
The Relationship Between Maternal History Of Chronic Energy Deficiency (CED) And Stunting Incidence In Toddlers Aged 6 To 24 Months In Bagu Community Health Center, Central Lombok Regency

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Abstract

Stunting is a manifestation of chronic undernutrition characterized by impaired linear growth and disrupted developmental outcomes in early childhood. Maternal chronic energy deficiency during pregnancy is widely recognized as an important prenatal risk factor, yet the occurrence of stunting is multifactorial, with postnatal socioeconomic and environmental determinants also contributing substantially. This study aimed to analyze the association between maternal history of chronic energy deficiency during pregnancy and the severity of stunting among children aged 6 to 24 months in the working area of Bagu Primary Health Center. This study employed an analytical observational design with a cross-sectional approach. A total of 43 children aged 6 to 24 months were included as respondents, selected using a total sampling technique due to the limited population size. Maternal history of chronic energy deficiency was determined based on a mid upper arm circumference of less than 23.5 centimeters recorded in the maternal and child health handbook, while child nutritional status was assessed using the height for age index. Statistical analysis was conducted using the Fisher's Exact Test. All study subjects exhibited impaired growth, with 68.2 percent classified as stunted and 32.8 percent as severely stunted. The majority of mothers (79.1 percent) had normal nutritional status during pregnancy, while 20.9 percent had a history of chronic energy deficiency, and most households (88.4 percent) had income below the regional minimum wage. The statistical test demonstrated no significant association, with a p-value of 1.000. Maternal history of chronic energy deficiency during pregnancy was not significantly associated with the severity of stunting in this population, indicating that maternal nutritional status alone may not adequately explain the occurrence of stunting and that broader socioeconomic and postnatal environmental determinants may exert a more dominant influence.

Keywords: History Of CED, Maternal Nutritional Status, Stunting, Toddlers

INTRODUCTION

Stunting is a growth impairment experienced by children under five as a result of chronic malnutrition, characterized by a body height that does not correspond to the child's age (Dirjen Kesmas, 2025). Stunting refers to a short or very short stature based on height for age that falls below minus two standard deviations on the WHO growth curve, occurring as an irreversible condition caused by inadequate nutrient intake and recurrent or chronic infection during the first one thousand days of life (WHO, 2020).

Based on data from the Indonesian Nutritional Status Survey of 2024, the prevalence of stunting in Indonesia was recorded at 19.8 percent, showing a significant decrease compared with 2023, which stood at 21.5 percent. The province of West Nusa Tenggara recorded a stunting prevalence of 23.5 percent, placing it as the third highest nationally (Kemenkes RI, 2025). Central Lombok Regency was the area with the highest stunting prevalence in West Nusa Tenggara based on the 2022 survey, reaching 34.6 percent (Kemenkes RI, 2023). One of the villages in this region, Bagu Village, is categorized within the red zone for nutritional problems, with an underweight prevalence of 16.29 percent, a wasted prevalence of 6.09 percent, and a stunting prevalence reaching 11.22 percent (e-PPGBM, 2023).

Stunting not only affects the physical growth of children but also impedes brain development, cognitive ability, and academic achievement (Fitriyani et al., 2023). Children who experience stunting are at risk of cognitive developmental delays, weak memory, and low self confidence. In addition, stunting also influences motor development, communication, and the quality of human resources (Laily & Indarjo, 2023).

The factors that contribute to stunting include the level of poverty, education, parental knowledge, parenting patterns, the quality of complementary feeding, and the nutrition received during pregnancy (Kemenkes RI, 2022). One factor that plays an important role is the condition of the parents, particularly the nutritional status of the mother and an unbalanced diet, encompassing maternal health before pregnancy, during pregnancy, and after childbirth, as well as the growth of the fetus in the womb (Trisnawati et al., 2021). Nutritional problems in early pregnancy may lead to various disorders in pregnant women that risk affecting fetal growth, such as chronic energy deficiency, anemia, and preeclampsia (Ismawati et al., 2021).

Chronic energy deficiency in pregnant women is identified based on the measurement of the mid upper arm circumference showing a value of less than 23.5 centimeters (Rachmi et al., 2024). The main cause of chronic energy deficiency in pregnant women is the insufficient intake of macro and micro nutrients, particularly energy and protein, during pregnancy, aggravated by the low quality of food consumption and the presence of infectious diseases (Triyana & Winarti, 2025). Beyond nutritional and health aspects, the low level of maternal education may limit knowledge and awareness regarding the importance of nutritional fulfillment during pregnancy (Akbarini & Siswina, 2022).

Chronic energy deficiency in pregnant women may disrupt embryonic and fetal development due to insufficient energy intake during pregnancy (Harismayanti, 2021), and it also increases the risk of low birth weight in infants (Khairani & Ningsih, 2024). Based on data from the Central Lombok District Health Office, the prevalence of chronic energy deficiency among pregnant women reached 14.52 percent, a figure that is considered high compared with the national target (Dinas Kesehatan Lombok Tengah, 2023). Referring to this background and the absence of prior research on the relationship between chronic energy deficiency in pregnant women and the incidence of stunting in the working area of Bagu Primary Health Center, the researcher was interested in analyzing the association between maternal chronic energy deficiency during pregnancy and the severity of stunting among toddlers aged 6 to 24 months (Putri & Salsabila, 2023).

RESEARCH METHODS

Design, Subjects, and Instruments

This study employed an analytical observational design with a *cross-sectional* approach to determine the association between two variables, namely the history of maternal chronic energy deficiency during pregnancy as the independent variable and the severity of stunting as the dependent variable. The population comprised all mothers of stunted toddlers aged 6 to 24 months in the working area of Bagu Primary Health Center, Central Lombok Regency. The sampling technique used was *total sampling*, selected because of the limited population size; after a selection process based on the inclusion and exclusion criteria, a total of 43 respondents were obtained. The instruments used were the accessible maternal and child health handbook and a questionnaire covering respondent identity, posyandu utilization, complete basic immunization status, and parenting patterns such as breastfeeding and complementary feeding. The maternal history of chronic energy deficiency was determined using a mid upper arm circumference measurement of less than 23.5 centimeters recorded in the handbook, while child nutritional status was measured using the height for age index based on the WHO standard, with a *Z-score* below minus two standard deviations classified as *stunted* and below minus three standard deviations classified as *severely stunted*.

Procedure and Data Analysis

The research procedure began with the preparation of *ethical clearance* and administrative permits, followed by the identification of eligible respondents based on the inclusion and exclusion criteria. Secondary data on maternal chronic energy deficiency and child nutritional status were collected from the maternal and child health handbook, while primary data on respondent characteristics were obtained through questionnaires. After all data were collected, the verification process was carried out to ensure accuracy and completeness before the data were entered into

statistical software. The collected data were then processed and analyzed using the *Statistical Package for the Social Sciences* program. Univariate analysis was performed to describe the frequency distribution and percentage of each variable, whereas bivariate analysis was conducted using the *Fisher's Exact Test* because the variables were categorical and did not meet the assumptions required for the *Chi-Square* test, with the *Odds Ratio* calculated to estimate the strength of association between variables.

RESULTS AND DISCUSSION

Respondent Characteristics

Table 1. Characteristics of Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Sex of Toddler	Male	25	58.1
	Female	18	41.9
Nutritional Status	Stunted	27	62.8
	Severely stunted	16	37.2
Maternal Education	No school / not completing primary	2	4.7
	Primary school	3	7.0
	Junior high school	11	25.6
	Senior high school	21	48.8
	Higher education	6	14.0
Family Income	Below regional minimum wage	38	88.4
	Above regional minimum wage	5	11.6
Maternal History of CED	Not CED (MUAC greater than or equal to 23.5 cm)	34	79.1
	CED (MUAC less than 23.5 cm)	9	20.9
Total		43	100.0

Table 1 shows that the study subjects were dominated by male toddlers, namely 25 children (58.1 percent), while female toddlers numbered 18 children (41.9 percent). Based on the height for age index, all respondents were identified as experiencing growth impairment, with the largest proportion in the stunted category, namely 27 children (62.8 percent), while the remaining 16 children (37.2 percent) were in the severely stunted category. The educational background of the mothers was varied, with the highest proportion having completed senior high school (48.8 percent), although two mothers (4.7 percent) had a low level of education. In terms of economic indicators, most respondent families were in the prosperous below condition, with 38 families (88.4 percent) earning below the regional minimum wage. Regarding maternal nutritional history during pregnancy, the majority of mothers, namely 34 (79.1 percent), had good nutritional status, while nine mothers (20.9 percent) had a history of chronic energy deficiency marked by a mid upper arm circumference of less than 23.5 centimeters. According to the WHO threshold, a prevalence of chronic energy deficiency at or above 20 percent is categorized as a serious public health problem, so the proportion of 20.9 percent in this study indicates a substantial public health burden (Kementerian Kesehatan RI, 2018).

Severity of Stunting Among Toddlers in the Working Area of Bagu Primary Health Center

Table 2. Nutritional Status of Stunted Toddlers in the Working Area of Bagu Primary Health Center

Toddler Nutritional Status	Frequency (n)	Percentage (%)
Severely stunted	16	37.2
Stunted	27	62.8
Total	43	100.0

Table 2 shows that most toddlers were classified in the stunted category, namely 27 children (62.8 percent), while toddlers with severely stunted status numbered 16 children (37.2 percent). This distribution demonstrates that the majority of respondents were in the moderate stunting category, indicating that chronic growth impairment had occurred over a long period but had not yet fully

progressed to the most severe degree, reflecting an accumulation of nutritional and health risk exposures that developed continuously.

Description of Chronic Energy Deficiency Among Pregnant Women in the Working Area of Bagu Primary Health Center

Table 3. Description of Chronic Energy Deficiency Among Pregnant Women in the Working Area of Bagu Primary Health Center

Maternal History of CED	Frequency (n)	Percentage (%)
CED	9	20.9
Not CED	34	79.1
Total	43	100.0

Table 3 shows that most mothers did not experience chronic energy deficiency, with a mid upper arm circumference greater than 23.5 centimeters, namely 34 mothers (79.1 percent), while mothers who experienced chronic energy deficiency numbered nine (20.9 percent). This finding indicates that although the majority of mothers had adequate nutritional status during pregnancy, chronic maternal nutritional problems were still present in the study area and remain relevant as a prenatal risk factor for fetal growth disturbance, so that early detection through mid upper arm circumference screening at antenatal visits continues to be an important preventive measure.

Relationship Between CED Status and the Severity of Stunting in the Working Area of Bagu Primary Health Center

Table 4. Relationship Between CED Status and the Incidence of Stunting in the Working Area of Bagu Primary Health Center

Maternal History of CED	Severely stunted	Stunted	Total	p-value	OR (95% CI)
CED	3 (33.3%)	6 (66.7%)	9 (100%)	1.000	1.238 (0.263 to 5.827)
Not CED (Normal)	13 (38.2%)	21 (61.8%)	34 (100%)		
Total	16	27	43		

Table 4 shows that of the nine mothers with a history of chronic energy deficiency, three children (33.3 percent) experienced the severely stunted condition, while six children (66.7 percent) were in the stunted category. Among mothers without a history of chronic energy deficiency, the proportion of severely stunted cases was slightly higher, namely 13 children (38.2 percent), while 21 children (61.8 percent) were in the stunted category. The statistical test using the Fisher's Exact Test yielded a p-value of 1.000 (p greater than 0.05), indicating that there was no significant association between maternal history of chronic energy deficiency during pregnancy and the severity of stunting. The Odds Ratio value was 1.238 with a 95 percent Confidence Interval of 0.263 to 5.827; because the interval still includes the value of one, the association was not statistically significant, so that even though there was a tendency toward increased risk, the available evidence was not strong enough to confirm a meaningful relationship.

Discussion

Characteristics of Respondents

The analysis of respondent characteristics involving 43 toddlers showed that stunted toddlers aged 6 to 24 months in the working area of Bagu Primary Health Center were predominantly male, namely 25 children (58.1 percent), while females numbered 18 children (41.9 percent). Biologically, several studies note that boys tend to be more vulnerable to growth disturbances due to infection factors and higher energy needs compared with girls (Laksono et al., 2022). Based on age group, most respondents were aged 15 months or older, namely 33 children (76.7 percent), which is consistent with the concept of the first one thousand days of life, in which the manifestation of stunting generally becomes apparent after the age of 12 months as a result of the accumulation of nutritional deficits and repeated infection exposure (Kementerian Kesehatan RI, 2022).

In terms of maternal education, the majority had completed senior high school, namely 21 mothers (48.8 percent), followed by junior high school, higher education, primary school, and those with no schooling. Theoretically, maternal education plays an important role in improving health

literacy and child feeding practices, and the study by Hafid et al. (2023) states that mothers with low education have a higher risk of having stunted children. Based on family income, the majority of respondents were in the below regional minimum wage category, namely 38 families (88.4 percent), while only five families (11.6 percent) earned above the regional minimum wage. The dominance of low income families indicates that socioeconomic conditions are a strong contextual factor in the incidence of stunting, because family income affects the purchasing power for food, particularly animal protein sources that are essential for the linear growth of children.

In this study, most mothers did not have a history of chronic energy deficiency during pregnancy (79.1 percent), while 20.9 percent experienced it. Theoretically, chronic energy deficiency in pregnant women can cause fetal growth disturbances, including intrauterine growth restriction, which increases the risk of infants being born with low birth weight and continuing to stunt later in life (Mijayanti et al., 2020). Therefore, efforts to prevent chronic energy deficiency in pregnant women remain relevant and strategic as part of nutritional intervention during the first one thousand days of life, which is recognized as a crucial phase in determining the nutritional status, growth capacity, and long term health of children (World Health Organization, 2020).

Relationship Between Chronic Energy Deficiency and the Severity of Stunting Among Toddlers

The bivariate analysis using the Fisher's Exact Test showed a p-value of 1.000 (p greater than 0.05), meaning that there was no significant association between maternal history of chronic energy deficiency and the severity of stunting. The Odds Ratio of 1.238 theoretically indicates that mothers with a history of chronic energy deficiency have a 1.238 times greater chance of having stunted children compared with mothers without such a history; however, because the 95 percent Confidence Interval still includes the value of one, the association cannot be considered statistically significant. This finding indicates that maternal nutritional status during pregnancy is not the sole determinant of the severity of stunting, and that postnatal improvement or intervention likely contributes to the variation in the degree of stunting found.

The result of this study is consistent with several previous studies, one of which was conducted by Astrid et al. (2025), which showed that there was no significant relationship between the nutritional status of pregnant women and the incidence of stunting in children (p equals 0.386), and even reported that the proportion of stunted children was higher in the group of mothers with normal nutritional status. A similar finding was obtained by Astuti and Handajani (2025), who stated that the nutritional status of mothers in the first trimester, based on both body mass index and mid upper arm circumference, did not show a significant relationship with the incidence of stunting (p greater than 0.05), emphasizing that stunting is a multifactorial condition. This finding was further reinforced by the study of Noviyanti and Mulyasari (2023), which also showed that a history of chronic energy deficiency during pregnancy was not significantly associated with the incidence of stunting in toddlers aged 12 to 35 months (p equals 0.431).

This result is also in line with the study conducted by Qoyyimah et al. (2021) at Jatinom Primary Health Center, which stated that there was no significant relationship between maternal history of chronic energy deficiency and the incidence of stunting, with a p-value of 0.605, concluding that the majority of mothers of stunted toddlers actually had a normal pregnancy history. A similar result was found in the study by Rahmawati (2024) in the working area of Bungi Primary Health Center, Pinrang Regency, which showed a statistically non significant result with a p-value of 0.317. However, this study differs from several previous studies that consistently showed a significant relationship between chronic energy deficiency in pregnant women and the incidence of stunting, such as the study by Khairani and Ningsih (2024) in the Pringgarata area, which found a significant association where mothers with chronic energy deficiency had a higher risk than mothers with normal nutritional status.

The difference in results between studies is most likely caused by the sample characteristics and other dominant factors at the more homogeneous research location. In this study population, children born to mothers without a history of chronic energy deficiency also experienced stunting in a large

proportion, namely 34 children. This phenomenon indicates that in the working area of Bagu Primary Health Center, the past prenatal nutritional history of the mother is not the main differentiating factor, but rather has shifted to postnatal factors, particularly socioeconomic and environmental conditions. Given that the majority of respondents had incomes below the regional minimum wage, economic limitations can restrict access to nutritious food, especially animal protein sources, and affect the quality of sanitation and access to clean water, which increases the risk of recurrent infections that ultimately worsen the growth status of children, consistent with the concept that social determinants of health contribute substantially to the global burden of stunting (World Health Organization, 2020).

Theoretically, the relationship between maternal nutritional status and child growth can be explained through the developmental origins of health and disease framework proposed by Barker, which states that the intrauterine environment, including the adequacy of maternal energy and nutrient intake during pregnancy, plays a role in the process of fetal programming that can affect organ structure, metabolic function, and the growth capacity of the child in later life (Barker, 2004). When a mother experiences chronic energy deficiency, the supply of macro and micro nutrients becomes suboptimal, which can inhibit fetal growth and increase the risk of intrauterine growth restriction and low birth weight, which are closely related to growth disturbances in the subsequent period (Black et al., 2013). The absence of a significant relationship in this study does not mean that chronic energy deficiency has no role at all, but rather shows that in a population with relatively homogeneous socioeconomic conditions and high environmental risk exposure, postnatal factors can become stronger determinants of the degree of stunting.

Research Limitations

This study has several limitations that should be considered in interpreting the results. The design used was cross-sectional, so that the measurement of variables was carried out at a single point in time and could not confirm a causal relationship between chronic energy deficiency during pregnancy and the incidence of stunting in children. In addition, the relatively small number of respondents, namely 43, may affect the strength of the statistical analysis and limit the generalization of the results to a broader population. The assessment of chronic energy deficiency was also based solely on the mid upper arm circumference indicator, which reflects macro energy reserves and does not fully describe micronutrient status, while several other factors such as maternal disease history, child health conditions, and environmental and socioeconomic factors were not analyzed in depth, so that the possibility of confounding factors still needs to be considered.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that there was no significant relationship between maternal history of chronic energy deficiency during pregnancy and the severity of stunting among toddlers aged 6 to 24 months in the working area of Bagu Primary Health Center, Central Lombok Regency (p-value equals 1.000). The characteristics of respondents showed that the majority of toddlers were male (58.1 percent) and aged 15 months or older (76.7 percent), while most mothers came from families with a prosperous below socioeconomic condition, marked by incomes below the regional minimum wage (88.4 percent). Based on the severity of stunting, most toddlers were in the stunted category (62.8 percent), while the remainder were severely stunted (37.2 percent). Although the majority of mothers had good nutritional status during pregnancy (79.1 percent), 20.9 percent still experienced chronic energy deficiency, indicating that these findings underline the multifactorial nature of stunting, in which socioeconomic constraints and postnatal environmental conditions may exert a more dominant influence on child growth outcomes than maternal nutritional status during pregnancy alone.

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