

THE CAUSES OF MALNUTRITION FOR PREGNANT MOTHERS ANALYSIS AND THE IMPACT ON THE COVID-19 PANDEMIC

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ABSTRACT

Chronic Energy Deficiency (CED), and anemia are malnutrition in pregnant women. The impact is inappropriate maternal weight gain during pregnancy. It causes the baby low birth weight, the risk is greater stunting. Ogan Ilir District designated as a stunting locus by the central Bappenas in 2020. CED and anemia had a significant increase during COVID-19 pandemic in 2019-2020. This research aims to analyze the factors that cause malnutrition in pregnant women and their impact during the COVID-19 pandemic as an effort to prevent stunting. Quantitative study with a cross sectional design used. 99 pregnant women taken by purposive sampling technique. Questionnaires and nutritional status measurements were carried out by measuring (LiLA), hemoglobin levels, and nutritional intake was assessed from food recall 2x24 hours. Data were analyzed using Chi square test. The results show that 13.1% of pregnant women experienced CED, 61.6% anemia, 62.6%, *Emesis gravidarum* and 44.4% weight gain was not appropriate. There is a relationship between energy intake ($p = 0.004$, carbohydrates ($p = 0.012$), the incidence of CED in pregnant women, there is a relationship between Fe intake ($p = 0.0001$) and consumption of TTD ($p = 0.003$) having anemia. and the impact of malnutrition, There is a relationship between CED ($p=0.018$) and *emesis gravidarum* ($p=0.003$) by weight gain of pregnant women during the COVID-19 pandemic. It is necessary to improve antenatal care services during the COVID-19 pandemic in providing information about fulfilling the nutritional intake of pregnant women so that mothers do not malnutrition.

Keywords: anemia, chronic energy deficiency, malnutrition of pregnant women

ABSTRAK

Kekurangan Energi Kronis (KEK), dan anemia bentuk dari malnutrisi pada ibu hamil yang berdampak timbulnya masalah gizi lainnya seperti pertambahan berat badan ibu selama kehamilan yang tidak sesuai. Hal tersebut bisa menyebabkan bayi berat lahir rendah (BBLR) yang beresiko mengalami stunting. Kabupaten Ogan Ilir ditetapkan sebagai Lokus stunting oleh Bappenas pusat pada tahun 2020. Dimasa Pandemi COVID-19 prevalensi Anemia ibu hamil dan KEK mengalami Kenaikan yang signifikan dari tahun 2019-2020. Penelitian ini bertujuan untuk menganalisis faktor yang menjadi penyebab malnutrisi ibu hamil dan dampaknya pada masa pandemi COVID-19 sebagai upaya pencegahan stunting. Penelitian ini merupakan penelitian kuantitatif desain *cross sectional*, jumlah sampel 99 ibu hamil yang diambil dengan teknik *purposive sampling*. Pengambilan data karakteristik menggunakan kuesioner dan pengukuran status gizi melalui pengukuran LiLA, kadar Hemoglobin, dan Asupan zat gizi dinilai dari *food recall* 2x24 jam. Data dianalisis menggunakan uji *Chi square*. Hasil penelitian menunjukkan sebanyak 13,1% ibu hamil mengalami KEK, 61,6% mengalami anemia, 62,6% pernah mengalami *Emesis gravidarum* dan 44,4% pertambahan berat badan tidak sesuai. Ada hubungan yang signifikan antara asupan energi ($p=0,004$) dan karbohidrat ($p=0,012$) dengan kejadian KEK pada ibu hamil, ada hubungan yang signifikan antara Asupan Fe ($p=0,0001$) dan konsumsi TTD ($p=0,003$) dengan kejadian Anemia serta dampak dari malnutrisi yaitu ada hubungan yang signifikan antara KEK ($p=0,018$) dan *emesis gravidarum* ($p=0,003$) dengan penambahan berat badan ibu hamil pada masa pandemi COVID-19. Perlu ditingkatkan pelayanan *antenatal care* dimasa pandemi COVID-19 dalam memberikan informasi tentang pemenuhan asupan gizi ibu hamil agar ibu tidak mengalami malnutrisi.

Kata kunci : anemia, kekurangan energi kronis, malnutrisi ibu hamil

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Introduction

Since the announcement of the first case of COVID-19 in Wuhan, China at the end of 2019 by the WHO (World Health Organization) until it was declared a pandemic, COVID-19 cases have not been declared over until now. The COVID-19 pandemic has affected all sectors of life, including the health sector. Many health service activities cannot be carried out optimally due to activity restrictions (social distancing) by the government to prevent the spread of cases. As a result, there has been a decrease in public visits to health service centers, and some health centers have been closed because health workers have been exposed to COVID-19. Finally, people are afraid to leave the house and find it difficult to get health services, including pregnant women. COVID-19 can infect anyone without exception, regardless of age group, congenital condition, gender, including pregnant women. Whereas pregnant women are classified as vulnerable to nutritional problems (malnutrition), also included in the high-risk group during the COVID-19 pandemic, who must perform antenatal care (ANC) every month, or at least four times during pregnancy. Pregnant women and their fetuses.¹

Most pregnant women in several regions of Indonesia have a good level of knowledge about COVID-19, and most pregnant women have a positive attitude towards COVID-19, and most of these pregnant women do not make routine pregnancy visits at health care facilities during the COVID-19 pandemic. The existence of support from health workers, closest people, husbands, and families to make pregnancy visits is very necessary as an effort to detect early complications in pregnancy so that it is hoped that the mother and baby can be healthy and safe.²

Pregnant women are the most important part of the 1000 Days of First Life (1000 HPK) movement launched by the government as an indicator of health development in the national medium-term development plan (RPJMN) 2020-2024.³ Movement of 1000 HPK is an acceleration nutrition improvement adopted from the Scaling Up-Nutrition (SUN) Movement. Scaling Up-Nutrition (SUN) Movement is a global movement under the coordination of the Secretary-General of the United Nations. The global goal of the SUN *Movement* is to reduce nutritional problems in 1000 HPK, from early pregnancy to 2 years of age. In Indonesia, the scaling up nutrition movement is known as the National Movement for the Acceleration of Nutrition Improvement in the context of the First Thousand Days of Life (1000 HPK Movement). The 1000 HPK period is often called the *window of opportunities* or also known as the golden period, which is based on a very fast growth and development process from the fetus to the child of two years and does not occur in other age groups.⁴

Malnutrition in pregnant women such as the incidence of Chronic Energy Deficiency (CED) is a condition where the nutritional status of the mother is in a nutritional deficiency condition

characterized by the size of the upper arm circumference of less than 23.5 cm. This can be caused by a lack of food consumption and energy sources that contain nutrients. The nutritional needs of pregnant women will increase from usual, therefore an increase in the amount of food consumption needs to be added, especially the intake of food sources of energy to meet all the needs of the mother and fetus.⁵

Chronic Energy Deficiency (CED) is a risk factor for the incidence of anemia in pregnant women. Pregnant women who experience CED are 6 times more likely to experience anemia than pregnant women who do not experience CED. When pregnant women experience CED, usually mothers tend to experience a lack of intake of other nutrients including vitamins and minerals, this can cause the mother to be at risk of deficiency of various micronutrients including iron and folic acid, which allows the mother to become anemic. Increased risk factors for anemia when pregnant women experience CED and *emesis gravidarum* simultaneously,⁶ and can cause risks and complications to the mother and fetus such as the mother's weight does not gain normally, susceptibility to infectious diseases, and bleeding. Pregnant women, affect the process of fetal growth and can cause miscarriage, low birth weight babies (LBW), neonatal death, anemia in infants. Babies born with low birth weight have the risk of impaired growth and development and are malnourished.⁷ LBW is the most dominant risk factor related to with stunting. Children with a history of LBW (birth weight less than 2500 grams) have a risk of 14,063 times to experience stunting when compared to babies with normal birth weight.⁸

The results of the 2018 Basic Health Research (Riskesmas) stated that in Indonesia the prevalence of pregnant women with anemia was still high at 48.9% and pregnant women with CED was 17.3%, while in South Sumatra the prevalence of pregnant women with CED was 17.22% and in Ogan Ilir Regency it is 17.51% higher than the national figure.⁹ Profile data of the Ogan Ilir District Health Office. The prevalence of CED in pregnant women in 2018 was 5.37%, in 2019 it rose to 6.60%, and in 2020 it fell by 6.41% but is still high when compared to 2018, and There was an increase in anemia cases between 2019 and 2020, from 5.23% to 13.27% during the COVID-19 pandemic.¹⁰ Determination of stunting locus by the central Bappenas in 2020, from 160 regions throughout Indonesia that are included in the stunting red zone, 6 of them are in the province of South Sumatra, one of which is Ogan Ilir Regency with a stunting prevalence of 43.90% higher than the national figure (26.92%).¹¹ It is from this background description that researchers feel the need to analyze the factors that cause malnutrition in pregnant women and their impact during the COVID-19 pandemic as an effort to prevent stunting in Ogan Ilir Regency.

Method

This study used a descriptive and quantitative analytical study design through a *cross sectional study approach*, which is a type of research that examines risk factors and impacts that

occur and are then observed simultaneously. The target population is all pregnant women in South Sumatra Province. The source population is all pregnant women in Ogan Ilir Regency. While the study population is all pregnant women in the working area of Tanjung Batu Health Center and Tebing Gerinting Health Center, Ogan Ilir Regency. *Purposive sampling technique* was used by the inclusion criteria (mother's gestational age more than 8 weeks) and exclusion criteria (diagnosed with twin pregnancy) by the total sample of 99 pregnant women. The data used is primary data where the data is obtained directly from the results of filling out questionnaires by pregnant women including age, parity, pregnancy distance, education level, family income, occupation, and consumption of TTD as well as filling out a *food recall* 2 x 24 hours to see energy intake, protein, carbohydrates, Fe. The second *food recall* is filled out at a time of 3 days from filling the first *food recall*. To assess the nutritional status of respondents, anthropometric measurements were carried out including upper arm circumference size using the upper arm circumference tape and checking hemoglobin (Hb) levels using *easy touch* digital Hb and history of emesis gravidarum using questions on the questionnaire. To see the impact of nutritional problems on respondents, weight gain was measured using a calibrated digital weight scale. Weight gain is seen from the difference between the weight at the time of the study and the last weight measurement, then adjusted for the respondent's gestational age. The data of this study were analyzed using univariate analysis (frequency distribution) and bivariate using *chi square* test and *test fisher's exact test*.

This study received ethical approval from Health Research Ethics Commission, Faculty of Public Health, Sriwijaya University issued on September 1, 2021 with Number: 267/UN9.FKM/TU.KKE/2021.

Results

The results of the univariate analysis of research data on the frequency distribution of the characteristics of research respondents can be seen in table 1 below. Based on Table 1, data shows that most (87.9%) of the age of pregnant women are in the non-risk category, namely in the age range of 20-35 years. Most of the pregnant women (87.9%) were not at risk (≤ 3 children). Birth spacing is mostly not at risk, which is 75.8%. Most of the mothers' education level (68.7%) is higher education (high school and university). Most of the respondent's family income is low or below the *Upah Minimum Regional (UMR)* of Ogan Ilir Regency, which is 54.5%. Most of the mothers (61.6%) do not work or work as housewives. Most of the pregnant women (74.7%) had received promotion and nutrition education through health worker counseling, self-initiated seeking information on the internet and social media. Most pregnant women (62.6%) have experienced *emesis gravidarum* in her pregnancy.

Table 1. Frequency Distribution of Respondents Characteristics

Variable	Amount	Percentage (%)
Age of pregnant women:		
At risk (<20 years and >35 years)	12	12.1
Not at risk (20 – 35 years)	87	87.9
Parity :		
Risky (> 3 times)	12	12.1
No risk (\leq 3 times)	87	87.9
Birth spacing:		
At risk (\leq 2 years)	24	24.2
No risk (> 2 years)	75	75.8
Education level of pregnant women:		
Low (SD, SMP/equivalent)	31	31.3
High (high school/equivalent, PT)	68	68.7
Family income:		
Low (< Regency Minimum Wage)	54	54.5
Height (\geq District Minimum Wage)	45	45.5
Employment of pregnant women:		
Working	38	38.4
Doesn't work	61	61.6
Nutrition promotion/education:		
Never got	25	25.3
Ever get	74	74.7
History of <i>emesis gravidarum</i> :		
Ever experienced	62	62.6
Never experienced	37	37.4
Total	99	100

Based on the measurement of nutrient intake (Table 2), it was found that most of the energy intake (61.6 %) , protein intake (72.7%), carbohydrate intake (71.7%) was sufficient (\geq 80% *Nutrient Adequacy Ratio/ NAR*). As for iron intake (57.6%), folic acid intake (64.6%) is still less than the daily adequacy of pregnant women. Most of the pregnant women (59.6%) did not take Iron tablets that had been given by health workers.

Table 2. Univariate Analysis of Respondents ' Nutrient Intake

Variable	Amount	Percentage (%)
Energy intake of pregnant women:		
Not enough	38	38.4
Enough	61	61.6
Protein intake for pregnant women:		
Not enough	27	27.3
Enough	72	72.7
Carbohydrate intake:		
Not enough	28	28.3
Enough	71	71.7
Intake of iron (Fe):		
Not enough	57	57.6
Enough	42	42.4
Folic acid intake		
Not enough	64	64.6
Enough	35	35.4
Iron Tablets consumption		
Not consuming	59	59.6
Consuming	40	40.4
Total	99	100

Table 3. Univariate Analysis of Respondents Nutritional Status

Variable	Amount	Percentage (%)
Upper Arm Circumference Pregnant Women:		
CED(< 23.5 cm)	13	13.1
Not CED(≥ 23.5 cm)	86	86.9
Pregnant women's Hb levels:		
Anemia (< 11 g/dL)	61	61.6
No anemia (≥ 11 g/dL)	38	38.4
Weight gain of pregnant women:		
Not according to recommendation (TM I < 1 kg/month, TM II < 2 kg/month, TM III < 1 kg/month)	44	44.4
According to recommendation (TM I 1 kg/month, TM II 2 kg/month, TM III 1 kg/month)	55	55.6
Total	99	100

Measurement of nutritional status (Table 3) obtained that the majority of pregnant women did not experience CED as many as 86.9 % and 13.1% experienced CED. A total of 61.6% of pregnant women are anemic, and 55.6% of maternal weight gain during pregnancy based on the month in the trimester is normal.

The results of the bivariate analysis obtained the following results:

Table 4. Bivariate Analysis of The Relationship between Macronutrient Intake and The Incidence of Chronic Energy Deficiency (CED) in Pregnant Women

Nutrient intake	Nutritional status				Total		P-Value	PR (95% CI)
	KEK		No KEK		n	%		
	n	%	N	%				
Energy intake								
Not enough	10	26.3	28	73.7	38	100	0.004	5.351
Enough	3	4.9	58	95.1	61	100		(1.572-18.215)
Protein intake								
Not enough	6	22.2	21	77.8	27	100	0.192	2.653
Enough	7	9.7	65	90.3	72	100		(0.802 – 8.776)
Carbohydrate intake								
Not enough	8	28.6	20	71.4	28	100	0.012	4.057
Enough	5	7	66	93	71	100		(1.451-11.344)

The results of the Chi square test on the relationship between nutrient intake and the incidence of chronic energy deficiency (CED) in pregnant women (Table 4) shows that there is a significant relationship between energy intake and carbohydrate intake with the incidence of chronic energy deficiency (CED) in pregnant women during the COVID-19 pandemic at the Stunting Locus, Ogan Ilir Regency (p value < (0.05), while the protein intake variable obtained p value > 0.05 which means that there is no significant relationship between energy intake and carbohydrate intake with the incidence of chronic energy deficiency (CED) in pregnant women during the COVID-19 pandemic at the Stunting Locus, Ogan Ilir Regency.

From the results of the analysis, it was obtained that the PR value = 4.057, it was concluded that mothers with low carbohydrate intake would have a risk of 4.1 times experiencing CED compared to mothers with sufficient carbohydrate intake. From the results of the analysis, it was

obtained that the PR value = 5.351, it was concluded that mothers with less energy intake would be at risk of 5.4 times suffering from CED compared to pregnant women with sufficient energy intake.

Table 5. Bivariate Analysis of The Relationship between CEDs , Fe intake and Consumption of TTD with Anemia

Independent Variable	Dependent Variable				Total		P-Value	PR (95% CI)
	Incidence of Anemia		No anemia					
	n	%	N	%	N	%		
CED incident								
CED	8	61.5	5	38.5	13	100	1.000	0.996 (0.300 – 3.304)
No CED	53	61.6	33	38.4	86	100		
Fe intake								
Not enough	50	87.7	7	12.3	57	100	0.0001	3.349 (1.997-5.616)
Enough	11	26.2	31	73.8	42	100		
TTD consumption								
Not consuming	44	74.6	15	25.4	59	100	0.003	1.755 (1.188 – 2.592)
Consuming	17	42.5	23	57.5	40	100		

The results of the bivariate analysis of the relationship between the incidence of chronic energy deficiency (CED) and the incidence of anemia in pregnant women (Table 5) found that the *p value* > 0.05 from the *fisher's exact test results* so that it can be concluded that there is no significant relationship between the incidence of malnutrition chronic energy (CED) with the incidence of anemia in pregnant women during the COVID-19 pandemic in Ogan Ilir Regency. Meanwhile, based on the results of the *Chi Square test* for Fe Intake and Consumption of TTD tablets, *P value* < 0.05 which can be concluded that there is a significant relationship between Fe intake and consumption of iron tablets with the incidence of anemia in pregnant women during the COVID-19 pandemic at the Stunting Locus, Ogan Ilir Regency.

The obtained value of PR = 3.349 from the analysis results, it is concluded that the intake of Fe is less in pregnant women will have a 3.3 times risk of experiencing anemia compared to pregnant women who have sufficient Fe intake. From the analysis results obtained PR value = 1.755, it is concluded that mothers who do not take iron tablets will have 1.8 times the risk of experiencing anemia compared to mothers who consume iron tablets.

The bivariate analysis of table 6 below is to see the relationship between nutritional problems and weight gain of pregnant women as the impact of these nutritional problems. The results of the bivariate analysis of the relationship between the incidence of CED and *Emesis gravidarum* with weight gain of pregnant women (Table 6) obtained *p value* < 0.05 from the *fisher's exact test* , so it was concluded that there was a significant relationship between CED and *emesis gravidarum* with weight gain of pregnant women during the Covid-19 pandemic at the Stunting Locus, District Ogan Ilir. With a PR value = 1.01 for the CED incident variable, which means that pregnant women with CED will be at risk of 1.01 times experiencing weight gain that is not according to the recommendations during pregnancy when compared to pregnant women without CED. For the variable *emesis gravidarum*, the PR value = 2.321, which means that it can

be concluded that pregnant women who have experienced emesis gravidarum are 2.321 times at risk of experiencing abnormal weight gain compared to pregnant women who do not experience emesis gravidarum. Statistical results of the *Chi Square* test on the anemia incidence variable obtained the value of *p value* > 0.05 so it can be concluded that there is no significant relationship between the incidence of anemia with weight gain of pregnant women.

Table 6. Bivariate Analysis of The Relationship Between Malnutrition (CED, anemia) with Weight Gain of Pregnant Women

Malnutrition	BB increase				Total		P-Value	PR (95% CI)
	Not according to recommendation		according to recommendation					
	N	%	N	%	n	%		
CED incident								
CED	6	46.2	7	53.8	13	100	0.018	1.083 (0.336 – 3.490)
No CED	38	44.2	48	55.8	86	100		
Incidence of Anemia								
Anemia	30	49.2	31	50.8	61	100	0.299	1.658 (0.724 – 3.799)
No anemia	14	36.8	24	63.2	38	100		
Emesis gravidarum								
Once	35	56.5	27	43.5	62	100	0.003	2.321 (1.262 – 4.267)
Never	9	24.3	28	75.7	37	100		

Discussion

The relationship between macronutrient intake and the incidence of Chronic Energy Deficiency (CED) of pregnant women during the COVID-19 pandemic in Ogan Ilir regency. The results of this study indicate that most of the respondents' intake of macronutrients is in the sufficient category. This is supported by the education level of most of the respondents is higher education (68.7%), and 74.7% have received promotions and nutrition education from health workers and searched for information via the internet or social media. Low education of pregnant women tend not to have a good understanding of balanced nutrition during pregnancy so that they cannot consume food adequately. There is no relationship between protein intake and the incidence of CED pregnant women during the COVID-19 pandemic in Ogan Ilir Regency because the number of CED pregnant women whose protein intake is quite more than CED pregnant women whose protein intake is less.

Research results states that low intake of macronutrients such as energy, protein, fat and carbohydrates is the direct cause of CED. During the COVID-19 pandemic, everyone is encouraged to *stay at home*, which has an impact on access to leaving the house to buy food is very limited and causing a lack of nutritional intake for pregnant women. The study, which was conducted in June – September 2020 in the working area of the Puuwatu Public Health Center, Kendari City, Southeast Sulawesi, stated that, of the 35 pregnant women with CED, most of their *macronutrient intake* during the COVID-19 pandemic experienced severe deficiencies.¹²

The results of this study are in line with the results of research from Gotri Marsedi S et al which states that there is a significant relationship between nutritional intake and the incidence of CED in pregnant women in the working area of the Sei Jang Health Center, Bukit Bestari District, Tanjung Pinang City.¹³ The need for nutrients during pregnancy is needed for the body's metabolism for both the mother and the fetus in the womb to increase. Therefore, during pregnancy the intake of nutrients is needed for fetal growth and development, the increase in the size of the uterine organs, changes in the composition and metabolism of the mother and fetus. Pregnant women who experience a lack of nutritional intake and poor nutritional status have a high risk of giving birth to babies with low birth weight (LBW).¹⁴

In this study, there was a significant relationship between energy intake and CED. The results of this study are in line with the results of this researchF stated that there was a positive correlation between intake of macronutrients (energy) and upper arm circumference of pregnant women (CED). Low energy intake will have an impact on the nutritional status of pregnant women. Lack of energy intake will affect the availability of nutrients such as carbohydrates, protein and fat where if the body lacks energy then the intake of these nutrients will experience changes, if it occurs for a long time will affect nutritional status in the form of CED, especially in pregnant women.¹⁵

In pregnant women, there is an increase in metabolism, which requires more energy and nutrients such as carbohydrates. The results of this study showed that protein nutrition was not associated with CED in pregnant women, it was found that most of the respondents' protein intake was sufficient, so protein intake could meet the nutritional needs of the respondents .

The relationship between the incidence of chronic energy deficiency (CED), Fe intake, and consumption of iron tablets with anemia in pregnant women during the COVID-19 pandemic in Ogan Ilir Regency. The results of the study of the relationship between the incidence of CED, Fe intake, and consumption of iron tablets with the incidence of anemia in pregnant women during the COVID-19 pandemic in Ogan Ilir Regency, namely there was no significant relationship between the incidence of CED and anemia based on the statistical results of the *Fisher's exact test* (p value = 1,000) because of the 13 pregnant women with CED (8 or 61.5%) who experienced less anemia than pregnant women who did not have CED (53 or 61.6% of 86 pregnant women) but suffered from anemia. In line with the results of Hayati's research, Sri, et. al., (2020) where p value = 1,000 is obtained, there is no significant relationship between CED and the incidence of anemia in pregnant women. The incidence of anemia is closely related to the absorption of iron in the body.¹⁶

Iron is one of the essential micronutrients needed during pregnancy because iron has an important role in the transportation of oxygen to all body tissues and the formation of red blood cells. There is an increase in the need for iron during pregnancy because iron is needed to produce

larger red blood cells, to support fetal development and growth, and to compensate for iron loss during childbirth.¹⁷

In contrast to the results of the Main Risma Putri research, there is a relationship between poor nutritional status of pregnant women (based on upper arm circumference size) and the incidence of anemia in pregnant women with p value = 0.0001. From a total sample of 78 pregnant women, 64.1% (50 pregnant women) had poor nutritional status (upper arm circumference < 23.5 cm), and 82.1% (64 pregnant women) had anemia. Pregnant women with poor nutritional status and more anemia (94%) compared to pregnant women with poor nutritional status but not anemic (6%).¹⁸ In a study conducted by Afahira, et. al., which stated that there was a significant relationship between the incidence of CED and anemia in pregnant women (OR = 6.545, 95% CI = 2.925-14.646) a high chance of experiencing anemia when the mother pregnant also experience CED.⁶

Statistical results in this study indicate that there is a relationship between iron intake and iron intake consumption with the incidence of anemia in pregnant women during the COVID-19 pandemic in Ogan Ilir Regency. In addition to the incidence of CED, factors that can cause pregnant women to experience anemia are micronutrient intake, namely inadequate iron (Fe) intake and non-compliance in consuming iron tablets (*TTD*). The results of research from Rizki Fadinah et al (2017) stated that the administration of iron tablets (*TTD*) in accordance with service standards and balanced with a good diet and balanced nutrition will have an influence on the hemoglobin levels of pregnant women, namely the reduced number of pregnant women who have anemia.¹⁹ Consumption of vitamin C can also help increase iron absorption and consume drinks or foods that contain Tannins can affect iron intake, because tannins can inhibit the absorption of iron in the body.¹⁶

The results of the research by Fadli, et. al., stated that the knowledge factor of pregnant women ($p = 0.001$), *antenatal visits care* ($p=0.003$), adequate consumption of Fe tablets ($p=0.009$) was associated with anemia in pregnant women. The factor of adequacy of consumption of Fe tablets that has the most influence on the incidence of anemia in pregnant women with OR = 9.221 based on the results of *multiple logistic regression test*.²⁰ If the level of compliance of pregnant women in consuming Iron tablets is good, the mother's Hb level will tend to increase by 3.2 times when compared to pregnant women who do not comply with taking blood-added tablets. One of the causes of anemia in pregnant women is iron deficiency in the body which results in the process of red blood cell formation being disrupted.²¹ The research conducted by Widiasih Restuning et al is in the form of a literature study using a scoping review method approach with the aim of comprehensively identifying factors associated with anemia in pregnancy in Indonesia. The 14 articles identified as meeting the inclusion criteria, the results of the analysis showed that the factors related to anemia in pregnant women in Indonesia were the active role of health workers,

adherence to consuming Fe tablets, pregnancy control, formal education, nutritional status, health education, and awareness of pregnant women.²²

The relationship between malnutrition (CED, anemia, and *emesis gravidarum*) and weight gain of pregnant women during the COVID- 19 pandemic in Ogan Ilir Regency. The impact of malnutrition in pregnant women (CED, anemia, *emesis)gravidarum*) is the emergence of other nutritional problems such as abnormal weight gain of pregnant women. This is evidenced by the results of the study, namely that there is a significant relationship between the incidence of CED and *Emesisgravidarum* with weight gain of pregnant women. As many as 44.4 % of pregnant women have abnormal weight gain. Based on Table 6, of 13 pregnant women with CED 6 of them experienced abnormal weight gain, of 61 anemic pregnant women 30 of them experienced abnormal weight gain and of 62 pregnant women who had experienced *emesis .gravidarum* 35 of them experienced abnormal weight gain. This shows that of the total number of pregnant women who are malnourished, more than half have an impact on maternal weight gain during pregnancy.

It is very important to monitor weight gain during pregnancy which can be done during *antenatal care* (ANC) visits or antenatal care to health services. The more often pregnant women perform ANC on health workers, the weight gain during pregnancy will be easier to monitor. Especially during the COVID- 19 pandemic like now, even though there are limited activities outside the home, pregnancy check-ups (ANC) must still be done carried out at least 4 times during pregnancy.

Many factors can influence the weight gain of pregnant women including the level of edema, metabolic rate, food intake, the amount of amniotic fluid, and the size of the fetus. Maternal age, pre-pregnancy body size, parity, hypertension, and diabetes also affect the pattern of weight gain of pregnant women. Weight gain in pregnancy includes three components, namely, 1) products of conception: fetus, placenta, amniotic fluid; 2) tissues in the mother's body: uterus, breasts , and increased blood volume; 3) maternal fat reserves with an average of 30% of the total weight gain.²³

The results of the study from Fitri stated that pregnant women whose weight gain was not according to the recommendations were three times more likely to give birth to LBW babies than mothers whose weight gain was according to the recommendations.²⁴ Based on research by Metasari, et. al., there is a significant relationship between in pregnant women and estimated fetal weight with p value = 0.0001. Upper arm circumference in pregnant women is very influential on the development of the fetus in the womb. Normal weight gain in pregnant women each trimester can be a determinant of good fetal development as well. Pregnant women who experience CED will affect their weight gain which is not appropriate because the intake of energy and nutrients obtained by pregnant women is less while metabolism during pregnancy increases.²⁵

Weight gain during pregnancy is influenced by the uterus and its contents, the breasts, and the increase in blood volume and extravascular external fluid. A small part of this increase results from metabolic changes that cause an increase in cellular water and deposition of fat and protein which is called maternal reserves. In addition, it is influenced by biological factors, namely placental metabolism. The function of the placenta is as an endocrine organ and an intermediary between the mother and the fetus. Changes in homeostasis (conditions of ideal internal balance, where all body systems work and interact in the right way to meet all the needs of the mother's body) can change the structure and function of the placenta which can have an impact on the condition of fetal growth. Another function of the placenta is to affect the mother's metabolic system due to changes in the insulin hormone and inflammation system, resulting in weight gain in pregnant women.²⁶

Conclusion

Based on the results and discussion, it can be concluded that the factors that cause malnutrition in pregnant women during the COVID-19 pandemic are energy intake, carbohydrate intake, and low Fe intake, as well as pregnant women who have never consumed Iron Tablets (TTD) during pregnancy. The impact of pregnant women who are malnourished (CED and *emesis gravidarum*) is abnormal weight gain (not in accordance with recommendations).

Pregnant women with high risk are expected to always check their pregnancy regularly to health workers while still implementing the COVID-19 health protocol to be able to prevent and detect the causes of nutritional problems during pregnancy as early as possible. *Antenatal care* services need to be improved during the COVID-19 pandemic in providing information about fulfilling the nutritional intake of pregnant women so that mothers do not experience malnutrition and do not cause other impacts that will affect the baby to be born later as an effort to prevent stunting during pregnancy.

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Conflict of Interest

The author declares that he does not have any conflict of interest.

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