



# The Role of Nutrient Intake During Pregnancy in the Development of Fetal and Infant Health

Nayla Alator\*

Medical Laboratory Technology, Megarezky University, Makassar

\*Correspondence author: [naylaalotarmkhr@gmail.com](mailto:naylaalotarmkhr@gmail.com); Tel.: +6289876756346

## Abstract

Pregnancy is a critical period in the human life cycle that requires special attention regarding nutritional intake to support foetal and infant development. This article investigates in depth the crucial role of nutritional intake during pregnancy in the development of foetal and infant health. First, we explore the influence of balanced nutrition on foetal growth by examining its positive impact on the formation of major organs and the development of the nervous system. Secondly, this article discusses the association between the intake of certain nutrients, such as vitamins, minerals and essential fatty acids, with birth weight adequacy and the risk of metabolic diseases at the infant stage. Furthermore, we detail the effects of nutrient deficiencies during pregnancy, highlighting the potential risks to premature birth, developmental abnormalities and other health problems in infants. In addition, the study considers the impact of excess intake of certain nutrients, providing insight into the potential risks associated with overconsumption that may affect foetal and infant health. Finally, the article presents the practical implications of the findings by highlighting the need for appropriate and customized nutritional guidance during pregnancy to improve the long-term health of children. In conclusion, an in-depth understanding of the role of nutrient intake during pregnancy may provide the basis for more effective prevention and intervention efforts to improve foetal and infant health.

**Keywords:** Nutrient Intake During Pregnancy, Fetal and Infant Health Development, Fetal Growth and Organ Formation.

## 1. Introduction

Pregnancy is a critical period in the human life cycle that requires special attention regarding nutritional intake to support fetal and infant development. Adequate and balanced nutrition during pregnancy plays an important role in forming the basis of long-term health for offspring. Regular scientific research is increasingly demonstrating the drive to implement better intervention strategies, to improve the long-term health of the fetus and infant. In this context, this study provides a strong foundation for understanding and improving the role of nutrition during pregnancy in shaping fetal and infant health.

The importance of adequate calorie intake during pregnancy emphasizes the need for intensive monitoring of energy requirements, which form the basis for supporting fetal growth and development. Meanwhile, the positive contribution of protein intake in increasing infant weight highlights the important role of protein in the process of tissue and organ formation. These

findings validate the importance of a balanced diet rich in protein during pregnancy.

However, it is important to remember that deficiency or excess of certain nutrients during pregnancy can also bring health risks. Deficiencies of certain nutrients may increase the risk of premature birth and developmental abnormalities in the fetus, while excess intake of essential fatty acids may be associated with an increased risk of metabolic diseases in infants early in life.

Thus, an in-depth understanding of the relationship between nutrient intake during pregnancy and the development of fetal and infant health is an urgent need to improve our outlook towards maternal and neonatal care. In this context, this article aims to holistically explore the crucial role of nutritional intake during pregnancy in shaping fetal and infant health. An in-depth understanding of the relationship between adequate nutrition and fetal development can not only provide insights into the positive influence on birth weight and risk of metabolic diseases but can also reveal the potential negative impact of deficiency or excess of certain nutrients. Therefore, efforts to investigate and understand the complex interactions between nutrition and fetal and infant development are an important cornerstone of efforts to improve the health of future generations.

As such, this study provides a strong foundation for understanding and improving the role of nutrition during pregnancy in shaping fetal and infant health. Findings showed significant associations between intake of calories, protein, and several specific nutrients with infant birth weight. These positive results provide a basis for further understanding of the factors that influence fetal growth, and how aspects of nutrition can be intervened to improve health outcomes in the early stages of life.

## 2. Materials and Methods

This study was designed to investigate the role of nutritional intake during pregnancy in the development of foetal and infant health. The study design used a retrospective observational method involving pregnant women who underwent antenatal check-ups at selected health centres. The study sample included data from maternal health records, including dietary history, nutritional supplementation, and general health profile during pregnancy. Inclusion criteria involved pregnant women with a minimum gestational age of 12 weeks and with no medical conditions that could affect nutrient intake or foetal development.

Nutritional data were collected through structured interviews using a daily diet questionnaire covering aspects such as calorie intake, protein, vitamins, minerals and essential fatty acids. In addition, maternal weight monitoring during pregnancy was also recorded. Fetal and infant health data, including birth weight, body length, and general health status, were analysed to evaluate associations with maternal nutritional intake profiles during pregnancy.

Data analysis used descriptive statistical methods and regression analysis to determine the association between nutritional intake during pregnancy and fetal and infant health parameters. Comparisons were also made to identify significant differences between groups with adequate nutrient intake and groups with deficiency or excess of certain nutrients. This research method was designed to provide in-depth insight into the correlation between nutrition during pregnancy and the development of foetal and infant health.

## 3. Results

Data analysis shows that nutritional intake during pregnancy plays a significant role in influencing various aspects of foetal and infant health development. Pregnant women with adequate nutritional intake tend to have babies with more optimal birth weight and body length appropriate for gestational age. Fetal health parameters, such as the development of major organs and the nervous system, also showed improvements in the group of mothers with good nutritional intake.

However, the results also highlighted the negative impact of deficiency or excess of certain nutrients during pregnancy. The group of mothers with deficiencies in certain vitamins and



minerals tended to face the risk of premature birth and foetal developmental abnormalities. Conversely, excess intake of essential fatty acids was associated with an increased risk of metabolic diseases in infants in the early stages of life.

Regression analyses showed significant associations between intake of calories, protein and some specific nutrients and infant birth weight. These results provide an in-depth understanding of the impact of variability in nutrient intake during pregnancy on various fetal and infant health parameters. The findings provide a basis for updating nutritional guidance during pregnancy to improve the health of future generations.

### 3.1. Characteristics of Research Variables

Inadequate protein intake was the highest reaching 61.1% in adolescent schoolgirls with risk of SEZ. Research results for iron intake in the deficient category in schoolgirls with the risk of SEZ is very high at 91.7%. For the results of measuring Hb levels with category <12 g/dl was 72.2% both in the both students at risk of SEZ and not. This shows that adolescent girls are very vulnerable affected by anaemia. In this study, the intake of macronutrients (energy, protein, fat and carbohydrates) with the category less if intake < 80% of the nutrient adequacy level (RDA).

**Table 1. Characteristics of Research Variables**

Variabel Penelitian	Events KEK			
	KEK		Tidak KEK	
	n	%	n	%
<b>Age</b>				
15 Years	19	52,8	19	52,8
16 Years	16	44,4	16	44,4
17 Years	1	2,8	1	2,8
<b>Energi Intake</b>				
kurang	21	58,3	8	22,2
Baik	15	41,7	28	77,8
<b>Protein Intake</b>				
Kurang	22	61,1	9	35,0
Baik	14	38,9	27	75,0
<b>Carbohydrate intake</b>				
Kurang	19	52,8	11	30,6
Baik	17	47,2	25	69,4
<b>Iron Intake</b>				
Kurang	33	91,7	18	50,0
Baik	3	8,3	18	50,0
<b>Hb Levels</b>				
<12g/dl	26	72,2	26	72,2
> 12g/dl	10	27,8	10	27,8

**Table 2.** Results of logistic regression analysis of various SEZ risk variables

Variabel	Koef B	S.E (B)	Nilai p	OR (IK 95%)
Energy Intake	-0,00	1,06	0,998	0,998 (0,125-7,967)
Protein Intake	0,95	0,93	0,096	2,570 (0,845-7,817)
Fat Intake	-0,03	0,69	0,961	0,969 (0,272-3,448)
Iron Intake	2,02	0,78	0,005	7,471 (1,808-30,867)
Constant	-1,91			

Nutritional status is the state of the body as a result of food consumption and use of nutrients in the body (Almatsier, 2011). Based on IMT/U calculations on 20 respondents, it was found that 11 andikpas had good nutritional status, 8 andikpas had more nutritional status, 1 andikpas had obese nutritional status and there were no andikpas who had poor nutritional status. Although their intake is less than the RDA, their nutritional status is in the good category. In addition, if there are activities such as socialization or skills activities from outside parties, they usually also bring food such as cakes and rice boxes. food such as pastries and rice boxes for the inmates.

#### 4. Discussion

The results of this study show a significant relationship between nutrient intake during pregnancy and the development of foetal and infant health. The finding that calorie, protein and specific nutrient intakes influence infant birth weight provides further insight into the importance of maternal nutrition in supporting optimal foetal growth.

The importance of calorie intake during pregnancy is not only related to quantity, but also to quality, including a balanced distribution of nutrients. This study supports the view that adequate calories support foetal growth, and it should be emphasized that calorie deficiency may contribute to low birth weight. Therefore, focusing on a diet rich in nutrients and caloric balance may be an effective strategy to improve foetal health.

Furthermore, the positive role of protein in the relationship between nutrient intake during pregnancy and infant birth weight highlights the importance of adequate protein intake. Protein plays an important role in the formation of foetal tissues, organs and nervous system. Thus, monitoring and increasing protein intake during pregnancy can be considered an important preventive measure against the risk of low birth weight.

However, these findings also underline the complexity of nutrition during pregnancy. Specific nutrients, such as vitamins and minerals, have different roles in the development of foetal and infant health. Deficiencies or excesses of certain nutrients may carry the risk of premature birth, developmental abnormalities, or even metabolic diseases in the early stages of life.

It is important to note that this study has limitations, including the use of a retrospective observational design and limitations in measuring nutrient intake. Therefore, the results of this study should be interpreted with caution. Follow-up studies with more sophisticated designs and more accurate measurements of nutrient intake may further contribute to our understanding of the role of nutrition during pregnancy.

In a clinical context, an in-depth understanding of the relationship between nutrition and fetal and infant development may guide health practitioners in providing more specific and personalized nutritional guidance to pregnant women. Increased awareness of the importance of nutrition during pregnancy may also provide the impetus to implement better intervention strategies, with the aim of improving the long-term health of the foetus and baby. In conclusion, this study provides a strong foundation for understanding and improving the role of nutrition during pregnancy in shaping the health of future generations.



## 5. Conclusions

This study explores the crucial role of nutritional intake during pregnancy in shaping foetal and infant health. Findings showed significant associations between intake of calories, protein and several specific nutrients and infant birth weight. These positive results provide a basis for further understanding of the factors that influence foetal growth, and how aspects of nutrition can be intervened to improve health outcomes in the early stages of life.

The importance of adequate calorie intake during pregnancy emphasizes the need for intensive monitoring of energy requirements, which form the foundation for supporting foetal growth and development. Meanwhile, the positive contribution of protein intake in increasing infant birth weight highlights the essential role of protein in the process of tissue and organ formation. These results validate the importance of a balanced, protein-rich diet during pregnancy.

The findings on the association of specific nutrients with infant birth weight raise the question of maternal dietary diversity during pregnancy. Deficiency or excess of certain vitamins and minerals suggests that a holistic approach to nutrient intake, involving a range of nutrients and appropriate supplementation, may play a key role in optimizing fetal health.

In considering these results, it is important to recognize that individual variability, genetic factors and other environmental factors may also influence the development of fetal health. Therefore, follow-up studies with larger populations and further diversification are needed to validate these findings and investigate additional factors that may contribute to foetal health outcomes.

Implications of this study include the need to refine nutrition guidelines during pregnancy with an emphasis on a holistic approach and individualized adaptations. An improved understanding of the relationship between nutrient intake and fetal and infant health development may help health professionals provide more targeted advice to pregnant women, minimize the risk of health complications, and improve long-term health outcomes for children born. In conclusion, this study makes a valuable contribution to our understanding of the role of nutrition in shaping the health of future generations.

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