	19 (63.3)	30 (100)	19.105 (2.285- 159.72)	0.002
Standard	1 (2.9)	33 (97.1)	34 (100)	Ref	
Parental Income					
< RMW	9 (20)	36 (80)	45 (100)	1.333 (0.318 -5.590)	0.965
≥ RMW	3 (15.8)	16 (84.2)	19 (100)	Ref	
Maternal Education					
Low	10 (27)	27 (73)	37 (100)	4.630 (0.923 -23.224)	0.097
High	2 (7.4)	25 (92.6)	27 (100)	Ref	
Maternal Knowledge					
Poor	7 (43.8)	9 (56.2)	16 (100)	6.689 (1.727- 25.905)	0.01
Good	5 (10.4)	43 (89.6)	48 (100)	Ref	

OR: Unadjusted Odds Ration; CI: Confidence interval

Table 4: Multiple Logistic Regression

Variable	*p-value*	aOR	95% CI	
			lower	upper
Step 1				
History of LBW	0.073	22.690	0.749	687.341
Non standard Environmental Sanitation	0.021	14.689	1.494	144.394
Low Maternal Education	0.434	2.251	0.295	17.179
Poor Maternal Knowledge	0.568	1.765	0.260	11.971
Step 2				
History of LBW	0.044	27.791	1.089	709.280
Non standard Environmental Sanitation	0.018	15.879	1.614	156.261
Low Maternal Education	0.235	2.955	0.494	17.677
Step 3 (Final model)				
History of LBW	**0.025**	**26.582**	**1.513**	**466.996**
Non-standard Environmental Sanitation	**0.013**	**19.567**	**1.886**	**202.966**

aOR: Adjusted Odds ratio; CI: Confidence interval

Regarding growth and development status (Table 2), the majority of toddlers had development appropriate for age group, totaling 52 (81.2%), while 12 (18.8%) did not meet the anticipated growth and development standards. The growth and development status of toddlers was significantly correlated with the history of LBW, environmental sanitation, and maternal knowledge, as indicated by the statistical analysis conducted using the chi-square test in Table 3 (P < 0.005).

Table 4 shows the multivariate analysis results, displaying the stepwise elimination process in logistic regression. Initially, all variables with P<0.2 were included namely history of LBW, environmental sanitation, maternal education, and maternal knowledge. In Step 2, maternal knowledge was removed (P=0.568) as it was not significant and did not cause a change of more than 10% in other variables. In Step 3, maternal education was also excluded (P=0.235) for the same reasons. The final model retained two significant variables namely history of LBW (P=0.025) and environmental sanitation (P=0.013). Among the two, environmental sanitation yielded POR of 19.567, indicating that toddlers with non-standard environmental sanitation are 19.567 times more likely to experience inappropriate growth and development compared to toddlers with standardized environmental sanitation.

DISCUSSION

The analysis showed that the growth and development status of most toddlers in the Ikur Koto Public Health Center working area was appropriate for age, with an 81.2% rate. This result was consistent with previous studies, stating that 60% of children had normal growth and 56.9% had normal development in the Ungaran, Leyangan, and Banyuiru Public Health Center working areas.[24] Most children in the study area are receiving adequate care, including proper nutrition and optimal developmental stimulation. Early provision of good nutrition plays a crucial role in supporting optimal growth and development. Early provision of good nutrition plays a crucial role in supporting optimal growth and development. A study in Pasaman Barat also highlights the importance of nutrition interventions in tackling stunting, a complex issue tied to the achievement of the SDGs, including reducing hunger and malnutrition, improving maternal and child health, and enhancing sanitation.[25]

Most toddlers with normal birth weight (86.4%) had appropriate growth and development, while those with a history of LBW were more likely to experience developmental delays. The chi-square test showed a substantial correlation between child development status and LBW history, with a p-value of 0.002. POR of 25.5 suggests that toddlers with a history of LBW are 25.5 times more likely to experience developmental delays than those with normal birth weight. This is consistent with the results showing that children with a history of LBW frequently encounter more severe health challenges, such as an elevated risk of chronic diseases in maturity and developmental delays.[24] Studies have indicated that adequate interventions during the critical first 1000 days of life, especially in preventing low birth weight, can significantly reduce the risk of developmental issues.[26]

The growth and development status of toddlers is substantially correlated with environmental sanitation (p = 0.002). A previous study reported a p-value of 0.040, suggesting that children residing in non-standard sanitation environments are at an increased risk of stunting.[24] Improved environmental sanitation has been identified as a key factor in preventing stunting, particularly in areas with inadequate access to clean water and sanitation facilities.[27]

Chi-square analysis showed a p-value of 0.965 for parental income, suggesting that there is no significant correlation between income level and toddlers' growth and development, regardless of whether it is below or above the regional minimum wage. This may be attributed to other factors that mitigate the adverse effects of low income, such as robust community support or social assistance. A previous study reported a p-value of 0.091, indicating that there is no significant relationship between family income

and stunting in toddlers aged 12-59 months in the Banyudono II Public Health Center working area.[28]

There is no statistically significant correlation between maternal education and the growth and development status of toddlers (p = 0.097). This result is also in accordance with a study in Passi Timur subdistrict, Bolaang Mongondow, in which there was no correlation between maternal education and toddlers development, with a p-value of 0.124.[29] Furthermore, a comprehensive government commitment to improving nutrition and health through increased funding and policy implementation is essential.[27]

Maternal knowledge showed a significant relationship with child growth and development status (p = 0.010). A similar result was obtained in a previous study with a p-value of 0.000, proving a significant relationship between maternal knowledge and toddlers development.[30] Additionally, a significant relationship between maternal knowledge and child development was found in the Waena Jayapura Public Health Center working area, with a p-value of 0.045.[24] These findings are consistent with the importance of maternal involvement and support, as demonstrated in a study conducted at the Pauh Community Health Center, where maternal knowledge was found to be linked to high-risk pregnancies and, by extension, to better growth and development outcomes for children.[31]

Multivariate analysis showed that environmental sanitation is the dominant factor affecting toddlers growth and development status. Good sanitation conditions are essential for ensuring toddlers grow and develop optimally, as a clean and healthy environment can prevent various infectious diseases that may hinder physical growth and cognitive development. Good environmental sanitation also plays a crucial role in creating a supportive environment for cognitive and social development. A clean and safe environment allows toddlers to play, learn, and interact with peers without a high risk of disease, which is important for social and emotional development, as well as physical and cognitive growth.

Strength and Limitations

This study outlines significant factors affecting toddlers' growth and development, with a particular emphasis on the role of environmental sanitation. Although the sample size of 64 may appear small, the study effectively identifies critical factors, such as sanitation and maternal knowledge, that could be improved to enhance child health outcomes. These results provide a solid foundation for future studies and targeted interventions.

The primary limitation of this study is the small sample size, which limits the ability to generalize the results to larger populations. Additionally, the cross-sectional design restricts the determination of causal relationships between the identified factors. This study also did not account for other potentially influential factors, such as history of illness, comorbidities, and dietary habits, which could have contributed to the growth and development outcomes. The factors should be considered in future studies to provide a more comprehensive understanding of the influences on child health.

Conclusion

In conclusion, environmental sanitation was found as the most significant factor influencing the growth and development status of toddlers in the working territory of the Ikur Koto Public Health Center. It is recommended that public health centers consistently implement early detection and intervention programs for child development and conduct routine reporting to identify and address developmental issues early, preventing more serious outcomes. The community is also advised to focus on improving environmental sanitation and actively participate in providing stimulation, training, and development of toddlers psychological and motor skills.

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Availability of Data: The data used in this study are protected under copyright laws and cannot be shared publicly. However, requests for data access can be directed to the corresponding author for academic purposes.

No use of generative AI tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise

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