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Research Article

THE RELATIONSHIP BETWEEN MATERNAL AND CHILD HEALTH SERVICES AND THE INCIDENCE OF STUNTING AMONG TODDLERS AT THE SIKABU COMMUNITY HEALTH CENTER IN PADANG PARIAMAN: A CASE-CONTROL STUDY

Novi Putriana Dewi[1], Syafrawati[2], Vivi Triana[3] *

[1,2,3] *Master of Epidemiology, Faculty of Public Health, Andalas University*

Corresponding Author :
***Vivi Triana*, Email: vivitriana@ph.unand.ac.id ***

ABSTRACT

Background: Stunting remains a serious public health concern in Indonesia. This study aims to examine the relationship between maternal and child health (MCH) service utilization, including antenatal care (ANC) visits, exclusive breastfeeding, complete basic immunization, vitamin A supplementation, and child growth monitoring and the incidence of stunting in children under five at at Sikabu Public Health Center, Padang Pariaman Regency, in 2025.
Methods: This study used a case-control design with a 1:1 ratio, involving 154 respondents (77 cases and 77 controls). Data were obtained from E-PPBGM, Maternal Cohort Register, Nutrition Register, and Immunization Register. Analysis was conducted using Chi-Square tests and multiple logistic regression.
Results: Bivariate analysis showed that incomplete ANC visits ($p<0.001$; OR=7.13), absence of exclusive breastfeeding ($p<0.001$; OR=14.1), and irregular growth monitoring ($p<0.001$; OR=3.92) were significantly associated with stunting. Multivariate analysis identified exclusive breastfeeding as the most dominant risk factor (Adjusted OR=18.3), followed by ANC visits (Adjusted OR=10.6) and vitamin A supplementation ($p=0.03$).
Conclusion: Exclusive breastfeeding, ANC visits, and growth monitoring are MCH service components associated with stunting incidence, with exclusive breastfeeding as the dominant factor. Optimization of all MCH service components is essential for accelerating stunting reduction.

Keywords: Stunting, MCH Services, Antenatal Care, Exclusive Breastfeeding, Growth Monitoring

INTRODUCTION

Stunting is a condition of chronic growth failure in children under five, primarily caused by prolonged nutritional deficiency during the first 1,000 Days of Life (1,000 DHL), spanning from conception to age two. Anthropometrically, stunting is defined as a length-for-age or height-for-age (LAZ/HAZ) score below -2 standard deviations (−2 SD) from the median of the WHO child growth standard.(1,2)

According to WHO 2023 data, approximately 148 million children under five worldwide, equivalent to 22.3% of the global under-five population, are affected by stunting. More than half of the world's stunted children reside in Asia (53%), and Indonesia continues to face a significant burden. (3,4)

Based on the 2024 Indonesian Nutritional Status Survey (SSGI), the national prevalence of stunting stands at 19.8%, still above the national target of 14.2% by 2029. West Sumatra Province recorded a prevalence of 24.9%, exceeding the national figure, while Padang Pariaman Regency reported 26.6%.(5,6) At the sub-district level, at Sikabu Public Health Center exhibited a fluctuating stunting trend, from 26.5% in 2022 to 15.2% in 2025—indicating that prevention and management efforts remain inconsistent.(7)

MCH service utilization is considered one of the most important determinants in stunting prevention. MCH services encompass antenatal care (ANC) visits, exclusive breastfeeding, complete basic immunization, vitamin A supplementation, and child growth monitoring.(8) Research has demonstrated that inadequate ANC utilization is associated with a 2–3-fold higher risk of stunting,(9) while children who do not receive exclusive breastfeeding face a 4.57-fold greater risk.(10) Incomplete basic immunization has been shown to increase the stunting risk by up to 3.6-fold.(11)

Coverage data from at Sikabu Public Health Center Sikabu reveal persisting gaps: ANC coverage is only 64.2%, complete basic immunization is 72.7%, exclusive breastfeeding coverage is 75%, and child growth monitoring reaches only 63%.(7) These gaps are likely contributing to the continued occurrence of stunting in the area. Therefore, this study aims to determine the association between MCH service utilization and the incidence of stunting in children under five at at Sikabu Public Health Center, Padang Pariaman Regency, in 2025.

MATERIAL AND METHODS

This study employed a quantitative, observational, analytic design using a case-control approach. The dependent variable was the incidence of stunting in children under five, while the independent variables comprised five components of MCH service utilization: (1) antenatal care (ANC) visits, (2) exclusive breastfeeding, (3) complete basic immunization, (4) vitamin A supplementation, and (5) child growth monitoring.

The study was conducted at at Sikabu Public Health Center, Padang Pariaman Regency, from February 2025 to March 2026. The case population consisted of all children aged 12–59 months who were diagnosed with stunting based on the Electronic Community-Based Nutritional Recording and Reporting System (E-PPBGM) of at Sikabu Public Health Center . The control population comprised children of the same age group who had never been classified as stunted.

Case sampling was performed using total sampling, whereby all stunted children meeting the inclusion criteria were enrolled (n=77). Controls were selected by simple random sampling in equal numbers (n=77), yielding a total sample of 154 respondents with a 1:1 case-to-control ratio. Inclusion criteria for cases required complete and available data for all study variables. The same criteria applied to the control group.

Data were collected from secondary sources: E-PPBGM for stunting status and growth monitoring, the Maternal Cohort Register for ANC visit history, the Nutrition Register for exclusive breastfeeding and vitamin A supplementation records, and the Immunization Register for basic immunization status. Operational definitions were as follows: ANC visits were classified as complete (≥6 visits) or incomplete (<6 visits); exclusive breastfeeding was classified as exclusive or non-exclusive; basic immunization was classified as complete (HB-0, BCG, Polio, DPT-HB-Hib, Measles/MR) or incomplete; vitamin A supplementation was classified as complete (2 doses/year for children aged 12–59 months) or incomplete; and growthmonitoring was classified as routine (≥8 times/year) or non-routine (<8 times/year).

Statistical analysis was conducted in three stages. Univariate analysis described the frequency distribution of each variable. Bivariate analysis used the Chi-Square test (95% CI) to assess associations, with an Odds Ratio (OR) calculated to estimate the magnitude of risk. Multivariate analysis used multiple logistic regression with the enter method to identify the most dominant risk factor. Variables with p<0.25 in bivariate analysis were entered as candidates for multivariate modeling.

RESULTS

Univariate Analysis

A total of 154 respondents participated in this study, consisting of 77 stunting cases and 77 non-stunting controls. The frequency distribution of child characteristics and MCH service utilization variables is presented in Table 1.

Table 1. Distribution of Toddlers and Determinants of Stunted Incidence in the Service Area of the Sikabu Community Health Center, Padang Pariaman in 2025

Variable	Case (n=77)		Control (n=77)	
	f	%	f	%
Child Characteristics				
Sex				
Male	36	46.8	41	53.2
Female	41	53.2	36	46.8
Age Group				
12–24 months	14	18.2	17	22.1
25–59 months	63	81.8	60	77.9
MCH Service Utilization				
ANC Visits				
Incomplete (<6 visits)	55	71.4	20	26.0
Complete (≥6 visits)	22	28.6	57	74.0
Exclusive Breastfeeding				
Non-exclusive	45	58.4	7	9.1

Variable	Case (n=77)		Control (n=77)	
	f	%	f	%
Exclusive	32	41.6	70	90.9
Complete Basic Immunization				
Incomplete	60	77.9	54	70.1
Complete	17	22.1	23	29.9
Vitamin A Supplementation				
Incomplete	38	49.4	28	36.4
Complete	39	50.6	49	63.6
Growth Monitoring				
Non-routine (<8 times/year)	47	61.0	22	28.6
Routine (≥8 times/year)	30	39.0	55	71.4
Total	**77**	**100**	**77**	**100**

Table 1 shows that, by gender, the majority of toddlers in the case group were female (53.2%), while in the control group, the majority were male (53.2%). Based on age characteristics, the majority of respondents in both groups were in the 25–59-month age range, namely 81.8% in the case group and 77.9% in the control group. The percentage of mothers with incomplete ANC visits was higher in the case group (71%) compared to the control group (26%). The percentage of toddlers not receiving exclusive breastfeeding was higher in the case group (58%) compared to the control group (9%). The percentage of toddlers with incomplete basic immunizations was higher in the case group (78%) compared to the control group (70%). The percentage of infants with incomplete vitamin A supplementation was higher in the case group (49%) compared to the control group (36%). The percentage of infants with irregular growth monitoring was higher in the case group (61%) compared to the control group (29%).

Bivariate Analysis

Table 2. Association Between the Use of Maternal and Child Health Services and the Prevalence of Stunted Among Toddlers at the Sikabu Community Health Center, Padang Pariaman Regency, in 2025

Variable	Stunted				Total		OR (95% CI)	*p-value*
	Cases		Controls					
	f	%	f	%	f	%		
Antenatal Care								
Incomplete	55	36	20	13	75	49	7,13 (3,56-14,8)	<0,001*
Complete	22	14	57	37	79	51		
Exclusive Breastfeeding								
Not Exclusive	45	29	7	4,5	52	34	14,1 (6,04-37,3)	<0,001*
Exclusive	32	21	70	45,5	102	66		
IDL								
Incomplete	60	39	54	35	114	74	1,5 (0,73-3,14)	0,27
Complete	17	11	23	15	40	36		
Vitamins A								
Incomplete	38	24,5	28	18	66	43	1,71 (0,9-3,27)	0,10
Complete	39	25,5	49	32	88	57		

Variable	Stunted				Total		OR (95% CI)	*p-value*
	Cases		Controls					
	f	%	f	%	f	%		
Growth Monitoring								
Irregular	47	31	22	14	69	45	3,92 (2,02-7,8)	<0,001*
Regular	30	19	55	36	85	55		
Total	**77**	**50**	**77**	**50**	**154**	**100**		

*Significant

Table 2 shows that incomplete ANC visits were significantly associated with stunting (p<0.001), with an OR of 7.13 (95% CI: 3.56–14.8), indicating that mothers with incomplete ANC had 7.13-fold greater odds of having a stunted child. Non-exclusive breastfeeding was also significantly associated with stunting (p<0.001), with an OR of 14.1 (95% CI: 6.04–37.3). Non-routine growth monitoring showed a significant association (p<0.001) with an OR of 3.92 (95% CI: 2.02–7.80). Conversely, incomplete basic immunization (p=0.27) and incomplete vitamin A supplementation (p=0.10) did not demonstrate statistically significant associations.

Multivariate Analysis

Variables with p<0.25 in bivariate analysis, ANC visits, exclusive breastfeeding, vitamin A supplementation, and growth monitoring, were entered as candidates for multivariate logistic regression. Basic immunization (p=0.27) was excluded. The final model is presented in Table 3.

Table 3. Final Model of Multivariate Logistic Regression Analysis

Variable	p-value	OR	95% CI
Incomplete ANC Visits	<0.001	10.6	3.29 - 42.3
Non-exclusive Breastfeeding	<0.001	18.3	5.72 - 70.0
Incomplete Vitamin A Supplementation	0.03	0.06	0.01 -0.031
Non-routine Growth Monitoring	0.50	1.72	0.36 -8.85

The final multivariate model identified three variables that were statistically significant: non-exclusive breastfeeding (p<0.001; Adjusted OR=18.3; 95% CI: 5.72–70.0), incomplete ANC visits (p<0.001; Adjusted OR=10.6; 95% CI: 3.29–42.3), and incomplete vitamin A supplementation (p=0.03). Growth monitoring was retained in the model as a confounder despite not being statistically significant (p=0.50), as its removal caused a >10% change in the OR of other variables. Non-exclusive breastfeeding emerged as the most dominant risk factor, with its OR increasing from 14.1 in bivariate analysis to 18.3 after adjustment for confounders.

DISCUSSION

Univariate Analysis

The univariate analysis provides a descriptive picture of the distribution of MCH service utilization between stunting cases and controls prior to inferential testing. Regarding sex distribution, female children were slightly predominant in the case group (53.2%), while male children were more common in the control group (53.2%). The majority of children in both groups were aged 25–59 months (81.8% in cases; 77.9%

in controls), reflecting the higher proportion of older toddlers in the study population and indicating that the age bracket most prone to manifesting stunting was well-represented.

The proportion of incomplete ANC visits was substantially higher in the case group (71.4%) compared with controls (26.0%), suggesting that sub-optimal utilization of prenatal care services was far more common among mothers of stunted children. A contrasting pattern was observed for exclusive breastfeeding: 58.4% of cases had not received exclusive breastfeeding, while 90.9% of controls had a striking differential distribution that foreshadowed its dominant role in subsequent multivariate analysis.

For basic immunization, incomplete coverage was high in both groups (77.9% cases; 70.1% controls), with only modest differences. This similar distribution between groups helps explain the absence of a significant association in later analyses. Vitamin A supplementation was incomplete in 49.4% of cases versus 36.4% of controls, a moderate difference that did not reach significance in bivariate analysis but became meaningful when other variables were controlled for in multivariate modeling. Finally, non-routine growth monitoring was considerably more prevalent in cases (61.0%) than controls (28.6%), reinforcing the role of regular health facility attendance in enabling timely nutritional surveillance.

Association between ANC visits and stunting

Mothers with incomplete ANC visits had a 7.13-fold greater odds of having a stunted child (OR=7.13; 95% CI: 3.56–14.8; p<0.001). This finding is consistent with Irawati et al. (2022), who reported a significant association between ANC visit completeness and stunting in children aged 12–36 months (OR=9.471; p=0.003).(12) Aulia (2023) similarly found that incomplete ANC was associated with a 3.27-fold increase in stunting risk.(13)

Routine antenatal visits enable health workers to screen for maternal nutritional risks—including chronic energy deficiency (CED) and anemia—provide iron and folic acid supplementation, monitor fetal growth, and deliver health and nutrition education. When ANC visits are incomplete, these opportunities for early detection and intervention are foregone, thereby increasing the likelihood of intrauterine growth restriction and subsequent stunting.(8) These findings align with the UNICEF Conceptual Framework on Maternal and Child Nutrition, which identifies maternal health care utilization as an underlying determinant of child nutritional status.(14)

Association between Exclusive Breastfeeding and Stunting

Children who were not exclusively breastfed had 14.1-fold greater odds of stunting (OR=14.1; 95% CI: 6.04–37.3; p<0.001), which increased to 18.3-fold after multivariate adjustment, confirming exclusive breastfeeding as the most dominant risk factor in this study. Izzah et al. (2021) found that non-exclusive breastfeeding carried a 4.57-fold risk of stunting (10), while Hadi et al. (2021) reported an OR of 3.7.(15) The current estimate of OR=18.3 is higher than those in previous studies, which may reflect the relatively small sample size or the specific characteristics of the study population.

Breast milk provides a complete array of macro- and micronutrients—protein, fat, carbohydrates, vitamins, minerals—along with immunoglobulins that protect against infection. Infants not receiving

exclusive breastfeeding are more vulnerable to recurrent infections that disrupt nutrient absorption and growth.(16) According to the UNICEF Conceptual Framework, inadequate dietary intake represents a direct cause of stunting; exclusive breastfeeding is the primary nutritional intervention during the first six months of the 1,000 DHL, making its optimization essential for stunting prevention. (14)

Association between Basic Immunization and Stunting

No significant association was found between complete basic immunization and stunting incidence (p=0.27), consistent with the findings of Sumiaty (2020) who also reported no significant relationship (p>0.05).(17) The absence of significance may partly be explained by the high proportions of incomplete immunization in both case (77.9%) and control (70.1%) groups, reducing the contrast between categories. Furthermore, stunting is a multi-factorial chronic condition more directly driven by sustained nutritional deficits, maternal health during pregnancy, and feeding practices, rather than by immunization status alone. Notwithstanding, immunization remains important as a preventive measure against infectious diseases that can indirectly impair child growth through repeated illness episodes.

Association between Vitamin a Supplementation and Stunting

Vitamin A supplementation did not show a statistically significant association with stunting in bivariate analysis (p=0.10); however, it reached significance in the multivariate model (p=0.03), with an OR of 0.06—suggesting a protective confounded effect. Rahmawati et al. (2022) likewise reported no significant bivariate association between vitamin A capsule provision and stunting.(18) Vitamin A plays a critical role in immune function and cellular growth, and deficiency increases susceptibility to infectious diseases that may compromise nutrient utilization. The emergence of significance in multivariate analysis implies that the relationship between vitamin A and stunting is moderated by other co-occurring MCH service variables, particularly breastfeeding and ANC.

Association between Growth Monitoring and Stunting

Children whose growth monitoring was non-routine had 3.92-fold greater odds of stunting (OR=3.92; 95% CI: 2.02–7.80; p<0.001). Ibrahim et al. (2021) corroborated these findings, reporting a significant association between growth monitoring and stunting (p=0.001).(19) Regular monitoring at integrated health posts (posyandu) enables early detection of growth faltering, allowing timely nutritional counseling and intervention. Conversely, when attendance is irregular, growth problems may go undetected until they have progressed to chronic stunting. Although growth monitoring lost statistical significance in the final multivariate model (p=0.50), it was retained due to its confounding effect, its removal caused changes of more than 10% in the OR of other variables, confirming its meaningful interaction with the other MCH service components.

Murlivariate Analysis

The multivariate analysis identified non-exclusive breastfeeding (Adjusted OR=18.3) as the most dominant determinant of stunting, followed by incomplete ANC visits (Adjusted OR=10.6). The

amplification of the breastfeeding OR from 14.1 in bivariate to 18.3 in multivariate analysis confirms that, after controlling for confounders, its effect on stunting risk is even stronger than crude estimates suggest. These findings underscore that early-life nutrition interventions—particularly during the first six months of life—represent the highest-priority target for stunting prevention programs at at Sikabu Public Health Center.

CONCLUSION

This study concludes that antenatal care visits, exclusive breastfeeding, and child growth monitoring are MCH service components significantly associated with stunting incidence in children under five at at Sikabu Public Health Center, Padang Pariaman Regency, in 2025. Complete basic immunization and vitamin A supplementation did not show significant bivariate associations; however, vitamin A became significant in multivariate analysis, reflecting its confounded relationship with other service components. Non-exclusive breastfeeding was identified as the most dominant risk factor (Adjusted OR=18.3).

These findings have several practical implications. First, Sikabu should prioritize strengthening exclusive breastfeeding promotion by establishing dedicated breastfeeding counseling spaces, training lactation counselors, and engaging husbands and extended family as support systems. Second, ANC coverage must be improved through active tracing of pregnant women, community health worker outreach, and the use of digital communication platforms for monitoring. Third, the quality and regularity of posyandu-based growth monitoring must be strengthened, including improving the physical environment of posyandu locations and empowering health cadres for proactive home visits. Future research should incorporate mixed methods approaches, primary data collection, and explore additional variables such as sanitation conditions, maternal education, and household food security.

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