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Original Research

Factors of Low Birth Weight (LBW) Most Related to Stunting in Toddlers

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ABSTRACT

Background: *Stunting is a condition of growth failure in toddlers due to chronic malnutrition, resulting in children being too short for their age, which has an impact on mortality, motor development, and language skills. This study aims to determine the factors associated with stunting in toddlers in Semen Village, Jatisrono District, Wonogiri Regency.*

Methods: *This study used an observational analytical design with a case-control approach. Sampling was conducted using total sampling technique, resulting in 62 respondents. The research instruments were questionnaires and medical records, while data analysis was performed using the Chi-square test and logistic regression to identify the relationship between variables.*

Results: *The results showed that factors significantly associated with stunting were maternal age ($\chi^2 = 4.509$; $p = 0.034$), family income ($\chi^2 = 5.599$; $p = 0.018$), and low birth weight (LBW) ($\chi^2 = 9.378$; $p = 0.002$). The most dominant factor associated with stunting was LBW. The variables of education ($\chi^2 = 0.622$; $p = 0.430$), parity ($\chi^2 = 0.295$; $p = 0.587$), and exclusive breastfeeding ($\chi^2 = 0.081$; $p = 0.776$) did not show a significant relationship.*

Conclusion: *Factors associated with stunting are maternal age, family income, and low birth weight. The most dominant factor associated with stunting is low birth weight. Health workers and village governments can improve nutrition education for expectant mothers, monitor infant growth from birth, and provide special interventions for infants with LBW to prevent stunting.*

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INTRODUCTION

Stunting is a chronic nutritional problem that affects children's growth and development, especially during the first 1000 days of life. This condition occurs when children fail to reach the height appropriate for their age due to a prolonged lack of nutritional intake. Based on data from the 2018 Basic Health Research, the national prevalence of stunting reached 30.8%, indicating a high level of public health problems in Indonesia (Indonesian Ministry of Health, 2018). This phenomenon raises concerns about the quality of human resources in the future, requiring maximum efforts from various sectors to reduce the prevalence of stunting.

The problem of stunting not only affects children's physical condition but also influences their cognitive and social development and economic productivity in adulthood. Children who experience stunting have a higher risk of reduced learning ability, motor development disorders, and an increased risk of non-communicable diseases such as diabetes and hypertension (Susilowati & Kuspriyanto, 2016). These long-term impacts have the potential to hamper the country's economic growth if not addressed comprehensively (Pakpahan, 2021). Therefore, research focusing on prevention efforts and the cause of stunting is an important step in improving the quality of life of the community.

The prevalence of stunting in Central Java has shown a significant increase from year to year, with the 2017 Nutrition Status Monitoring data recording a figure of 28.5%. Wonogiri Regency is among the areas with high stunting rates, where 5,114 toddlers are recorded as stunted (DKK Wonogiri, 2019). This problem occurs due to several factors, such as low maternal nutrition knowledge, family economic conditions, and suboptimal exclusive breastfeeding (Hapsari, 2018). Based on this phenomenon, research in the Wonogiri area is relevant to identify factors related to stunting more specifically.

The causes of stunting are multifactorial, involving biological, social, economic, and environmental aspects. Factors such as low birth weight (LBW), parental education level, maternal age, and nutritional status during pregnancy play a major role in the risk of stunting (Natalia & Evitasari, 2020; Widyaningsih et al., 2021). In addition, low family welfare can limit access to nutritious food, health services, and proper sanitation (Usman & Paramashanti, 2020). Therefore, it is important to conduct research that can identify the dominant factors causing stunting so that intervention policies can be formulated in a more targeted manner.

Efforts to combat stunting have become a national priority through various programs such as specific and sensitive nutritional interventions and strengthening the role of the community in the first 1000 days of life (Achadi et al., 2020). This program is expected to reduce the prevalence of stunting in a sustainable manner by involving the active participation of families and health workers. This study aims to analyze factors associated with stunting in toddlers in Semen Village, Jatisrono District, Wonogiri Regency, as a scientific contribution to supporting the reduction of stunting rates at the regional and national levels.

MATERIALS AND METHODS

This study used a quantitative approach with a case-control design. This design was chosen because it is suitable for analyzing the relationship between risk factors and the incidence of stunting through a retrospective approach. This approach allows researchers to identify and compare case groups (stunted toddlers) and control groups (normal toddlers). The selection of this design was based on time efficiency, cost, and the design's ability to explain cause and effect retrospectively for events that have already occurred.

The research was conducted in Semen Village, Jatisrono District, Wonogiri Regency, because this area still has a high stunting rate based on data from the Wonogiri Regency Health Office in 2019. This location was also chosen because access to primary data was fairly easy through active integrated health service posts (posyandu). The research was conducted from July to December 2021, covering the stages from preparation, implementation, to the preparation of the research report. The research process ran according to schedule and received official permission from the relevant agencies.

The research population consisted of all mothers with toddlers in Semen Village, totaling 62 people. The sampling technique used was total sampling, because the population was less than 100 people, so the entire population was used as the sample. The inclusion criteria included mothers who were willing to be respondents, had complete toddler nutrition measurement data, and resided in the research area. Meanwhile, the exclusion criteria included respondents who were unwilling to fill out the questionnaire or were absent during data collection.

There were two research variables, namely independent and dependent variables. The independent variables included the mothers' education level, age, parity, family income, history of exclusive breastfeeding, and history of low birth weight (LBW) babies. The dependent variable was the incidence of stunting. The data collection instrument used a structured questionnaire that had been tested for validity and reliability. The validity test results on 20 respondents outside the sample showed that all items had a calculated r > table r (0.444) with a significance level of 5%, thus declaring it valid. The reliability test results using Cronbach's Alpha reached 0.871, which means that the instrument has a high level of reliability.

The data collection process was carried out in collaboration between the researchers and local posyandu cadres. The questionnaires were distributed directly with a three-day deadline for completion to ensure data accuracy and completeness. The collected data underwent editing, coding, tabulation, and data entry into SPSS software. The analysis was carried out in stages using the Chi-Square test for bivariate analysis and multiple logistic regression to determine the most dominant factors associated with stunting. If the data did not meet the Chi-Square requirements, the Fisher Exact test was used.

All research procedures underwent ethical review and obtained ethical approval from the Research Ethics Committee of the Surakarta Ministry of Health Polytechnic with ethical letter number: LB.02.03/KE/442/VI/2021. The ethical aspects upheld in this study included informed consent, anonymity, and confidentiality. The researchers ensured that all respondents understood the purpose of the study and provided written consent before data collection was conducted.

RESULTS

Table 1. Characteristics of Research Respondents Based on Stunting Risk Factors in Semen Village, Jatisrono (n = 62)

Risk Factors	Category	Cases n (%)	Control n (%)	Total n (%)
Mother's education	Elementary–Junior High School	18 (58.1)	21 (67.7)	39 (62.9)
	High School–Bachelor's Degree	13 (41.9)	10 (32.3)	23 (37.1)
Parity	Primipara	9 (29.0)	11 (35.5)	20 (32.3)
	Multipara	22 (71.0)	20 (64.5)	42 (67.7)

Risk Factors	Category	Cases n (%)	Control n (%)	Total n (%)
Mother's age	<20 or >35 years	15 (48.4)	7 (22.6)	22 (35.5)
	20–35 years	16 (51.6)	24 (77.4)	40 (64.5)
Breastfeeding	Not breastfeeding	22 (71.0)	23 (74.2)	45 (72.6)
	Breastfeeding	9 (29.0)	8 (25.8)	17 (27.4)
Family Income	< Minimum Wage	24 (77.4)	15 (48.4)	39 (62.9)
	≥ Minimum Wage	7 (22.6)	16 (51.6)	23 (37.1)
Birth Weight	<2,500 grams	20 (64.5)	8 (25.8)	28 (45.2)
	≥2,500 grams	11 (35.5)	23 (74.2)	34 (54.8)

Table 1 shows that most mothers of stunted children have low education (58.1%), are aged 20–35 years (51.6%), are multiparous (71.0%), do not breastfeed (71.0%), have a family income below the minimum wage (77.4%), and give birth to babies with a low birth weight of <2,500 grams (64.5%).

Table 2. Results of Bivariate Analysis of the Relationship Between Risk Factors and Stunting Incidence (n = 62)

Variable	χ^2	p-value	Description
Level of Education	0.622	0.430	Not significant
Parity	0.295	0.587	Not significant
Mother's age	4.509	0.034	Significant
Breastfeeding	0.081	0.776	Not significant
Family income	5.599	0.018	Significant
Birth Weight	9.378	0.002	Significant

Table 2 shows the results of the Chi-Square test, which indicates a significant relationship between maternal age (p=0.034), family income (p=0.018), and birth weight history (p=0.002) with stunting. Other variables such as education level, parity, and breastfeeding did not show a statistically significant relationship.

Table 3. Results of Multivariate Analysis of Factors Associated with Stunting Incidence (n = 62)

Variable	p-value	OR	95% CI	Interpretation
Mother's age	0.037	3.214	1.072–9.634	Significant
Family Income	0.021	3,657	1,220–10,962	Significant
Birth Weight	0.003	5,227	1.757–15.550	Significant

The results of multivariate analysis using logistic regression show that birth weight <2,500 grams has *an odds ratio (OR) of 5.227*, indicating a 5 times greater chance of experiencing stunting compared to toddlers with normal birth weight. The variables of maternal age (OR=3.214) and family income (OR=3.657) were also significantly associated, while the combined contribution of these three factors to stunting was R^2 = 33.4%.

DISCUSSION

The results of this study indicate that low birth weight (LBW), maternal age, and family income are significantly associated with stunting in toddlers in Semen Village, Wonogiri District. LBW is the most dominant factor influencing the risk of stunting, which shows the importance of maternal nutritional status during pregnancy for child growth. This finding is in line with previous studies showing that LBW is a major predictor of stunting in several regions of Indonesia (Natalia & Evitasari, 2020). This condition emphasizes the need for early intervention starting from pregnancy to prevent stunting from the outset.

This study is in line with several previous studies that found that maternal age and family economic conditions play an important role in stunting. Mothers who are too young or older than the ideal age range may be at risk of increasing growth disorders in children (Achadi et al., 2020). Low family income limits families' access to nutritious food and adequate health services, contributing to high stunting rates (Usman & Paramashanti, 2020). Therefore, multisectoral action involving socioeconomic aspects is essential to address this issue.

The implications of this study underscore the importance of strengthening specific and sensitive nutrition intervention programs, especially for pregnant women at risk of LBW, as well as strengthening education and economic empowerment of families. The First 1000 Days of Life program must be optimized so that the nutritional intake of mothers and babies can be adequately met (Achadi et al., 2020). In addition, improving access to education and providing information on parenting and nutrition is crucial to reducing stunting rates in villages prone to malnutrition. A holistic approach involving families, health workers, and the government is key to successfully combating stunting.

However, methodologically, this study has limitations in the form of the use of a retrospective case-control design, which relies on historical data that may cause respondent recall bias. The sample size is also relatively small because it uses total population sampling limited to one village, so the results of the study may not be generalizable to a wider area. These limitations must be taken into consideration when interpreting the results and planning further research involving a larger population and a longitudinal design.

An important recommendation from this study is the need for further research using longitudinal methods that can monitor the nutritional status of children and mothers from pregnancy to toddlerhood. The evaluation of nutrition intervention programs at the village level also needs to be improved so that their effectiveness can be measured comprehensively. Local governments can develop more responsive policies based on the main risk factors identified, such as strengthening economic support for poor families and improving access to maternal and infant health services ( ) (Pakpahan, 2021). Continuous health education for the community is also highly recommended.

Overall, this study confirms the need for multisectoral collaboration in addressing stunting and emphasizes the importance of maternal nutritional status and family socioeconomic conditions. Prevention and treatment of stunting must be a national priority, with a focus on early intervention to break the chain of malnutrition. The results of this study provide empirical evidence that can be used as a basis for optimizing stunting prevention programs and strengthening public health policies in malnutrition-prone areas such as Wonogiri.

CONCLUSION

This study shows that there is no significant relationship between the mother's level of education, parity, and breastfeeding with the incidence of stunting in toddlers in Semen Village, Jatisrono District, Wonogiri Regency. Conversely, the mother's age, family income, and low birth weight (LBW) have a significant relationship with the incidence of stunting, with LBW being the dominant influencing factor. These findings emphasize the need to focus interventions on improving maternal health and preventing LBW as strategic steps in reducing stunting rates in the region. Therefore, it is recommended that community health centers improve monitoring of maternal health by providing vitamins and education on fetal care, and that midwives organize stunting toddler classes and mobilize active posyandu cadres to monitor the health of mothers and newborns.

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