



SUPPORTING FACTORS OF MATERNAL-FETAL ATTACHMENT IN PREGNANT WOMEN WITH CHRONIC ENERGY DEFICIENCY IN YOGYAKARTA, INDONESIA

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ABSTRACT

Background: Most interventions to address Chronic Energy Deficiency (CED) have focused on physical aspects. **Objective:** Study aims to analyze maternal-fetal attachment (MFA) supporting factors in pregnant women with CED. Cross-sectional study design. 76 pregnant women in their 2nd and 3rd trimesters using purposive sampling. **Methods:** Sociodemographic factors were collected using sociodemographic questionnaires developed by researchers. Anxiety levels using PRAQ-R2, perceived social support using MSPSS, MFA using Indonesian version of IPAI. Data were analyzed using the Chi-square test and logistic regression to determine the most influential factors on MFA. **Results:** Maternal age emerged as a significant predictor of MFA (Wald $p=0.018$). Individual factors: anxiety, social support, education, income, parity, health history were not statistically significant ($p>0.05$), their combined effect was significant (Chi-square $p=0.001$; value=24.357; table value=14.067). **Conclusion:** To increase MFA levels is providing proper education regarding pregnancy readiness and age-appropriate conception. Maternal age plays key role in MFA among women with CED. Women in optimal reproductive age tend to develop stronger fetal attachment. These findings importance of promoting pregnancy preparedness and encouraging childbearing at ideal reproductive ages to enhance maternal-fetal attachment.

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BACKGROUND

The period encompassing conception, pregnancy, and childbirth represents a critical window that profoundly impacts a child's future development (Davis & Narayan, 2020). During pregnancy, adequate nutritional intake is essential to meet maternal and fetal nutritional needs (ter Borg et al., 2023). However, insufficient quantity and quality of maternal nutrition can lead to suboptimal weight gain in both mother and fetus, thereby increasing health risks for both (Harna et al., 2024). A common nutritional issue during pregnancy is CED, characterized by long-term inadequate energy and nutrient intake, often occurring before pregnancy begins. CED is typically indicated by a mid-upper arm circumference (MUAC) of less than 23.5 cm (Wati et al., 2024a).

Globally, maternal malnutrition, including CED, remains a significant concern, especially in low- and middle-income countries. In Indonesia, data from the (National Team for the Acceleration of Poverty Reduction, 2018) showed that approximately 48.9% of pregnant women experienced anemia and many others suffered from CED, contributing to 6.2% prevalence of low birth weight (LBW) (National Team for the Acceleration of Poverty Reduction, 2018; Saragih et al., 2023). The province with the highest prevalence of CED is Aceh, at 23.05%, followed by West Papua at 21.72%. Meanwhile, on the island of Java, the Yogyakarta Special Region (DIY) ranks first, with a CED rate of 11.90% (Kemenkes RI, 2022). As the highest contributing regency in Yogyakarta, Gunung Kidul indicated the fluctuating cases ranged between 15% and 17% from 2015 to 2019 (Dinkes Gunungkidul, 2021). These numbers highlight a persistent and concerning problem in the region.

CED in pregnancy increases the risk of adverse outcomes such as low birth weight, intrauterine growth restriction (IUGR), preterm birth, and impaired fetal development (Fitriani et al., 2022; Svensson et al., 2023). Long-term effects on the child include a higher risk of stunting, which is associated with delayed cognitive and motor development (Wati et al., 2024b). The poor academic achievement, increased vulnerability to disease, and reduced productivity in adulthood (Akseer et al., 2022; Nurahmawati et al., 2022; Rosyidah et al., 2021; Yuningsih & Perbawati, 2022). Thus, maternal nutrition, particularly during the first 1,000 days of life, is critically linked to the child's short- and long-term outcomes.

Several factors contribute to CED in pregnant women, including short pregnancy intervals, high parity, low socioeconomic status (Vilcins et al., 2018), limited maternal knowledge, infectious diseases, and inadequate antenatal care (ANC) utilization (Abdillah, 2022; Angkasa et al., 2024). Efforts to prevent CED have been carried out effectively and systematically by the government, with a substantial budget allocation (Sanou et al., 2018). Several government programs and policies to address and prevent CED include the provision of 90 free iron (Fe) tablets, the pregnancy support team program to ensure proper nutrition, and the distribution of supplementary food programs for pregnant women suffering from CED. Community initiatives have also supported CED prevention efforts through empowerment programs based on local wisdom (Retnaningrum & Rahmawati, 2022). However, despite these efforts, the prevalence of CED remains relatively high across most provinces in Indonesia. This is concerning, considering the government has set a national target of reducing CED among pregnant women to 5%, achieving 95% non-CED pregnancies in Indonesia. Therefore, it is necessary to adopt different approaches to accelerate the reduction of CED rates. While interventions so far have primarily focused on physical needs, such as iron supplementation and food support. Attention has been given to psychological aspects that influence health behavior, such as MFA (Rahimi et al., 2025).

Maternal-fetal attachment (MFA), defined as the emotional bond between a mother and her fetus during pregnancy, is increasingly recognized as an important factor that supports maternal behavior change during pregnancy. First, numerous studies have shown that mothers with strong MFA are more likely to adopt healthy lifestyle practices, such as avoiding smoking and alcohol consumption, attending ANC visits regularly, adhering to iron (Fe) supplementation, engaging in physical activity during pregnancy, and maintaining adequate nutritional intake. These positive behaviors contribute to improved pregnancy outcomes, including delivering healthy infants with normal birth weight and appropriate gestational age. Healthy infants are less likely to experience stunting in early childhood. Additionally, research has demonstrated that pregnant women with strong MFA are at lower risk of giving birth to infants with intrauterine growth restriction (IUGR), preterm birth, and low birth weight (Branjerdporn et al., 2022; Sukriani et al., 2020). Second, MFA can contribute to the mother's mental well-being during pregnancy. Mothers with good men-

tal well-being during pregnancy are more likely to take responsibility for maintaining their health and the fetus. They are also more aware of their new role as an expectant mother (Anjarwati & Suryaningsih, 2021).

One indicator of this change is consuming sufficient and balanced nutrition, including pregnancy milk, for the health of both the mother and the fetus. This can reduce the mother's risk of experiencing energy deficiencies that accumulate from acute to chronic. Despite its relevance, research on MFA among pregnant women experiencing CED is scarce, especially in Indonesia. Research in Indonesia only focuses on CED problems with physical approaches and interventions such as iron supplementation and food support (Fitriah et al, 2023; Paramata & Sandalayuk, 2019; Retnaningrum & Rahmawati, 2022). Meanwhile, psychological approaches are still rarely explored, even though the emotional attachment of the mother to the fetus also plays an important role in supporting healthy pregnancy behaviour and better outcomes. In addition, research on MFA in Indonesia focuses more on pregnant women in general, without considering specific conditions such as pregnant women with CED (Anjarwati & Suryaningsih, 2021; Sacchi et al, 2021; Salehi et al, 2018; Sjariati & Primana, 2021).

Identifying the supporting factors of MFA in this vulnerable population can provide insight into new strategies that combine nutritional and emotional health approaches to reduce the risk of stunting and improve pregnancy outcomes. This study aims to analyze the supporting factors of MFA in pregnant women with CED in Yogyakarta, mainly focusing on Sociodemographic, Psychological, and obstetric characteristics that may influence MFA in pregnant women with CED.

METHODS

This study was conducted at the Amanah Husada Primary Inpatient Clinic in Gunung Kidul, Yogyakarta. The clinic provides maternal and child health services, including antenatal care, childbirth, postpartum care, infant and toddler care, and pregnancy classes. This study employed a quantitative method with an analytical survey design using a cross-sectional approach, conducted from January to March 2024. The study population consisted of pregnant women in the second and third trimesters with CED who attended ANC at the Amanah Husada Inpatient Clinic in Gunung Kidul, Yogyakarta. During the study period, 129 pregnant women with CED visited the clinic. Inclusion criteria included pregnant women in the second and third trimesters, whether primigravida or multigravida, and diagnosed with CED. Exclusion criteria were those with specific health conditions, such as heart disease, asthma, or pregnancy complications like preeclampsia and gestational diabetes. The sample size is determined using the Slovin formula (Santoso, 2023; Slovin, 1960) is 76. Between January and March 2024, 94 antenatal visits were made by individuals diagnosed with CED, of which 76 pregnant women met the eligibility criteria for this study. Data were collected using standardized and validated questionnaires. The primary variable measured was MFA using the Indonesian Prenatal Attachment Inventory (IPAI) version. Data were collected using standardized and validated questionnaires. The primary variable, MFA, was measured using the Indonesian version of the Prenatal Attachment Inventory (IPAI) (Suryaningsih et al, 2021) with scores categorized as high (>42) and low ($=42$). Anxiety levels were assessed with the Pregnancy-Related Anxiety Questionnaire-Revised (PRAQ-R2 with total scores from 0 to 40 with three subscales, namely fear of giving birth, worry about having a disabled child, and worry about one's appearance (Naja et al, 2020) and researcher categorized as high (>24) and low ($=24$). Social support was evaluated using the Multidimensional Scale of Perceived Social Support (MSPSS) with scores categorized as high (>42) and low ($=42$) (Zimet et al, 1988). Sociodemographic data such as age, education level, parity, and income were also collected using a demographic questionnaire designed by the researchers. The dependent variable in this study is MFA. In contrast, the independent variables include factors that may influence MFA: maternal age, education level, anxiety level, economic status, and social support. Data analysis was performed using SPSS version 26.0. Bivariate analysis using the Chi-square test was conducted to identify MFA factors in pregnant women with CED. Multivariate analysis using logistic regression was then applied to determine the most dominant factors influencing MFA in this population. Ethical approval, approval number 3883, was obtained from Universitas Aisyiyah Yogyakarta. Before recruitment into the study, each participant provided written informed consent. Participants were assured of confidentiality, privacy, and anonymity throughout the research process. Names and other identifying information were coded, and the researchers securely

stored all completed questionnaires.

RESULTS

Based on Table 1, the characteristics of respondents are based on gender; most respondents are female, 76 people (100%). Based on age, the majority of respondents are aged 20-35 years, which is 66 people (86.8%), and the minority are aged <20 years, which is two people (2.7%). Based on religion, most respondents are Muslim, 75 people (98.7%), and the minority are Catholic, one person (1.3%). Based on Education Level, the majority of respondents have a high school education background, which is 43 people (56.6%), and the minority of respondents have a Diploma education background, which is one person (1.3%). Based on Parity, the majority of respondents are primigravida (have never given birth before), 46 people (60.5%), and the minority are multigravida, which is 30 respondents (39.5%). Based on 1, the majority of respondents have an income of >2,300,000 (high category), as many as 48 respondents (63.8%), and a minority < 2,300,000 (low category), as many as 28 respondents (36.2%). Based on health history, the majority of respondents do not have a health history, as many as 64 respondents (84.2%), while respondents without health problems are more, namely 56 respondents (73.7%). Based on residential status, the majority live with their husbands, as many as 73 people (96%).

Table 2 shows that most respondents have high Maternal-Fetal Attachment, as many as 67 people (88.2%). Anxiety is mostly in the low category, with as many as 52 people (68.4%). Most respondents get high social support, as many as 74 people (97.4%).

Table 3 shows maternal age has a Wald test P value of $0.018 < 0.05$, meaning that the maternal age variable has a significant partial effect on maternal-fetal attachment in the model. While other independent variables anxiety has $p\text{-value} = 0.880 > 0.05$, social support has $p\text{-value} = 0.999 > 0.05$, education has $p\text{-value} = 0.698 > 0.05$, household income has $p\text{-value} = 0.278 > 0.05$, parity has $p\text{-value} = 0.340 > 0.05$. Health history has a $p\text{-value} = 0.999 > 0.05$, meaning that the other variables do not have a significant partial effect on maternal-fetal attachment in the model. However, if simultaneously/together, it will affect the incidence of MFA (Chi-Square p Value of 0.001 where $< \text{Alpha } 0.05$ or Chi-Square Calculation value $24.357 >$ Chi-Square table 14.067140).

Table 1. Characteristics of pregnant women in amanah Husada Primary Clinic in Gunung Kidul

Characteristics	Category	f	%
Gender	Male	0	0.0
	Female	76	100.0
Ages	< 20	2	2,7
	20 – 35	66	86,8
	> 35	8	10,5
Religions	Islam	75	98.7
	Christianity	0	0.0
	Catholicism	1	1.3
	Hinduism	0	0.0
	Buddhism	0	0.0
	Confucianism	0	0.0
Education	Elementary school	8	10.5
	Junior High School	22	29.0
	Senior High School	43	56.6
	College	3	3.9
Parity	Primigravid	46	60.5
	Multigravid	30	39.5
Household Income	Low < 2,300,000	28	36.2
	High >2,300,000	48	63.8
Health History	Yes	12	15.8
	No	64	84.2
Current Health Problems	Yes	20	26.3
	No	56	73.7
Residence	Husband	73	96.0
	Other	3	4.0

Table 2. Maternal fetal attachment level, anxiety, and social support

Variables	Category	f	%
MFA	High	67	88.2
	Low	9	11.8
Anxiety	High	24	31.6
	Low	52	68.4
Social Support	High	74	97.4
	Low	2	2.6

Table 3. Factors associated with maternal fetal attachment in pregnant women with CED

Factors	B	SE	p	Odd Ratio	95% CI	
					Lower	Upper
Anxiety	-.203	1.343	.880	0.817	.059	11.366
Social Support	25.495	26343.089	.999	1,18 x 10 ¹¹	.000	.
Maternal Ages	-3.235	1.363	.018	0.039	.003	.569
Education	.358	.924	.698	1.431	.234	8.743
Household Income	-1.892	1.746	.278	0.151	.005	4.617
Parity	-1.267	1.327	.340	0.282	.021	3.799
Health History	17.964	11850.379	.999	6,3 x 10 ⁷	.000	.

DISCUSSION

Ages

Maternal age is an important factor influencing MFA. Based on this study's results, most respondents were aged 20–35 years (86.8%), which is the optimal reproductive age and the ideal age for pregnant women. Respondents in this age group showed better physical and mental readiness than other age groups. However, around 2.7% were under the age of 20 years, and 10.5% were over 35 years old. This age has unique challenges that can affect maternal-fetal attachment. Young mothers (<20 years) often face emotional challenges, such as psychological immaturity and lack of experience in pregnancy, which have the potential to lower MFA scores.

The study showed that mothers aged <20 years are more prone to anxiety and stress during pregnancy, which will increase postpartum depression compared to mothers aged >20 years (Aitken et al, 2016). Meanwhile, according to (Branjerdporn et al, 2021), although young mothers tend to face emotional challenges, they think about and interact with their fetuses more often than older mothers. This is due to older mothers' additional responsibilities, such as working or taking care of other children. However, positive emotional experiences during pregnancy remain an important factor influencing increased maternal attachment to the fetus in young and older age groups (Moniri et al, 2023).

Young mothers tend to have higher levels of anxiety during pregnancy, especially if they do not have adequate social support. This is relevant to the condition of CED, where anxiety often increases the risk of young mothers neglecting adequate nutritional intake. This is in line with the results of a study (Maurizatilla et al, 2024), which found that pregnant women who are too young (less than 20 years) or too old (over 35 years) have a higher risk of experiencing CED compared to pregnant women aged 20-35 years. This is due to the competition for nutrients between the growth of young mothers and the fetus and decreased organ function in older mothers, which affects nutrient intake and utilization. Thus, special educational and counseling interventions are essential for this age group to increase their awareness of the importance of maintaining nutrition during pregnancy.

On the other hand, mothers aged >35 years often face health challenges associated with high pregnancy complications, poor obstetric and neonatal outcomes (Ahmad et al, 2024), such as the risk of hypertension, preeclampsia, gestational diabetes, and other complications (Cavazos-Rehg et al, 2015) which can reduce their attention to emotional attachment to the fetus (Hailemeskel et al, 2022). CED conditions in this age group can worsen the risk of complications, such as premature birth and LBW (Nasaru et al, 2024). Older mothers often focus more on physical challenges than on emotional relationships with their fetuses. Hence, they need a holistic physical challenges than on emotional relationships with their fetuses. Hence, they need a holistic approach to support a healthy pregnancy and improve MFA scores. This con-

tradicts the study's results (Ahmad et al., 2024) that older mothers tend to pay more attention to the quality of their relationships with their children. This is because older mothers will be more prepared to care for their babies, and their parenting style will be supportive and closer to their children. This differs significantly from the physical risks in older mothers and their offspring. The age of older mothers can affect the level of protectiveness of mothers towards their children's behavior, socially and emotionally. This dimension will improve the physical and mental well-being of more positive children (Kato et al., 2017).

On the other hand, mothers aged >35 years often face health challenges associated with high pregnancy complications, poor obstetric and neonatal outcomes (Ahmad et al., 2024), such as the risk of hypertension, preeclampsia, gestational diabetes, and other complications (Cavazos-Rehg et al., 2015) which can reduce their attention to emotional attachment to the fetus (Hailemeskel et al., 2022). CED conditions in this age group can worsen the risk of complications, such as premature birth and low birth weight (LBW) (Nasaru et al., 2024). Older mothers often focus more on physical challenges than on emotional relationships with their fetuses. Hence, they need a holistic approach to support a healthy pregnancy and improve MFA scores.

Interestingly, this contrasts with findings from (Ahmad et al., 2024), which showed that older mothers pay more attention to the quality of their relationships with their children. This seeming contradiction can be reconciled by differentiating between prenatal emotional attachment and postnatal parenting behaviors. While physical risks during pregnancy may detract from prenatal MFA in older mothers, their greater life experience and readiness for parenting post-birth can foster more supportive and close parenting styles. Thus, despite physical challenges in reducing prenatal MFA, the quality of the overall maternal-child relationship may remain strong or improve after delivery. This dual influence of age highlights the complex interaction between physical health risks and psychological readiness in determining maternal-fetal attachment and subsequent parenting behavior.

Household Income

63.8% of respondents in this study had a high household income (>Rp2,300,000), which was determined based on the regional minimum wage (UMR) standard in the study area. This condition reflects significant economic challenges in maintaining maternal and fetal health, especially in developing countries. This is a challenge in overcoming nutritional problems and is one of the goals of the Sustainable Development Goals, which is to overcome poverty problems. Low income has a significant relationship and contributes to CED (Wubie et al., 2020). This condition occurs when the mother experiences long-term chronic energy deficiency. CED in pregnant women is directly influenced by insufficient energy and protein intake, especially essential nutrients such as protein, vitamins, and carbohydrates (Rifki et al., 2022). In addition, indirect mechanisms such as limited dietary variety also contribute to the incidence of CED. Pregnant women who consume a less diverse diet have a higher risk of experiencing CED (70%) than women who consume a diet with sufficient variety (30%) (Dieny et al., 2020). In addition, limited access to health services is also an important factor affecting the incidence of CED (Mustafa et al., 2021).

Low income is often associated with limited access to nutritious food, health care, and pregnancy-related information, affecting CED and MFA status. This study provides evidence that household income is associated with the incidence of CED in first-trimester pregnant women. Low income limits the purchasing power of nutritious foods essential for maternal and fetal health, thus increasing the risk of CED (Kamila et al., 2024). However, the logistic regression results showed that income was not statistically significant to the MFA score.

This is likely due to the high level of social support among the respondents (97.4%), which may mask the effect of income on maternal-fetal attachment. This near-universal social support—whether emotional, practical, financial, or spiritual—from partners, family, and the community helps alleviate the mental burden on pregnant women and strengthens their emotional attachment to the fetus despite economic constraints. Mothers with low incomes often rely on social support as a substitute for economic limitations. Social support during pregnancy, whether emotional, practical, financial, or spiritual, is crucial for the well-being of pregnant women (Al-Mutawtah et al., 2023). Support from spouse, family, and community can help reduce the mental burden and strengthen the mother's emotional attachment to the fetus.

However, in the context of CED, low income remains a significant barrier to providing adequate

nutrition, which ultimately affects the physical health of the mother and fetus. The study shows that increasing the income of impoverished households through various productive economic activities effectively reduces the risk of CED in pregnant women by improving access to nutritious food and family economic stability. In line with this, intervention programs such as the distribution of Supplementary Food (PMT) for pregnant women with CED in Indonesia have also proven effective in improving the nutritional status of mothers. However, the success of these programs relies heavily on mothers' understanding of the importance of nutritional intake during pregnancy. Therefore, a community-based nutrition education approach that considers the economic condition of mothers can be a holistic and effective solution to improve MFA while reducing the risk of CED.

Parity

Parity is one of the factors that influence CED in pregnant women. Most respondents (60.5%) were primigravida or mothers facing their first pregnancy. This first experience is often accompanied by high anticipation and anxiety about pregnancy, which can affect emotional attachment to the fetus. Primigravida (first pregnancy) pregnant women have higher attachment than multiparous (Yoon & Choi, 2023). Primigravida mothers tend to seek more information about pregnancy and show more significant concern for the fetus, which may increase MFA scores. However, they are also more susceptible to external influences such as pregnancy-related myths or stigma, which may reduce nutrient intake and increase the risk of CED. This is in line with the findings of Abdalla et al. (2024), who showed that women with lower gravida (first pregnancy/primigravida) tended to have higher myth than women with higher gravida (multigravida). Nutrition education interventions by health professionals have been shown to positively impact nutrition knowledge during pregnancy, especially in primigravida mothers (Teweldemedhin et al, 2021).

In contrast, multigravida (39.5%) are often more experienced in dealing with pregnancy, but they may have limited time or resources due to other family responsibilities. The study (Mahmoud et al, 2019) showed that most multigravida mothers experienced high and severe anxiety and fear of labor compared to primigravida mothers. This may be due to previous unfavorable obstetric experiences or complications in previous deliveries. Higher parity is also associated with an increased risk of malnutrition, rooted in the mother's double burden, such as lack of postpartum care, limited quality of nutrition, and the physical and mental burden of responsibility for her family and herself (Chilot et al, 2023).

In the context of CED, multigravid mothers who experienced energy deficiency during a previous pregnancy are at greater risk of developing CED again. This suggests the need for personalized interventions based on previous pregnancy experience to improve maternal MFA and nutritional status, as well as intervention efforts focused on education regarding ideal pregnancy spacing and improved economic welfare to prevent future occurrences of CED (Akbarini & Siswina, 2022).

Education

Most respondents (56.6%) had a high school education, while 29% had only completed junior high school. Education is an important factor influencing a mother's understanding of health and pregnancy-related information. However, logistic regression analysis showed that education did not significantly predict MFA scores. Despite this, previous studies have indicated that higher education levels are associated with better maternal knowledge and understanding, which may enhance awareness of the importance of MFA during pregnancy (Suryaningsih, 2016).

Research by (Sukriani et al, 2020) shows that although education can affect access to information, the emotional attachment between the mother and the fetus is more determined by psychological and social factors. In the context of CED, education can affect the mother's understanding of the importance of nutrition during pregnancy. However, the level of social support remains a key factor in determining the success of nutritional interventions. Knowledge and level of education have a significant influence on the incidence of CED. Mothers with low levels of education have a higher risk of experiencing CED (Triyawati & Yuliani, 2023). This state is in line with research (Kuntari et al, 2024), which found that low education was significantly associated with a high prevalence of CED in young pregnant women in rural areas. The study (Wati et al, 2024b) showed that low education of pregnant women affects the incidence of CED due to limited knowledge about nutrition, consumption behavior that does not meet needs, and low utilization

of ANC services as a means of nutrition education. This factor causes inadequate nutritional intake, thereby increasing the risk of CED in pregnant women. CED itself is a dominant factor contributing to anemia in pregnant women in Indonesia, in addition to high parity, low education levels, and limited health knowledge. Therefore, future policy strategies should emphasize a holistic nutrition approach, better health education, and empowerment of women of reproductive age to ensure optimal health before conception and during pregnancy (Lipoeto et al., 2020). Community-based education programs tailored to the mother's education level can increase their awareness of the importance of maintaining nutritional intake and supporting MFA. This approach is especially relevant in areas such as Gunung Kidul, where access to formal education may be limited.

Health History

Most respondents (84.2%) had no significant medical history, so they could provide a stable physical background to support a healthy pregnancy. A healthy mother will have good maternal-fetal attachment quality, ultimately contributing to maternal health and infant development. However, for respondents with specific medical histories, such as mothers with CED, it can worsen existing conditions, such as anemia, bleeding, infections, or other chronic diseases (Fitriah et al., 2023), which can affect the mother's emotional attachment to the fetus. A study by Suryaningsih et al. (2020) showed that poor physical health can reduce the mother's energy to focus on the fetus, lowering the MFA score. In cases of CED, nutritional interventions supported by a psychological approach can help improve the mother's physical and emotional health simultaneously.

This study has a significant limitation in its cross-sectional design, which only allows for the analysis of associative relationships without being able to establish causal links between variables. Additionally, the relatively small sample size limits the generalizability of the results and the statistical power to detect significant effects. Therefore, further research with a longitudinal design and a larger sample size is needed to obtain a more valid and comprehensive understanding of the factors influencing MFA and the risk of CED in pregnant women.

CONCLUSION

Maternal age has been proven to be a significant supporting factor for MFA among pregnant women with CED. Women in the ideal reproductive age range exhibit higher levels of MFA, highlighting the importance of targeted education to improve pregnancy readiness and understanding of conception at an appropriate age. Conversely, women under 20 years old and over 35 years old are more vulnerable to pregnancy complications, which can potentially reduce MFA levels. These findings emphasize the necessity of specialized educational interventions for both young and older mothers to enhance emotional attachment during pregnancy and strengthen the health of both mother and fetus.

Furthermore, improving MFA in pregnant women with CED is not only crucial for maternal and fetal health but also contributes to stunting prevention efforts, which remain an urgent public health issue. Therefore, intervention programs that integrate nutritional education, psychosocial support, and pregnancy monitoring should be prioritized to prevent stunting and improve the quality of future generations.

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