

Maternal Knowledge, Medical History, and Family Support in Relation to Chronic Energy Deficiency among Pregnant Women: A Correlational Study

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Abstract:

Chronic Energy Deficiency (CED) remains an important maternal nutritional problem because inadequate energy intake during pregnancy may adversely affect maternal health, fetal growth, and pregnancy outcomes. This study aimed to examine the relationships between maternal knowledge, medical history, family support, and the incidence of CED among pregnant women. A correlational study was conducted among 200 pregnant women receiving antenatal care at Cimalaka Community Health Center from July 7 to 31, 2026. Participants were recruited using purposive sampling based on predefined eligibility criteria. Data were collected using a structured questionnaire, an observation sheet, a hemoglobin-measuring device, a sphygmomanometer, a stethoscope, and a mid-upper arm circumference measuring tape. Univariate analysis was used to summarize participant characteristics, while bivariate associations were examined using the Chi-square test. Most participants had good knowledge, more than half reported a medical history, and slightly more than half received family support during pregnancy. CED was identified in 10.5% of participants. Statistically, there are no significant associations were observed between CED and maternal knowledge ($p = 0.921$), medical history ($p = 0.564$), or family support ($p = 0.442$). These findings indicate that factors beyond those examined may influence CED in this population. Comprehensive antenatal nutritional assessment should therefore consider broader socioeconomic, dietary, obstetric, and clinical factors to strengthen early identification and prevention of maternal nutritional vulnerability.

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INTRODUCTION

Maternal nutritional status is a fundamental determinant of pregnancy outcomes and fetal growth, making Chronic Energy Deficiency (CED) a persistent global maternal health concern (Tareke et al., 2024). Pregnancy substantially increases physiological demands for energy, protein, micronutrients, and other nutritional resources required to support maternal adaptation, placental development, and fetal growth. Inadequate nutrient intake or prolonged nutritional imbalance may compromise pregnant women's ability to meet these increased requirements (Hunter et al., 2023). CED represents a condition of sustained insufficient energy availability that may increase maternal vulnerability during pregnancy. Poor maternal nutritional status has been associated with anemia, impaired fetal growth, low birth weight, preterm birth, postpartum complications, and subsequent growth problems in children (Seid et al., 2023). Prevention of CED is important not only for maternal well-being but also for improving neonatal health and long-term child development.

CED during pregnancy remains particularly important in low- and middle-income settings where nutritional vulnerability intersects with socioeconomic, dietary, and healthcare-related constraints. Access to sufficient and nutritionally diverse food may be affected by household income, food prices, employment conditions, education, cultural practices, and family resource allocation (Ujah et al., 2023). Pregnancy-related symptoms may further reduce dietary intake through nausea, vomiting, appetite changes, or intolerance to foods (Elkins et al., 2022). Limited access to timely antenatal care may delay identification of nutritional problems and reduce opportunities for counseling or supplementation. Nutritional counseling delivered during pregnancy represents an important strategy for improving maternal dietary and nutritional outcomes, particularly in low- and middle-income countries (Dewidar et al., 2023). These interacting conditions demonstrate that maternal undernutrition cannot be understood solely as the consequence of inadequate food consumption. CED is better viewed as a multifactorial maternal health problem influenced by individual, household, clinical, and social determinants.

Indonesia continues to face maternal nutritional challenges, with CED among pregnant women representing an important concern for antenatal care and prevention of adverse maternal and neonatal outcomes (Isdiany et al., 2024). Community-based primary healthcare services play a central role in identifying pregnant women at nutritional risk through routine antenatal examinations and anthropometric assessment, while the utilization of antenatal care in Indonesia is itself influenced by personal, socioeconomic, and social-support factors (Kartika et al., 2024). Mid-upper arm circumference measurement is commonly used as a practical indicator for identifying women who may experience chronic nutritional deficiency during pregnancy (Salih et al., 2023). Early detection provides opportunities for nutritional counseling, monitoring, supplementation, and referral when additional care is required. Local evidence remains essential because maternal nutritional vulnerability may differ across communities according to socioeconomic circumstances, access to healthcare, dietary practices, and population characteristics.

Current evidence indicates that maternal knowledge, previous or concurrent health conditions, and family support may influence nutritional status through behavioral, biological, and household-level pathways. Adequate knowledge may strengthen awareness of nutritional requirements, appropriate food choices, meal frequency, supplementation, and healthy practices during pregnancy (Demisew et al., 2024). Medical history may affect nutritional status when existing or previous health conditions influence appetite, nutrient absorption, metabolism, or physiological requirements, as demonstrated by conditions such as hyperemesis gravidarum that can result in substantial nutritional depletion and weight loss (Maslin & Dean, 2022). Family support may facilitate access to food, healthcare services, emotional assistance, financial resources, and adherence to nutritional recommendations (Al-Mutawtah et al., 2023). These factors represent conceptually distinct determinants that may contribute to maternal nutrition through different mechanisms, making their assessment relevant within antenatal care.

Existing studies have produced inconsistent findings regarding the relationship between these determinants and CED. At the same time, many investigations have assessed individual factors rather than their combined relevance within a specific antenatal-care population. Knowledge does not necessarily translate into appropriate dietary behavior when financial or household constraints limit access to nutritious foods (Maykondo et al., 2022). Intervention evidence similarly demonstrates that improvements in maternal nutrition-related knowledge do not necessarily produce equivalent improvements in dietary behavior, indicating a potential knowledge-behavior gap (Arifah et al., 2023). The presence of a medical history may also have different implications depending on the type, severity, duration, and current clinical status of the condition. Family support may vary considerably in emotional, informational, instrumental, and financial forms, creating substantial

differences in its potential influence on maternal nutrition; perceived partner support has also been associated with dietary and lifestyle behaviors among expectant parents (Versele et al., 2022). These complexities indicate a need for context-specific research examining whether these factors are statistically associated with CED among pregnant women receiving routine maternal healthcare.

The simultaneous assessment of knowledge, medical history, and family support among pregnant women attending Cimalaka Community Health Center provides context-specific evidence that may clarify potentially modifiable determinants of CED. Examining these variables within the same population allows their individual relationships with maternal nutritional status to be evaluated under comparable healthcare and community conditions. This approach also contributes local empirical evidence that may help healthcare professionals identify whether educational, clinical, or family-centered strategies should receive greater attention in CED prevention (Sanghvi et al., 2022). The findings may further support the refinement of antenatal nutritional screening beyond anthropometric assessment alone by informing a more integrated approach to maternal nutrition interventions within routine antenatal care (Kim et al., 2023).

This study aimed to examine the relationships among knowledge, medical history, family support, and CED among pregnant women receiving antenatal care at the Cimalaka Community Health Center. The study addresses the need for locally relevant evidence regarding factors that may contribute to maternal nutritional vulnerability during pregnancy. Identification of significant or non-significant relationships can inform the direction of future research and help refine maternal nutrition programs toward the determinants most relevant to the study population. Evidence that maternal anthropometric nutritional status is associated with fetal growth further emphasizes the importance of appropriate nutritional assessment during pregnancy (Appiagyei et al., 2023). The evidence generated may support more comprehensive antenatal assessment, targeted health education, appropriate clinical monitoring, and better-informed strategies for preventing CED and its potential consequences for mothers and infants (Beressa et al., 2024).

METHOD

Design

The study employed a correlational research design to examine the associations of knowledge, medical history, and family support with the incidence of Chronic Energy Deficiency (CED) among pregnant women. Knowledge, medical history, and family support were specified as the principal independent variables, and CED status as the outcome variable. The design was selected to assess whether these factors were statistically associated with the occurrence of CED in the study population.

Setting and Time

The study was conducted at Cimalaka Community Health Center, where eligible pregnant women received antenatal care (ANC) services. Data collection was conducted from July 7 to July 31, 2026, in accordance with the required research authorization and ethical clearance. The defined study period provided a clear temporal framework for participant recruitment and data collection.

Sample and Sampling

The study population comprised pregnant women attending antenatal care (ANC) services at Cimalaka Community Health Center. Participants were recruited using a purposive sampling technique based on predefined eligibility criteria. The inclusion criteria comprised pregnant women receiving ANC services at the study site who had available mid-upper arm circumference (MUAC)

measurements or documented height and weight measurements. The exclusion criteria included emergency conditions or severe pregnancy-related complications at the time of data collection, mental disorders or communication difficulties that could interfere with participation, hyperemesis gravidarum, or incomplete study data. The final sample consisted of 200 pregnant women, with the sample size determined using the Slovin formula.

Instrument and Measurement Properties

Data collection used a structured questionnaire, an observation sheet, a hemoglobin (Hb) meter, a sphygmomanometer, a stethoscope, and a mid-upper arm circumference (MUAC) tape. The questionnaire underwent validity and reliability testing before its use in the main study. Psychometric testing was conducted in a separate group of 20 pregnant women receiving antenatal care (ANC) services at Situ Community Health Center, providing a preliminary assessment of the questionnaire's measurement properties prior to data collection.

Data Collection Procedure

Data collection commenced only after formal research authorization and ethical clearance had been obtained from the relevant institutions. Informed consent was obtained from all participants before study procedures were initiated, confirming their voluntary participation in the research. Participant confidentiality was maintained throughout the data collection process by recording names using initials and protecting all information provided by the respondents.

Data Analysis

Data were analyzed using univariate and bivariate statistical procedures. Univariate analysis was used to summarize respondents' characteristics, including age, educational attainment, employment status, income, parity, gestational age, blood pressure, hemoglobin (Hb) level, knowledge level, medical history, family support, and Chronic Energy Deficiency (CED) status, with categorical data reported as frequencies and percentages. Bivariate analysis was performed using the Chi-square test to examine associations among knowledge level, medical history, family support, and CED status, as all variables were categorical and organized into 2×2 contingency tables. Statistical significance was evaluated using a threshold of $p < 0.05$.

Ethical Declaration

Ethical approval for this study was obtained from Universitas Ngudi Waluyo (No. 565/KEP/EC/UNW/2026) prior to the commencement of data collection. Written informed consent was obtained from all participants, confirming their voluntary agreement to participate in the study. Participant confidentiality was maintained throughout the research process by restricting access to study information and recording participant identities using initials rather than full names.

RESULT

Respondent Characteristics

The characteristics of the respondents in this study included maternal age, education level, employment status, income, parity, gestational age, blood pressure, and hemoglobin (Hb) level. Based on Table 1, among the 200 respondents, 175 (87.5%) were aged 20–35 years, 118 (59%) had completed senior high school, 172 (86%) were unemployed, 144 (72%) had an income below the Sumedang Minimum Regional Wage, 120 (60%) were multigravida, 87 (43.5%) were in the third trimester of pregnancy, 8 (4%) had high blood pressure, and 16 (8%) had anemia.

Table 1. Characteristics of Study Participants (N = 200)

Characteristic	Category	n	%
Age (years)	<20	3	1.5
	20–35	175	87.5
	>35	22	11.0
Education level	Elementary school	16	8.0
	Junior high school	34	17.0
	Senior high school	118	59.0
	College or university	32	16.0
Employment status	Employed	28	14.0
	Unemployed	172	86.0
Income	≥ Regional minimum wage	56	28.0
	< Regional minimum wage	144	72.0
Parity	Primigravida	68	34.0
	Multigravida	120	60.0
	Grand multigravida	12	6.0
Gestational age	First trimester	40	20.0
	Second trimester	73	36.5
	Third trimester	87	43.5
Blood pressure	Low	59	29.5
	Normal	133	66.5
	High	8	4.0
Hemoglobin status	Normal	184	92.0
	Anemia	16	8.0

Knowledge Level, Medical History, and Family Support

The distribution presented in Table 2 shows that most respondents had good knowledge (70.5%), reported a medical history (56.0%), and received supportive family support (55.5%). Regarding nutritional status, 10.5% of the pregnant women experienced chronic energy deficiency (CED), while 89.5% did not. These findings indicate that although most respondents had good knowledge and supportive family environments, CED remained present in a proportion of the study population.

Table 2. Knowledge Level, Medical History, Family Support, and Chronic Energy Deficiency Among Pregnant Women (N = 200)

Variable	Category	n	%
Knowledge level	Good	141	70.5
	Poor	59	29.5
Medical history	Yes	112	56.0
	No	88	44.0
Family support	Supportive	111	55.5
	Not supportive	89	44.5
Chronic energy deficiency (CED)	Yes	21	10.5
	No	179	89.5

The Relationship between Knowledge, Medical History, and Family Support and the Incidence of Chronic Energy Deficiency (CED) among Pregnant Women

The bivariate analysis presented in Table 3 showed no statistically significant associations between the examined factors and CED. Knowledge level was not significantly associated with CED ($p = 0.921$), with CED occurring in 7.5% of respondents with good knowledge and 3.0% of those with poor knowledge. Similarly, no significant association was observed for medical history ($p = 0.564$)

or family support ($p = 0.442$). Thus, within this study population, knowledge, medical history, and family support were not significantly associated with the incidence of CED.

Table 3. Association of Knowledge, Medical History, and Family Support with Chronic Energy Deficiency Among Pregnant Women (N = 200)

Variable	Category	CED, n (%)	No CED, n (%)	p
Knowledge level	Good	15 (7.5)	126 (63.0)	0.921
	Poor	6 (3.0)	53 (26.5)	
Medical history	Yes	13 (6.5)	99 (49.5)	0.564
	No	8 (4.0)	80 (40.0)	
Family support	Supportive	10 (5.0)	101 (50.5)	0.442
	Not supportive	11 (5.5)	78 (39.0)	

DISCUSSION

The present study found that Chronic Energy Deficiency (CED) affected 10.5% of pregnant women attending antenatal care at Cimalaka Community Health Center. Most respondents demonstrated good nutritional knowledge, more than half reported a medical history, and slightly more than half received family support during pregnancy. The bivariate analysis showed no statistically significant association between CED and knowledge level, medical history, or family support. These findings indicate that CED in this population may not be adequately explained by the three factors examined individually. The relatively low prevalence of CED compared with several reports from resource-limited maternal populations may reflect differences in socioeconomic conditions, access to antenatal care, nutritional practices, maternal characteristics, or local health-service coverage (Yoseph et al., 2024). Maternal nutritional status is likely to be influenced by multiple biological, behavioral, household, and environmental determinants that may not be captured by simple categorical measures (Wati et al., 2024).

The absence of a significant relationship between maternal knowledge and CED warrants careful interpretation, as nutritional knowledge is generally considered an important prerequisite for healthy dietary behavior during pregnancy. Previous research has frequently shown that women with better nutrition knowledge are more likely to recognize appropriate food choices, understand increased nutrient requirements, and adopt practices that support adequate gestational nutrition (Wang et al., 2023). The present findings suggest that knowledge alone may be insufficient to prevent CED when women face constraints related to food availability, household income, cultural dietary practices, changes in appetite, or competing family needs. A woman may understand the importance of protein-rich foods, dietary diversity, and adequate energy intake yet be unable to translate that knowledge into practice due to financial or structural barriers (Tesfa et al., 2022). The high proportion of participants with good knowledge may also have reduced variability in the exposure, limiting the ability to detect differences between knowledge categories. Educational interventions are more effective when combined with strategies that improve access to nutritionally adequate foods.

The non-significant association between medical history and CED indicates that the presence of a reported health history did not independently distinguish women with CED from those without CED in this sample. Maternal nutritional status is biologically linked to clinical conditions such as anemia, infection, gastrointestinal disorders, chronic disease, and pregnancy-related complications that may alter intake, absorption, metabolism, or energy requirements (Jansen et al., 2024). The broad classification of medical history as a dichotomous variable may have obscured differences in

the type, severity, duration, and current relevance of specific conditions. A resolved illness may have little influence on current nutritional status, whereas an active disease associated with reduced intake or increased metabolic demand could exert a substantial effect (Erick, 2022). The small proportions of women with anemia or elevated blood pressure may also have limited the ability to identify clinically meaningful associations. More detailed clinical characterization would help clarify whether specific maternal conditions contribute to the risk of CED.

Family support was not significantly associated with CED despite the recognized role of the household environment in shaping maternal nutrition. Support from spouses and other family members can influence food purchasing, meal preparation, emotional well-being, adherence to antenatal recommendations, access to health services, and the allocation of household resources (Mitchell et al., 2022). Previous maternal-health research has generally identified family support as beneficial for health-seeking behavior and adherence to recommended pregnancy practices. The present finding may indicate that perceived support does not necessarily correspond to material or nutritional support sufficient to affect energy status. Emotional encouragement may improve well-being without increasing access to nutrient-dense foods, while practical support may vary considerably among women classified as receiving support. A binary measure may also have reduced sensitivity to emotional, informational, instrumental, and financial dimensions of family support (Hinton et al., 2023). A multidimensional assessment may provide a more accurate understanding of how household support interacts with maternal nutritional status.

The prevalence of CED should also be interpreted considering the participants' socioeconomic profile, as most women were unemployed and a substantial proportion had household incomes below the regional minimum wage. Economic resources strongly influence dietary diversity, food quantity, food quality, and the capacity to meet increased nutritional requirements during pregnancy (Whiteoak et al., 2024). The lack of significant associations for the primary study variables does not imply that social determinants are unimportant. Household income, food insecurity, maternal education, parity, gestational age, meal frequency, dietary diversity, pre-pregnancy nutritional status, and access to supplementation may operate simultaneously. It may confound or modify observed relationships (Cheng et al., 2023). Future analytical models should consider these determinants jointly rather than evaluating each exposure in isolation.

The findings have important implications for maternal health practice because screening for CED should not rely solely on knowledge assessment, medical history, or perceived family support. Routine antenatal care should continue to include anthropometric assessment, particularly mid-upper arm circumference, together with evaluation of dietary intake, weight trajectory, hemoglobin status, food security, socioeconomic vulnerability, and pregnancy-related symptoms that may interfere with nutrition (Lemi et al., 2025). Nutrition counseling remains relevant, although counseling should be tailored to the woman's actual capacity to follow dietary recommendations. Individualized interventions may require links to food assistance, supplementation programs, social support services, or household-based counseling when economic or family barriers are identified. Community health centers are well-positioned to integrate nutritional risk screening with antenatal care through repeated opportunities for assessment, monitoring, and referral (Zegeye et al., 2024).

The lack of statistically significant associations also has methodological implications for future research on CED among pregnant women. Multivariable analysis would provide a stronger approach for identifying independent predictors while accounting for potential confounding among socioeconomic, obstetric, behavioral, and clinical factors (Yoseph et al., 2024). More detailed measurements may provide greater discriminatory power than broad binary classifications of knowledge, medical history, and family support. Dietary assessment should ideally include dietary diversity, meal frequency, energy intake, protein intake, supplement use, and household food

security (Shriver et al., 2023). Reproductive factors such as interpregnancy interval, parity, gestational age, and pre-pregnancy body mass index may further clarify nutritional vulnerability. Prospective cohort designs could more clearly establish temporal relationships and evaluate changes in nutritional status across pregnancy.

Several limitations should be considered when interpreting these findings. The correlational design does not permit causal inference or the establishment of whether the measured exposures preceded the development of CED. Purposive sampling from a single community health center may limit the generalizability of the findings to pregnant women in other geographic, socioeconomic, or healthcare settings. The sample included only 21 women with CED, which may have reduced statistical power to detect modest associations and increased the risk of a Type II error. Self-reported measures of knowledge, medical history, and family support may be vulnerable to recall bias, social desirability bias, or misclassification (Lemi et al., 2025). The use of categorical measures may have masked meaningful variation within each variable. The analysis was limited to bivariate Chi-square testing, preventing adjustment for potential confounders such as income, education, parity, gestational age, anemia, dietary intake, and food security (Staerk et al., 2024). The absence of detailed dietary and household food-access measures further limits the explanation of why CED occurred among women with apparently favorable knowledge or family-support profiles.

CONCLUSION

Chronic Energy Deficiency (CED) persisted among pregnant women receiving antenatal care at Cimalaka Community Health Center. However, most participants demonstrated good knowledge, and more than half reported a history of medical conditions and adequate family support. Knowledge level, medical history, and family support were not significantly associated with CED, suggesting that maternal nutritional status may be influenced by a broader combination of socioeconomic, dietary, obstetric, and clinical determinants. Maternal health programs should therefore maintain comprehensive nutritional screening during antenatal care while incorporating assessment of food security, dietary intake, socioeconomic vulnerability, and other modifiable risk factors. Further research using larger, more diverse populations and multivariable analytical approaches is needed to identify independent determinants of CED and support the development of more targeted maternal nutrition interventions.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest regarding this manuscript.

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