

The Relationship Between Mother's History of Anemia and Chronic Energy Deficiency (CED) and The Incidence of Stunting in Toddlers Aged 0–59 Months

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Abstract

Introduction: Child growth and development are affected by stunting, a chronic nutritional problem that occurs primarily in communities with low nutritional levels. Maternal nutritional status during pregnancy is a major cause of stunting, including anemia and chronic energy deficiency. **Objective:** to determine the relationship between maternal anemia and CED history on stunting in toddlers aged 0–59 months. **Method:** The following study used an analytical design with a retrospective approach. Data were obtained from medical records at the Welamosa Community Health Center and analyzed using the Chi-Square test and logistic regression. **Result and Discussion:** Of the 147 respondents, 70.7% of toddlers experienced stunting. The analysis results showed that maternal anemia had a significant relationship with stunting (p -value = 0.000, OR = 6.507). CED in mothers also showed a significant relationship with stunting (p -value = 0.008, OR = 3.676). Multivariate analysis showed that anemia was the most dominant factor in stunting compared to CED. Mothers with a history of anemia and chronic kidney disease (CED) are at higher risk of giving birth to stunted children. **Conclusions:** more optimal nutritional interventions for pregnant women are needed through education, iron supplementation, and regular nutritional status monitoring to prevent stunting and improve maternal and child health.

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Introduction

Stunting is a global nutritional issue that affects child growth and development, particularly in developing countries. According to the World Health Organization (2023), stunting is defined as a child being shorter (dwarf) than the average height for that age group (Naryono, 2023). Inadequate dietary intake during pregnancy and during a child's growth and development can lead to stunting. The 2018 Basic Health Research (Riskesdas) reported a stunting prevalence rate among toddlers in Indonesia of 30.8%. This figure includes 11.5% of toddlers with very short stature and 19.3% with stunting. This data shows a decrease compared to the 2013 Basic Health Research (Riskesdas), where the stunting rate reached 37.2%, consisting of 18% of toddlers with very short stature and 19.2% with short stature.¹ Based on the data, the prevalence of stunting in Ende Regency increased from 6.8% in 2023, with 1,241 affected toddlers, to 7.8% in 2024, with 1,319 toddlers. Wewaria District itself experienced an increase of 6.18%, from 48.88% in 2023 to 55.06% in 2024 (Ende, 2026). a study on the relationship between chronic energy deficiency in pregnant women with low birth weight and stunting in infants at the Tawiri Community Health Center in Ambon City showed significant results: stunting was 14.48 times more likely to occur in children born to mothers with CED compared to children born to mothers without CED (RI, 2019)

The focus of this research indicates that anemia and chronic energy deficiency in mothers are more than just personal health issues; they also have implications for children's nutritional status, which can lead to stunting. From a social perspective, the fact that many mothers in Wewaria District may face challenges in obtaining adequate nutrition, either due to economic constraints or a lack of nutritional knowledge, creates an environment that is not conducive to optimal child growth. This situation underscores the importance of public health interventions to improve the nutritional status of mothers and children, as well as to raise awareness of the importance of nutrition in preventing stunting (Lenau, Hardiningsih, ..., & 2023, n.d.; Ruaida, Terpadu, & 2018, n.d.). Although stunting is influenced by multiple factors—such as child age and sex, infection history, sanitation, socioeconomic status, maternal education, breastfeeding and complementary feeding practices, and maternal height—this study focuses specifically on maternal anemia and chronic energy deficiency as key maternal determinants that are measurable and directly related to pregnancy nutrition.

In Wewaria District, limitations in maternal nutritional intake, potentially influenced by economic constraints and insufficient nutritional knowledge, may contribute to the persistence of anemia and chronic energy deficiency among pregnant women, thereby increasing the risk of stunting in children. This condition highlights the need for targeted maternal nutrition interventions as part of stunting prevention strategies. Based on these considerations, this study aims to analyze the relationship between a history of maternal anemia and chronic energy deficiency and the incidence of stunting among children aged 0–59 months in Wewaria District, Ende Regency.”

Method

The following study used a retrospective analytical approach. According to Sugiyono (2019), research that examines past events to identify their causes is known as retrospective research (Sugiyono, 2013). The study was conducted in Wewaria District, Ende Regency, East Nusa Tenggara. Data collection and implementation began from February 1 to February 3, 2025. The population of the following study were 147 toddlers and their mothers whose data were recorded at the Welamosa Community Health Center,

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Wewaria District. This study used 104 samples of mothers with toddlers experiencing stunting and 43 mothers with toddlers who did not experience stunting who met the inclusion criteria (toddlers aged 0-59 months who live in Wewaria District; Mothers who have complete data regarding the history of hemoglobin examination and MUAC measurements during pregnancy; Mothers who reside permanently in Wewaria District) and exclusion criteria (toddlers with congenital abnormalities that can affect growth; Mothers who do not have a history of MUAC measurements and hemoglobin examination results; Mothers who do not reside permanently in Wewaria District). The following study used secondary data obtained from medical records in the Maternal and Child Health Book (KIA) of respondents at the Welamosa Community Health Center. This data includes results from routine evaluations of child growth, including height and length measurements. Additionally, the data also included maternal mid-upper arm circumference measurements recorded at the community health center.

Result and Discussion

1. Result

The following study aims to determine the relationship between maternal anemia and chronic energy deficiency (CED) and stunting in toddlers aged 0-59 months in Wewaria District, Ende Regency. The findings from the study were then processed using computer software, by examining statistical data from 147 respondents registered at the Welamosa Community Health Center, Wewaria District, Ende Regency. Data collection began from February 1 to February 3, 2025.

Table 1
Distribution Respondents Based on Gender and Age

Description	Frequency	Percentage (%)
Gender		
Male	68	46.26
Female	79	53.74
Age		
0-11 Month	14	9.52
12-23 Month	38	25.85
24-36 Month	37	25.17
37-47 Month	36	24.49
48-59 Month	22	14.97

Table 2
Frequency Distribution of Respondents Based on History of Anemia and Chronic Energy Deficiency (CED)

Description	Frequency	Percentage (%)
Anemia		
Yes	88	59.9
No	59	40.1
Chronic Energy Deficiency (CED)		
Yes	86	58.5
No	61	41.5

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Table 3

Bivariate Analysis of the Relationship between Maternal Anemia History and Stunting

	Stunting		No Stunting		Total		<i>p- Value</i>
	N	%	N	%	N	%	
Maternal Anemia History							
Anemia	74	84	14	16	88	100	0.000
No Anemia	30	51	29	49	59	100	

Based on Table 3, among the 88 mothers with anemia, 74 toddlers (84%) experienced stunting, whereas among the 59 mothers without anemia, only 30 toddlers (51%) experienced stunting. Statistical analysis showed a p-value of 0.000, indicating a highly significant association between maternal anemia and stunting.

Table 4

Bivariate Analysis of the Relationship between Maternal CED History and Stunting

	Stunting		No Stunting		Total		<i>p- Value</i>
	N	%	N	%	N	%	
Maternal CED History							
CED	68	79	18	21	86	100	0.008
No CED	36	59	25	41	61	100	

Based on the results of Table 4, an analysis of the relationship between maternal CED and the incidence of stunting in children was conducted. The data show that of the 86 mothers with CED, 68 toddlers (79%) experienced stunting, while of the 61 mothers without CED, 36 toddlers (59%) experienced stunting. The p-value was 0.008, indicating a significant association between maternal CED and stunting incidence.

Table 5

The Dominant Influence of a History of Anemia and KEK in Mothers on the Incidence of Stunting

	Stunting		No Stunting		Total		<i>p- Value</i>	<i>OR</i>
	N	%	N	%	N	%		
Anemia	74	84	14	16	88	100	0.000	6.507
CED	68	79	18	21	86	100	0.008	3.676

Based on the multivariate analysis presented in the table, anemia has a highly significant effect on stunting incidence in toddlers. Of the 88 mothers with anemia, 74 toddlers (84%) experienced stunting, with a p-value of 0.000 indicating a highly significant association between maternal anemia and stunting in toddlers. The odds ratio of 6.507 indicates that toddlers born to anemic mothers are 6.5 times more likely to experience stunting compared to toddlers born to mothers without anemia. In addition to anemia, chronic energy deficiency syndrome (CED) also has a significant influence on the incidence of stunting, although the effect is smaller than that of anemia. Of the 86 mothers with CED, 68 toddlers (79%) experienced stunting, with a p-value of 0.008 indicating a significant association. The odds ratio of 3.676 indicates that mothers with CED are 3.6 times more likely to give birth to stunted toddlers compared to mothers without CED.

2. Discussion

Overview of Mothers with a History of Anemia in Wewaria District

Of the 147 respondents, 88 mothers (59.9%) were diagnosed with anemia, while 59 mothers (40.1%) were not. Anemia in pregnant women can be caused by insufficient iron intake, which impacts fetal growth and increases the risk of stunting in toddlers. According to (Susanti, Kirana, Social, & 2025, n.d.), anemia in pregnancy also causes a decreased appetite, thus reducing the mother's nutritional intake. This condition automatically affects the availability of nutrients for the fetus. When the fetus experiences nutritional deficiencies, it will disrupt fetal growth in the womb and increase the risk of stunting. Experiencing malnutrition puts the baby at risk of stunting.

Anemia in women of childbearing age (WUS) is closely linked to the incidence of stunting in newborns. Anemia that occurs before and during pregnancy can cause impaired fetal growth, fetal distress, and increase the risk of low birth weight (LBW), which is a major factor in stunting in toddlers. Furthermore, untreated anemia in adolescent girls can progress to anemia during pregnancy, which carries the risk of bleeding during delivery and impaired fetal growth, which can lead to stunting. Therefore, preventing anemia in WUS through increased iron consumption, nutritional education, and the provision of iron-fortified tablets (TTD) is crucial to reducing the incidence of stunting in the future (James, 2021; Li, Liang, Liang, Shi, & Han, 2019; Wija & Hilman, 2018)

The Relationship Between Mothers and a History of Anemia and the Incidence of Stunting in Toddlers

Anemia in pregnant women has been shown to have a significant impact on the incidence of stunting in toddlers. Research shows that 84% of children of anemic mothers experience stunting, while 51% of children of non-anemic mothers experience the same condition. This is in line with the theory that anemia during pregnancy can inhibit the transport of nutrients necessary for fetal development through the placenta.6 Consequently, children born to anemic mothers tend to have low birth weight and height that is not appropriate for their age, which are indicators of stunting.

Anemia, or iron deficiency, can disrupt the transport of oxygen and nutrients to the fetus, thus inhibiting fetal growth and development in the womb. According to the World Health Organization, anemia in pregnant women is associated with an increased risk of low birth weight, stunted growth, and suboptimal cognitive development in children, all of which are major risk factors for stunting (De Onis et al., 2013; Maulina & Rachmayanti, 2021; Zen Rahfiludin, Aruben, Gizi Kesehatan Masyarakat, Kesehatan Masyarakat Universitas Diponegoro, & Kesehatan, 2018). Furthermore, a report from the Indonesian Ministry of Health confirms that pregnant women with anemia are at risk of giving birth to children with poor nutritional status, which can progress to stunting if not properly managed.

Previous research by (Salakory & Wija, 2021) also showed that anemia in pregnant women contributes to the risk of stunting, primarily due to a lack of iron, which is necessary for optimal growth and development. (Killeen & Tambe, 2024) stated that anemia causes a decrease in hemoglobin levels, which transports oxygen and nutrients throughout the body, including the fetus. As a result, the fetus experiences a deficiency in essential nutrients, which can lead to growth disorders. 6 Thus, the presence of anemia in the mother not only affects the mother's health but also the health and growth of the child. Research by (Hidayat, Susanto, & Lestari, 2023) confirmed that appropriate

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nutritional interventions during pregnancy can significantly reduce the risk of stunting in children. The study results showed that mothers who received iron and folic acid supplementation had children with better growth compared to mothers who did not receive such interventions. This supplementation not only helps increase the mother's hemoglobin levels but also ensures the fetus receives sufficient nutrients for optimal growth (Pasalina, Ihsan, Kesehatan, & 2023, n.d.).

However, not all studies show similar results. (Warsini, Hadi, Dietetik, & 2016, n.d.) showed that CED and anemia are not risk factors for stunting in toddlers. This study showed that although anemia and CED in pregnant women can increase the risk of stunting, no statistically significant association was found in the studied population. Other factors, such as maternal height and household food security, have a greater influence on stunting. Systemic iron availability during pregnancy plays a crucial role in supporting fetal growth and development. When iron intake is insufficient and anemia develops, the transport of oxygen and nutrients to the fetus is disrupted, leading to impaired intrauterine growth and development. Suboptimal fetal growth leads to stunting in infants after birth (Yuwanti, Mulyaningrum, & Susanti, 2021)

The Relationship Between a History of Maternal Chronic Energy Deficiency (CED) and Stunting in Toddlers

Chronic energy deficiency in pregnant women is also a significant risk factor for stunting in toddlers. Research shows that 79% of toddlers born to mothers with CED experienced stunting, while 59% of children born to mothers without CED experienced the same condition. Prolonged maternal energy deficiency during pregnancy not only impacts the mother's health but also inhibits fetal growth, increases the risk of low birth weight (LBW), and reduces the child's potential for optimal growth in the early years of life. CED can disrupt placental development, impacting the effectiveness of nutrient transfer from the mother to the fetus (Walimah & Rahma, 2022). According to the Indonesian Ministry of Health (2021), inadequate calorie and protein intake during pregnancy can result in low birth weight and a high risk of stunting (Hapsari, Fadhilah, & Wardhani, 2022) Research by Puspitasari (2022) found that prolonged malnutrition during pregnancy directly impacts child growth and development. Therefore, mothers experiencing chronic energy deficiency (CED) are more likely to give birth to stunted children due to limited energy and nutrient reserves. Therefore, efforts to improve maternal nutritional status, including preventing CED, are crucial in reducing the risk of stunting in toddlers (Puspitasari, 2023).

Chronic energy deficiency (CED) in pregnant women can also affect placental development, which plays a crucial role in the transport of nutrients from the mother to the fetus. If the placenta does not function properly due to energy deficiency, the supply of nutrients needed for fetal growth is suboptimal. This can hinder continued fetal growth after birth, increasing the risk of stunting in children. Research by Setyawati (2025) also showed a significant association between CED in mothers and the incidence of stunting, emphasizing the importance of appropriate interventions to improve maternal nutritional status during pregnancy (Audi Setyawati, Oktavia, Puspito Rini, & kesehatan Ummi Khasanah, 2025). However, research conducted at the Grong-Grong Community Health Center in Pidie Regency by Ramadhaniah et al. (2022) showed that CED during pregnancy was not associated with stunting (p -value 0.494). The lack of association between CED in pregnant women and stunting in toddlers is likely due to adequate nutritional interventions, the more dominant influence of postnatal factors, and the greater

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role of socioeconomic and environmental factors (Ramadhaniah, Azvia, Masyarakat, & 2022, n.d.)

Factors that can cause CED in pregnant women include age, pregnancy spacing, maternal education level, maternal knowledge, dietary intake or consumption patterns, and husband's support. Community health centers (Puskesmas) are tasked with implementing health policies to achieve health development goals in their respective areas. Efforts to improve the health and nutritional status of pregnant women are also carried out through Antenatal Care (ANC) at health care facilities to implement promotive and preventive measures to prevent CED in pregnant women (Islam & Masud, 2018; Ketut Suarayasa, 2021)

Dominant Factors: Maternal History of Anemia and History of Chronic Economic Deficiency (CED) on the Incidence of Stunting in Toddlers

Based on the results of the multivariate analysis in this study, maternal anemia was the most dominant factor in the incidence of stunting in toddlers compared to CED. Of the 88 mothers with anemia, 74 toddlers (84%) experienced stunting, with a p-value of 0.000 and an odds ratio (OR) of 6.507. This means that mothers with a history of anemia were 6.5 times more likely to give birth to a child with stunting than mothers without anemia. On the other hand, CED also had a significant influence on the incidence of stunting, although the effect was smaller than anemia. Of the 86 mothers with CED, 68 toddlers (79%) experienced stunting, with a p-value of 0.008 and an odds ratio (OR) of 3.676. This indicates that mothers with a history of CED had a 3.6 times greater risk of giving birth to a child with stunting compared to mothers without CED. These results confirm that maternal anemia history has a greater impact than KEK in increasing the risk of stunting in children. Therefore, anemia prevention interventions during pregnancy, such as iron supplementation, education about a balanced diet, and maternal health monitoring, are crucial steps in reducing stunting rates in Wewaria District.

According to Hulayya (2018), anemia in pregnant women is generally caused by inadequate nutritional intake, iron deficiency in the diet, impaired iron absorption, and chronic diseases such as pulmonary tuberculosis, intestinal worm infections, and malaria. Pregnant women are considered anemic if their hemoglobin (Hb) levels are less than 11 g/dl, based on laboratory test results. Clinically, anemia in pregnant women can be recognized through symptoms such as fatigue, dizziness, blurred vision, and vomiting that are more severe in the first trimester of pregnancy (Hulayya, 2021).

Conclusion

This study demonstrates a significant relationship between maternal nutritional problems during pregnancy and the incidence of stunting among children aged 0–59 months in Wewaria District. A history of maternal anaemia and chronic energy deficiency were both significantly associated with higher stunting prevalence, with anaemia emerging as the most dominant risk factor. Children born to mothers with anaemia had a substantially higher likelihood of experiencing stunting compared to those born to non-anaemic mothers. These findings highlight the critical role of maternal nutritional status during pregnancy in determining child growth outcomes. Therefore, strengthening preventive efforts through improved maternal nutrition education, routine screening, adequate iron supplementation, and continuous monitoring during pregnancy is essential to reduce stunting prevalence and enhance maternal and child health outcomes in high-risk areas

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