ORIGINAL RESEARCH

Knowledge, education, and information affect chronic energy deficiency among pregnant mothers in the area of Public Health Center Balen, Bojonegoro, Indonesia

Lilik Triyawati*, Esti Yuliani*
Diploma Program of Bojonegoro Midwifery Academy, Poltekkes Kemenkes Surabaya, Indonesia.

Article Info
Received Jun 15, 2022
Revised Sep 25, 2022
Accepted Oct 14, 2022
Published Apr 1, 2023

***Corresponding author:**
Esti Yuliani
estiyuliani4771@gmail.com
liliktriyawati@gmail.com

Keywords:
Chronic Energy Deficiency
Knowledge
Education
Informative Support
Instrument Support
Maternal Health

ABSTRACT

Objective: To analyze the effect of knowledge, education and information on the incidence of chronic energy deficiency (CED) in pregnant women at Balen Health Center, Bojonegoro Regency, Indonesia.

Materials and Methods: This research was a correlational analytic study with a cross-sectional approach. The sample of this study were several pregnant women at Public Health Center Balen, Bojonegoro Regency, Indonesia. There were 122 respondents who were recruited with simple random sampling. The independent variables were the predisposing factors, comprising age, number of children, education background, mother's occupational status and knowledge; the enabling factors of the prenatal class participation, and the reinforcing factors of the family support. The dependent variable was the occurrence of CED. Data collection was carried out using questionnaire and secondary data (maternal cohort). Data were processed by editing, scoring, coding, and tabulating. Data analysis used multiple logistic regression with a significance level of 0.05.

Results: The most dominant factor influencing the occurrence of CED was the reinforcing factors of informative support with an Exp value (B) 3.918 and the instrument support with an Exp value (B) value of 3.450. The following factor that influenced the CED incidence was the predisposing factor of knowledge with an Exp value (B) of 2.677, the enabling factor of the prenatal class participation with an Exp value (B) of 1.793, and finally the predisposing factor of education with Exp value (B) of 0.176.

Conclusion: In Balen Health Center Bojonegoro, Indonesia, the predisposing factors significantly affecting Chronic Energy Deficiency in pregnant women were knowledge and education level, while the enabling factors were availability of health facilities and prenatal class participation, and the reinforcing factors were informative support and instrument support.

How to cite: Triyawati L, Yuliani E. Knowledge, education, and information affect chronic energy deficiency among pregnant mothers in the area of Balen Public Health Center, Bojonegoro, Indonesia. Majalah Obstetri & Ginekologi. 2023;31(1):1-10. doi: 10.20473/ mog.V31I12023.1-10.

Highlights:

1. One of the most common maternal health problems is the Chronic Energy Deficiency (CED) in pregnancy.
2. Factors that lead to CED incidence were analyzed to be able to provide adequate precautions.
3. It was found that knowledge, education, and information are factors that affect chronic energy deficiency among pregnant mothers.

INTRODUCTION

Maternal mortality rate is one of the key indicators of public health status. It refers to the number of maternal deaths due pregnancy complications relative to the total number of births. Maternal mortality is a major health problem in many countries, including Indonesia. Chronic Energy Deficiency (CED) is one of the most common maternal health problems in Indonesia. It is common among pregnant women who suffer from chronic food shortages and various health problems. A large number of pregnant women are still suffering from nutritional disorders, especially malnutrition, CED and nutritional anemia. Upper Arm Circumference (UAC) is a type of anthropometric measurement used to assess the risk of CED in women of childbearing age, which include adolescents, pregnant women, breastfeeding mothers and couples of reproductive age (EFA). UAC threshold in women of productive age with a risk of CED is 23.5 cm. If the circumference is less than 23.5 cm, a woman is regarded as having CED.[1]

CED is one of the health problems in the world, especially in developing countries. CED occurs when the intake of energy, protein, or even both is not sufficient for the body's needs. CED affects many women of childbearing age of 15-45 years. CED can also affect pregnant women who have risk factors for CED.[2]

The nutritional status of a mother prior to or during pregnancy plays a critical role in the outcome of conception. Adequate nutrition is essential for the healthy development of the fetus without congenital abnormalities. Conversely, poor maternal nutrition can result in low birth weight and congenital abnormalities.[3] Genetic and chromosomal disorders can also contribute to the occurrence of congenital abnormalities, with parental genetic abnormalities posing a greater risk.[4] Pregnant women with poor nutritional status are at risk of developing CED, a condition characterized by inadequate energy and protein intake due to insufficient consumption of staple foods, imbalanced meal arrangements, and impaired nutrient metabolism.[5] Multigravida, or women who have been pregnant and delivered a term baby, must prioritize their health and maintain proper nutrition before, during, and after pregnancy.[6] Education level is also an important determinant of nutritional status, as individuals with higher education are more likely to possess better knowledge and information regarding nutrition. Thus, optimal maternal nutrition and health before, during, and after pregnancy are critical for the prevention of adverse outcomes in fetal development.[7]

According to the Ministry of Health, Republic of Indonesia, in 2016 the proportion of pregnant women aged 15-49 years with UAC < 23.5 cm or at risk of CED in Indonesia was 24.2%. The lowest proportion was in Bali of 10.1% and the highest was in East Nusa Tenggara of 45.5%. As for the province of East Java, the prevalence was 29.8%. The number of pregnant women with CED in Bojonegoro Regency, East Java, in a report from 2017 was 10.06% and in 2018 it was 10.74%. The Health Office of Bojonegoro Regency reported that people with CED at Public Health Center Balen, Bojonegoro District in 2017 were as many as 122 or 13.09%, while in 2018 there were 154 people or 16.33%. There was an increase in the prevalence of pregnant women with CED at the health center from 2017 to 2018 by 3.24%.

CED can arise from an imbalance between energy intake and expenditure. This imbalance may be attributed to seasonal or chronic food unavailability, uneven distribution of food within the household, and the strenuous workload experienced by expectant mothers. Furthermore, the nutritional status of the mother plays a significant role in the occurrence of CED. Specifically, young maternal age (below 20 years), short intervals between pregnancies (less than 2 years), frequent pregnancies, and advanced maternal age (over 35 years) increase the likelihood of CED. CED in pregnant women has dire consequences not only on fetal growth, birth weight, and the growth of infants and children but also extends to the next generation. This cycle of poor nutritional status can perpetuate from infancy, toddlerhood, adolescence, and future mothers as the next generation. The maternal effects of CED include infectious diseases, obstructed labor, maternal mortality, low birth weight, and neonatal deaths.

In order to decrease the likelihood of low birth weight (LBW) deliveries, it is imperative to enhance the nutritional state of mothers with CED prior to conception. Preconception care should focus on achieving a healthy weight and ensuring adequate nutritional intake for optimal maternal and fetal health. It is crucial to emphasize the importance of proper nutritional intake during pregnancy.[3] To overcome CED in pregnant women, interventions such as education, information dissemination, and communication regarding CED and its influencing factors, as well as strategies for overcoming it, are necessary. These efforts should include recommendations for supplementary feeding and iron supplementation during pregnancy.[8]

In pregnant women, CED typically arises due to inadequate energy intake that existed prior to pregnancy. This is because the energy requirements for pregnant women are greater than those of non-pregnant

women. The factors contributing to CED can be classified as direct or indirect causes. Direct causes include insufficient dietary intake and infections. Indirect causes encompass various obstacles to nutrient utilization, poor nutritional status, low body weight, socioeconomic disadvantage, inadequate knowledge and education regarding nutrition, limited food availability, poor hygiene conditions, high parity, early pregnancy, low income, uneven distribution and trade, poor diet, and inadequate administration of iron tablets.[9]

The aim of this study was to analyze the effect of knowledge, education and information on CED incidence among pregnant women at Public Health Center Balen, Bojonegoro Regency, East Java, Indonesia. The effect of each variables on CED incidence among pregnant women in the health center were also elaborated as the specific purpose of this study.

MATERIALS AND METHODS

This was an observational cross-sectional analytic research using quantitative approach. The population was all pregnant women in the working area of Public Health Center at Balen, Bojonegoro District, East Java, Indonesia, up to August 2020 as many as 645 people. The sample in this study was some pregnant women in the area of Public Health Center Balen, Bojonegoro, in 2020 as many as 122 people. They were recruited using simple random sampling. Data retrieval was performed using questionnaire. This research had received a proper ethical certificate with number No. EA/326/KEPK-Poltekkes_Sby/V/2020.

RESULTS AND DISCUSSION

This study observed the predisposing factors of CED incidence, which included age, number of children, education level, mother's working Status, and knowledge, the enabling factors of the availability of health facilities and the prenatal class participation, as well as the reinforcing factors that comprised of the family support.

General description of the respondents

The distribution of the data is described in Table 1. The most dominant factor influencing CED incidence was the reinforcing factors, consisting of the informative support with an Exp (B) value=3.918 and instrument support with an Exp (B) value=3.450. The following factor that influenced CED incidence was the predisposing factors of knowledge) with Exp (B) value=2.677, the enabling factors of the prenatal class participation with Exp (B) value=1.793, and the last was the predisposing factors of education with Exp (B) value=.176.

Table 1. Distribution of predisposing factors (age, number of children, education level, mother's working status, knowledge) at the area of Public Health Center Balen.

Variables	Categories	F	Percentage
Age	< 20 - > 35 y.o.	25	20.5%
	≥ 20 - ≤ 35 y.o.	97	79.5%
	Total	122	100%
Number of children	0-1	92	75.4%
	≥ 2	30	24.6%
	Total	122	100 %
Educational background	Elementary school	47	38.5%
	High School	56	45.9%
	College	19	25.6%
	Total	122	100%
Occupational Status	Unemployed	87	71.3%
	Employed	35	28.7%
	Total	122	100%
Knowledge	Low	19	15.6%
	Average	44	36.1%
	Good	59	48.4%
	Total	122	100%

Table 2. Distribution of enabling factors based on class participation of the pregnant women in the area of Public Health Center Balen.

Variable	Categories	F	Percentage
Prenatal class participation	Never	27	22.1%
	Sometimes	43	35.2%
	Always	52	42.6%
	Total	122	100%

Table 3. Distribution of reinforcing factors based on family support in prenatal class participation among pregnant women at the area of Public Health Center Balen.

Variables	Categories	F	%
Information support	Unsupporting	48	39.3%
	Supporting	74	60.7%
	Total	122	100%
Instrumental support	Unsupporting		37.7%
	Supporting	76	62.3%
	Total	122	100%
Emotional support	Unsupporting	67	54.9%
	Supporting	55	45.1%
	Total	122	100%
Evaluation support	Unsupporting	63	51.6%
	Supporting	59	48.4%
	Total	122	100%

Presdisposing factors

This study showed that most of the respondents aged 20-35 years, comprising 97 people (79.5%). Most of the respondents had 0-1 children as many as 92 people

Table 4. Distribution of respondents with chronic energy deficiency in the area of Public Health Center Balen.

Variables	Categories	F	Percentages
CED	CED	24	19.7%
	Non CED	98	80.3%
	Total	122	100%

Table 5. The results of the influence of the predisposing factor variables (age, number of children, education level, mother's working status, knowledge), enabling factors (participation in prenatal class), reinforcing and factors (family support) on incidence of CED among pregnant women in the working area of the Public Health Center Balen in 2020.

Variables	Regression						Notes
	Regres-sion Coeffi-cient (B)	S.E	Wald	dF	Sig.	Exp (B)	
Age	.543	.719	.571	1	.450	1.722	Not significant
Number of children	1.047	.750	1.949	1	.163	2.849	Not significant
Educational background	-1.736	.468	13.751	1	.000	.176	Significant
Occupational status	.194	.622	.098	1	.755	1.215	Not significant
Knowledge	.985	.424	5.404	1	.020	2.677	Significant
Prenatal class	.584	.294	3.953	1	.047	1.793	Significant
Information support	1.365	.635	4.618	1	.032	3.918	Significant
Instrumental support	1.238	.518	5.723	1	.017	3.450	Significant
Emotional support	.425	.629	.457	1	.499	1.530	Not significant
Evaluation support	-.617	.643	.921	1	.337	.540	Not significant

Table 6. Dominant factors that influenced CED incidence in pregnant women in the working area of Public Health Center Balen in 2020.

Sub-Variables	Sig (p)	Exp (B)	Notes
Information support	.032	3.918	Significant
Instrumental support	.017	3.450	Significant
Knowledge	.020	2.677	Significant
Prenatal class	.047	1.793	Significant
Educational background	.000	.176	Significant

(75.4%), most of the respondents' education was high school, comprising 56 people with secondary education (45.9%), most of the respondents' occupational status, 87 people (71.3%). The presdisposing factors (age, number of children, education background, mother's occupational status, and knowledge), which had an influence on CED incidence in pregnant women, after being cross-tabulated and analyzed using multiple logistic regression test with SPSS with a significance value of 0.05, revealed that the level of education resulted in p value of 0.000 (< 0.05) and knowledge resulted in p value of 0.020 (< 0.05), underscoring the influence of the level of education and knowledge of pregnant women on CED incidence in pregnant women.

The knowledge that women possess plays a crucial role in their decision-making and subsequent behavior, particularly with regards to providing adequate nutrition to their infants during pregnancy. This is particularly important during periods of cravings, during which the mother may be reluctant to consume nutrient-rich foods due to feelings of nausea, leading to a preference for foods with a fresh and sour taste. However, with adequate knowledge, mothers are more likely to meet their own and their baby's nutritional requirements even during such conditions.[10] These findings align with a previous study conducted by Handayani and Budianingrum (2011), who investigated the factors influencing chronic energy deficiency (CED) in pregnant women at a public health center in Wedi, Klaten, Indonesia.[11] The researchers hypothesized that CED incidence could be attributed to a low level of knowledge among respondents who had not consulted health workers or lacked access to information about CED.[12]

Enabling factors

This study showed that most of the respondents always took prenatal class. They were as many as 52 people (42.6%). As many as 27 pregnant women who had never participated in prenatal class, 17 (37.0%) were not

CED mothers and of 43 pregnant women who sometimes participated in prenatal class, 37 86.0%) were not CED mothers. Among 52 pregnant women who always participated in prenatal class, 44 people (84.6%) were not CED mothers. After cross-tabulation and data analysis using multiple logistic regression test with significance value of 0.05 using SPSS, the obtained p=value was 0.047 (<0.05), showing the effect of prenatal class on CED incidence in pregnant women.

Reinforcing factors

This study showed that most of the families provided informative support to pregnant women, as many as 74 people (60.7%). Most of the families provided instrumental support to pregnant women, as many as 76 people (62.3%), but most did not provide emotional support, as many as 67 people (54.9%), and most did not provide assessment support to the pregnant women, as many as 63 people (51.6%).

Cross-tabulation and data analysis using multiple logistic regression test with a significance value of 0.05 with SPSS, revealed that informative support had p value of 0.032 (<0.05) and instrument support had p value of 0.017 (<0.05), indicating the influence of informative and instrument support on CED incidence in pregnant women.

Effect of predisposing factors on CED incidence

The results of logistic regression analysis showed that knowledge and level of education had a significant influence on CED incidence in pregnant women. Predisposing factors of age, number of children and working status of the mother did not have a significant effect on CED incidence in pregnant women. Presdisposing factors are factors that facilitate or predispose to the occurrence of a person's behavior, including knowledge, attitudes, beliefs and cultural values, perceptions, some individual characteristics such as age, gender, level of education and occupation.

Knowledge

Knowledge had a significant influence on CED incidence in pregnant women. Most of the respondents had knowledge in good category, which means that pregnant women who have good knowledge about nutrition in pregnancy are less likely to experience CED. Knowledge is the result of human sensing, or the result of someone knowing about objects through their senses. Knowledge is very important for the formation of a person's actions that are applied in the form of behavior.[13] Knowledge can be interpreted as actionable information or information that can be followed up and can be used as a basis for action, for making decisions and for taking certain directions or strategies.[14] Factors that influence knowledge include age, educational background, experience, and occupation. Age affects the perception and mindset of a person. The higher the level of maturity and strength of an individual, the more mature the individual in thinking or working. In terms of public trust, trust is given to more mature individuals will be more trusted than someone not mature enough. At middle age (31-49 years), individuals will play a more active role in the society and social life and make more preparations for the success of the efforts for old age adaptation. In addition, middle-aged people will spend more time reading.[15]

The results of this study were in accordance with research conducted by Hilda et al. (2022) regarding the relationship between knowledge and attitudes with CED incidence in pregnant women. They found that there was a relationship between knowledge and CED incidence.[16] The results of this study were also in accordance the results from a study by Rika et al. (2021) on the relationship between knowledge about nutrition and CED in pregnancy.[17] Aulia et al. (2020) in their study on the relationship between knowledge of nutrition, food availability and intake with CED incidence also found a significant relationship between those variables.[18]

In this research, it was identified that a subset of pregnant women exhibits suboptimal knowledge about nutrition during pregnancy. Insufficient understanding of pregnancy nutrition by expectant mothers can negatively impact their dietary intake, which is crucial for supporting maternal and fetal growth and development. Maternal knowledge of pregnancy nutrition plays a significant role in ensuring appropriate intake of essential nutrients and energy required during pregnancy. Pregnant women with higher knowledge of nutrition are better equipped to comprehend the increased energy and nutrient requirements associated with pregnancy, and subsequently select nutrient-dense food options. Adequate nutrition during pregnancy is critical to prevent adverse maternal and fetal outcomes. Suboptimal dietary intake during pregnancy has been associated with lower infant birth weight, and an increased incidence of maternal complications. Therefore, promoting maternal knowledge about optimal nutrition during pregnancy is an important strategy to support maternal and fetal health.

Education

Education has a significant influence on CED incidence in pregnant women. Most of the respondents had education in the middle category, which means that

pregnant women who had a fairly good education about nutrition in pregnancy were less likely to experience CED.

The higher the education, the easier it is for an individual to receive information, so the more knowledge the individual may have, and vice versa.[15] Lack of education will hinder the development of a person's attitude towards newly introduced values, including on nutrition during pregnancy. Education as a process of personal formation is defined as a systematic and systemic activity directed to the formation of the personality of the students. Educational factors affect the diet of pregnant women. Individuals with higher education levels are expected to have better knowledge or information about nutrition so that they can meet their nutritional intake. The results of this study were in accordance to those from a study by Anggraeni et al. (2016) on CED incidence at a public health center in Yogyakarta which found relationship between education and CED incidence in pregnant women.

Education can predict the occurrence of CED with an Exp (B) value of 29.83.[19] In addition, the results in this study were also supported by a previous study by Mijayanti et al. (2020), who investigated factors of CED in pregnant women in Sukoharjo, Indonesia. This study found a relationship between education factors and CED in pregnant women. [20]

The level of education is a significant determinant of an individual's understanding of health and pregnancy-related concerns, subsequently influencing maternal behavior regarding pregnancy care and nutrition. Education has a crucial role in modifying individuals' attitudes and behaviors towards healthy lifestyles. Higher levels of education are associated with better comprehension and uptake of health-related information. Inadequate nutrition and poor dietary habits can negatively impact an individual's nutritional status and increase their risk of malnutrition, particularly protein-energy malnutrition (PEM). Inadequate intake of energy and other essential food components can result in malnourishment and other associated consequences.

Age

Age did not have a significant effect on CED incidence in pregnant women. Most of the respondents aged 20-35 years, which means that pregnant women were of healthy reproductive age. Delivering a baby at a young or too old age results in lower quality of the child and will also harm the health of the mother. The best age is more than 20 years and less than 35 years, so it is expected that the nutritional status of the pregnant women will be better.[8] In this study, it was found that the age of pregnant women was not related to CED incidence. This was because the age of the respondents was mostly at the age of 20-35 years which was the best ages for women to get pregnant so that there was no relationship between age and CED incidence in this study. This finding was in line with that of Novitasari et al. (2019) who found no significant relationship between age and CED incidence.[21]

In this study, there were also pregnant women who experienced chronic lack of energy at an unhealthy reproductive age, which was of less than 20 years and more than 35 years. Pregnancy at this age is still acceptable as long as the condition of the woman's body and health, including nutrition, are in good condition. After the age of 35, some women are classified as having high-risk pregnancies. At this age, maternal and infant mortality rates have increased.

Number of children

The number of children did not have a significant effect on CED incidence in pregnant women. Most respondents had children in the 0-1 category, which means that the pregnant women tended to experience CED.

Parity (number of children) is a woman's condition related to the number of children born. Parity is also one of the factors that affect the nutritional status of pregnant women. Parity is a woman's condition related to the number of children born. Parity is a factor that greatly influences the outcome of conception.[22] This study was in line with a study conducted by Novitasari et al. (2019) who found no significant relationship between parity and CED. [21]

This study revealed that pregnant women who experienced CED had typically given birth to only one child or were currently pregnant with their first child. This observation is attributable to the fact that mothers with limited prior pregnancy experience may be less aware of the importance of nutrient intake during pregnancy, thus increasing the risk of developing various health complications, including anemia and mal-nutrition.

Mothers' occupational status

Mothers' occupational status did not have a significant effect on CED incidence in pregnant women. Most of the respondents had an unemployed status, which means that those pregnant women tended to experience chronic lack of energy. Work is an act or doing something that is done to earn a living in order to live.[23] The amount of

the family's income, the cost of the food itself, and the degree of management of the family resources are among the factors that affect the family's ability to purchase food. Families with low incomes are probably less able to provide for their food needs, particularly for their bodies' nutritional requirements. Diet can be influenced by income status. The most crucial element in influencing the quality and quantity of food is income. The quality of food increases along with income, thus the more money one has, the more of the money will be spent on fruit, vegetables, and a variety of other foods.[22]

The reason why some respondents had a poor economy was because they did not help their husbands acquire extra sources of income, which left their family's income dependent solely on their husbands' income. Their perspective was affected by their lack of knowledge, and as a result, they lacked the motivation to start their own businesses. They simply settled down to be housewives and waited for their husbands to give them money to spend.

Effect of enabling factors on CED incidence

The results of this study showed that there was a significant relationship between the enabling factor of participation in prenatal class on CED incidence. Most of the respondents always participated the prenatal class so they had improved their knowledge about pregnancy and about nutrition in pregnancy, preventing them from CED. In prenatal class, pregnant women will learn together, discuss and share experiences about maternal and child health in a comprehensive and systematic manner that can be carried out on a scheduled and continuous basis.[24] The general purposes of the class were to improve knowledge, change attitudes and behavior of the mothers to understand about pregnancy, body changes and complaints during pregnancy, pregnancy care, childbirth, postpartum care, postnatal family planning, newborn care, local myths/beliefs/ customs, infectious diseases and birth certificates.

The results of this study were in accordance with those of Agustiningsih (2018) who studied effectiveness of the classroom learning program for pregnant women on nutrition knowledge, anemia status, CED and LBW. The study found significant difference in UAC between pregnant women who participated the class and those who did not.[25]

In this study, pregnant women with CED mostly never participated in prenatal class. The impact that will arise from conducting health education activities on behavior change takes a long time, but if the behavior is successfully adopted by individuals or the community, then it will be persistent. It will last a long time, maybe even in a lifetime. Education is a form of intervention aimed at changing behavior to become conducive to health.

Effect of reinforcing factors on CED incidence

The results of logistic regression analysis showed that reinforcing factors of informative support and instrument support had a significant effect on CED incidence in pregnant women, while the reinforcing factors of emotional support and assessment support did not have a significant effect on CED incidence. Reinforcing factors are the consequences of actions that determine whether the perpetrator receives positive (or negative) feedback and is socially supported after the feedback has occurred. Reinforcing factors thus include social support, peer influence, and advice and feedback by health care providers. Reinforcing factors also include the physical consequences of behavior, which can be separated from the social context.

Information support

In this study, information support had a significant influence on CED incidence in pregnant women. Most of the respondents received informative support from their families. Family support is a process that occurs throughout life, the nature and type of support vary at each stage of the life cycle. However, in all stages of life, all family social support enables the family to function with various intelligences and senses. As a result this improves family health and adaptation. The family functions as a collector and disseminator of information about the world.[26] Family support is an attitude, action and acceptance of the family towards family members. Family support is a reinforcing factor in the formation of health behavior. The results of this study were in line with those of Juwita (2018), who studied relationship between counseling and family support to the compliance of pregnant women consuming Fe tablets,[27] and those of Novitasari et al (2019) which both found significant relationship between family support and CED incidence.[21]

Husband's support plays an important role in providing information about participating classes for pregnant women. Paying attention to the nutritional intake needed by pregnant women is a real form of care and responsibility of the husband in the wife's pregnancy, because the husband is the closest family member and can be trusted to provide support to the wife. Support is important for a pregnant wife as she is seeking for information regarding the potential risks of CED due to inadequate nutrient intake during pregnancy to prevent

adverse consequences such as persistent fatigue, fetal miscarriage, and low infant birth weight.

Instrumental support

Instrumental support has a significant effect on CED incidence in pregnant women. Most of the respondents received instrumental support from their families. Family is a source of practical and concrete help. The results of this study were in line with those by Novitasari et al. (2019) who found significant relationship between family support and CED incidence.[21] Mothers require instrumental support from their family or spouse during pregnancy, including assistance with attending healthcare check-ups and prenatal classes. This support facilitates mothers' access to health education, enhancing their knowledge of various aspects of pregnancy, including nutrition.

Emotional support

Emotional support does not have a significant effect on CED incidence in pregnant women. Most of the respondents did not get emotional support from their families. Family is a safe and peaceful place for rest and recovery and helps control emotions.[26] The finding in this study confirmed that of Sari (2020) who found that husband's support had no relationship with CED incidence in pregnant women.[28] The provision of emotional support by family members is a crucial determinant of pregnant women's participation in prenatal classes and adherence to recommended nutritional intake. Husbands or families may act as motivators, positively influencing the behavioral changes of pregnant women. To reduce physical stress, pregnant women require their husbands' support, providing emotional security and lending a listening ear. Encouragement from family members promotes healthy pregnancies and dietary practices.

Evaluation support

Evaluation support does not have a significant effect on CED incidence in pregnant women. Most of the respondents did not receive assessment support from their families. Evaluation support of the family acts as a feedback guide, guiding and mediating problem solving and as a source and validator.[26] This study also found results as those of Sari (2020) that there was no relationship with CED incidence in pregnant women.[28]

During prenatal classes, family assessment support plays a pivotal role in ensuring pregnant women receive necessary support. Family members, particularly the spouse, act as an encouraging and guiding system, reassuring the pregnant woman of their willingness to provide assistance whenever necessary. This support system acknowledges and values the family's current situation, emphasizing the importance of supportive measures in promoting positive outcomes.

CONCLUSION

In Health Center Balen, Bojonegoro, Indonesia, among the predisposing factors, which included age, number of children, education level, mother's occupational status, and knowledge, the factors that had significant effect on CED incidence in pregnant women were knowledge and education level. The enabling factors of availability of health facilities and participation in prenatal class had significant effect on CED incidence in pregnant women, while among the family support, which included informative, instrumental, emotional, and evaluation supports, those that had significant effect on CED incidence were informative and instrument supports.

DISCLOSURES

Acknowledgment

Thank you to all parties involved in this research

Conflict of interest

All authors have no conflict of interest.

Funding

This research has received no external funding.

Author contribution

All authors have contributed to all process in this research, including preparation, data gathering and analysis, drafting and approval for publication of this manuscript.

REFERENCES

1. Mukkadas H, Salma WO, Cristian Bhinekada IM. Factors related to chronic energy deficiency in pregnant mothers in the Konawe District, Indonesia. J Res Dev Nurs Midw 2021;18(2):18-20. doi: 10.52547/jgbfnm.18.2.18
2. Lestari WOSW, Syarif S, Hidayanty H. et al. Nutrition education with android-based application media to increase knowledge, attitudes, and behaviors of pregnant women about chronic energy deficiency (KEK). International Journal of Health

& Medical Sciences. 2021;4(1):15-22. doi: 10.31295/ijhms.v4n1.440.
3. Lailiyana, Nurmailis N, Suryatni. Buku ajar gizi kesehatan reproduksi [Textbook on reproductive health nutrition]. Jakarta: EGC; 2010.
4. Prawirohardjo S. Ilmu Kebidanan [Midwifery]. Jakarta: PT Bina Pustaka Sarwono Prawirohardjo; 2014.
5. Habibah. Ibu hamil dengan KEK [Pregnancy with CED] [Internet] [updated 2014: cited 2017 April 1]. Available from: www.nurhabibah2606.blogspot.com
6. Manuaba IBG. Pengantar kuliah obstetri [Introduction to obstetrics]. Jakarta: EGC; 2015.
7. Kementerian Kesehatan Republik Indonesia. Situasi Gizi [Nutrition Situation]. Jakarta: Pusat Data dan Informasi Kemenkes RI; 2015.
8. Rahmadhani S. Kekurangan energi kronis pada ibu hamil [Chronic energy deficiency in pregnancy] [Internet] [updated 2012; cited 2017 April 1]., Available from: http://sendyfemale.blogspot.com/
9. Yetti P, Pratiwi R, Dewiani K, et al. Hubungan pernikahan dini dengan kejadian anemia pada ibu hamil di Kabupaten Kepahiang Provinsi Bengkulu [Correlation between early marriage and anemic incidence among pregnant women in Bengkulu]. Jurnal Kesehatan Poltekkes Palembang. 2022;17(2):133-7. doi: 10.36086/jpp.v17i2.1291.
10. Proverawati. Anemia dan anemia kehamilan. Kejadian anemia pada ibu hamil ditinjau dari paritas dan usia [Anemia and anemia in pregnancy according to parity and age]. Yogyakarta: Nuha Medika; 2013.
11. Handayani S. Analisis faktor yang mempengaruhi kekurangan energi kronis pada ibu hamil di wilayah Puskesmas Wedi Klaten [Analysis of factors affecting CED in pregnancy at Klaten]. Jurnal Involusi Kebidanan. 2011;1(1):42-60.
12. Novelia S, Rukmaini, Annisa E. Factors related to chronic energy deficiency among pregnant women. Nursing and Health Sciences Journal. 2021;1(3):237-41. doi: 10.53713/nhs.v1i3.54.
13. Notoatmodjo S. Promosi kesehatan dan perilaku kesehatan [Health and health behavior promotion]. Jakarta: Rineka Cipta; 2014.
14. Nursalam. Metodologi penelitian ilmu keperawatan: pendekatan praktis [Research methodology in nursing. A practical approach]. 4th ed. Jakarta: Salemba Medika; 2016.
15. Nursalam, Pariani S. Pendekatan praktis metodologi riset keperawatan [A practical approach in nursing research methodology]. Jakarta: Salemba Medika; 2011.
16. Panjaitan HC, Sagita DI, Rusfianti A, et al. Hubungan pengetahuan dan sikap dengan kejadian KEK pada ibu hamil di Puskesmas Gemolong [Correlation between knowledge and attitude with CED incidence in pregnancy]. Darussalam Nutrition Journal. 2022;6(2):72-81. doi: 10.21111/dnj.v6i2.8258.
17. Diningsih RF, Wiratmo PA, Lubis E. Hubungan tingkat pengetahuan tentang gizi terhadap kejadian kekurangan energi kronik (KEK) pada ibu hamil [Correlation between knowledge on nutrition and CED incidence in pregnancy]. Binawan Student Journal. 2021;3(3). doi: 10.54771/bsj.v3i3.327.
18. Aulia I, Verawati B, Dhilon DA, et al. Hubungan pengetahuan gizi, ketersediaan pangan dan asupan makan dengan kejadian kekurangan energi kronis pada ibu hamil [Correlation between nutrition knowledge, food availability, and food intake with CED incidence in pregnancy]. Jurnal Doppler. 2020;4(2).
19. Anggraeni FD. Analisis faktor yang berhubungan dengan kejadian kekurangan energi kronis (KEK) di wilayah kerja Puskesmas Kasihan I, Bantul Yogyakarta [Factors related to CED incidence at Bantul]. Jurnal Ilmiah Kesehatan Rustida. 2019;6(1):82-9. doi: 10.55500/jikr.v6i2.82.
20. Mijayanti R, Fauziah NA, Sagita YD, et al. Faktor-faktor yang berhubungan dengan kurang energi kronik (KEK) pada ibu hamil di UPT Puskesmas Rawat Inap Sukoharjo Kabupaten Pringsewu [Factors related to CED in pregnancy at Pringsewu]. Jurnal Maternitas Aisyah. 2020;1(3).
21. Novitasari YD, Wahyudi F, Nugraheni A. Faktor–faktor yang berhubungan dengan kekurangan energi kronik (KEK) ibu hamil di wilayah kerja Puskesmas Rowosari Semarang [Factors related to CED among pregnant women in Semarang]. Diponegoro Medical Journal (Jurnal Kedokteran Diponegoro). 2019;8(1):562-571. doi: 10.14710/dmj.v8i1.23399.
22. Suparyanto. Kekurangan energi kronis (KEK) Pada ibu hamil [CED in pregnancy] [internet] [updated 2011; cited 2017 Mar 31]. Available from: http://dr-suparyanto.blogspot.com/
23. Kamus Besar Bahasa Indonesia (KBBI). [Internet] [Cited 2018 Feb 22]. Available from: https://kbbi.web.id/pusat.
24. Kementerian Kesehatan Republik Indonesia. Pedoman umum manajemen kelas ibu; ibu hamil dan ibu balita [Management general guidelines for mothers; pregnant mothers; and underfives' mothers]. Jakarta: Direktorat Jenderal Bina Gizi dan KIA; 2019.
25. Agustiningsih N, Muwakhidah. (2018) Efektifitas program pembelajaran kelas ibu hamil terhadap pengetahuan gizi, status anemia, KEK dan Berat Bayi Lahir Rendah di Kecamatan Grogol Kabupaten Sukoharjo [Effectiveness of prenatal class learning in improving nutritional knowledge,

anemia status, CED, and LBW in Sukoharjo] [thesis on the internet]. Surakarta: Universitas Muhammadiyah Surakarta; 2018. Available from: http://eprints.ums.ac.id/60119/.
26. Simbolon D, Jumiyati, Rahmadi A. Modul edukasi gizi pencegahan dan pe-nanggulangan Kurang Energi Kronik (KEK) dan anemia pada ibu hamil [Nutrition education module on CED and anemia prevention and control]. Deepublish; 2018.
27. Juwita R. Hubungan konseling dan dukungan keluarga terhadap kepatuhan ibu hamil meng-konsumsi tablet Fe [Correlation between conseling and family support with pregnant women's adherence in consuming Fe]. Jurnal Endurance. 2018;3(1):112–20. doi: 10.22216/jen.v3i1.1189.
28. Sari IP. Hubungan pengetahuan, dukungan suami dan jarak kehamilan dengan kejadian kekurangan energi kronik (KEK) pada ibu hamil di wilayah kerja Puskesmas Alalak Selatan Kota Banjarmasin Kalimantan Selatan tahun 2020 [Correlation between knowledge, husband's support and CED incidence among pregnant women in Banjarmasin] [thesis on the internet]. Banjarmasin: Universitas Islam Kalimantan MAB; 2020. Available from: http://eprints.uniska-bjm.ac.id/ 2455/