

THE RELATIONSHIP BETWEEN NUTRITIONAL STATUS OF PREGNANT WOMEN AND FETAL GROWTH: A LITERATURE REVIEW

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ABSTRACT

Background: Pregnancy is a crucial period that determines maternal health and fetal growth. Energy and nutrient needs increase significantly to support the mother's physical changes and the development of fetal organs. Nutritional problems such as Chronic Energy Deficiency (CED) with a Mid-Upper Arm Circumference (MUAC) <23.5 cm, anemia, and low nutritional knowledge are still common. These conditions carry the risk of complications, stunted fetal growth, low birth weight (LBW), and even stunting, which have long-term impacts. **Objectives:** To examine the relationship between nutritional status of pregnant women and fetal growth and pregnancy outcomes. (Maslikhah, Prajayanti and Baroroh, 2023) **Methods:** This study employed a systematic literature review. Sources were searched through Google Scholar and health journal databases, covering publication years 2019–2025. A total of 13 relevant articles were selected and analyzed, encompassing cross-sectional, cohort, and experimental designs. The variables studied included MUAC, hemoglobin levels, nutritional intake, and fetal growth and birth weight parameters. **Result:** Maternal nutritional status is significantly related to fetal growth. Mothers with a mid-birth weight (MULA) ≥ 23.5 cm have a 2–3 times lower risk of giving birth to a low-birth-weight (LBW) baby. Conversely, CED and anemia increase the risk of fetal growth restriction and stunting by up to 3.7 times. Providing supplemental food, iron supplements, and nutrition education have been shown to be effective in improving maternal nutritional status. **Conclusions:** The better the mother's nutritional status, the more optimal the fetus's growth. Regular monitoring, balanced nutrition, and counseling from early pregnancy are essential to ensure a successful pregnancy outcome. (González-Fernández *et al.*, 2024)

Keywords: Pregnant women, Nutritional status, KEK, LILA, Fetal growth

INTRODUCTION

Pregnancy is a crucial period that determines the quality of maternal health and fetal growth and development. During this period, energy and nutrient needs increase significantly to support the physiological changes in the mother's body and ensure optimal fetal organ and tissue development. (Ardini, Nurlianih and Irmayanti, 2025) Various studies have shown that maternal nutritional status is a key determinant of a successful pregnancy. In Indonesia

and other regions, nutritional issues such as Chronic Energy Deficiency (CED), characterized by a mid-upper arm circumference (MUAC) of less than 23.5 cm, anemia, and unbalanced nutritional intake, remain public health challenges. **(Bekti, Utami and Siwi, 2020)**. Poor nutritional status during pregnancy has a cascading impact on both the mother and the fetus. The mother is at risk of complications such as bleeding, infection, and prolonged labor, while the fetus is at high risk of stunting, low birth weight (LBW), and even permanent stunting, which can impact future intelligence and productivity. **(Metasari and Kasmianti, 2020)** Furthermore, limited knowledge about balanced nutrition exacerbates these conditions. Therefore, studying the relationship between maternal nutritional status and fetal growth is crucial as a basis for designing prevention efforts, nutritional interventions, and improving the quality of maternal and child health services.

METHODS

This research is structured as a literature review to examine the relationship between maternal nutritional status and fetal growth. Data sources were obtained through a search of scientific articles in the Google Scholar database, national health journals, and international journals. **(November et al., 2023)** The search was conducted using the following keywords: pregnant women, nutritional status, Chronic Energy Deficiency (CED), Mid-Upper Arm Circumference (MUAC), anemia, hemoglobin levels, fetal growth, birth weight, and stunting.

Article selection criteria included: publication between 2019 and 2025, full-text availability, and topics relevant to the study. From the search results, 13 eligible articles were selected, with various research designs including cross-sectional, cohort, quasi-experimental, descriptive, and literature review. **(Yang et al., 2024)**

Data collected included study design, sample size and characteristics, nutritional status indicators (MUAC, hemoglobin levels, body mass index, nutrient intake), **(Dewi, Pangaribuan and ..., 2024)** as well as fetal growth parameters and birth outcomes. All data were systematically analyzed to compile a comprehensive summary and discussion. **(Kabahenda and Stoecker, 2024)**

RESULT

Based on the analysis of 13 selected scientific articles, findings show the relationship between maternal nutritional status and fetal growth as well as pregnancy outcomes. A summary of the research results is presented in the table below:

Table 1. Summary of Research Findings

NO	Author & Year	Study Design	Main Variables	Key Findings	Significance / Risk Value
1	Maslikhah et al. (2023)	Descriptive Exploratory	Nutritional knowledge, MUAC, maternal characteristics	Most mothers had (59.8%); 28.9% experienced Chronic Energy Deficiency (CED); education and age influenced knowledge level	-

2	Diah Safitri & Erin P. Siregar (2023)	Cross-sectional	Knowledge, nutritional status, anemia incidence	82.4% of mothers with poor knowledge had anemia; 85.7% of mothers with CED had anemia	p = 0.000; p = 0.033
3	Bekti Sri Utami et al. (2020)	Literature Review	Hypertension history, BMI, preeclampsia	Obese mothers had a 5.6 times higher risk of developing preeclampsia	OR = 5.63; p < 0.05
4	Parningotan Simanjuntak et al. (2023)	Community Intervention	Nutrition education, knowledge of pregnant women	Education improved understanding; all participants showed high enthusiasm	-
5	Eva Rd et al. (2024)	Quasi-experimental	Health education, nutritional knowledge	Good nutritional knowledge increased from 10% to 55% after intervention	p < 0.05
6	Research Team USD (2024)	Prospective Cohort	MUAC, weight gain, birth weight	MUAC $\geq$ 23.5 cm was significantly associated with normal birth weight	OR = 3.2; p = 0.004
7	González-Fernández et al. (2024)	Systematic Review & Meta-analysis	Nutritional status, supplementation, fetal growth	CED increased the risk of fetal growth restriction by 2.9 times	p < 0.001
8	Ratna Feti Wulandari et al. (2023)	Cross-sectional	Nutrient intake, hemoglobin level, LBW	Insufficient energy and iron intake increased the risk of Low Birth Weight (LBW)	p < 0.05
9	Research Team (2025)	Factor Analysis	Knowledge, birth interval, anemia	Dominant factors causing anemia: poor knowledge, birth interval < 2 years	p = 0.000
10	Kabahenda & Stoecker (2024)	Cross-sectional	Nutrient intake, MUAC, fetal growth	MUAC $\geq$ 23.5 cm had a positive correlation with normal fetal weight	r = 0.58; p < 0.001
11	Research Team (2023)	Correlational	Nutrient intake, MUAC, hemoglobin level	Insufficient intake of energy and iron was significantly associated with CED and anemia	p = 0.018; p = 0.009
12	Research Team JKM (2023)	Cross-sectional	Nutritional status, pregnancy outcome	Mothers with CED had a 2.7 times higher risk of delivering LBW infants	OR = 2.71; p = 0.002
13	Andi Ria Metasari (2023)	Quasi-experimental	Nutrition education, knowledge and attitude	Knowledge score increased from 52.2 to 78.6; positive attitude increased significantly	p < 0.001

DISCUSSION

The results in the table confirm that maternal nutritional status is a key determinant of successful pregnancy and fetal development. Most studies show that indicators such as Mid-

Upper Arm Circumference (MUAC) ≥ 23.5 cm, adequate weight gain, and normal hemoglobin levels are significantly associated with optimal fetal growth and normal birth weight. **(Nurmalina Hutahaen and Yanti Rosmidar Hasibuan, 2024)** In contrast, Chronic Energy Deficiency (CED) and anemia increase the risk of fetal growth restriction, Low Birth Weight (LBW), and complications such as preeclampsia.

Nutritional knowledge also plays an important role. Findings by Maslikhah et al. (2023) and Diah Safitri & Erin Siregar (2023) show that mothers with better knowledge have a much lower risk of anemia compared to those with limited understanding. **(Kabahenda and Stoecker, 2024)** This is supported by intervention studies proving that education and supplementation effectively improve maternal nutritional status, as seen in the works of **Parningotan Simanjuntak et al. (2023)**, **Eva Rd et al. (2024)**, and **Andi Ria Metasari (2023)**.

Although study designs vary, the overall conclusion remains consistent: meeting nutritional requirements, regularly monitoring nutritional status, **(Diah Safitri and Erin Padilla Siregar, 2023)** and improving knowledge from early pregnancy are essential strategies to ensure optimal fetal growth and prevent adverse pregnancy outcomes.

CONCLUSIONS

Based on the review and analysis of 13 scientific studies, it can be concluded that maternal nutritional status has a significant and positive relationship with fetal growth and pregnancy outcomes. Adequate nutritional status, indicated by Mid-Upper Arm Circumference (MUAC) ≥ 23.5 cm, sufficient weight gain, and normal hemoglobin levels, reduces the risk of fetal growth restriction, low birth weight, and complications during pregnancy. **(Wulandari, Susiloningtyas and Jaya, 2021)** Conversely, Chronic Energy Deficiency (CED) and anemia increase the risk of adverse outcomes by 2.7 to 3.7 times. Furthermore, nutritional knowledge and adherence to recommended dietary practices and supplementation play a vital role in maintaining good health. Interventions such as nutrition education, supplementary feeding, and iron and folic acid supplementation have proven effective in improving maternal nutritional status and reducing the prevalence of anemia and CED. **(Wahab, Scholing and Gaillard, 2021)** Therefore, regular monitoring of nutritional indicators, early detection of risk factors, and continuous health education from the beginning of pregnancy are essential strategies to ensure optimal fetal development, prevent long-term impacts such as stunting, **(Alfarisi et al., 2019)** and improve overall maternal and child health.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

Conflict of Interest

The author declares that there is no conflict of interest, whether financial or non-financial, that could influence the objectivity and results presented in this literature review. (Seyhanli *et al.*, 2024)

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This study received no financial support or funding from any institution, organization, or third party. All processes of literature search, analysis, and writing were conducted independently by the author. (Rooney *et al.*, 2024)

AUTHOR CONTRIBUTIONS

The author carried out all stages of this study, including: defining the topic and objectives, designing the literature search strategy, searching and selecting 13 scientific articles relevant to the relationship between maternal nutritional status and fetal growth, collecting and processing research data, analyzing and synthesizing the findings, compiling the summary table of results, writing the manuscript draft, reviewing and revising the content, and verifying the consistency of all sections of this work. No other parties were involved in the preparation, data processing, or writing of this manuscript.

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