PROCEEDING
5th International Conference of Health Polytechnic of Jambi 2025
icon@poltekkesjambi.ac.id
http://journal.poltekkesjambi.ac.id/index.php/ICoHPJ
doi.org/10.35910/icohpj.v5i0

SUPPLEMENTARY FOOD AND CONSUMPTION OF IRON TABLETS WITH THE PREVALENCE OF CHRONIC ENERGY DEFICIENCY

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ABSTRACT

Background: *The prevalence of pregnant and non-pregnant women experiencing chronic nutritional deficiency (CED) has become a societal issue. Chronic Energy Deficiency is characterized by chronic energy intake occurring in women of reproductive age. The provision of Supplementary Food based on local food with regional menus adjusted to local conditions, as well as the consumption of iron tablets (CIT), aims to meet nutritional needs, especially for those experiencing Chronic Energy Deficiency. The study aims to determine the relationship between the prevalence of the proportion of supplementary feeding and iron tablet distribution with the prevalence of chronic energy deficiency in Indonesia.*
Method: *This research uses aggregated data from the 2023 Indonesian Health Survey (IHS). The sample consists of 38 provinces in Indonesia divided into seven regions. The dependent variable is the prevalence of Chronic Energy Deficiency in pregnant and non-pregnant women. The independent variables are the proportion of women (pregnant and non-pregnant) who do not receive Supplementary Food and the proportion of mothers (pregnant and non-pregnant) who do not receive consumption of iron tablets. Data analysis used the Spearman test.*
Result: *The research findings indicate that there is no significant relationship between the proportion of non-receipt of Supplementary Food and the proportion of non-receipt of (CIT) with the prevalence of pregnant and non-pregnant women with chronic nutritional deficiency (CED) (p-value >0.05)*
Conclusion: *Further evaluation is needed on the effectiveness of the Supplementary Feeding and Iron Tablet programs, as well as a more comprehensive approach to reducing the prevalence of anemia in Indonesia*

Keywords: *Consumption of iron tablets, supplementary food, chronic energy deficiency*

INTRODUCTION

In Indonesia, nutritional deficiencies are associated with low nutritional status, indicating the occurrence of deficiencies (Pastuty et al., 2018). Chronic nutritional deficiency (CED) remains a major issue affecting women of reproductive age, as those experiencing CED have a high risk of giving birth to children who will later experience CED (Fitriana et al., 2024). In addition, malnutrition causes health problems such as morbidity, mortality, and disability, as well as reducing the quality of human resources (Irnawati, 2024). Chronic Energy Deficiency (CED) in Women of Reproductive Age (WRA) and pregnant women also poses a risk of giving birth to Low Birth Weight (LBW) (Andini, 2020). This is caused by a low intake of macro and micronutrients. The measurement of Upper Arm Circumference (UAC) on the arm that is less actively moving is one of the indices used to identify the risk of Chronic Energy Deficiency (CED) in anthropometric measurements. In Indonesia, the threshold value used is an average UAC < 23.5 cm, which indicates a risk of chronic energy deficiency among women of reproductive age (Pujiastuti et al., 2023). The condition of pregnant women with Chronic Energy Deficiency (CED) are at risk of reduced muscle strength that aids the delivery process (Utami et al., 2018). Other impacts of Chronic Energy Deficiency (CED) can also occur, such as increasing the risk of anemia, bleeding, and contracting infectious diseases (Andini, 2020).

Data from the United Nations International Children's Emergency Fund (UNICEF) in 2011 showed that the prevalence of chronic energy deficiency (CED) among pregnant women was 41%, in India it was around 19%, in Bangladesh it was 34%, and in Dhaka it was 34**%** (Novianti et al., 2022)**.** In developing countries, the prevalence of CED ranges from 15–47%, with Indonesia ranking fourth after India with a prevalence of 35.5% (Bakri, 2021). The increase in the number of CED cases in Indonesia from 2019 (11,487) to 2020 (11,357) shows an insignificant change or a very slight decrease in the number of cases. In 2021, the number of CED cases surged to 23,096, indicating a significant increase compared to the previous year (Harmawati Rustan et al., 2024).

Efforts to provide supplementary food and the consumption of iron tablets to improve nutrition in addressing nutritional problems (Adfar et al., 2023). This strategy, especially for vulnerable groups, in addressing nutritional problems (Puspitasari et al., 2021)**.** Supplementary feeding (SF) is carried out by providing safe and high-quality food (Nurhayati, 2021). Providing a high intake of energy and protein (Bakri, 2021). The supplementary feeding program is aimed at pregnant women whose examination results show an upper arm circumference (UAC) of less than 23.5 cm (Wariyaka & Kristin, 2024). Provision of supplementary food to vulnerable groups (Rohmah, 2020)**.** Efforts to provide supplementary food for pregnant women with CED to improve the nutritional status of pregnant women (Erna et al., 2023).

The administration of consumption of iron tablets with proper dosage can prevent anemia and increase iron reserves in the body (Fathony et al., 2022). One tablet (60 mg of elemental iron and 400 mcg of folic acid) is given as a blood tablet supplement (Rizkiana, 2022). Anemia can occur due to a decrease in hemoglobin levels in the blood (Ningtyas et al., 2021). In addition, iron deficiency can cause disturbances in the growth of body cells (Nurahmawati & Wulaningtya, 2024). Anemia does not occur in mothers who properly consume iron supplements (Sunarti Ayu, 2024). The impact of anemia on pregnant women results in bleeding, hinders fetal growth, increases the risk of miscarriage, and leads to premature birth and low birth weight (Luh Putu Sri Yuliastuti et al., 2023). This study aims to determine the relationship between the prevalence of the proportion of Supplementary Food (SF) and the Consumption of Iron Tablets (CIT) provision and the prevalence of chronic energy deficiency (CED) in Indonesia.

METHODS

This study uses aggregated data from 2023 Indonesian Health Survey (IHS) (SKI, 2023). The research uses a cross-sectional approach that allows the researchers to compare the proportion of Chronic Energy Deficiency among pregnant and non-pregnant women. HIS 2023 was conducted from August to October 2023 across all provinces in Indonesia, selected through stratified random sampling involving 586 thousand households in 38 provinces. The population of IHS 2023 consists of all women aged 10-54 years, while the sample includes women aged 10-54 years who are pregnant and not pregnant at the time of the survey. The population and sample of this study are 38 provinces in Indonesia, which are divided into 7 regions.

Independent variables are the proportion of currently pregnant women who do not receive Supplementary Food and the proportion of women aged 10-54 who have never received Consumption Iron Tablets (CIT). To calculate the proportion of pregnant women who do not receive Supplementary Food (SF). The number of pregnant women aged 10-54 years who do not receive Supplementary Food (SF)/the number of pregnant women aged 10-54 years. To calculate the proportion of women aged 10-54 who did

not receive CIT. The number of women aged 10-54 who did not receive CIT during the last child's pregnancy (who gave birth between January 1, 2018, and the interview date) according to the source of data. The number of women aged 10-54 who did not receive CIT during their last child's pregnancy (who gave birth in the period from January 1, 2018, to the interview). The dependent variable used is the prevalence of Chronic Energy Deficiency (CED) in pregnant and non-pregnant women. There is a formula to calculate the prevalence of CED in pregnant and non-pregnant women. The number of pregnant and non-pregnant women with mid-upper arm circumference (MUAC) <23.5 cm / The number of pregnant and non-pregnant women. Measurement of Upper Arm Circumference (UAC) using a UAC measuring tool with an accuracy level of 1 mm, conducted by trained enumerators with a minimum educational background of a Diploma 3 in Health.

Data analysis uses univariate analysis based on variance measures (minimum, maximum, mean, and standard deviation). Bivariate analysis uses the Spearman Test with the SPSS version 22 program (Statistical Package for the Social Sciences). This research is limited to the data available in IHS 2023 and cannot control other factors that may influence CED.

RESULTS AND DISCUSSION

Table 1 shows the prevalence of Chronic Energy Deficiency (CED) in the Indonesian region in 2023 among pregnant women, with the highest prevalence in the Papua region at 23.5% and the lowest in the Kalimantan region at 12.8%. Whereas in non-pregnant women, the highest prevalence of CED is found in the Southeast region at 29.0% and the lowest in the Java-Balinese region at 18.8%. The national figures show the prevalence of pregnant women with CED (17.1%) and non-pregnant women with CED (21.2%).

Table 1. Distribution of Chronic Energy Deficiency (CED) Prevalence by Indonesian Region in 2023

Regional		Min	Max	$\bar{x}$±SD
Sumatera	Pregnant womens	10.1	19.2	14.8±3.4
	Non-pregnant women	17.2	22.8	18.8±1.6
Java-Balinese	Pregnant women	5.4	24.6	14.7±7.1
	Non-pregnant women	12.5	22.5	19.2±3.3
Southeast	Pregnant women	15.7	28.0	21.8±8.6
	Non-pregnant women	22.4	35.7	29.0±9.4
Kalimantan	Pregnant women	5.2	20.0	12.8±5.5
	Non-pregnant women	18.4	23.0	20.8±1.7
Sulawesi	Pregnant women	10.5	21.5	18.7±4.1
	Non-pregnant women	17.6	23.9	21.5±2.3
Maluku	Pregnant women	18.1	21.2	19.6±2.1
	Non-pregnant women	19.5	25.5	22.5±4.2
Papua	Pregnant women	7.6	44.7	23.5±13.5
	Non-pregnant women	21.0	30.9	24.8±3.5
Indonesia	**Pregnant women**	**5.2**	**44.7**	**17.1±7.4**
	Non-pregnant women	**12.5**	**35.7**	**21.2±3.9**

The results of this study show the prevalence of Chronic Energy Deficiency (CED) by region in Indonesia in 2023. Among pregnant women, the highest prevalence of CED is found in the Papua region at 23.5% and the lowest in the Kalimantan region at 12.8%. Among non-pregnant women, the highest prevalence of CED is found in the Southeast region at 29.0% and the lowest in the Java-Balinese regions at 18.8%. The national figures indicate the prevalence of CED among pregnant women, 17.1,% and non-pregnant

women 21.2%. The incidence of CED in pregnant women globally is reported to reach 35-75%, significantly higher in the third trimester compared to the first and second trimesters of pregnancy (Hasyim et al., 2023). Indonesia ranks fourth with the highest prevalence of CED among pregnant women, which is 35.5% (Sri Lestari et al., 2023).

Chronic Energy Deficiency (CED) in pregnant women can be described as a persistent malnutrition condition that can negatively impact the health of the mother and the growth of the fetus. Pregnant women with CED are characterized by an upper arm circumference (UAC) of less than 23.5 cm. The purpose of measuring the UAC is to determine the risk of CED in pregnant and non-pregnant women. Factors affecting the nutritional status of pregnant women with CED are direct and indirect factors. Direct factors include food consumption and diseases, while indirect factors include socio-economic factors (family income, mother's education level, other related factors), related to consumption patterns, behavioral factors), biological factors (mother's age during pregnancy, interval between pregnancies), number of births, weight during pregnancy) and activities, facilities, socio-cultural factors, environmental health, and treatment (Pujiastuti et al., 2023).

Table 2. Distribution of the Proportion of Pregnant Women Not Receiving Supplementary Food by Indonesian Region in 2023

Region	Min	Max	x̄±SD
Sumatera	64.2	98.1	79.9±9.4
Java-Balinese	68.7	96.9	81.8±11.1
Southeast	69.8	76.8	73.3±4.9
Kalimantan	71.6	81.9	76.7±5.1
Sulawesi	70.0	83.7	76.3±4.4
Maluku	77.2	77.6	77.4±0.2
Papua	72.7	92.4	78.8±8.1
Indonesia	**64.2**	**98.1**	**78.9±7.8**

Table 2 shows the Proportion of Pregnant Women Currently Not Receiving Supplementary Food by the Indonesian Region in 2023, with the highest proportion in the Java-Balinese region (81.8%) and the lowest in the Southeast region (73.3%). Nationally, the proportion of currently pregnant women who do not receive Supplementary Food in Indonesia averages 78.9%.

The results of this study show that the proportion of pregnant women currently not receiving Supplementary Food by region in Indonesia in 2023 is highest in the Java-Balinese region at 81.8% and lowest in the Southeast region at 73.3%. Nationally, the proportion of pregnant women currently not receiving Supplementary Food in Indonesia averages 78.9%. The level of family income is one of the socio-economic indicators that plays a role in the provision of food and family eating patterns; income also affects the level of food expenditure incurred by a family. Low income can be one of the factors causing malnutrition status in toddlers, because if the income level is low, the food expenditure level is also low, which can lead to reduced purchasing power and food availability, affecting the optimal nutritional consumption level of toddlers.

Table 3 shows the Proportion of Women aged 10-54 years who received CIT by Indonesian Region in 2023, with the highest proportion of mothers not receiving CIT in the Papua region (27.4%) and the lowest in the Southeast region (3.2%). Nationally, the current proportion of mothers in Indonesia who do not receive CIT is an average of 11.4%.

The results of this study show the proportion of women aged 10-54 who received Consumption of Iron Tablets (CIT) by the Indonesian region in 2023, with the highest proportion of mothers not receiving CIT in the Papua region (27.4%) and the lowest in the Southeast region (3.2%). Nationally, the current proportion of mothers in Indonesia who do not receive iron tablets CIT is an average of 11.4%. The administration of CIT with proper dosage can prevent anemia and increase iron reserves in the body (Fathony et al., 2022). Chronic energy deficiency can lead to inadequate nutrient intake, thereby reducing the production of red blood cells and hemoglobin, which play a crucial role in preventing anemia.

Anemia can occur due to a decrease in hemoglobin (HB) levels in the blood (Ningtyas et al., 2021). There are several factors that influence the occurrence of iron deficiency anemia, namely the role of health workers and the availability of iron tablets. Health workers play an active role in providing health education and are involved in the treatment and healing process of diseases (Nisa et al., 2023).

Table 3. Distribution of the Proportion of Women aged 10-54 who do not receive Consumption of Iron Tablets

Region	Min	Max	x̄±SD
Sumatera	5.9	17.8	10.5±3.7
Java-Balinese	2.9	9.3	5.6±2.1
Southeast	2.2	4.3	3.2±1.4
Kalimantan	5.2	14.1	9.2±3.5
Sulawesi	5.4	12.2	8.1±3.0
Maluku	12.5	15.1	13.8±1.8
Papua	12.4	54.8	27.4±18.7
Indonesia	**2.2**	**54.8**	**11.4±10.2**

Table 4 of the data analysis results shows that in pregnant women, the proportion not receiving Supplementary Food (p-value 0.12) and the proportion not receiving Consumption of Iron Tablets (p-value 0.10) are not related to the prevalence of pregnant women with CED. In non-pregnant women, the proportion not receiving Supplementary Food (p-value 0.84) and the proportion not receiving Consumption of Iron Tablets (p-value 0.45) are not related to the prevalence of non-CED pregnant women.

The results of this study used analysis with the Spearman test, obtaining a p-value >0.05, thus concluding that there is no significant relationship between the proportion of not receiving Supplementary Food and the proportion of not receiving Consumption Iron Tablets with the prevalence of pregnant and non-pregnant women with CED. This study is not in line with the research conducted by (Silawati and Nurpadilah, 2018) which states that the provision of supplementary food and milk to pregnant women affects weight gain in pregnant women with CED. The limitation of this study is that it only uses data from IHS 2023 without direct observation or in-depth interviews, so other factors influencing CED may not be detected.

Table 4. The relationship between the proportion of not receiving Supplementary Food and Consumption Iron Tablets (CIT) with the prevalence of Chronic Energy Deficiency (CED)

Prevalence of CED in Pregnant Women	Proportion Not receiving Supplementary Food	Proportion Not Receiving Consumption Iron Tablets
Beta	-0.22	0.19
Constant	34.74	14.95
Correlation coefficient (r)	0.25	0.26
p-value	0.12	0.10
Prevalence of CED in Non-Pregnant Women		
Beta	0.01	0.04
Constant	22.4	20.7
Correlation coefficient (r)	0.03	0.12
p-value	0.84	0.45

This results in information related to social, cultural, and individual behavior aspects in food consumption and nutritional intake patterns being less deeply detected. The advantage of this research on the relevant topic is that it addresses nutritional issues that remain a major problem in Indonesia, namely Chronic

Energy Deficiency (CED) in women of reproductive age. CED has long-term impacts on maternal and child health, including an increased risk of low birth weight, growth disorders, and increased morbidity and mortality for mothers and babies.

CONCLUSION

This study shows that there is no significant relationship between the proportion of not receiving Supplementary Food and the proportion of not receiving Consumption Iron Tablets with the prevalence of pregnant and non-pregnant mothers with CED. There are other factors such as diet, socioeconomic status, and community awareness of nutrition that also play a role in the occurrence of CED. Although no significant relationship was found, efforts to

provide supplementary food and iron tablets remain part of the strategy to improve nutritional status, especially for vulnerable groups. Further evaluation of the effectiveness of this program and a more comprehensive approach are needed to reduce the prevalence of CED in Indonesia. The issue of CED requires solutions that not only involve the health sector but also the education, social, and economic sectors. Collaboration between the government, academics, community organizations, and the private sector is essential to create a more comprehensive strategy to reduce the CED rate in Indonesia. Further research is needed to identify other factors contributing to CED, such as dietary patterns, access to healthcare services, and economic factors.

ACKNOWLEDGMENT

I would like to thank all parties who have supported the preparation of this manuscript, both morally, intellectually, and technically. Thank you to family, friends, mentors, and academics who have shared valuable insights. May this work be beneficial and contribute to the world of literacy.

CONFLICT OF INTEREST

All authors declared that there was no conflict of interest.

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