

The Relationship Between Knowledge, Energy, and Protein Intake with the Incidence of Chronic Energy Deficiency (CED) In Brides-To-Be in West Rengat District Indragiri Hulu Regency

Yulianto^{1*}

¹Health Polytechnic of the Ministry of Health Riau (Poltekkes Kemenkes Riau),

Indonesia, yulianto@pkr.ac.id

** Corresponding Author: Health Polytechnic of the Ministry of Health Riau (Poltekkes Kemenkes Riau: yulianto@pkr.ac.id*

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Abstract

The incidence of Chronic Energy Deficiency (CED) among prospective brides (brides-to-be) is caused by a lack of knowledge as well as inadequate energy and protein intake. The purpose of this study was to analyze the relationship between knowledge, energy intake, and protein intake and the incidence of CED in prospective brides in West Rengat District, Indragiri Hulu Regency. This was a quantitative study with a cross-sectional design. The research was conducted from March 6 to April 15, 2026, with a sample size of 45 prospective brides selected using total sampling. Data were collected using questionnaires, Upper Arm Circumference (MUAC/LILA) measurements, and 2x24-hour Food Recalls. Data analysis involved univariate and bivariate analysis using the Chi-Square test. The results showed that 30 brides-to-be (66.7%) had adequate knowledge, 23 (51.1%) had adequate energy intake, 25 (55.6%) had inadequate protein intake, and 29 (64.4%) did not experience CED. The Chi-Square test revealed significant relationships between knowledge (p-value = 0.006), energy intake (p-value = 0.004), and protein intake (p-value = 0.024) and the incidence of CED in prospective brides. In conclusion, there is a significant relationship between knowledge, energy intake, and protein intake and the incidence of CED in prospective brides in West Rengat District, Indragiri Hulu Regency. Prospective brides are expected to regularly monitor their nutritional status and pay close attention to energy and protein intake to prevent CED.

Keywords: Energy Intake, Protein Intake, Prospective Brides (Brides-to-be), Knowledge.

Introduction

The premarital period up to the First One Thousand Days of Life (1000 HPK) is a golden period that requires careful attention. The premarital phase needs to be prepared to maintain health physically, psychologically, and socially, aiming to produce high-quality offspring ¹. Target groups vulnerable to nutritional deficits, essential for enhancing health quality during the 1000 HPK, start from Women of Childbearing Age (WCA/WUS), prospective couples (brides-to-be), pregnant women, breastfeeding mothers, newborns, and children under two years (baduta) ². Health and nutritional problems in Indonesia are closely related to a woman's health and nutritional preparation to become a prospective mother, including adolescent girls and prospective brides.

The term 'prospective bride' (catin) refers to Women of Childbearing Age (WCA) who maintain good health before pregnancy to deliver normal and healthy infants, as well as prospective grooms who are introduced to reproductive health issues regarding themselves and their partners. Prospective brides need to pay attention to their nutritional status before marriage and ensure sufficient nutrient intake to achieve sexual maturity, which is useful for properly planning pregnancy to produce quality offspring and achieve a healthy family; thus, balanced nutrition consumption determines reproductive organ health. Balanced nutrition is obtained from a variety of foods, such as a meal plate containing rice, vegetables, plant protein, animal protein, fruit, and fresh water ³.

Premarital nutrition is an initial step to control and monitor the nutritional status of women about to marry. Premarital nutrition is very important because it is directly related to determining the nutritional status of future children. Good nutritional status in prospective brides will result in healthy families and quality offspring ⁴.

Pre-marital issues are linked to pre-pregnancy preparation because conception occurs after marriage. The nutritional status of preconception women influences pregnancy outcomes, making preconception nutritional status critical ⁵. The phenomenon of prospective brides wanting to look slim on their wedding day leads many to adopt strict diets, losing vital macronutrients. When energy requirements are unmet over long periods, energy production becomes suboptimal, leading to Chronic Energy Deficiency (CED).

CED is a condition in which the body lacks energy over an extended duration, reflecting long-term nutritional status. CED can occur in WCA or prospective mothers aged 15–45 years ⁶. CED exhibits observable and measurable signs and symptoms, notably Mid-Upper Arm Circumference (MUAC/LILA) under 23.5 cm. The cutoff point for MUAC in WCA at risk of CED in Indonesia is 23.5 cm. If MUAC is under 23.5 cm (in the red zone of the MUAC tape), the woman is at risk for CED ⁶.

The process of CED development results from long-term nutrient deficits, causing body tissues and reserves to be depleted to meet requirements. Prolonged insufficient intake causes tissue wasting, marked by weight loss ⁷.

The World Health Organization (WHO) reports global prevalence of CED during pregnancy between 35% and 75%. In Indonesia, CED prevalence across age groups is 36.3% (15–19 years), 23.3% (20–24 years), and 13.5% (25–29 years) ⁸. CED cases caused by nutrient intake imbalances lead to inadequate body nutrient supply, causing physical and mental developmental issues.

In Riau Province, CED prevalence among WCA aged 15–49 is 12.9% for pregnant women and 11.4% for non-pregnant women (Kemenkes RI, 2019). Data from the Indragiri Hulu District Health Office (2023) indicates that among 10 Community Health Centers (Puskesmas), Pekanheran Health Center had the highest CED percentage at 24.1%.

The impact of CED on prospective brides includes underweight status and reduced productivity due to lethargy. CED prevention includes supplementary feeding with balanced nutritional value. When CED occurs in WCA and pregnant women, it negatively affects pregnancy and delivery, leading to risks of miscarriage, neonatal death, congenital defects, infant anemia, and Low Birth Weight (LBW) ⁹.

CED causes stem from energy intake and expenditure imbalances. Irregular food consumption and chronic fatigue from heavy workloads affect nutrient requirements. Nutritional status in WCA is also linked to early pregnancy (<20 years), short birth spacing, high parity, infectious diseases, and advanced maternal age ¹⁰.

Factors influencing CED are categorized into direct and indirect factors. Direct factors include inadequate nutritional intake, while indirect factors include nutritional knowledge and physical activity ¹¹. Anemia, infections, or anorexia in adolescents compound nutritional deficits.

Prospective brides must be prepared physically (good nutrition, non-anemic) and cognitively regarding child development ¹². Knowledge, according to Notoatmodjo (2019), is the result of sensory perception. Good preconception nutrition knowledge enables prospective brides to choose appropriate food types in quality and quantity. Lack of knowledge often leads to improper dietary patterns, energy imbalances, and poor health outcomes ¹³.

Macronutrients—carbohydrates (65%), fats (20–30%), and proteins (10–20%)—serve as the body's primary energy sources ¹⁴. CED in Indonesia is primarily driven by energy and protein intake deficits ¹⁵. Research by Wulandari (2022) confirmed a significant association between energy and protein intake and CED among prospective brides ($p = 0.028$) ¹⁶.

A preliminary survey of 10 prospective brides in West Rengat District revealed that 4 (40%) had CED, 6 (60%) had insufficient knowledge, 5 (50%) had inadequate energy intake, and 6 (60%) had inadequate protein intake. Based on these findings, the author conducted this research entitled 'Relationship of Knowledge, Energy, and Protein Intake with Chronic Energy Deficiency (CED) in Prospective Brides: A Case Study in West Rengat District, Indragiri Hulu Regency.

Method

1. Research design

This research employed a quantitative analytical correlation design with a cross-sectional approach, where data on risk factors and outcomes were collected simultaneously.

2. Setting and samples

The population comprised all prospective brides aged 18–45 years in West Rengat District, totaling 45 individuals. Total sampling was utilized, including all 45 prospective brides registered between March and November.

3. Measurement and data collection

Research instruments included: (1) CED measurement using a standard Indonesian Ministry of Health MUAC/LILA tape (precision 0.1 cm); (2) Energy and protein intake measurement using a 2x24-hour Food Recall form alongside the Individual Food Survey Photo Book (2014). Food intake data were converted into energy (kcal) and

protein (g) values using the Indonesian Food Composition Table (DKBM) and Nutri Survey software.

4. Data analysis;

Univariate analysis was conducted to present frequency and percentage distributions of each variable. Bivariate analysis evaluated relationships between independent variables (knowledge, energy intake, protein intake) and the dependent variable (CED status) using the Chi-Square test (95% confidence level, $\alpha = 0.05$).

5. Trustworthiness/rigor (applies to qualitative studies)

Before the research, administrative approval was obtained from the Office of Religious Affairs (KUA) of West Rengat District. Ethical considerations were strictly enforced: Informed Consent (voluntary participation with signed approval), Confidentiality (data used solely for research), and Anonymity (replacement of names with identification codes).

Results

Results Data collection was conducted from March 6 to April 15, 2026, involving 45 prospective brides in West Rengat District.

Characteristics of Respondents

Respondent characteristics analyzed included education level, age, and employment status.

Respondent Characteristics	n	%
Education Level		
No Formal Education	1	2.2
Did not complete Primary School (SD/MI)	1	2.2
Completed Primary School (SD/MI)	1	2.2
Completed Junior High School (SMP/MTS)	7	15.6
Completed Senior High School (SMA/MA)	31	68.9
Diploma / Higher Education	4	8.9
Age Group		
< 20 years	3	6.7
20 – 35 years	40	88.9
> 35 years	2	4.4
Employment Status		
Unemployed / Housewife	20	44.4
Civil Servant (PNS) / Honorary Staff	3	6.7
Other Occupations	22	48.9
Total	45	100.0

Table 1 shows that out of 45 prospective brides, 31 (68.9%) completed senior high school (SMA/MA), 40 (88.9%) were aged 20–35 years, and 22 (48.9%) worked in non-civil service occupations.

Univariate Analysis

Univariate analysis describes the frequency distributions of knowledge, energy intake, protein intake, and CED status among prospective brides.

Variable & Category	n	%
Knowledge Level		
Low / Deficient	15	33.3
Adequate	30	66.7
Energy Intake		
Inadequate / Deficient	22	48.9
Adequate	23	51.1
Protein Intake		
Inadequate / Deficient	25	55.6
Adequate	20	44.4
CED Status		
CED (MUAC < 23.5 cm)	16	35.6
Non-CED (MUAC ≥ 23.5 cm)	29	64.4
Total	45	100.0

As presented in Table 2, 30 respondents (66.7%) exhibited adequate knowledge, 23 (51.1%) had adequate energy intake, 25 (55.6%) had inadequate protein intake, and 29 (64.4%) did not suffer from CED.

Bivariate Analysis

Bivariate analysis evaluated the relationships between independent variables and CED status using Chi-Square tests.

Table 3. Relationship between Knowledge and CED Status in Prospective Brides

Knowledge Level	CED (Yes) n (%)	Non-CED (No) n (%)	Total n (%)	P-value	POR (95% CI)
Low / Deficient	10 (66.7%)	5 (33.3%)	15 (100.0%)	0.006	8.00 (1.98 – 32.36)
Adequate	6 (20.0%)	24 (80.0%)	30 (100.0%)		
Total	16 (35.6%)	29 (64.4%)	45 (100.0%)		

Table 3 shows that among 15 prospective brides with low knowledge, 10 (66.7%) had CED, whereas among 30 with adequate knowledge, only 6 (20.0%) had CED. The Chi-Square test yielded a statistically significant result ($p = 0.006$). The Prevalence Odds Ratio (POR) of 8.00 (95% CI: 1.98–32.36) indicates that prospective brides with low

knowledge have 8 times higher odds of experiencing CED compared to those with adequate knowledge.

Table 4. Relationship between Energy Intake and CED Status in Prospective Brides

Energy Intake		CED (Yes) n (%)	Non-CED (No) n (%)	Total n (%)	P-value	POR (95% CI)
Inadequate Deficient	/	13 (59.1%)	9 (40.9%)	22 (100.0%)	0.004	9.63 (2.19 – 42.37)
Adequate		3 (13.1%)	20 (86.9%)	23 (100.0%)		
Total		16 (35.6%)	29 (64.4%)	45 (100.0%)		

Table 4 illustrates that among 22 respondents with inadequate energy intake, 13 (59.1%) suffered from CED, whereas among 23 respondents with adequate energy intake, 20 (86.9%) were non-CED. The Chi-Square test demonstrated a significant relationship ($p = 0.004$) with a POR of 9.63 (95% CI: 2.19–42.37), meaning respondents with deficient energy intake are 9.6 times more likely to experience CED.

Table 5. Relationship between Protein Intake and CED Status in Prospective Brides

Protein Intake		CED (Yes) n (%)	Non-CED (No) n (%)	Total n (%)	P-value	POR (95% CI)
Inadequate Deficient	/	13 (52.0%)	12 (48.0%)	25 (100.0%)	0.024	6.14 (1.43 – 26.35)
Adequate		3 (15.0%)	17 (85.0%)	20 (100.0%)		
Total		16 (35.6%)	29 (64.4%)	45 (100.0%)		

Table 5 reveals that among 25 respondents with deficient protein intake, 13 (52.0%) had CED, compared to only 3 (15.0%) among those with adequate protein intake. A statistically significant association was found ($p = 0.024$) with a POR of 6.14 (95% CI: 1.43–26.35), indicating that deficient protein intake increases the odds of CED by 6.1 times.

Discussion

Relationship between Knowledge and CED Status in Prospective Brides in West Rengat District

The study identified a statistically significant association between nutritional knowledge and CED incidence ($p = 0.006$). Health-related knowledge directly influences health behaviors and outcomes. A lack of nutritional knowledge diminishes an individual's ability to apply dietary recommendations, serving as a key driver of nutritional disorders¹⁷. Prospective brides with adequate knowledge are more capable

of selecting balanced meals, ensuring sufficient intake to prevent CED. These findings align with Mahmudah et al. 2022¹³ in the KUA Tarub work area and Krisdayani 2023¹⁸, who both established significant links between nutritional knowledge and premarital nutritional status.

Interestingly, 5 out of 15 respondents with low knowledge did not develop CED. This is attributed to strong family support systems and local geographical accessibility. West Rengat District's coastal/island setting provides easy access to fresh seafood rich in high-quality protein and energy. Conversely, 6 of the 30 respondents with adequate knowledge still suffered from CED. This anomaly was influenced by age-related psychological factors and rigid weight loss behaviors before wedding ceremonies.

Relationship between Energy Intake and CED Status in Prospective Brides in West Rengat District

A significant relationship was confirmed between energy intake and CED status ($p = 0.004$, $POR = 9.63$). Energy adequacy depends on caloric metabolism from carbohydrates, fats, and proteins. When energy requirements remain unmet for extended periods, body tissue reserves are depleted, inducing CED. This finding accords with Safira, 2020¹⁷, who noted high rates of deficit energy macronutrient intake among prospective brides leading directly to CED.

Among respondents with inadequate energy intake, 9 did not have CED, likely because their calorie restriction was acute (short-term pre-wedding diet) while maintaining normal baseline nutritional reserves. On the other hand, 3 respondents with adequate total calories had CED due to poor nutritional balance—specifically consuming high-carbohydrate, low-protein diets (e.g., rice combined with instant noodles) that fail to build muscle mass.

Relationship between Protein Intake and CED Status in Prospective Brides in West Rengat District

The analysis demonstrated a significant relationship between protein intake and CED ($p = 0.024$, $POR = 6.14$). Protein is essential for tissue synthesis, repair, and immune maintenance. Inadequate protein intake compromises cellular repair and leads to muscle wasting and low MUAC.

In this study, 12 respondents with low protein intake did not present with CED due to historical baseline health during adolescence and localized access to marine products. However, among those with adequate protein intake, 3 respondents had CED. This was driven by persistent local misconceptions—such as the belief that consuming excessive fish causes helminthiasis (worm infections)—leading to improper meal proportions (e.g., small half-piece fish portions) and a preference for plant proteins with lower biological value.

Limitation

This study is limited to prospective brides and grooms, and other variables—such as motivation—need to be considered.

Conclusion

1. The majority of respondents (64.4%, $n = 29$) did not experience CED. Overall, 66.7% possessed adequate knowledge, 51.1% had adequate energy intake, and 55.6% had inadequate protein intake.
2. There is a significant relationship between nutritional knowledge and the incidence of CED among prospective brides in West Rengat District ($p\text{-value} = 0.006$, $\text{POR} = 8.00$).
3. There is a significant relationship between energy intake and the incidence of CED among prospective brides in West Rengat District ($p\text{-value} = 0.004$, $\text{POR} = 9.63$).
4. There is a significant relationship between protein intake and the incidence of CED among prospective brides in West Rengat District ($p\text{-value} = 0.024$, $\text{POR} = 6.14$).

Ethical Consideration

This study received ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Riau (No. LB.02.03/EA/KEPK-PKR/20/2025). Informed consent was obtained from all respondents, and confidentiality and anonymity were maintained throughout the study.

Conflict of Interest

No conflict of interest.

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