

Association of Body Image and Nutritional Adequacy with Chronic Energy Deficiency among Future Brides in Cibiru District

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ABSTRACT

Background: Chronic Energy Deficiency (CED) is a significant nutritional issue affecting women of reproductive age, including future brides. This condition can have negative effects on reproductive health and the well-being of future descent. CED often arises from insufficient nutrient intake and negative perceptions of body image, which can result in unhealthy eating behaviors. In Bandung City, the Cibiru District has the highest prevalence of malnutrition among future brides.

Objectives: This study aimed to analyze the relationship between body image perception and nutrient adequacy (energy, protein, fat, and carbohydrate) with the incidence of chronic energy deficiency among future brides.

Methods: This study used a cross-sectional design and involved 41 respondents who were recruited through consecutive sampling. Data collection included Measuring Mid-Upper Arm Circumference (MUAC), conducting 2x24-hour food recall interviews, and administering the MBSRQ-AS. The dataset was examined using both univariate and bivariate analyses, with Pearson's and Spearman's correlation tests employed to assess relationships.

Result: Among the respondents, 29.3% were identified as experiencing chronic energy deficiency, while over half reported a positive body image. However, most respondents did not meet the recommended intake levels for energy and macronutrients. Of all the variables assessed, only adequate fat intake was significantly related to chronic energy deficiency in future brides ($p=0.029$; $r=0.341$).

Conclusion: Adequate fat intake is weakly positively related to chronic energy deficiency among future brides. No significant associations were observed between chronic energy deficiency and body image perception or the adequacy of energy, protein, and carbohydrate intake. Therefore, future brides are recommended to meet their nutritional needs, especially fat intake from healthy sources such as mackerel, skipjack tuna, sardines, avocado, and peanuts, to prevent the occurrence of Chronic Energy Deficiency (CED).

Keywords: Body Image, Chronic Energy Deficiency, Future Brides, Nutritional Adequacy, Nutritional Status

INTRODUCTION

Malnutrition continues to pose a significant intergenerational health challenge in Indonesia, as inadequate nutrition may influence an individual's health status in later stages of life. Women of reproductive age, particularly those future brides, are considered highly susceptible to nutritional deficiencies. Among these, Chronic Energy Deficiency (CED) is relatively common and is associated with adverse consequences for

reproductive health as well as the well-being of future generations (Dieny et al., 2019).

Low intake of macronutrients for a long time can lead to Chronic Energy Deficiency (CED). This condition may impact nutritional status and increase the risk of various kinds of health issues. The incidence of CED at a young age will continue into pregnancy and have a negative impact on the mother's and the fetus's health, such as anemia, pregnancy complications, Low Birth Weight

(LBW), and even stunting (Dieny et al., 2019; Sumiati et al., 2021; Wirawanti, 2022).

The Republic of Indonesia's Ministry of Health reported that the prevalence of CED among non-pregnant women of reproductive age increased from 14.5% in 2018 to 20.6% in 2023. In West Java Province, the prevalence of CED was 19.9%, which remained below the national average. That said, these percentages still indicate a rise compared to 12.5% in 2018 (Kementerian Kesehatan Republik Indonesia, 2023, 2018).

Chronic Energy Deficiency (CED) is directly caused by infectious disease and inadequate macronutrient intake, whereas the indirect factors are related to physical activity, nutritional knowledge, and body image (Mahmudah et al., 2022; Sukarti et al., 2023; Sari et al., 2024). Women with a negative body image commonly adopt strict diets and ignore their actual nutritional needs in order to achieve their ideal body shape (Sari et al., 2023). These behaviors may affect daily eating habits and potentially lead to unhealthy dietary practices, thereby increasing the risk of CED over time (Kadmaerubun et al., 2023).

According to earlier research, 37.7% of future brides suffer from Chronic Energy Deficiency (CED) (Puspitasari et al., 2020). Adequate nutritional status in this group is crucial for ensuring maternal well-being throughout pregnancy. Poor preconception nutrition may compromise maternal health, increase the risk of Low Birth Weight (LBW), and lead to stunting in children (Desmiati et al., 2020; Murti et al., 2020).

Bandung City Health Office shows that the prevalence of malnutrition among future brides in 2025 increased to 4.3% from 3.5% in 2024, with the Cibiru District recording the highest rate at 11%. This trend highlights the importance of exploring the causes of CED among future brides, especially in relation to nutritional adequacy and body image. Therefore, the current study aims to examine the relationship between body image and adequate intake of energy, protein, fat, and carbohydrates, as well as the incidence of CED among future brides in Cibiru Districts, Bandung City. The results may provide valuable insights for developing dietary supplements and reproductive health education programs that effectively reduce CED among future brides.

METHODS

The study adopted a cross-sectional quantitative approach, implemented between February and April 2025 in Cibiru District Religious Affairs Office. The study population consisted of future brides registered at the Cibiru District Religious Affairs Office during the study period. For sample size determination, registration data of future brides from October to December 2024 were used,

which recorded 43, 26, and 42 couples, respectively. Based on the average number of registrations during this period, with an additional 10% to anticipate potential data loss, a minimum of 41 respondents was determined as the required sample for this study and was selected using consecutive sampling.

Nutritional status data of the respondents were obtained through anthropometric measurements of Mid-Upper Arm Circumference (MUAC) using a standard measuring tape. Each measurement was taken twice, and the results were recorded in centimeters. A MUAC <23.5 cm was classified as indicating CED (Dieny et al., 2019). Nutritional adequacy data, including energy, protein, fat, and carbohydrate intake, were collected using a 2x24-hour food recall method covering one weekday and one weekend day. The quantitative data on nutrient intake obtained through interviews were then evaluated using the 2019 Indonesian Recommended Dietary Allowance (RDA) as a reference, and the results were expressed as a percentage.

Data on body image perception were obtained through the direct completion of the Multidimensional Body Self Relations Questionnaire–Appearance Scales (MBSRQ-AS) by the respondents. The instrument used was the Indonesian version of the MBSRQ-AS, which had been validated by Dienasari (2016). The questionnaire was constructed using a five-point Likert scale, with response options ranging from “Strongly Disagree” to “Strongly Agree”, each assigned a value from 1 to 5. The statements consisted of two types, namely favorable (supporting the measured construct) and unfavorable (not supporting the measured construct), with the scores for unfavorable items reversed. The results of body image measurement were expressed as total scores.

The authorization for this study was granted by the Health Research Ethics Committee of Universitas Muhammadiyah Surakarta (Certificate No. 862/KEPK-FIK/II/2025). Data were analyzed using IBM SPSS Statistics version 21. Descriptive statistics were applied to present the frequency distributions and percentages of the study variables. Prior to further analyses, normality tests were carried out on all variables. In the bivariate analysis, Pearson's correlation test was applied to variables with normal distribution, while Spearman's rank correlation was used for variables that did not follow a normal distribution. The threshold for statistical significance was defined as $p < 0.05$.

RESULTS AND DISCUSSION

The study was conducted at the Religious Affairs Office of Cibiru District, focusing on women registered as future brides between February and April 2025. The collected data included participants age, educational attainment, occupational status,

nutritional condition assessed through MUAC, body image perception, and adequacy of macronutrient intake (energy, protein, fat, and carbohydrates). A

summary of respondents demographic characteristics is presented in Table 1.

Table 1. Respondents Characteristics by Age, Education, and Occupation

Characteristics	Frequency (N=41)	Percentage (%)
Age Group		
<20 years	1	2.4
20–35 years	37	90.2
≥35 years	3	7.3
Education Level		
Junior High School	4	9.8
Senior High School/Equivalent	22	53.7
Diploma Degree	5	12.2
Bachelor/Master/Doctorate	10	24.4
Occupation		
Private Employee	22	53.7
Civil Servant	2	4.9
Student	3	7.3
Entrepreneur	3	7.3
Unemployed	11	26.8

Based on Table 1, the majority of respondents were aged 20–35 years, totaling 37 individuals (90.2%). This age bracket is classified within the reproductive period, which is typically linked to a reduced likelihood of pregnancy-related complications, making it an optimal time for planning pregnancy. In terms of education, more than half of the respondents (53.7%) had completed senior high school or its equivalent. Some respondents also demonstrated awareness of the importance of education by completing a bachelor's degree. Regarding occupation, the majority of respondents (53.7%) worked as private-sector employees, such as retail workers, shop attendants,

and casual factory laborers. Meanwhile, unemployed respondents accounted for 26.8% of the sample, reflecting a considerable proportion of women who were not engaged in formal employment. The high unemployment rate among respondents can be partly attributed to limited education, which poses a barrier to obtaining decent employment and increases the risk of unemployment. This is in line with previous research showing that the lower the average years of schooling, the higher the level of unemployment (Yuliani, 2023). Other occupations, such as civil servants, students, and entrepreneurs, accounted for relatively small proportions, each representing less than 10%.

Table 2. Distribution of Nutritional Status, Nutrient Adequacy, and Body Image

Variable	N	Mean	Median	SD	Min	Max
MUAC (cm)	41	26.2	25.0	4.0	18.5	35.0
Body Image Score	41	111.9	110.0	9.5	96.0	137.0
Energy Adequacy (%)	41	62.7	59.0	13.7	35.0	92.0
Protein Adequacy (%)	41	70.3	68.0	21.7	34.0	136.0
Fat Adequacy (%)	41	71.8	68.0	24.0	26.0	128.0
Carbohydrate Adequacy (%)	41	57.4	55.0	11.5	32.5	86.0

Note: Measuring Mid-Upper Arm Circumference (MUAC)

Assessment using Mid-Upper Arm Circumference (MUAC) revealed that the average MUAC of respondents was 26.2 cm, indicating that, on average, participants demonstrated a relatively adequate nutritional status. However, the minimum MUAC value recorded was 18.5 cm, which falls within the Chronic Energy Deficiency (CED) category. This highlights the need for further attention to address and mitigate the risk of chronic energy deficiency within this population.

Analysis of macronutrient adequacy revealed that the mean adequacy levels of energy (62.7%), protein (70.3%), fat (71.8%), and

carbohydrates (57.4%) were below 100%, indicating that overall dietary intake was not optimal. Particularly, carbohydrate adequacy had the lowest average compared to other macronutrients, implying lower energy availability and increasing the risk of CED (Yunita et al., 2023). Low consumption of energy and protein can damage the immune system, hamper fetal growth, and elevate the risk of delivering a Low Birth Weight (LBW) newborn. Menstrual irregularities may result from inadequate dietary fat intake (Nahdah et al., 2022), particularly when healthy fats such as omega-3 fatty acids are deficient, which has also been associated with a

decreased probability of achieving natural conception (Trop-Steinberg et al., 2024).

The results of the study showed that the respondents body image scores had an average value of 111.9, with a range between 69 and 137, indicating a considerable variation in body image perception among participants. A lower total score reflected a higher level of dissatisfaction with one's body image, suggesting that some respondents experienced negative perceptions or concerns regarding their physical appearance. Body image has been widely recognized as a factor closely related to

an individual's eating patterns and overall dietary behavior. Based on observations and data collected during the study, respondents who obtained lower total body image scores generally exhibited less healthy eating habits, such as consuming meals fewer than three times per day and having a lower overall energy intake. These unhealthy eating behaviors, when sustained over time, have the potential to adversely affect the respondents nutritional status, possibly leading to nutrient deficiencies or imbalances that could negatively impact their overall health and well-being.

Table 3. Relationship of Body Image and Nutrient Adequacy with Chronic Energy Deficiency

Variable	p-value	r
Body Image	0.277 ^b	0.174
Energy Adequacy	0.270 ^a	0.176
Protein Adequacy	0.114 ^b	0.251
Fat Adequacy	0.029 ^{a*}	0.341
Carbohydrate adequacy	0.970 ^a	-0.006

Note: ^aPearson correlation; ^bSpearman's rank correlation; *Significance (p<0.05)

The analysis revealed that among the five examined variables, only fat intake adequacy showed a statistically significant association with Chronic Energy Deficiency (CED) in future brides (p=0.029; r=0.341). The positive correlation, although weak, indicates that better adequacy of fat intake is associated with better nutritional status in future brides. Therefore, the alternative hypothesis (Ha) was accepted for fat adequacy, whereas Ha was rejected for body image, as well as for energy, protein, and carbohydrate adequacy.

This finding is in line with the results study from Mahmudah et al. (2022), who reported that inadequate fat intake was associated with CED among future brides in the Tarub Religious Affairs Office area. However, it contrasts with the results of Meilinasari et al. (2024), who found no such association among women of reproductive age. Physiologically, fat plays a crucial role in energy metabolism, providing 9 kcal per gram, nearly twice that of protein and carbohydrates. When dietary fat intake is inadequate and body energy reserves are limited, the body mobilizes fat stored in adipose tissue. Prolonged insufficiency may lead to protein catabolism from muscle tissue, resulting in muscle mass loss and weight reduction, which are hallmarks of CED (Dieny et al., 2019; Hatta et al., 2023). Given its essential role, adequate fat intake is critical for preventing CED among women of reproductive age. Recommendations suggest that fat should constitute 20–30% of total daily energy, equivalent to approximately 60–70 grams per day, depending on

age (Kementerian Kesehatan Republik Indonesia, 2019). The type of fat ingested is just as significant as the amount. While saturated and trans fats from animal products, palm oil, and processed meals should be avoided, unsaturated fats from foods like almonds, avocados, and fatty fish are recommended (Ahsan et al., 2020).

The adequacy of energy, protein, and carbohydrates was not significantly associated with CED among future brides in Cibiru District. Similar findings were reported by Fitriani et al. (2024), Simbolon et al. (2024), and Suryadi et al. (2025), who also observed no significant associations between macronutrient adequacy and CED. This condition may be related to dietary patterns characterized by generally low intake of these nutrients, both in quality and diversity. The majority of respondents ate small portions of monotonous meals with inadequate consumption of vegetables, fruits, and plant-based proteins.

Similarly, body image perception and CED incidence among future brides did not have a significant relationship in this study. These results are consistent with Yulia et al. (2024), who also observed no significant association. Meanwhile, this finding contrasts with Astuti et al. (2022), who reported that strict dietary restrictions due to body dissatisfaction increase the risk of CED. To better understand body image, the average scores of the five aspects of the MBSRQ-AS were analyzed to identify which aspects were most and least preferred by respondents.

Table 4. Mean Scores of Body Image Aspects in the MBSRQ-AS

Body Image Aspect	N	Mean±SD
Appearance Evaluation	41	3.41±0.55
Appearance Orientation	41	3.43±0.31
Body Areas Satisfaction Scale	41	3.30±0.53

Body Image Aspect	N	Mean±SD
Overweight Preoccupation	41	2.82±0.84
Self-Classified Weight	41	3.07±0.86

According to Table 4, the overweight preoccupation aspect has the lowest mean score (2.82), indicating concerns about changes in body shape and dissatisfaction with body weight. This concern is probably a result of premarital social and cultural pressures, notably the need to seem slim on the wedding day (Taylor et al., 2023). Family or close friends might also have an impact, in addition to bigger societal pressures. They may gently recommend weight reduction in order to satisfy particular appearance standards.

In contrast, the Appearance Orientation aspect received the highest mean score (3.43), suggesting that respondents pay close attention to their overall appearance and are generally satisfied with their self-care routines. This pattern demonstrates that respondents prioritize enhancing their physical appearance, engaging in activities such as facials, skincare, and body treatments to boost confidence and achieve an optimal look for the wedding day (Putri et al., 2024).

When viewed together, the contrast between the highest and lowest MBSRQ-AS scores indicates that body image among future brides is predominantly focused on appearance management and self-presentation, rather than anxiety over weight alone. These findings show a similar pattern to Sun and Yi (2024), who studied women with PCOS and reported that Appearance Orientation consistently scores highest, while Overweight Preoccupation scores lowest among the MBSRQ-AS dimensions. Although the populations differ, the similarity suggests that prioritizing aspects of appearance that are modifiable over concerns about body weight may be a common trend among women in different contexts. In the context of this study, this indicates that premarital preparations emphasize proactive appearance enhancement to boost self-confidence.

Furthermore, this study underlines how aspects of physical appearance that are relatively simple to change, like facial features or clothing style, receive greater attention from future brides. In contrast, controlling body weight requires persistence, patience, and consistency. As a result, most respondents appear to focus on modifiable aspects of appearance as a means of expressing self-satisfaction and achieving self-actualization prior to marriage.

Despite providing clear insights, this study has certain limitations. The 2x24-hour food recall method employed is subject to recall bias and may not adequately represent variations in food consumption or long-term dietary patterns. Furthermore, the use of quantitative instruments to measure body image captures perceptions in

numerical form without exploring the psychological and social dimensions in depth. Therefore, future research is recommended to combine this method with additional techniques such as the Individual Dietary Diversity Score (IDDS) or Food Weighing, and to incorporate in-depth interviews or Focus Group Discussions (FGD) to obtain a more comprehensive understanding of dietary intake and body image among future brides.

CONCLUSION

This study concludes that Chronic Energy Deficiency (CED) among future brides is weakly associated with fat intake ($p=0.029$; $r=0.341$), while body image and the adequacy of energy, protein, and carbohydrate intake show no significant relationship. The direction of this relationship indicates that the better the adequacy of fat intake, the better the nutritional status of future brides. For the community, particularly future brides, it is recommended to meet their nutritional needs, especially fats from healthy sources such as mackerel, tuna, sardines, avocado, and peanuts, to prevent CED. Regular weight monitoring and adherence to a balanced diet should be practiced from adolescence to ensure optimal health before marriage and pregnancy, thereby supporting the well-being of both the mother and her future child.

These findings underscore the importance of comprehensive premarital health examinations, accompanied by nutritional interventions and reproductive health education delivered through accessible media such as brochures, to support nutritional readiness before conception and prevent CED. Although the observed association was relatively weak, it suggests the involvement of other contributing factors. Therefore, it is recommended that future studies employ larger sample sizes and longitudinal designs to provide a more comprehensive understanding of the determinants of CED in future brides.

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Conflict of Interest and Funding Disclosure

The authors declare no conflict of interest related to the publication of this study.

Author Contributions

The contributions of each author to this study are as follows: APP was responsible for conceptualization, data curation, formal analysis, investigation, methodology, visualization, and writing—original draft; SFS contributed to conceptualization, methodology, supervision, validation, and writing—review and editing; IK was involved in methodology, supervision, validation, and writing—review and editing; and HMI undertook project administration, resources, validation, and writing—review and editing.

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