Jurnal Ners

Volume 19 Issue 4, Nov 2024, p. 433-440
http://dx.doi.org/10.20473/jn.v19i4.56196

ORIGINAL ARTICLE OPEN ACCESS

Chronic energy deficiency in young pregnant women in rural Indonesia: an analysis of basic health survey 2018

Titik Kuntari[1]*, Utami Utami[1], Vita Widyasari[1], Sri Supadmi[2], and Emi Azmi Choironi[3]

[1] Public Health Department, Faculty of Medicine, Islamic University of Indonesia, Yogyakarta, Indonesia

[2] National Research and Innovation Agency Republic of Indonesia, Jakarta, Indonesia

[3] Department of Paediatric, Faculty of Medicine, Islamic University of Indonesia, Yogyakarta, Indonesia

*Correspondence: Titik Kuntari. Address: Public Health Department, Faculty of Medicine, Islamic University of Indonesia, Yogyakarta, Indonesia Email: 017110426@uii.ac.id

Responsible Editor: Retnayu Pradanie

Received: 21 March 2024○ Revised: 26 August 2024 ○ Accepted: 12 November 2024

ABSTRACT

Introduction: Chronic energy deficiency (CED) significantly impacts maternal health and child development. Socioeconomic conditions and access to health services cause young mothers in rural areas to have different health problems from those in urban areas. The study aimed to analyze the factors associated with CED among young pregnant women in rural areas in Indonesia.

Methods: Secondary data for this cross-sectional study were obtained from the 2018 Basic Health Research Survey. One thousand one hundred and thirty-nine pregnant women aged <25 years were involved as subjects. Age, number of family members, education, occupation, gravida, abortion, supplementary feeding, and iron tablets during pregnancy were included as independent variables. Binomial logistic regression analysis was performed to measure the association between the independent and dependent variables. The strength of the association was expressed by p-value <0.05.

Results: The three factors associated with CED were age (p=0.001), education (p=0.013), and supplementary feeding (p<0.001).

Conclusions: Equitable education, increasing the age at which moms can become pregnant, and efforts to fulfill the nutrition needs of pregnant women by providing supplemental food based on community empowerment are significant. Family and community involvement will ensure the sustainability of this CED prevention program.

Keywords: Chronic energy deficiency, nutritional status, pregnancy, rural area, supplementary feeding

Introduction

Malnutrition, whether undernutrition or overnutrition, remains a major global health problem, such as overweight or obesity. One in three of the world's population is malnourished (Dagne *et al.*, 2021). Adolescent girls and pregnant women are groups that are vulnerable to malnutrition, in addition to nursing mothers and children. Malnutrition in adolescent girls has remained relatively high since 2000 (United Nations Children's Fund, 2023).

Malnutrition that occurs in adolescent girls, if not treated properly, will continue until they become pregnant and breastfeed. Many young pregnant women live in poor and developing countries. It is correlated with a lack of sexual education, employment, and access to family planning. Pregnancy in these young women will have an impact on the health outcomes of the mother and her child, such as low birth weight, prematurity, bleeding, and others (Larasati, Nindya and Arief, 2018; Maravilla *et al.*, 2020; Saleh *et al.*, 2021). These complications are associated with malnutrition,

which is common among young pregnant women (Maheshwari *et al.*, 2022). Malnutrition in pregnant women also increases the risk of intrauterine growth retardation (IUGR) and weakens the immune system, making the mother more vulnerable to infections. The mother's nutritional state during pregnancy and breastfeeding impacts the quality of breast milk, affecting the baby's nutritional intake (Mate *et al.*, 2021). The United Nations Children's Fund (UNICEF) estimates an increase in cases of malnutrition in pregnant women due to the food crisis in several countries. About 6.9 million pregnant and lactating women will be malnourished in 2022, an increase of about 25% compared to 2020. This condition is further exacerbated by the climate crisis and the COVID-19 pandemic, which impacts people's socioeconomics and ability to obtain food (United Nations Children's Fund, 2023).

Chronic energy deficiency (CED) is malnutrition that pregnant women often experience due to a long-lasting imbalance in nutrient intake. The 2018 Basic Health Research data show that the prevalence of CED among pregnant women in Indonesia is highest among those aged 15-19 years (33.5%) and 20-24 years (23.3%). The prevalence of pregnant women in rural areas experiencing CED is also higher than those living in urban areas, at 19.3% compared to 15.7% (Ministry of Health Republic of Indonesia, 2018). Young women less than 25 years old, pregnant, and living in rural areas are at twice the risk of CED. Several studies have found that children, adolescent girls, and pregnant women in rural areas are more vulnerable to malnutrition, including anemia and CED, which could be attributed to less accessible access to antenatal care and adherence to iron and folic acid supplements (Edeo Berarti, Gebrie and Beyene, 2023), timing of antenatal care (Aboagye *et al.*, 2022), mother's education level, husband's education level, and family's socioeconomic ability, which differs from urban areas (Islam *et al.*, 2016).

Based on what has been described earlier, various programs have been implemented to address the problem of CED among young pregnant women in rural areas in Indonesia, such as pregnancy monitoring with antenatal care, supplementary feeding, and micronutrient supplementation. These programs were part of the effort to achieve the target of reducing all forms of malnutrition by 2025 and Sustainable Development Goals 2 and 3 by 2030 (World Health Organization, 2023). More than 800 million individuals experience chronic malnutrition. The second SDG aims to abolish all types of hunger and malnutrition while the third is to achieve good health and well-being, with mother and child health being one of the primary focus areas. Children's morbidity and mortality rates must be dramatically decreased (UNDP, 2024). Efforts to implement comprehensive and integrated antenatal care services, including nutrition education for pregnant women, in Indonesia, face several challenges, including low health worker competence, low family participation and support, a lack of facilities, and cultural influences (Rahmawati *et al.*, 2021). An understanding of the determinants of CED in young pregnant women is needed to determine appropriate interventions. This study aimed to analyze the factors associated with the incidence of CED among young pregnant women in rural Indonesia.

Materials and Methods

Study Design

A cross-sectional study used 2018 Basic Health Research data from the Health Development Policy Agency, Ministry of Health of the Republic of Indonesia. The survey covered 34 provinces in Indonesia. The target sample was 300,000 families from 30,000 blocks of the 2018 National Socioeconomic Survey (Susenas).

Population

The study population was young women, less than 25 years old, who were pregnant at the time of data collection. The study then focused on mothers living in rural areas. The rural residence category was determined based on Basic Health Research data. Of the 2,397 young pregnant women, 1,519 (63.33%) lived in rural areas and the rest in urban areas. Based on the completeness of available data, 1,139 young pregnant women living in Indonesia's rural areas were included in the study.

Data Analysis

The dependent variable in this study was maternal nutritional status. The nutritional status of pregnant women was determined based on upper arm circumference information. This variable was categorized into chronic energy deficiency or CED (arm circumference less than 23.5 cm) and not CED (upper arm circumference 23.5 cm or more).

Based on the availability and completeness of basic health survey data, we identified many independent variables that may be linked to CED risk. Some variables, such as anemia and the timing of the initial ANC visit, were not investigated due to many missing data points. The independent variables included age, number of

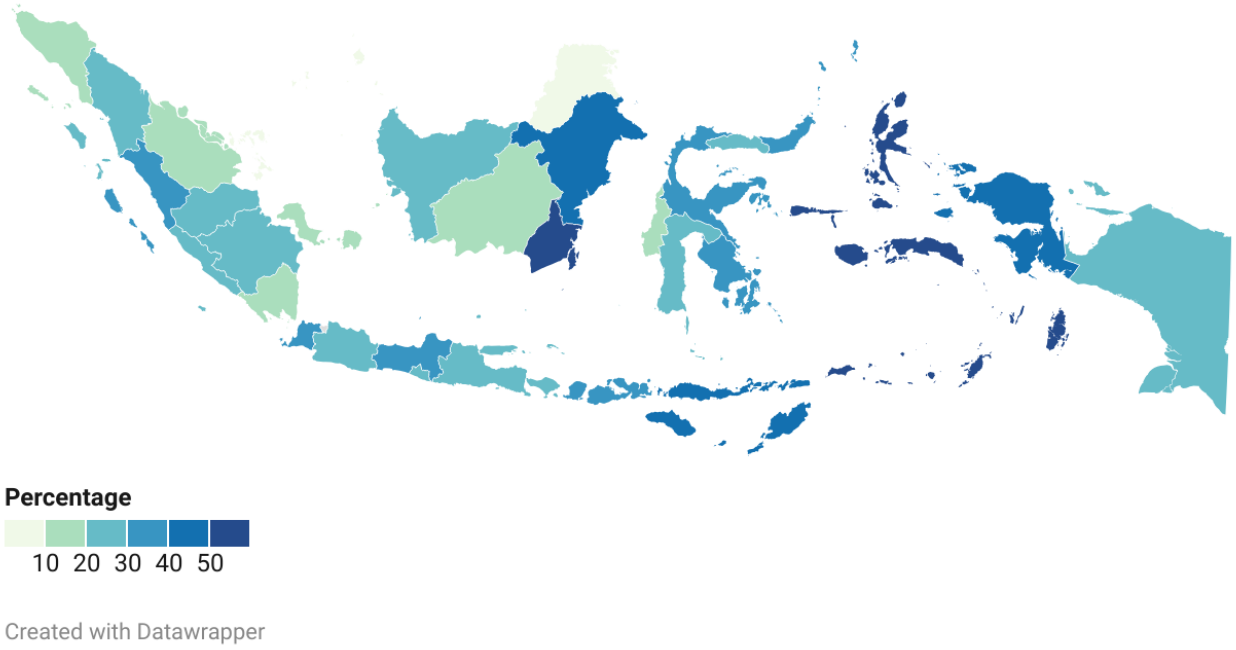

Figure 1. The Distribution of the prevalence of chronic energy deficiency in young pregnant women in rural Indonesia

family members, education, occupation, gravida, history of abortion, supplementary feeding, and ferrous sulfate during pregnancy. Based on the risks that may arise during pregnancy, we classify young mothers into two groups: those under 20 and those aged 20 to 24. Education level is the highest level of formal education completed by the respondent. Education level was categorized as low for junior high or lower and high for senior high or higher. Based on employment, respondents were categorized into either employed or unemployed. Gravida was determined according to the order of pregnancy experienced at the time of data collection and classified into primigravida and multigravida. History of abortion, supplementary feeding, and ferrous sulfate tablet administration were categorized into "yes" and "no."Descriptive analysis illustrated the distribution of CED prevalence among young pregnant women in rural Indonesia by province, presented as a geospatial map. Characteristics of young pregnant women in rural areas are presented as frequency distribution tables.

We conducted univariate and then multivariate analyses. The results of the univariate analysis of subject characteristics are presented in the frequency distribution table. Meanwhile, the percentage of young rural pregnant women who experienced CED in each province is shown in the map image. The percentage value was obtained from the number of young pregnant women in rural areas in a particular province who experienced CED compared to the total number of young pregnant women in rural areas in that province. We performed multivariate analysis with binary logistic regression to determine the association of various independent variables and dependent variables. The relationship was significant if the p-value was <0.05.

Ethics

The researchers did not submit an independent ethical assessment because they relied on secondary data from the 2018 Basic Health Research which are available to the public. Basic Health Research was done following an ethical evaluation by the Ethics Commission for Health Research, Agency for Health Research and Development, under letter LB 02.01/2/KE.267/2017. The researchers received the data set by submitting a request to the Health Development Policy Agency of the Ministry of Health of the Republic of Indonesia, following the protocol outlined on www.layanandata.kemenkes.go.id.

Results

Data showed that 328 people out of 1139 young pregnant women experienced chronic energy deficiency (28.8%). The highest prevalence of young pregnant women with CED is in Maluku Province, which is 55%. The lowest prevalence is in Riau Islands Province and North Kalimantan Province (0%). The distribution of CED prevalence in young rural pregnant in each province in Indonesia is presented as a map (Figure 1).

Table 1 shows that the majority of mothers are in the age range of 21-24 years (58.8%), have a senior high school education (41.4%), have family members of more than four people (47.3%), and are not working (68.0%). Judging from pregnancy history, most of them were primigravida (75.1%), had no previous history of

Table 1. The characteristics of young pregnant women in rural Indonesia (n= 1139)

Characteristics	N	Percentage
Age		
=<19 years old	469	41.2
20-24 years old	670	58.8
Number of household members		
1-4	600	62.7.0
>=5	539	47.3
Education		
No education	15	1.3
Not graduated from elementary school	69	6.1
Graduated elementary school	185	16.2
Graduated junior high school	338	29.7
Graduated senior high school	471	41.4
Diploma	30	2.6
Undergraduate	31	2.7
Employment		
Unemployed	774	68.0
Students	19	1.7
Civil servants	5	0.4
Official private sector	50	4.4
Unofficial private sector	38	3.3
Farmer	121	10.6
Fisherman	2	0.2
Labor/driver/household assistant	11	1.0
Others	119	10.4
Gravida		
Primigravida	855	75.1
Multigravida	284	24.9
Abortion		
Yes	127	11.2
No	1012	88.8
Supplementary feeding		
Yes	437	38.4
No	702	61.6
Ferrous sulfate supplementation		
< 90 tablets	1012	88.8
≥90 tablets	127	11.2

Upper Arms Circumference			
Mean	**Min**	**Max**	**Standard Deviation**
25.2 cm	17.6 cm	39.5 cm	3.16

abortion (88.8%), did not get supplementary food supplementation (PMT) during pregnancy (61.6%), and had taken ferrous sulfate less than 90 tablets (75.0%).

Table 2 presents the multivariate analysis results using binary logistic regression. Age, level of education, and supplementary feeding are the factors most associated with the risk of CED in young pregnant women. Based on their age, pregnant women aged 11-20 years have a more negligible risk of developing CED than pregnant women aged 21-24 years (OR=1.583; 95% CI=1.198-2.091; p=0.001). Pregnant women with junior high school education or lower have a higher risk than mothers with high school education and above (OR=1.409; 95% CI=1.075-1.846; p=0.013), and so do the mothers who get supplementary food (OR=1.696, 95% CI=1.303-2.208; p<0.001). Meanwhile, the number of family members, occupation, gravida, history of abortion, and consumption of ferrous sulfate tablets were not significantly associated with the incidence of CED in young pregnant women in rural areas.

Discussions

Chronic energy deficiency (CED) in adults is often diagnosed based on body mass index (BMI). BMI measurement becomes more complex and less valid in pregnant women since the mother's body weight includes the weight of the fetus she carries. In addition, pregnant women experience physiological changes that impact their body volume. According to research, upper arm circumference is an alternative measure for determining pregnant women's nutritional status (Bari et al., 2021; Musa et al., 2022; 2023; Salih et al., 2023). Based on data (Table 1), the average upper arm circumference in this study was 25.2 cm. This figure is still lower than the national average for upper arm circumference among pregnant women in Indonesia, which is 26.8 cm. Meanwhile, the average rate of CED

Table 2. Logistic regression of chronic energy deficiency in young pregnant women in rural Indonesia

Characteristics	CED (+)	CED (-)	Multivariate	
			P-value	aOR (95% CI)
Age				
=<19 y.o	156	313	0.001	1.583 (1.198-2.091)
20-24 y.o	172	498		1
Number of household members				
1-4	162	438	0.373	0.887 (0.682-1.154)
>=5	166	373		1
Education				
Low (junior high school education or lower)	168	364	0.013	1.409 (1.075-1.846)
Higher (high school or above)	160	447		1
Occupation				
Unemployed	107	258	0.715	1.054 (0.796-1.394)
Employed	221	553		1
Gravida				
Primigravida	250	605	0.623	0.916 (0.644-1.301)
multigravida	78	206		1
Abortion				
Yes	35	92	0.883	0.965 (0.603-1.545)
No	293	719		1
Supplementary feeding				
Yes	154	283	0.000	1.696 (1.303-2.208)
No	174	528		1
Ferrous sulfate supplementation				
<90 tablets	298	714	0.118	1.419 (0.915-2.199)
>90 tablets	30	97		1

among young pregnant women in rural regions was 28.8%, significantly higher than the provincial average of 17.3% (Ministry of Health Republic of Indonesia, 2018).

According to this study, maternal age is an essential variable in determining the risk of malnutrition among young pregnant women. Young pregnancies, particularly in rural settings, are often complex and subject to a variety of risk factors. Rural women are more likely to suffer from nutritional inadequacies than urban women due to discrepancies in access to health, education, and social services and information (Black *et al.*, 2013). Due to her young age, the mother depends significantly on the help of others, particularly her family. Young mothers' education, knowledge, and economic capacity affect their ability to obtain nourishing food and access to healthcare (Helliyana, Aritonang and Sanusi, 2019).

The binary regression logistic test indicated that education level was substantially related to CED in young pregnant women in Rural Indonesia. The mother's formal education level correlates positively with family food consumption patterns (Novelia, Rukmaini and Annisa, 2021). It is also related to the mother's awareness of food ingredients and how to process food for the family (Robiyati, Aisyah and Anggraini, 2022). The mother's level of education also reflects the family's economic capabilities, which influences the ability to purchase food. However, several other investigations have yielded different findings (Moediarso et al., 2020; Wiyono et al., 2020; Akbarini and Siswina, 2022).

Providing supplementary food has a significant effect on CED. Several related studies have found similar results (Rahmah, Nurlinda and Kurnaesih, 2022; Retnaningtyas *et al.*, 2023). This supplementary food can boost energy intake (Putri *et al.*, 2022), which is essential for maternal metabolism and fetal development. Furthermore, supplementary food can increase nutritional intake (Putri *et al.*, 2022) and benefit fetal growth and development (Prameswari, Marliyati and Dewi, 2020).

Although this study found no significant association between the number of family members and the risk of CED, other research has found that having more family members raises the risk of malnutrition in mother-child couples (Andriani *et al.*, 2023). However, this is modified by the family members' personalities. Productive adult family members can help enhance family income, improve food quality, and provide access to education and healthcare. The reverse situation happens among households with several children and elderly (Lowe *et al.*, 2021).

This study discovered that employment had no relationship with the prevalence of CED among young pregnant women in rural locations. These findings are consistent with several other researches, which demonstrate that the status of mothers who are neither employed nor unemployed does not correlate with the incidence of CED in pregnant women (Moediarso et al., 2020; Wiyono et al., 2020; Akbarini and Siswina, 2022). Other factors, including wealth and birth spacing, were associated with CED (Akbarini and Siswina, 2022). Rural housewives are accustomed to conducting household tasks on their own; whether they are housewives or work outside the home, they have almost the same physical obligations. The work that women conduct at home is frequently unaccounted for and not recognized as employment (Bhan *et al.*, 2020). However, the results of this study contradict research in Ethiopia, which states that employment status and wealth index are significant predictors of chronic energy deficiency (Dagne *et al.*, 2021). Economic factors are related to family income, which describes the level of purchasing power of individuals in determining the quality and quantity of diet (Novelia, Rukmaini and Annisa, 2021), which can affect the adequacy of food intake. Shortages that last for a long time can result in CED, especially in pregnant women (Robiyati, Aisyah and Anggraini, 2022). Research in iodine deficiency areas in Indonesia shows that nutritional intake deficiencies in pregnant women are higher than in non-CED pregnant women (Supadmi, Kusrini and Kusumawardani, 2020).

Young pregnant women who are multigravida are at greater risk than primigravida to have CED. Multigravidity, or the condition of having had multiple pregnancies, may have a significant impact on the risk of chronic energy deficiency (CED) during pregnancy (Rizkah and Mahmudiono, 2017 Kumera et al., 2018; Karemoi et al., 2020).

A mother's chance of having CED increases with the number of children. With each subsequent pregnancy, the body may become increasingly depleted of essential nutrients and energy reserves, making it more difficult to adequately support both the mother and the developing fetus. On the contrary, Tejayanti (2019) analyzed Indonesian Riskesdas 2013 data and reported that one-child parity is a significant factor in CED due to the potential of lower mothers' readiness (Tejayanti, 2020). However, the current study did not reveal a significant effect of parity toward the CED. The impact of multiple parities may cause it, and CED is attributed to

other factors, such as anemia and other nutrition depletion, which has received much attention in national programs. It also follows the hypothesis of maternal depletion syndrome, in which high parity and short intervals between deliveries are strongly associated with poor maternal nutrition status (Bigiu *et al.*, 2015)

Abortion and CED are complicated, multilayered topics. Given that CED is not an instant procedure, a history of abortion may imply that CED caused it. Potential links between CED and abortion include malnutrition (Black *et al.*, 2013), which can have an impact on the pregnancy's overall health and hormonal imbalances (The ESHRE Capri Workshop Group, 2006), which have the potential to disrupt the hormonal balance required for successful implantation and development of the pregnancy, and decreased immunity, which makes women more vulnerable to infections that can lead to abortion. However, the impact of CED varies according to the severity and length of the deficit, the individual's health status, and other circumstances.

This study found that iron tablet administration in young pregnant women was not substantially associated with the risk of CED. The prevalence of anemia among pregnant women in Indonesia is 48.9%, and 22.3% among women of reproductive age (Ministry of Health Republic of Indonesia, 2018). According to the WHO, anemia is a moderate health problem in Indonesia. Therefore, pregnant women in Indonesia are given iron supplements for 90 days during pregnancy (Kuntari, Supadmi and Purwoko, 2023). CED frequently causes micronutrient deficiencies, including iron deficiency anemia (IDA) (Helliyana, Aritonang and Sanusi, 2019; Lipoeto, Masrul and Nindrea, 2020), which is extremely common among pregnant women in rural areas. Iron is required for oxygen transport to the fetus, and IDA can result in adverse pregnancy outcomes such as low birth weight (Rahmati et al., 2017; Figueiredo et al., 2018) preterm birth (Rahmati *et al.*, 2020), and maternal complications (Kemppinen *et al.*, 2020). Ferrous sulfate supplements provide iron, which helps to combat IDA and improve outcomes (Seaharattanapatum *et al.*, 2021). While iron deficiency is a concern, excessive iron consumption can also be harmful. Iron supplementation in women without IDA may overload iron stores, increasing the risk of complications such as gestational diabetes (Petry, 2022). Iron may also cause issues with the absorption of other essential nutrients such as zinc and calcium. Careful planning and monitoring are required to ensure adequate nutrient intake.

The mother's nutritional state before and during pregnancy significantly impacts fetal growth and development, the delivery process, and the mother and child's subsequent health (Marshall *et al.*, 2022). As a result, initiatives to satisfy dietary needs must be implemented even before women get pregnant. As a preventive precaution, supplementation and additional food programs are administered to children as young as school age, especially in vulnerable groups. Thus, women are in good nutritional and health status when entering marriage and are ready to give birth to healthy children.

This study's limitation is that, because it uses secondary data, not all factors that affect the risk of CED are available, complete, and can be analyzed, such as anemia or hemoglobin levels. Furthermore, the available Basic Health Research data were collected in 2018. More recent data from this survey are not yet available.

Conclusion

The prevalence of CED among young pregnant women in rural Indonesia has remained significant. The mapping results indicate that the proportion of CED in this age group is higher in Eastern Indonesia than in Western Indonesia, with Maluku Province having the most significant incidence. The three most important factors influencing the occurrence of CED are maternal age, education level, and supplementary feeding.

Equal access to education in rural communities is crucial. Adolescent girls should be taught about reproductive health and nutrition from an early age. Pregnant women should get nutrition instruction and counselling on their nutritional needs, nutrient sources, and how to process them. The high dependence of young pregnant women or adolescents on people around them requires interventions that also involve social support from the closest people, especially family. Therefore, education and counseling should target not only pregnant women but also their partners and closest family members.

Acknowledgments

The authors thank the Health Development Policy Agency and the Ministry of Health of the Republic of Indonesia for granting permission and access to process and publish the 2018 Basic Health Research data.

Conflict of Interest

The authors declare that there was no conflict of interest during the research process or the publication of this article.

References

Aboagye, R. G. *et al.* (2022) 'Health insurance coverage and timely antenatal care attendance in sub-Saharan Africa', *BMC Health Serv Res*, 22(1), pp. 1–12. doi: 10.1186/s12913-022-07601-6.

Akbarini, O. F. and Siswina, T. (2022) 'Factors affecting the incidence of chronic energy deficiency (CED) in pregnant women', *Sci Midwifery*, 10(5), pp. 3776–3783. doi: 10.35335/midwifery.v10i5.841.

Andriani, H. *et al.* (2023) 'A multilevel analysis of the triple burden of malnutrition in Indonesia: trends and determinants from repeated cross-sectional surveys', *BMC Public Health*, 23(1), pp. 1–15. doi: 10.1186/s12889-023-16728-y.

Bari, A. *et al.* (2021) 'Relationship of mid-upper arm circumference and body mass index for assessing maternal nutritional status', *Pak Paediatr J*, 45(2), pp. 186–191.

Bhan, G. *et al.* (2020) 'Informal work and maternal and child health: a blind spot in public health and research', *Bull World Health Organ*, 98, pp. 219–221. doi: 10.2471/BLT.19.231258.

Bigiu, N. *et al.* (2015) 'Maternal depletion syndrome', *Gineco.eu*, 11(2), pp. 98–103. doi: 10.18643/gieu.2015.98.

Black, R. E. *et al.* (2013) 'Maternal and child undernutrition and overweight in low-income and middle-income countries', *Lancet*, 382, pp. 427–451. doi: 10.1016/S0140-6736(13)60937-X.

Dagne, S. *et al.* (2021) 'Chronic Energy Deficiency and Its Determinant Factors among Adults Aged 18 – 59 Years in Ethiopia: A Cross-Sectional Study', *J Nutr Metab*, 2021, p. 8850241. doi: 10.1155/2021/8850241.

Edeo Berarti, A., Gebrie, M. and Beyene, B. (2023) 'Adherence to iron folic acid supplementation and associated factors among antenatal CARE attending women in Sire district primary health care units, South-East Ethiopia: A facility based cross-sectional study', *Int J Afr Nurs Sci*, 18(December 2022), p. 100526. doi: 10.1016/j.ijans.2023.100526.

Figueiredo, A. C. M. G. *et al.* (2018) 'Maternal Anemia and Low Birth Weight: A Systematic Review and Meta-Analysis', *Nutrients*, 10, p. 601. doi: 10.3390/nu10050601.

Helliyana, H., Aritonang, E. Y. and Sanusi, S. R. (2019) 'The Associations between Maternal Education , Chronic Energy Deficit, and Anemia in Pregnant Women: An Evidence from Lhokseumawe , Indonesia', *J Matern Child Health*, 4(5), pp. 312–316. doi: 10.26911/thejmch.2019.04.05.02.

Islam, A. *et al.* (2016) 'Socio-economic and demographic factors influencing nutritional status among early childbearing young mothers in Bangladesh', *BMC Women Health*, 16, p. 58. doi: 10.1186/s12905-016-0338-y.

Karemoi, T. M., Mardiah, W. and Adistie, F. (2020) 'Factors Affecting Nutritional Status of Pregnant Women: A Literature Study', *Asian Comm Health Nurs Res*, 2(2), pp. 39–47. doi: 10.29253/achnr.2020.23958.

Kemppinen, L. *et al.* (2020) 'Gestational iron deficiency anemia is associated with preterm birth, fetal growth restriction, and postpartum infections', *J Perinat Med*, 49(4), pp. 431–438. doi: 10.1515/jpm-2020-0379.

Kumera, G. *et al.* (2018) 'Undernutrition and its association with socio-demographic, anemia and intestinal parasitic infection among pregnant women attending antenatal care at the University of Gondar Hospital, Northwest Ethiopia', *Matern Health Neonatol Perinatol* ., 4, p. 18. doi: 10.1186/s40748-018-0087-z.

Kuntari, T., Supadmi, S. and Purwoko, S. (2023) 'Optimalisasi Antenatal Care pada Ibu Hamil di Usia Muda', in Nugraha, G. and Mentari, D. (eds) *Mengenal Anemia: Patofisiologi, Klasifikasi, dan Diagnosis*. Jakarta: Penerbit BRIN, pp. 203–228. doi: 10.55981/brin.906.c808.

Larasati, D. A., Nindya, T. S. and Arief, Y. S. (2018) 'The Correlation Between Adolescent Pregnancy, Breastfeeeding Practice and Stunted Children at Puskesmas Pujon Kabupaten Malang', *Amerta Nutr*, pp. 392–401. doi: 10.2473/amnt.v2i4.2018.392-401.

Lipoeto, N. I., Masrul and Nindrea, R. D. (2020) 'Nutritional contributors to maternal anemia in Indonesia: chronic energy deficiency and micronutrients', *Asia Pac J Clin Nutr*, 29(suppl 1), pp. s9–s17. doi: 10.6133/apjcn.202012_29(S1).02.

Lowe, C. *et al.* (2021) 'The double burden of malnutrition and dietary patterns in rural Central Java, Indonesia', *The Lancet Regional Health - Western Pacific*, 14, p. 100205. doi: 10.1016/j.lanwpc.2021.100205.

Maheshwari, M. V *et al.* (2022) 'Maternal and Neonatal Outcomes of Adolescent Pregnancy: A Narrative Review', *Cureus*, 14(6), p. e25921. doi: 10.7759/cureus.25921.

Maravilla, J. C. *et al.* (2020) 'Stunting of children under two from repeated pregnancy among young mothers', *Scientific Reports*, pp. 1–9. doi: 10.1038/s41598-020-71106-7.

Marshall, N. E. *et al.* (2022) 'The importance of nutrition in pregnancy and lactation: lifelong consequences', *Am J Obstet Gynecol*, 226(5), pp. 607–632. doi: 10.1016/j.ajog.2021.12.035.

Mate, A. *et al.* (2021) 'Impact of maternal nutrition in viral infections during pregnancy', *Biochim Biophys Acta Mol Basis Dis*, 1867, p. 166231. doi: 10.1016/j.bbadis.2021.166231.

Ministry of Health Republic of Indonesia (2018) *Riset Kesehatan Dasar*.

Moediarso, B. N. *et al.* (2020) 'Differentiate factors of pregnant women with chronic energy deficiency occurence in Bajulmati village, Wongsorejo District, Banyuwangi Regency 2019', *J Community Med Pub Health res*, 1(1), pp. 24–32. doi: 10.20473/jcmphr.v1i1.20297.

Musa, I. R. *et al.* (2023) 'Mid-upper arm circumference as a screening tool for identifying underweight adolescents', *Front Nutr*, 10, p. 1200077. doi: 10.3389/fnut.2023.1200077.

Musa, I. R., Omar, S. M. and Adam, I. (2022) 'Mid-upper arm circumference as a substitute for body mass index in the assessment of nutritional status among adults in eastern Sudan', *BMC Public Health*, 22(1), p. 2056. doi: 10.1186/s12889-022-14536-4.

Novelia, S., Rukmaini, R. and Annisa, E. (2021) 'Factors Related to Chronic Energy Deficiency among Pregnant Women', *NHSJ*, 1(3), pp. 237–241. doi: 10.53713/nhs.v1i3.54.

Petry, C. J. (2022) 'Iron Supplementation in Pregnancy and Risk of Gestational Diabetes : A Narrative Review', *Nutrients*, 14, p. 4791. doi: 10.3390/ nu14224791.

Prameswari, F. S. P., Marliyati, S. A. and Dewi, M. (2020) 'A Supplementary Protein Food for Pregnant Women with Chronic Energy Deficiency to Improve Fetal Growth', *J Gizi Pangan*, 15(28), pp. 1–10. doi: 10.25182/jgp.2020.15.1.1-10.

Putri, R. S. *et al.* (2022) 'Effectiveness of Supplementary Feeding in Pregnant Women with Chronic Energy Deficiency: A Systematic Article Review', *IJRP*, 115(1), pp. 122–129. doi: 10.47119/IJRP10011511220224285.

Rahmah, H., Nurlinda, A. and Kurnaesih, E. (2022) 'The Effect of Supplementary Feeding on Body Weight of Pregnant Women Who Have Chronic Energy Deficiency in Indonesia', *Journal of Aafiyah Health Research (JAHR)*, 3(1), pp. 44–51. doi: 10.52103/jahr.v3i1.947.

Rahmati, S. *et al.* (2017) 'Maternal Anemia during pregnancy and infant low birth weight: A systematic review and Meta-analysis', *Int J Reprod BioMed*, 15(3), pp. 125–134. doi: 10.29252/ijrm.15.3.125.

Rahmati, S. *et al.* (2020) 'The relationship between maternal anemia during pregnancy with preterm birth: a systematic review and meta-analysis', *J Matern Fetal Neonatal Med.*, 33(15), pp. 2679–2689. doi: 10.1080/14767058.2018.1555811.

Rahmawati, W. *et al.* (2021) 'Indonesian antenatal nutrition education: A qualitative study of healthcare professional views', *Women Health*, 17, pp. 1–17. doi: 10.1177/17455065211066077.

Retnaningtyas, E. *et al.* (2023) 'Provision of supplementary foods and diet against weight gain in pregnant women with chronic energy deficiency', *Science Midwifery*, 11(2), pp. 366–373. doi: 10.35335/midwifery.v11i2.1296.

Rizkah, Z. and Mahmudiono, T. (2017) 'Hubungan Antara Umur, Gravida, Dan Status Bekerja Terhadap Resiko Kurang Energi Kronis (KEK) Dan Anemia Pada Ibu Hamil', *Amerta Nutr*, 1(2), pp. 72–79. doi: 10.20473/amnt.v1.i2.2017.72-79.

Robiyati, R., Aisyah, S. and Anggraini, H. (2022) 'Factors Associated

with the Incidence of Chronic Energy Deficiency (CED) in Pregnant Women in the Working Area of the UPT Health Center Inpatient Banding Agung in 2021', *Sci Midwifery*, 10(2), pp. 559–565.

Saleh, A. *et al.* (2021) 'Role of Maternal in Preventing Stunting: a Systematic Review', *Gaceta Sanitaria*, 35, pp. S576–S582. doi: 10.1016/j.gaceta.2021.10.087.

Salih, Y. *et al.* (2023) 'The Mid-Upper Arm Circumference as a Substitute for Body Mass Index in the Assessment of Nutritional Status among Pregnant Women: A Cross-Sectional Study', *Medicina (Lithuania)*, 59, p. 1001. doi: 10.3390/medicina59061001.

Seaharattanapatum, B. *et al.* (2021) 'Effectiveness of Balanced Diet-Iron Supplement Program among Pregnant Women with Anemia : A Quasi-Experimental Study', *Pacific Rim Int J Nurs Res*, 25(4), pp. 653–665.

Supadmi, S., Kusrini, I. and Kusumawardani, H. D. (2020) 'The Influence of Iron Depletion and Chronic Energy Deficiency on the Risk of Hypothyroidism in Pregnant Women Living in Iodine Deficiency Disorders Endemic Areas in Badegan Ponorogo District East Java , Indonesia', *J Nutr Sci Vitaminol*, 66, pp. 456–462. doi: 10.3177/jnsv.66.S456.

Tejayanti, T. (2020) 'Determinants of Chronic Energy Deficiency and Low Body Mass Index of Pregnant Women in Indonesia', *Jurnal Kesehatan Reproduksi*, 10(2), pp. 173–180. doi: 10.22435/kespro.v10i2.2403.

The ESHRE Capri Workshop Group (2006) 'Nutrition and reproduction in women', *Hum Reprod Update*, 12(3), pp. 193–207. doi: 10.1093/humupd/dmk003.

UNDP (2024) *Sustainable Development Goals*.

United Nations Children's Fund (2023) *Undernourished and overlooked. A global nutrition crisis in adolescent girls and women*. New York.

Wiyono, S. *et al.* (2020) 'Study causes of chronic energy deficiency of pregnant in the rural areas', *Int J Community Med Public Health*, 7(2), pp. 443–448. doi: 10.18203/2394-6040.ijcmph20200412.

World Health Organization (2023) *Malnutrition*.

How to cite this article: Kuntari, T., Utami, U., Widyasari, V., Supadmi, S., and Choironi, E. A. (2024) ' Chronic Energy Deficiency In Young Pregnant Women In Rural Indonesia: An Analysis Of Basic Health Survey 2018', *Jurnal Ners*, 19(4), pp. 433-440. doi: http://dx.doi.org/10.20473/jn.v19i4.56196