

Factors related to stunting in children under 2 years old in the Papua, Indonesia

Does the type of residence matter?

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ABSTRACT

الأهداف: قام هذا البحث بتحليل العوامل المتعلقة بالتقزم في المنطقة.

المنهجية: استخدمت هذه الدراسة مسحًا مقطعيًا في منطقة بابوا بإندونيسيا في عام 2021م. مسح شمل 2937 شخصًا على مدى عامين. قامت هذه الدراسة بتحليل تسعة متغيرات مستقلة (مكان الإقامة، عمر الأم، الزواج، تعليم الأم، العمل، الثروة، عمر الطفل، الجنس، البدء المبكر بالرضاعة الطبيعية (EBFI) مع الحالة التغذوية. وتم تحليل العلاقة باستخدام اختبارات الانحدار اللوجستي.

النتائج: الأطفال في المناطق الريفية في بابوا أكثر عرضة للإصابة بالتقزم مقارنة بالمناطق الحضرية (AOR=1.168، 95%، فترة الثقة=1.128-1.209). الأطفال الذين تقل أعمارهم عن عامين والذين لا تعمل أمهاتهم لديهم احتمال أكبر للإصابة بالتقزم مقارنة بالأمهات العاملات (AOR=1.174، 95%، فترة الثقة=1.142-1.207). الأطفال في الفئة العمرية 12-23 شهرًا هم أكثر عرضة للإصابة بالتقزم من أولئك الذين هم في الفئة العمرية أقل من 12 شهرًا (AOR=3.381، 95%، فترة الثقة=3.291-3.474). أكثر عرضة لخطر الإصابة بالتقزم مقارنة بالفتيات (AOR=1.348، 95%، فترة الثقة=1.314-1.383). الأطفال الذين تقل أعمارهم عن عامين والذين لا يعانون من EBFI هم أكثر عرضة للخطر من أولئك الذين لديهم (95%، فترة الثقة=1.050-1.106، AOR=1.078).

الخلاصة: هناك ثمانية متغيرات مرتبطة بالتقزم، وهي مكان الإقامة، وعمر الأم، وتعليم الأم، ومهنة الأم، والحالة الاقتصادية، وعمر الطفل، والجنس، و EBFI. ينبغي أن تستهدف أولويات تدخلات التقزم في بابوا الأمهات اللاتي يعشن في المناطق الريفية، ولديهن تعليم منخفض، ولا يبدأن في الرضاعة الطبيعية مبكرًا.

Objectives: To analyze factors related to stunting in Papua region.

Methods: Secondary data from the 2021 Indonesian National Nutrition Status Survey were used in this study. Samples of 2,937 Papuan children under the age of two were gathered for the study. This study analyzed independent variables (type of residence, mother's age, marriage, mother's education, employment, wealth, child's age, gender, and early breastfeeding initiation (EBFI) with stunting. The relationship was analyzed using logistic regression tests.

Results: Stunting is more common among children in Papua's rural areas than in urban (AOR 1.168, 95% CI, 1.128-1.209). Stunting is more common in children whose mother do not work than in mothers who do (AOR 1.174, 95% CI, 1.142- 1.207). Stunting is more common in children aged 12-23 months compared to children <12 months (AOR 3.381, 95% CI, 3.291-3.474). Compared to girls, boys are more likely to become stunted (AOR 1.348, 95% CI, 1.314-1.383). Children under the age of two who do not experience EBFI are at higher risk than those who have (AOR 1.078, 95% CI, 1.050-1.106).

Conclusion: There are eight variables associated with stunting, namely residence, age of mother, mother's education, mother's occupation, economic status, child's age, gender, and EBFI. Prioritization of stunting interventions in Papua should be targeted at mothers who living in rural, having low education, and not doing early breastfeeding initiation.

Keywords: public health, nutritional status, stunting

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Nutritional status is a balance between nutrient intake and the body's ability to utilize nutrients for growth and development processes.¹ Indicators for assessing nutritional status include anthropometry, while measurements for stunted children include the Z-score (HAZ) height/age index. Worldwide consensus states that a child is stunted if their height or length falls below -2 SD from the World Health Organization (WHO) Child Growth Standards median for the same age and gender. Similarly, if a child's height or length falls below of -3 SD of the WHO Child Growth Standards median for that age and gender, they are deemed severely stunted.²

Stunting is associated with impaired growth and development in children. In the short term, it can cause problems such as: an upward trend in the morbidity and mortality rate of children, decreased intelligence, motor disorders, increased spending on health, and increased costs for health care and disease treatment. Meanwhile, in the long term, they include decreased height in adult children, decreased reproductive health, low activity at school, less potential learning capacity, and low work capacity and productivity.³ The low public health development index is one of the long-term impacts of health problems including stunting, where Papua still has a low index number.⁴

The pathogenesis of child stunting includes lipid synthesis, protein synthesis, and autophagy which can have a particular impact on the body, cognitive impairment, negative impacts on children's growth, and slowing bone growth. The other problems were anaemia, muscle atrophy, and immune dysfunction.⁵

Stunting is a major health issue that has a detrimental effect on children under 5. Approximately 21.9% of children worldwide suffer from stunting, with more than half living in Asia. According to WHO growth standards, this condition shows that 1 in 4 children under 5 suffer from optimal growth failure.⁶ According to the 2021 Indonesian Nutrition Status Survey, 24.4% of children under 5 are stunted. This number remains greater than the worldwide prevalence. The incidence of stunting in the provinces of Papua and West Papua is still above the national prevalence rate, namely 29.5% and 26.2%.⁷

The government was committed to addressing stunting in 2011 with Scaling Up Nutrition (SUN),

a form of public sector collaboration in providing and accessing nutritious food to reduce stunting. Then it was strengthened by implementing a national plan to speed up the prevention and reduction of stunting through multi-sectoral strategy involving coordination between the non-health and health sectors and program convergence at all levels. Combining the two interventions can reduce the incidence of stunting by 0.7% to 2.1% per year.⁶ Indonesia also has agreements with countries in Southeast Asia in the framework of reducing stunting by increasing food diversification and providing fortified supplementary food to pregnant and children aged 6-23 months, as well as nursing mothers.⁸ One of the contributing factors for the high frequency of stunting is the poor human development index of the Papua and West Papua provinces, in addition to local cultural practices that are detrimental to child development.⁹ These provinces have low coverage rates for early breastfeeding initiation (EBFI), exclusive breastfeeding, and iron supplement tablets for pregnant women. The Public Health Center's adequacy ratio is also not met by these 2 provinces.¹⁰ According to the background, the purpose of this study was to investigate the factors related to stunting in Papua and West Papua.

Methods. This article served as a further analysis from secondary data of the 2021 Indonesian National Nutrition Status Survey (SSGI). The survey is a cross-sectional study that was carried out in January-December 2021 by the Ministry of Health of the Republic of Indonesia in Indonesia. This study used data from all children in the Papua Region under the age of 2. A multi-stage cluster random sampling technique was employed in the survey to gather a weighted sample of 2,937 children under the age of 2. The inclusion criteria in this study was children aged 0-23 months and the exclusion criteria was incomplete research data. The Health Research and Development Agency's ethics commission has approved this study with the number LB.02.01/2/KE.248/2021.

Stunting in children under 2 was the dependent variable in this study. Based on height for age, stunting serves as an indicator of nutritional status. The z-score is used to estimate the height indicator based on WHO growth guideline standards. There are 2 types of stunted children under 2: normal and stunted. The limits of the nutritional status categorization according to the height/age index are < -2.0 SD (stunting) and ≥ -2.0 SD (normal). The independent variables were the place of residence, mother's age, marriage, mother's education, occupation, wealth, child's age, gender, and early breastfeeding initiation (EBFI).

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Data analysis. The Statistical Package for the Social Sciences for Windows, version 21 (IBM Corp., Armonk, N.Y., USA) was utilized to conduct the statistical analysis. The analysis was carried out using the Chi-Square test and followed by the logistic regression test.

Results. Based on the study's findings, in 2021, the ratio of stunted children under 2 years of age in Papua Indonesia was 20.7%. **Table 1** shows that the proportion of children under 2 who are stunted in rural is slightly higher than in urban areas. Furthermore, mothers with low education are more at risk of having stunted children compared to mothers with higher education.

Table 1 - Descriptive statistics of nutritional status of children under 2 years old in Papua, Indonesia (N=2,937).

Variable	Normal (n=2327)	Stunting (n=610)	P-value
Residence			<0.001
Urban	83.7%	16.3%	
Rural	75.9%	24.1%	
Mother's age (years)			<0.001
<20	84.0%	16.0%	
20-24	79.6%	20.4%	
25-29	80.3%	19.7%	
30-34	77.2%	22.8%	
35-39	76.1%	23.9%	
40-44	79.8%	20.2%	
>44	78.4%	21.6%	
Mother's marital status			0.604
Married	78.8%	21.2%	
Divorced/widowed	78.2%	21.8%	
Mother's education			<0.001
No Formal	67.8%	32.2%	
Primary	77.8%	22.2%	
Secondary	84.1%	15.9%	
Higher	83.8%	16.2%	
Mother's employment			<0.001
Employed	80.4%	19.6%	
Unemployed	75.7%	24.3%	
Wealth status			<0.001
Poorest	72.0%	28.0%	
Poorer	82.2%	17.8%	
Middle	83.2%	16.8%	
Richer	87.7%	12.3%	
Richest	86.7%	13.3%	
Children's age (month)			<0.001
<12	88.4%	11.6%	
12-23	69.0%	31.0%	
Children's gender			<0.001
Boy	76.4%	23.6%	
Girl	81.1%	18.9%	
Early breastfeeding initiation (EBFI)			<0.001
No	76.7%	23.3%	
Yes	80.8%	19.2%	

In addition, children under 2 years old from poor families have a higher risk of experiencing stunting than families who are not poor. Stunting is more common in children between the ages of 12 and 23 months than in children ages <11 months, and it is more common in boys than in girls.

Table 2 displays the result of the logistic regression analysis. These results explain that children under 2 years old in rural areas are 1,168 times more likely to experience stunting than those in urban areas (AOR 1,168; 95% CI 1,128-1,209). Based on the mother's age, in all age groups, there is a risk of their children being stunted compared to the age group <20 years. **Table 2** also illustrates that maternal education correlates with stunting. The likelihood of a child being stunted decreases with the mother's educational attainment. Similarly, the higher the family's economic status, the lower the possibility of their children becoming stunted. Children in the 12-23 month age group tend to be stunted 3,381 times compared to the <12 month age group. Boys and girls have a risk of 1,348 times compared to girls, with a 95% of CI 1,314-1,383. Children under 2 years old without early breastfeeding initiation have a risk of 1,078 times compared to those with early breastfeeding initiation. The study discovered that children under 2 with mothers who do not work experience stunting 1,174 times compared to children with working mothers, with a 95% CI 1,142-1,207.

Discussion. In this study, there were significant predictors of stunting in Papua by their characteristics like living in rural areas; lower socioeconomic status; maternal characteristics such as being a mother at an older age, having lower education, and not working; and children characteristics such as in the 12-23 month age group, boys, and did not obtain early breastfeeding initiation. The findings of the research provide important information on the characteristics that influenced stunting in under 2 years old children in Papua, one of the areas that still experiences health disparities in Indonesia.¹¹

The analysis's findings indicate that stunting is more common in rural areas than in urban ones for children under 2. These findings are in line with several studies that show children living in rural have a higher risk of experiencing stunting than those living in urban.^{12,13} It is similar to the problem of malnutrition in children.¹⁴ The opposite results occur in children. Another study stated that children living in urban areas are more likely to become stunted.¹⁵ The differences between rural and urban areas are related to individual, family, and community factors.¹⁴ The health system in rural

Table 2 - Logistic regression of nutritional status of children under 2 years old in Papua, Indonesia (N=2,937).

Predictor	P-value	AOR	Stunted	
			95%CI	
			Upper	Lower
Residence				
Urban	-	-	-	-
Rural	*<0.001	1.168	1.128	1.209
Mother's age (years)				
<20	-	-	-	-
20-24	*<0.001	1.374	1.275	1.482
25-29	*<0.001	1.413	1.311	1.522
30-34	*<0.001	1.653	1.535	1.780
35-39	*<0.001	1.889	1.750	2.039
40-44	*<0.001	1.384	1.269	1.511
>44	*<0.001	1.276	1.163	1.401
Mother's education				
No Formal	*<0.001	1.341	1.266	1.421
Primary	**0.001	1.090	1.036	1.148
Secondary	*<0.001	0.867	0.824	0.911
Higher	-	-	-	-
Mother's employment				
Employed	-	-	-	-
Unemployed	*<0.001	1.174	1.142	1.207
Wealth status				
Poorest	*<0.001	2.533	2.394	2.679
Poorer	*<0.001	1.430	1.346	1.518
Middle	*<0.001	1.353	1.272	1.438
Richer	**0.003	0.918	0.867	0.972
Richest	-	-	-	-
Children's age (month)				
<12	-	-	-	-
12-23	*<0.001	3.381	3.291	3.474
Children's gender				
Boy	*<0.001	1.348	1.314	1.383
Girls	-	-	-	-
Early breastfeeding initiation (EBFI)				
No	*<0.001	1.078	1.050	1.106
Yes	-	-	-	-

AOR: adjusted odds ratio; * $p < 0.001$; ** $p < 0.050$, CI: confidence interval

Indonesia is associated with poverty and relatively low health literacy, and some health issues are handled by non-health workers in several regions.⁹

Based on the analysis of maternal age, all age groups have a higher risk of child stunting than the <20-year-old group. The relationship between mother's age and the stunting risk is different in several studies' findings. A younger mother's age increases the chance of childhood stunting.^{16,17} The risk of stunting decreases with increasing maternal age at delivery.¹⁸ However, the results of this study show the opposite. Mothers over 20 years old have a higher risk of having a stunted child. The highest risk is in the mothers aged 35-39. These

results are in line with those of studies carried out in several regions, which show that those over the age of 35 years have a higher risk than the ideal reproductive age.^{18,19} Maternal age is related to the physical and psychological condition of the mother during pregnancy and childbirth, as well as her ability to do good parenting. As the mother gets older, the risk of pregnancy will increase, one of which is the possibility of giving birth to LBW children, which can potentially increase the chance of childhood stunting.²⁰

Additionally, a mother's level of education is correlated with the incidence of stunting. The higher the mother's level of education, the lower the risk of stunting. This is consistent with other studies' findings showing that the risk of stunting decreases in mothers with higher education compared to mothers who are not educated.^{21,22} A possible explanation related to this education problem is that educated mothers have better literacy related to health problems experienced by children. Parents with low education have difficulties communicating with health workers, conveying symptoms of illness experienced by children, and are not good at receiving information related to children's health.²³

This study also suggests that stunting is more common in children whose mothers are unemployed than in those whose mothers are employed. The other studies in Indonesia showed there is a difference of 11.1% of stunting sufferers in families with low socioeconomic conditions and mothers who do not work compared to those who do.²⁴ This condition emphasizes the need for policy considerations to develop the family economic system in formulating stunting alleviation policies in Indonesia and the Province of Papua, particularly those targeting educated and low-income mothers.^{9,25}

Another finding indicates that children in the 12-23 month age group tend to be stunted than the <12 month age group. This outcome is consistent with several previous studies, which demonstrate that as children age, their risk of stunting rises.^{26,27} Such tendency is probably due to the challenges that children must deal with during the transition from Exclusive breastfeeding to the consumption of complementary foods.²⁸ At this time, children will begin to lose passive immunity from their mothers.²⁹ In addition, there is a possibility of a decrease in nutrition because the frequency of minimum food requirements does not match the child's age.²⁶ Therefore, adequate nutritional needs for complementary foods are critical to lower the prevalence of stunting, especially in the initial 2 years of a child's growth.³⁰ Growth problems that increase at the age of 12-23 months can also be attributed to

exposure to various diseases and infections and exposure to environmental hygiene and sanitation, which also increases as the children grow.^{31,32}

Furthermore, boys have a higher risk compared to girls. This result shows that gender correlates with nutritional vulnerability. At the same age, the severity of stunting is more likely to be found in boys.²⁸ Even among the poorest groups, stunting is more common in boys than in girls.²⁹ Research carried out in Senegal has found that boys tend to experience failure to thrive due to shorter breastfeeding periods and consuming complementary foods at an earlier age than girls.³³ Boys are also more prone to infection and illnesses that can interfere with growth.³⁴

Lastly, this study has found that children without EBFI have a risk of 1,078 times compared to those with EBFI. Several studies state that EBFI performed less than one hour after the mother gives birth can reduce the risk of stunting.^{35,36} Breast milk colostrum given during EBFI can be a natural immunity for children.³⁷ Mothers who do EBFI will tend to give exclusive breastfeeding to their children.³⁸ This is crucial because exclusive breastfeeding can provide protection against infections and diarrhea, increase child immunity, and reduce stunting rates.³²

Study limitations. This study used the variables provided in the survey, so it could not accommodate some factors that might affect stunting in under 2 children, such as child illness or maternal BMI. Another limitation is that the study was conducted quantitatively, so it did not get an explanation of the impact of strong sociocultural elements in Indonesia such as parenting issues, food taboos, or the value of children.³⁹

In conclusion, this study is that residence, mother's age, mother's education, mother's occupation, economic status, child's age, child's gender, and EBFI are associated with stunting in children under 2 years old. Prioritization of stunting interventions in Papua should be targeted at mothers who living in rural, having low education, and not doing early breastfeeding initiation.

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