

LITERATURE REVIEW: NUTRITIONAL STATUS OF PREGNANT WOMEN WITH LOW BIRTH WEIGHT (LBW)

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ABSTRACT

Background: Pregnancy is a critical period requiring optimal nutrition to support maternal health and fetal development. In Indonesia, Chronic Energy Deficiency (CED) remains a significant public health issue, with prevalence ranging from 13.6% to 35.9%, identified by an Upper Arm Circumference (UAC) below 23.5 cm. Poor nutritional status during this stage can lead to various adverse outcomes affecting both mother and child. **Objective** This study aims to examine the relationship between maternal nutritional status and the occurrence of Low Birth Weight (LBW) and stunting, as well as to identify the main factors that influence nutritional status throughout pregnancy. **Methods** A descriptive-analytical literature review was conducted using secondary data sourced from scientific journals published between 2013 and 2019. Relevant information was collected, analyzed, and synthesized to draw consistent conclusions. **Result** The findings show that pregnant women with CED have a risk 2.2 to 4.15 times higher of giving birth to infants with LBW and children who experience stunting compared to mothers with normal nutritional status. Nutritional status is strongly influenced by maternal knowledge, attitude, and socioeconomic conditions, while factors such as education level and parity do not always demonstrate a direct effect. Furthermore, health education proves effective in improving understanding and preventing nutritional deficiencies. **Conclusion** Maternal nutritional status is a key determinant of successful pregnancy and long-term child growth. Regular monitoring and early intervention are therefore necessary to improve maternal health and break the intergenerational cycle of malnutrition.

Keywords: Maternal nutritional status, CED, LBW, stunting, nutrition knowledge

INTRODUCTION

Pregnancy is a critical period that determines the mother's health and fetal growth. During this time, energy and nutrient requirements increase gradually by 150 kcal per day in the first trimester and 350 kcal per day in the second and third trimester to support fetal development and physiological changes in the mother's body. If these needs are not met, nutritional problems such as Chronic Energy Deficiency (CED) may occur, indicated by an Upper Arm Circumference of less than 23.5 cm. This condition remains a major concern in Indonesia due to its high prevalence and its link to pregnancy complications and long-term growth disorders in children. (Lubis, 2003)

Stunting, defined as impaired growth, affects one out of every three children in Indonesia. In Lampung Province, its prevalence reaches 42.62%, with the highest rate recorded at 52.68% in Central Lampung Regency in 2017. As a chronic disorder that begins during fetal development, stunting is strongly determined by maternal nutritional status. Pregnant women with CED have a higher risk of giving birth to infants with Low Birth Weight, which in turn becomes a major risk factor for stunting in early childhood.(Alfarisi et al., 2019)

Maternal nutritional status is influenced by various factors, most notably the mother's knowledge and attitude toward nutrition; better understanding leads to a more balanced diet. Socioeconomic status also plays a role, as it determines the ability to provide nutritious food.(Sana et al., 2025) However, many pregnant women still lack sufficient knowledge, so the risk of nutritional deficiency remains high. While most studies confirm a significant relationship between maternal nutrition and stunting, some findings show no association, possibly due to early health interventions. This review summarizes and analyzes these factors and their effects, serving as a basis for developing strategies to prevent and address nutritional problems in the community. (Lubis, 2003)

METHODS

This study employs a literature review method, which is a type of research that collects, reviews, and analyzes information obtained from various scientific sources relevant to the topic of discussion. The approach used is descriptive-analytical, aiming to describe the relationship between the nutritional status of pregnant women, its influencing factors, and its impact on child growth.

The data used in this study are secondary data obtained from scientific journals and research reports published between 2013 and 2019. Data sources were accessed through databases such as Google Scholar, national health journals, and official publications from health institutions, covering studies conducted in various regions of Indonesia.

The search was carried out using keywords including: nutritional status of pregnant women, chronic energy deficiency, upper arm circumference, knowledge and attitude, low birth weight, and stunting. Following the screening process, 2 relevant articles were selected and used as the main references for this review. Data were analyzed qualitatively by comparing the research results, findings, and conclusions of each selected article. The analysis was conducted to identify similarities, differences, and relationships between variables, which were then arranged systematically to form a comprehensive overview.

RESULTS AND DISCUSSIONS

Based on a review of several scientific journals used as sources, a comprehensive overview was obtained regarding the nutritional status of pregnant women, the factors influencing it, and its effects on pregnancy and child growth.(Dharmalingam et al., 2010) Studies conducted across various regions in Indonesia show that the prevalence of pregnant women experiencing Chronic Energy Deficiency (CED) varies from 13.6% to 35.9%, characterized by an Upper Arm Circumference (UAC) measurement of less than 23.5 cm. (Eva Ratna Dewi et al., 2025)

Most studies indicate a significant relationship between maternal nutritional status and pregnancy outcomes, whereby women with CED face a higher risk of pregnancy

complications, giving birth to infants with Low Birth Weight (LBW), and having children who experience growth disorders.(Lubis, 2003)

One study conducted in Central Lampung Regency involving 237 respondents found that pregnant women with CED had a 2.2 times greater risk of having toddlers with stunting compared to women with normal nutritional status, with a significance value of $p = 0.005$. This finding is consistent with other studies reporting a risk of up to 4.15 times higher, although one study found no significant association; this difference may be attributed to early nutritional interventions and routine antenatal care provided during pregnancy. (Kartikasari, 2011)

Furthermore, maternal nutritional status is influenced by various factors. Research conducted in Manado and other regions confirms a significant relationship between the mother's level of knowledge and attitude toward nutrition and her nutritional status during pregnancy, with p -value 0.000 and 0.003 respectively. Women who understand the increased energy requirements an additional 150 kcal per day in the first trimester and 350 kcal per day in the second and third trimester tend to maintain better dietary intake. day in the first trimester and 350 kcal per day in the second and third trimester tend to maintain better dietary intake.(Triana et al., 2026) Socioeconomic status and employment also play a role, as women with sufficient income are better able to meet their nutritional needs compared to those facing economic constraints. In contrast, educational level and parity do not always show a significant relationship, since nutritional knowledge can also be obtained through counseling and health information. (Goni et al., 2013)

The impact of nutritional status is not limited to pregnancy but also extends to the child's subsequent growth. Women with CED are more likely to have smaller placentas, which reduces nutrient supply to the fetus and leads to growth restriction starting in the womb.(et al., 2021) This condition may result in stunting, a chronic growth disorder that affects a child's physical and cognitive development in the long term. In addition, maternal undernutrition increases the risk of anemia, reduced immunity, and other complications during childbirth. Overall, findings from these studies confirm that maternal nutritional status is a key determinant of successful pregnancy and the quality of the child's future growth and development. (Alfarisi et al., 2019)

Table 1. Table of characteristics

no	Title/Study location	Sample/Period	Main Variable Measured	Key Results
1	Prevent Stunting Early / Atu Lintang Health Center, Aceh	60 third-trimester pregnant women	Level of knowledge regarding Chronic Energy Deficiency (CED)	Before education: 56.7% had poor knowledge; After education: 68.3% had good knowledge
2	Education on Nutritional Needs / PMB M Ginting, Simalungun	30 first-trimester pregnant women	Understanding of nutritional needs and participation	Majority aged 20–35 years (90%); all participants actively engaged in educational activities
3	Health Education &	20 pregnant women	Knowledge level regarding	Pre-test: 50% had poor knowledge;

	Hyperemesis Gravidarum / BPM Mesrida		nutrition during nausea and vomiting	Post-test: 55% had good knowledge; 30% experienced weight loss
4	Maternal Nutritional Status & Stunting / Central Lampung	237 mother-toddler pairs	Relationship between Upper Arm Circumference (UAC) and stunting incidence	Prevalence of CED 35.9%; risk of stunting 2.2 times higher in mothers with CED; $p=0.005$; $OR=2.228$
5	Knowledge & Attitude / Bahu Health Center, Manado	pregnant women	Association of knowledge, attitude, with UAC/Body Mass Index	Knowledge: $p=0.000$; Attitude: $p=0.003$; both significantly related to nutritional status
6	Early Detection of CED / Sukajadi Health Center, Prabumulih	20 pregnant women	UAC measurement	65% had UAC <23.5 cm (at risk of CED); 60% undernourished; upward trend in cases 2017–2019
7-10	Review of Nutrition & Pregnancy / Various regions of Indonesia	Secondary data 2013–2024	CED prevalence and energy requirements	National CED prevalence 13.6%–35.9%; additional energy needs: 150 kcal (1st trimester), 350 kcal (2nd-3rd trimesters); stunting risk up to 4.15 times higher

Based on the findings of various studies, it is evident that the nutritional status of pregnant women plays a central role in determining pregnancy outcomes, delivery conditions, and the quality of a child's growth. The prevalence of Chronic Energy Deficiency (CED), which ranges from 13.6% to 35.9% across different regions of Indonesia, indicates that nutritional problems among pregnant women remain a public health concern requiring attention. This condition, characterized by an Upper Arm Circumference (UAC) of less than 23.5 cm, arises from an imbalance between energy and nutrient intake and the increased physiological demands of pregnancy. (Rashid et al., 2018) During this period, energy requirements rise by approximately 150 kcal per day in the first trimester and 350 kcal per day in the second and third trimesters to support fetal development; if these needs are not met, the mother's body will draw on its energy reserves, ultimately affecting placental function and nutrient supply to the fetus. (Adriati & Chloranyta, 2022)

Based on the findings of this review, it is evident that pregnant women still have limited knowledge regarding nutritional requirements and status, particularly during the first trimester and among those experiencing hyperemesis gravidarum. This often results in insufficient food intake, which raises the risk of deteriorating maternal nutritional status and interfering with fetal development. (Dewi et al., 2024) education and nutritional counseling delivered through

lectures, group discussions, and educational materials have proven effective in improving women's understanding and awareness of the importance of meeting energy and nutrient needs during pregnancy, while also helping them manage nausea and vomiting symptoms so that these conditions do not disrupt their eating patterns. This confirms that targeted, easy-to-understand educational interventions serve as a key strategy to prevent nutritional deficiencies, maintain maternal health, and support optimal fetal growth and development. (November et al., 2023)

Most studies confirm a significant relationship between maternal nutritional status and pregnancy outcomes. Women experiencing CED have a higher risk of giving birth to infants with Low Birth Weight (LBW) and children who develop stunting. This is clearly demonstrated in a study conducted in Central Lampung, which found that children born to mothers with CED had a 2.2 times greater risk of stunting, while other studies have reported this risk to be as high as 4.15 times. Biologically, chronic malnutrition leads to suboptimal placental development, restricting blood flow and nutrient delivery to the fetus. (Siswati et al., 2025) The growth adjustments made by the fetus under these limited conditions are permanent, resulting in impaired linear growth or stunting, which becomes clearly visible only after the child reaches two years of age and may reduce cognitive ability and immune function in the long term. However, one study found no significant association, a result that can be explained by early interventions such as supplementary feeding, routine antenatal care, and nutritional counseling, which are able to improve nutrient intake even if the mother initially experiences malnutrition. (Lubis, 2003)

Maternal nutritional status does not develop randomly; it is influenced by various factors. A mother's level of knowledge and attitude toward nutrition have been shown to be highly significant determinants, as women who understand nutritional requirements and hold supportive attitudes are more likely to consume a balanced diet. Socioeconomic status also plays an important role, as it determines the ability to purchase and provide nutritious food. (Berhe et al., 2021) In contrast, educational level and parity are not always the primary factors, since nutritional knowledge can also be acquired through non-formal channels such as counseling at community health centers, primary health care facilities, or health information media. This confirms that efforts to improve nutrition depend not only on educational background but also on access to information and health services. (Kartikasari, 2011)

In addition to its effects on fetal and child growth, CED in pregnant women increases the risk of other complications during pregnancy and childbirth, including anemia, reduced physical strength, and higher risk of hemorrhage. Conversely, women with good nutritional status have sufficient nutrient reserves to support the entire pregnancy process, give birth to infants with normal weight and length, and reduce the risk of long-term health problems for their children. Overall, the findings from these studies reinforce the view that monitoring nutritional status from the pre-pregnancy period through pregnancy, improving nutritional knowledge, and providing appropriate interventions are key strategies to break the cycle of malnutrition from mother to child and enhance the quality of human resources in the future. (Dini et al., 2021)

CONCLUSIONS

Based on the findings of various studies, it is evident that the nutritional status of pregnant women plays a central role in determining pregnancy outcomes, delivery conditions, and the quality of a child's growth. The prevalence of Chronic Energy Deficiency (CED),

which ranges from 13.6% to 35.9% across different regions of Indonesia, indicates that nutritional problems among pregnant women remain a public health concern requiring attention. This condition, characterized by an Upper Arm Circumference (UAC) of less than 23.5 cm, arises from an imbalance between energy and nutrient intake and the increased physiological demands of pregnancy. During this period, energy requirements rise by approximately 150 kcal per day in the first trimester and 350 kcal per day in the second and third trimesters to support fetal development; if these needs are not met, the mother's body will draw on its energy reserves, ultimately affecting placental function and nutrient supply to the fetus. (Adriati & Chloranyta, 2022)

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ACKNOWLEDGEMENT

The author would like to express sincere gratitude and appreciation to all authors, researchers, and institutions that have published the scientific journals and research reports used as references in this review. The studies conducted across various regions in Indonesia have provided valuable data, findings, and analysis, enabling the author to gain a comprehensive understanding of the nutritional status of pregnant women, its influencing factors, and its impact on child growth.

The availability of structured and accurate information from these scientific works serves as the main foundation for compiling this literature review. All findings presented have become a source of knowledge and reference that have supported the successful completion of this study.

CONFLICT OF INTEREST AND FUNDING DISCLOSURE

Conflict of Interest The author declares that there is no potential conflict of interest regarding the research, authorship, and publication of this article. There are no financial or personal relationships that could inappropriately influence or bias the content presented in this literature review. **Funding Disclosure** This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. All work was completed independently without external financial support.

AUTHOR CONTRIBUTIONS

Author Contributions
Single author: Conceived the research idea, designed the literature review framework, performed literature search and selection, analyzed and interpreted the findings, drafted and revised the manuscript, approved the final version for submission, and takes full responsibility for all content and aspects of this work.

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