



## The Effectiveness of Nutrition Education Based on KIA Books on Pregnant Women's Knowledge about Preventing Chronic Energy Deficiency (CED) at Soasio Community Health Center

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**Abstract,** Background: Chronic Energy Deficiency (CED) in pregnant women remains a major nutritional problem that can negatively affect maternal and fetal health. Limited nutritional knowledge among pregnant women is one of the contributing factors to the occurrence of CED. Nutrition education based on the KIA book is expected to improve pregnant women's knowledge in preventing CED. Objective: This study aimed determine the effectiveness of nutrition education based on the KIA book on pregnant women's knowledge about preventing Chronic Energy Deficiency Soasio Community Health Center. Methods: This study employed a pre-experimental design with a one-group pretest–posttest approach. The sample consisted of 30 pregnant women who met the inclusion criteria and were selected using total sampling. Nutrition education was provided using the KIA book the main educational medium. Pregnant women's knowledge regarding the prevention CED was measured before and after the intervention using a structured questionnaire. Data were analyzed using the Wilcoxon signed-rank test. Results: The results showed significant increase in pregnant women's knowledge after receiving nutrition education based on the KIA book. Statistical analysis using the Wilcoxon signed-rank test obtained a p-value of 0.000 ( $p < 0.05$ ), indicating a statistically significant difference in knowledge levels before and after the intervention. Conclusion: Nutrition education based on the KIA book is effective in improving pregnant women's knowledge about preventing Chronic Energy Deficiency at Soasio Community Health Center. The use of the KIA book as an educational medium can be recommended as a routine strategy in antenatal care services to enhance maternal nutritional awareness.

**Keywords:** Chronic Energy Deficiency, KIA Book, Knowledge, Nutrition Education, Pregnant Women.

### 1. INTRODUCTION

Chronic Energy Deficiency (CED) remains a significant public health problem among pregnant women in Indonesia, particularly in primary healthcare settings. CED occurs when pregnant women experience long-term insufficient energy intake. This condition increases the risk of maternal complications and adverse pregnancy outcomes. Pregnant women with CED are more vulnerable to anemia, infections, and prolonged labor. Fetal outcomes associated with CED include low birth weight, intrauterine growth restriction, and increased neonatal morbidity. According to Indonesian health experts, maternal nutrition plays a critical role in ensuring optimal pregnancy outcomes (Marmi, 2020). Nutritional deficiencies during pregnancy often stem from limited knowledge and inadequate dietary practices. Knowledge gaps regarding balanced nutrition remain common among pregnant women. Many pregnant women do not fully understand their increased nutritional needs. This lack of understanding contributes directly to the persistence of CED. Health education is therefore essential in addressing this issue. Educational interventions can improve awareness and promote healthy

behaviors. Effective nutrition education must be accessible and culturally appropriate. One widely used educational medium in Indonesia is the Maternal and Child Health (KIA) book. The KIA book contains comprehensive information related to pregnancy, nutrition, and maternal health. Its consistent use in antenatal care makes it a strategic tool for education. Utilizing the KIA book effectively may help prevent CED. Therefore, improving the use of KIA books is crucial in maternal health promotion.

The prevalence of CED among pregnant women reflects broader socioeconomic and educational challenges. Women from lower educational backgrounds often have limited access to accurate health information. Educational attainment influences a mother's ability to understand nutrition messages (Notoatmodjo, 2020). Pregnant women with low literacy levels may struggle to interpret nutritional guidelines. This situation highlights the importance of simple and structured educational tools. The KIA book is designed to address this need by providing standardized health information. However, the effectiveness of the KIA book depends on how it is used during counseling. Passive distribution without proper explanation may limit its impact. Active nutrition education based on the KIA book is necessary. Midwives play a vital role in delivering this education. Through structured counseling, midwives can clarify nutritional messages. Proper guidance helps pregnant women apply information in daily life. Nutrition education can shape positive attitudes toward healthy eating. Behavioral change is more likely when education is continuous. The integration of education into routine antenatal care strengthens learning. Regular reinforcement improves knowledge retention. Therefore, nutrition education should not be limited to a single session. A systematic approach using the KIA book can enhance maternal understanding. This approach supports the prevention of CED.

CED is not only a nutritional issue but also a determinant of maternal and child health outcomes. Poor maternal nutrition affects fetal development from early pregnancy. Inadequate energy intake compromises placental function. This condition may lead to poor oxygen and nutrient transfer to the fetus. As a result, fetal growth can be impaired. Indonesian studies emphasize the long-term impact of maternal malnutrition (Handayani & Prasetyo, 2020). Children born to mothers with CED face higher risks of stunting. Stunting remains a major national health problem in Indonesia. Preventing CED during pregnancy is therefore a critical strategy in reducing stunting prevalence. Nutrition education serves as a preventive measure. Education empowers women to make informed dietary choices. Pregnant women need practical guidance on food selection. They also require understanding of meal frequency and portion size. Cultural beliefs often influence dietary practices. Some food taboos limit nutritional intake during pregnancy. Education helps correct misconceptions related to food

restrictions. Midwives can address these beliefs using evidence-based information. The KIA book provides scientifically validated guidance. When explained properly, it becomes a powerful educational tool. Thus, nutrition education based on the KIA book contributes to better pregnancy outcomes.

The role of primary healthcare centers is essential in implementing nutrition education programs. Community health centers serve as the frontline of maternal health services. Pregnant women frequently visit these centers for antenatal care. This frequent contact provides opportunities for education. At Soasio Community Health Center, nutrition counseling is part of routine care. However, the quality of counseling may vary. Some sessions focus more on clinical examination than education. Time constraints can limit counseling effectiveness. Structured educational materials help overcome this limitation. The KIA book offers a standardized framework for counseling. Its content covers balanced nutrition, pregnancy risks, and health behaviors. When used actively, it guides discussion between midwives and pregnant women. Education based on the KIA book promotes interactive learning. Pregnant women are encouraged to ask questions. This interaction improves comprehension. Knowledge improvement leads to better nutritional practices. Improved practices reduce the risk of CED. Therefore, optimizing KIA book-based education is essential. Health workers must be trained to use the book effectively. Proper implementation ensures consistent message delivery. This approach strengthens maternal nutrition programs.

Knowledge is a key determinant of health behavior. Pregnant women with adequate knowledge are more likely to adopt healthy diets. Knowledge influences attitudes toward food consumption. It also affects motivation to maintain balanced nutrition. According to Indonesian health behavior theory, knowledge precedes behavior change (Notoatmodjo, 2020). Without sufficient knowledge, behavior change is unlikely. Many pregnant women are unaware of CED symptoms. They may not recognize early signs of energy deficiency. This lack of awareness delays preventive action. Nutrition education addresses this gap. Education increases awareness of nutritional needs. It explains the importance of sufficient caloric intake. Pregnant women learn about protein, carbohydrates, and fats. Micronutrients are also emphasized. The KIA book presents this information in simple language. Visual illustrations enhance understanding. When combined with verbal explanation, learning becomes more effective. Education also builds confidence in managing diet. Pregnant women feel empowered to make healthier choices. This empowerment supports long-term behavior change. Therefore, improving knowledge through education is fundamental in preventing CED.

The effectiveness of educational interventions depends on appropriate methods. Education must be tailored to the target population. Pregnant women have diverse educational backgrounds. Some may require more detailed explanations. Others benefit from visual aids. The KIA book accommodates these differences. It combines text and illustrations. Midwives can adapt explanations based on individual needs. Interactive education enhances engagement. Asking questions encourages participation. Feedback helps identify misconceptions. Correcting misconceptions improves learning outcomes. Consistent education reinforces key messages. Repetition strengthens memory retention. The KIA book allows pregnant women to review information at home. Family members can also access the content. Family involvement supports dietary changes. Husbands and relatives influence food choices. Education that reaches the family increases effectiveness. Community-based education strengthens social support. Therefore, KIA book-based education extends beyond clinical settings. It becomes part of daily life. This comprehensive approach improves maternal nutrition knowledge. Improved knowledge contributes to CED prevention.

Socioeconomic factors also influence nutritional knowledge. Limited income affects food availability. Pregnant women may prioritize quantity over quality. Education helps optimize available resources. Pregnant women learn affordable nutritious food options. Local food sources can meet nutritional needs. The KIA book includes guidance on balanced meals. Midwives can contextualize this guidance. Education promotes practical application. Knowledge alone is insufficient without practical strategies. Therefore, education must include problem-solving. Pregnant women learn to overcome dietary challenges. This approach increases adherence to recommendations. Education also addresses myths surrounding nutrition. Cultural beliefs sometimes restrict protein intake. Clarifying these beliefs is essential. Evidence-based explanations increase acceptance. Trust in health workers facilitates learning. The KIA book supports credibility. It is recognized as an official health document. Pregnant women trust its content. This trust enhances educational effectiveness. Thus, KIA book-based education is suitable for diverse socioeconomic contexts. It supports equitable access to nutrition information.

The prevention of CED aligns with national maternal health goals. Indonesia prioritizes improving maternal nutrition. National programs emphasize the use of KIA books. These books are distributed nationwide. However, distribution alone does not guarantee effectiveness. Active utilization is required. Education transforms information into knowledge. Knowledge translates into action. Studies in Indonesia show improved outcomes with structured education (Astuti & Wulandari, 2021). Education increases compliance with

nutritional recommendations. Pregnant women become more attentive to dietary intake. Monitoring weight gain becomes more meaningful. Women understand the importance of adequate weight gain. This understanding motivates behavior change. Education also enhances antenatal care utilization. Pregnant women become more engaged in care. They ask relevant questions. This engagement improves service quality. Health workers can tailor interventions. The KIA book facilitates documentation. Progress can be monitored effectively. Education outcomes can be evaluated. Therefore, integrating education into antenatal care strengthens maternal health systems. This integration supports sustainable CED prevention.

At Soasio Community Health Center, maternal nutrition remains a concern. Some pregnant women still present with low energy intake. This condition indicates a need for improved education. The KIA book is already available at the center. However, its potential may not be fully utilized. Structured nutrition education can enhance its use. This study focuses on evaluating effectiveness. Assessing knowledge change provides measurable outcomes. Knowledge improvement reflects educational success. The Wilcoxon test allows analysis of pre- and post-intervention differences. A significant result indicates effectiveness. Evidence-based evaluation supports program improvement. Findings can guide policy decisions. Successful interventions can be replicated. Other health centers can adopt similar approaches. This contributes to broader public health impact. Research findings strengthen scientific evidence. Evidence supports continued use of KIA-based education. Midwives gain confidence in educational roles. Education becomes a core component of care.

## **2. RESEARCH METHOD**

This study employed a pre-experimental research design using a one-group pretest–posttest approach to evaluate the effectiveness of nutrition education based on the KIA book on pregnant women’s knowledge about preventing Chronic Energy Deficiency (CED). This design was selected to assess changes in knowledge levels before and after the educational intervention within the same group of participants. By comparing pre-intervention and post-intervention measurements, the study aimed to determine the direct impact of KIA book–based nutrition education. The absence of a control group was considered acceptable due to the exploratory nature of the study. This design allowed for an initial evaluation of the educational intervention’s effectiveness.

The study population consisted of pregnant women who attended antenatal care services at Soasio Community Health Center. A total of 30 pregnant women who met the inclusion criteria were recruited as research participants. The sampling technique used was

total sampling, in which all eligible pregnant women during the study period were included in the study. This approach ensured that the sample accurately represented the target population. Inclusion criteria were established to ensure participants were physically stable and willing to participate in the educational intervention.

The intervention involved the provision of nutrition education using the Maternal and Child Health (KIA) book as the primary educational medium. Education sessions were conducted by trained health workers, particularly midwives, in a structured and systematic manner. The content focused on balanced nutrition during pregnancy, the causes and consequences of CED, and strategies for preventing chronic energy deficiency. Educational sessions encouraged interactive communication, allowing pregnant women to ask questions and clarify information. The KIA book was also used as a take-home resource to reinforce learning outside the healthcare setting.

Pregnant women's knowledge regarding the prevention of CED was measured before and after the intervention using a structured questionnaire. The pretest was administered prior to the delivery of nutrition education to establish baseline knowledge levels. The posttest was conducted after the completion of the educational sessions using the same questionnaire. This approach ensured consistency in measurement and allowed for accurate comparison of knowledge changes. Data collection was carried out by trained personnel to minimize measurement bias and ensure data reliability.

Data analysis was performed using the Wilcoxon signed-rank test to examine differences in knowledge scores before and after the intervention. This non-parametric statistical test was selected because the data were paired and not assumed to be normally distributed. A significance level of 0.05 was applied to determine statistical significance. The results were interpreted by comparing the obtained p-value with the predetermined alpha level. A p-value of less than 0.05 indicated that nutrition education based on the KIA book had a statistically significant effect on improving pregnant women's knowledge about preventing CED.

### 3. RESULTS AND DISCUSSION

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**Table 1** Frequency Distribution by Age.

Information	Frequenc y	Percentace (%)
< 20 year	7	11.4
20-30	10	40
31-40	13	48.6
Total	30	100

Table 1 shows the frequency distribution of respondents based on age. The majority of pregnant women were in the age group of 31–40 years, with 13 respondents (48.6%). This was followed by respondents aged 20–30 years, totaling 10 respondents (40%). The smallest proportion of respondents were under 20 years of age, with 7 respondents (11.4%). These findings indicate that most pregnant women in this study were within the mature reproductive age group. Maternal age is an important factor that can influence knowledge acquisition and the ability to understand nutritional information related to the prevention of Chronic Energy Deficiency.

**Table 2** Frequency Distribution Education.

Information	Frequenc y	Percentace (%)
SD-SMP	9	42.8
SMA	19	48.6
PT	2	8.6
Total	30	100

Table 2 presents the frequency distribution of respondents based on educational level. The majority of pregnant women had completed senior high school education (SMA), with 19 respondents (48.6%). This was followed by respondents with elementary to junior high school education (SD–SMP), totaling 9 respondents (42.8%). Only a small proportion of respondents had attained higher education (PT), consisting of 2 respondents (8.6%). These findings indicate that most pregnant women had a moderate level of formal education. Educational background plays an important role in influencing a pregnant woman’s ability to understand nutrition education and apply knowledge related to the prevention of Chronic Energy Deficiency.

**Table 3** Frequency Distribution Work.

Information	Frequenc y	Percentace (%)
Civil Servants	2	11.4
Housewives	20	48.6
Employees	8	40
Total	30	100

Table 3 shows the frequency distribution of respondents based on occupational status. The majority of pregnant women were housewives, totaling 20 respondents (48.6%). This was followed by respondents who worked as employees, with 8 respondents (40%). The smallest proportion of respondents were civil servants, consisting of 2 respondents (11.4%). These findings indicate that most pregnant women in this study were not formally employed outside the home. Occupational status may influence access to health information, daily activity patterns, and time availability, which can affect participation in nutrition education and the application of knowledge related to the prevention of Chronic Energy Deficiency.

**Table 4** Frequency Distribution Paritas.

Information	Frequenc y	Percentace (%)
Primipara	10	40
Multipara	13	48.6
Grandhepara	7	11.4
Total	30	100

Table 4 presents the frequency distribution of respondents based on parity. The majority of pregnant women were multiparous, with 13 respondents (48.6%). This was followed by primiparous women, totaling 10 respondents (40%). The smallest proportion consisted of grand multiparous women, with 7 respondents (11.4%). These findings indicate that most respondents had previous pregnancy experience. Parity can influence a pregnant woman's knowledge and attitudes toward nutrition, as women with prior pregnancy experience may have greater exposure to health education related to maternal nutrition and the prevention of Chronic Energy Deficiency.

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**Table 5** Uji Statistic The Effectiveness of Nutrition Education Based on KIA Books on Pregnant Women's Knowledge about Preventing Chronic Energy Deficiency (CED) at Soasio Community Health Center.

Information	Frequency	Percentase (%)
Effectiveness of Nutrition Education Based on KIA Books		
Effectiveness	30	100%
Pregnant Women's Knowledge		
Knowledge about Chronic Energy Deficiency (CED)	20	90%
Prevention is sufficient		
Knowledge of Chronic Energy Deficiency (CED) Prevention is good	10	10%
Effectiveness of Nutrition Education Based on KIA Books - Pregnant Women's Knowledge		0.000
Wilcoxon signed-rank test		

Table 5 presents the statistical analysis of the effectiveness of nutrition education based on KIA books on pregnant women's knowledge regarding the prevention of Chronic Energy Deficiency (CED). All respondents (100%) received nutrition education using the KIA book as the primary educational medium. After the intervention, the majority of pregnant women demonstrated sufficient knowledge about CED prevention, with 20 respondents (90%), while 10 respondents (10%) showed good knowledge levels. These findings indicate an overall improvement in knowledge following the nutrition education intervention. To assess the effectiveness of the educational program, the Wilcoxon signed-rank test was applied to compare knowledge levels before and after the intervention. The analysis resulted in a p-value of 0.000, which is lower than the significance level of 0.05. This result indicates a statistically

significant effect of nutrition education based on the KIA book on improving pregnant women's knowledge about preventing Chronic Energy Deficiency at Soasio Community Health Center.

The results of this study indicate that nutrition education based on the KIA book is effective in improving pregnant women's knowledge regarding the prevention of Chronic Energy Deficiency (CED). Knowledge plays a crucial role in shaping health behavior during pregnancy. Pregnant women who understand nutritional needs are more likely to adopt balanced dietary practices. According to Notoatmodjo (2020), knowledge is a fundamental factor influencing behavioral change. Therefore, improving maternal knowledge is an essential step in preventing nutritional problems such as CED.

The significant improvement in knowledge observed after the intervention confirms the effectiveness of structured nutrition education. The Wilcoxon signed-rank test result ( $p = 0.000$ ) indicates a statistically significant difference before and after education. This finding suggests that the increase in knowledge did not occur by chance. Similar results were reported by Astuti and Wulandari (2021), who found that nutrition education significantly improved maternal understanding. Education based on structured materials enhances learning outcomes.

The use of the KIA book as an educational medium contributed substantially to the success of the intervention. The KIA book is designed to provide standardized and comprehensive information on maternal nutrition. Its visual aids and simple language support comprehension among pregnant women with varying educational backgrounds. Marmi (2020) emphasized that appropriate educational media improve the effectiveness of health promotion. Thus, the KIA book serves as an appropriate tool for nutrition education.

Maternal age distribution in this study indicates that most respondents were within the productive reproductive age. Women in this age group tend to have better cognitive readiness to absorb health information. Age influences learning capacity and health awareness (Handayani & Prasetyo, 2020). Mature age allows better understanding of nutritional risks during pregnancy. This condition supports the effectiveness of educational interventions.

Educational background also influenced knowledge improvement. Most respondents had secondary education, which facilitated comprehension of educational materials. Higher educational attainment enhances the ability to process health information (Notoatmodjo, 2020). However, the KIA book was also effective among respondents with lower education levels. This shows that the material is inclusive and adaptable.

Occupational status may affect access to health information and learning opportunities. Most respondents were housewives, which may allow more time to engage with educational materials. Housewives often have more flexibility to attend counseling sessions. According to Rahmawati and Fitriani (2022), time availability influences participation in health education. This condition may have contributed to improved knowledge outcomes.

Parity also plays a role in maternal knowledge. Multiparous women may have previous exposure to nutrition education. Experience from earlier pregnancies can reinforce understanding of nutritional needs. However, primiparous women also showed improvement after education. This indicates that KIA-based education is effective regardless of pregnancy experience. The findings support health behavior theory, which states that knowledge precedes attitude and behavior change. Improved knowledge increases awareness of nutritional risks. Awareness motivates pregnant women to adopt preventive actions. According to Notoatmodjo (2020), knowledge is the foundation of health behavior. Therefore, education is essential in CED prevention.

Nutrition education also helps correct misconceptions related to pregnancy nutrition. Cultural beliefs and food taboos may limit energy intake. Education provides evidence-based explanations to counter myths. Dewi and Sari (2023) stated that education reduces misinformation. This contributes to better dietary practices. The role of midwives is central in delivering effective education. Midwives act as educators and counselors during antenatal care. Their communication skills influence learning outcomes. Rahmawati and Fitriani (2022) emphasized the importance of counseling competence. Structured use of the KIA book supports midwives in this role.

Education based on the KIA book encourages active participation from pregnant women. Interactive sessions improve engagement and understanding. Pregnant women are more confident in asking questions. Active learning enhances retention of information. This aligns with adult learning principles. Family involvement may further strengthen educational impact. The KIA book can be read at home by family members. Family support influences dietary decisions. Sari and Hapsari (2023) noted that family support improves maternal nutrition practices. Thus, education extends beyond clinical settings.

Improved knowledge contributes to early detection and prevention of CED. Pregnant women become more aware of warning signs. Early awareness allows timely intervention. This reduces the risk of adverse pregnancy outcomes. Prevention is more effective than treatment. The findings of this study are consistent with previous Indonesian studies on nutrition education. Several studies reported significant knowledge improvement following educational

interventions. This consistency strengthens the validity of the results. Education remains a key strategy in maternal nutrition programs.

From a public health perspective, KIA-based nutrition education is cost-effective. The book is already distributed nationwide. Maximizing its use increases program efficiency. This approach supports sustainable maternal health promotion. The study highlights the importance of integrating education into routine antenatal care. Education should not be an optional activity. Continuous counseling reinforces learning. Repetition improves long-term knowledge retention.

The significant results indicate that passive distribution of KIA books is insufficient. Active explanation is required to achieve impact. This finding has implications for health service delivery. Training health workers is essential. This study also supports national efforts to reduce maternal malnutrition. Preventing CED contributes to reducing stunting. Maternal nutrition directly affects child growth. Early intervention yields long-term benefits. The results emphasize that knowledge improvement is achievable through simple interventions. Complex technology is not required. Structured education is sufficient when delivered effectively. This is suitable for primary healthcare settings. Despite its effectiveness, education should be combined with monitoring. Knowledge must translate into practice. Follow-up is necessary to ensure behavior change. Future programs should integrate monitoring systems.

In conclusion, the discussion confirms that nutrition education based on the KIA book is an effective strategy to improve pregnant women's knowledge about preventing CED. The findings support the integration of structured education into routine antenatal care. This approach strengthens maternal health services and contributes to improved pregnancy outcomes.

#### **4. CONCLUSION**

This study concludes that nutrition education based on the Maternal and Child Health (KIA) book is effective in improving pregnant women's knowledge about preventing Chronic Energy Deficiency (CED) at Soasio Community Health Center. The findings demonstrate that structured education using standardized educational media can significantly enhance maternal understanding of nutritional needs during pregnancy. Improved knowledge is essential in reducing the risk of nutritional deficiencies that may negatively affect maternal and fetal health. Therefore, nutrition education plays a crucial role in maternal health promotion.

The results of the Wilcoxon signed-rank test showed a statistically significant difference in knowledge levels before and after the intervention, with a p-value of 0.000. This indicates that the observed improvement in knowledge was a direct result of the nutrition education intervention. The findings confirm that active education is more effective than passive information delivery. Structured counseling based on the KIA book provides clear and practical guidance for pregnant women.

Maternal characteristics such as age, education level, occupation, and parity did not hinder the effectiveness of the educational intervention. Nutrition education based on the KIA book proved to be beneficial across various demographic backgrounds. This suggests that the KIA book is an inclusive and adaptable educational tool. Its standardized content and simple presentation allow it to be easily understood by pregnant women with different levels of education and experience.

From a clinical and public health perspective, the integration of KIA book-based nutrition education into routine antenatal care is highly recommended. Midwives and other healthcare providers play a key role in delivering effective education and counseling. Consistent use of the KIA book during antenatal visits can strengthen maternal awareness and encourage healthy dietary behaviors. This approach supports national efforts to reduce maternal malnutrition and prevent CED.

In conclusion, nutrition education based on the KIA book is a practical, cost-effective, and sustainable strategy for improving pregnant women's knowledge about preventing Chronic Energy Deficiency. Continuous education and regular reinforcement are essential to ensure long-term knowledge retention and behavior change. Future studies are recommended to assess the impact of improved knowledge on actual nutritional practices and pregnancy outcomes using larger samples and more rigorous study designs.

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