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# Effectiveness of Mung Bean Biscuit Pmt on Arm Circumference, Weight Gain in Pregnant Women Chronic Energy Deficiency in Trimester III

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## ABSTRACT

### INTRODUCTION

*The World Health Organisation* (WHO) states that the prevalence of Chronic Energy Deficiency (CED) in third trimester pregnant women is 35% to 75%, much greater than the incidence in the first and second trimester.

### METHODS

*Literature review* research method based on national and international scientific journals related to the effectiveness of providing PMT green bean biscuits on Upper Arm Circumference and Weight gain of pregnant women with CED. Publications between 2019 -2024 on Pub-Med, Science Direct, Google Scholar, and Semantic databases with Indonesian and English keywords, "'*additional food, green* beans "*green bean*, biscuits "*biscuits"* Lila "*upper arm circumference"*, '*weight gain" "pregnant women"*, and "CED". The search for articles as many as 140 articles, screened get 76 articles. then selected abstracts, full text, open access and type of research obtained 40 eligibilite articles. The final process is to read and select eligibility articles based on the criteria obtained 30 relevant articles consisting of 5 international articles and 25 national articles.

### RESULTS

Mung bean formula given to pregnant women with CED for 21 days can increase body weight by 0.6 kg and Upper Arm Circumference (UAC) by 0.7 kg. Supplementary biscuits can increase the upper arm circumference and body weight of pregnant women with CED. Substitution of mung bean and other food ingredients can increase the nutritional value of supplementary food products so that they can fulfil the nutritional needs of pregnant women.

### CONCLUSIONS

The use of mung beans in the preparation of supplementary food can help pregnant women with CED to increase UAC and body weight.

***Keywords:*** *Supplementary Food, biscuits, Green Mung Beans, UAC, Weight, CED*

## 1. INTRODUCTION

*The World Health Organization* (WHO) states that the prevalence of chronic energy deficiency (CED) in third trimester pregnant women is 35% to 75%, much greater than the incidence in the first and second trimesters (Abadi & Putri, 2020). African and Asian countries, especially in the Sub-Saharan and Southeast Asian regions, are centres of global poverty and chronic malnutrition as the majority of the population lives in remote/rural areas. The rate of chronic malnutrition increased from 777 million in 2015 to 815 million in 2018 and it is estimated that at least about 120 million women (60%) living in South and Southeast Asia are chronically undernourished (WHO, 2020). According to WHO, morbidity is considered a critical health condition when its prevalence is more than 15%. (1). In 2018 in Indonesia, the risk of developing CED was

quite high, which was 17.3% experienced by pregnant women with an age range of 15-49 years. Routine report data in 2020 noted that of the 4,656,382 pregnant women, those who had UAC <23.5 cm were approximately 451,350 people, so they were at risk of developing CED. (2).

The results of Riskesdas 2018, stated that there is still a high prevalence of pregnant women with SEZ in women aged 15-19 years at 33.5% and 20 - 24 years at 23.3%. Pregnancy at an early age can increase the risk of malnutrition because in adolescence there is still physical growth. The prevalence of CED among adolescent girls (aged 15-19 years) was 36.3%. Adolescent girls have a high risk of developing SEZ during pregnancy. It is known that CED occurs due to lack of food intake over a long period of time.(2). Pregnancy is a process of conception in order to continue offspring that occurs naturally to produce a foetus that grows in the mother's womb. Pregnancy is a period that requires adaptation both physiologically and psychologically, which causes increased energy metabolism, therefore the need for energy and other nutrients will increase during pregnancy. The increase in nutrients is needed for the growth and development of the fetus, the increase in the size of the organs of the womb, as well as changes in the composition and metabolism of the mother's body, so that when pregnant, a pregnant woman will need additional nutrients to meet her nutritional needs.(3). Pregnancy requires special attention because it is an important period in pregnant women. This is because it is included in one of the nutritionally vulnerable groups (Rohmawati et al., 2021). The nutritional status of pregnant women must get attention because it will have an impact on the birth of children. The nutritional status of pregnant women is influenced by various factors, one of which is nutritional intake. During pregnancy, pregnant women must maintain the nutritional intake needed by them and the foetus, especially the consumption of food sources of energy. Nutritional status in pregnant women can be measured by several indicators, including by measuring upper arm circumference (UAC). Measurement of upper arm circumference is intended to determine the possibility of pregnant women suffering from Chronic Energy Deficiency.(4).

Pregnant women who are malnourished will suffer from chronic energy deficiency (CED), which will adversely affect their physical condition and have a 2-3 times greater risk of giving birth to a low-weight baby than pregnant women who are not malnourished and a 1.5-fold chance of dying.(5). CED is a condition of a person who suffers from chronic food deficiency characterised by an upper arm circumference (UAC) < 23.5 cm. resulting in health problems.(6). Chronic Energy Deficiency (CHD) is a condition caused by an imbalance in nutrient intake between energy and protein, so that the nutrients needed by the body are not fulfilled (7). (7).

The government's efforts in tackling nutrition problems in pregnant women include supplementary feeding (PMT). Supplementary feeding during pregnancy, also known as Prenatal Micronutrient Therapy (PMT), is one of the government's initiatives aimed at improving the health of pregnant women, who are a particularly vulnerable population in terms of nutrition. (8). Supplementary feeding during pregnancy has an effect on the incidence of chronic energy deficiency (CED), in the study obtained the results with supplementary feeding in pregnant women will reduce the risk of CED incidence, pregnant women who are not given additional food are at risk of CED by 13 times compared to those given additional food.(9). Pregnant women who are given additional food in the form of Corn, Soybean, Katuk and Yellow Pumpkin (JKKL) biscuits for 90 days can increase body weight by 7 kg and upper arm circumference by 1.6 cm.(10).

There are many local foods around pregnant women that can be consumed to fulfil their nutritional needs during pregnancy. Usually, local products are easier to find and more affordable in terms of cost and availability. Such as the local ingredient of mung beans. Mung beans are rich in macro and micro nutrients, vitamins B1, B2, amino acids, folic acid, protein, carbohydrates, Ca and phosphorus. Mung beans have several benefits for pregnant women, namely reducing disability from folic acid, maintaining health from vitamin C, strengthening bones from phosphorus content, overcoming digestive problems from fibre content, reducing *morning sickness*, and a source of calories. Mung beans have a complete protein content of 22% so that it can help the formation of body cells and growth so that it can increase body weight. In addition, the fat content is unsaturated fatty acids. In addition to protein, fat, and minerals such as calcium and phosphorus, mung beans also contain vitamin B1 which is beneficial for growth. (4).

The study found that pregnant women who received mung bean formula were effective in increasing LILA up to 1.3 cm in 30 days.(4). In a study conducted by, mung bean formula given to pregnant women with CED for 21 days and measurements were taken every 7th day gave the effect of increasing UAC by 0.7 cm and body weight by 0.6 Kg. (11, 12 ). Substitution of 40% mung bean sprout flour in flakes will produce 6.21% protein and substitution of 30% mung bean sprout flour in flakes produces 5.83% protein (13).

The purpose of this study was to analyse the effectiveness of giving mung bean biscuit PMT on arm circumference and weight gain in third trimester UAC pregnant women.

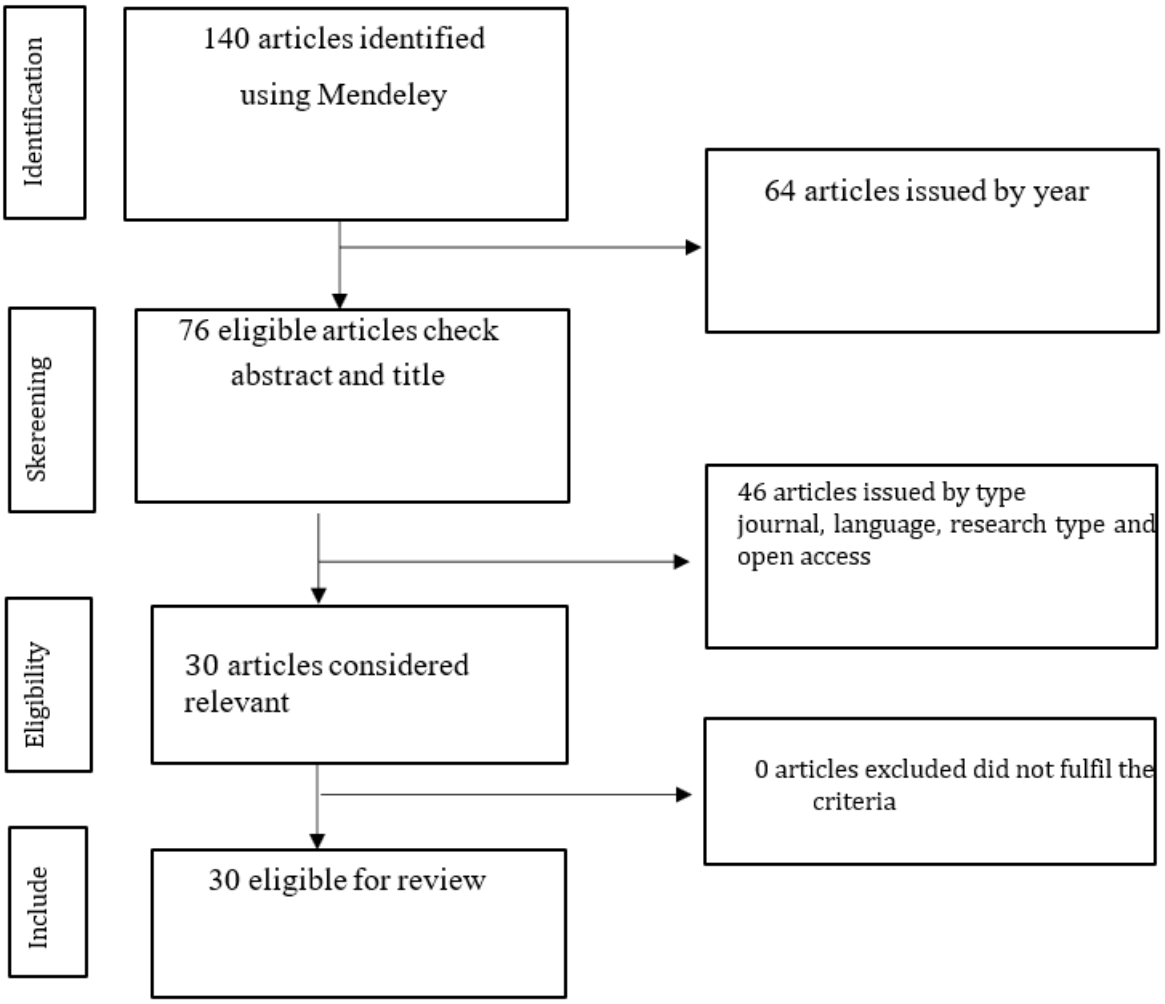
## 2. METHODS

The research method is a *literature review* based on national and international scientific journals related to the effectiveness of providing PMT green bean biscuits on Upper Arm Circumference and Weight Gain of Pregnant Women with CED. Publications between 2019-2024 on PubMed, ScienceDirect, Google Scholar, and Semantic databases with Indonesian and English keywords, namely "*additional food*", "*green* beans", "*biscuits*", "*upper arm circumference*", "*weight gain*",

"*pregnant women*", and "CED". Searching for articles using these keywords obtained search results as many as 140 articles. After identification and screening, 76 articles were obtained. Further selection was carried out related to abstracts, full text, open access, and type of research obtained 30 articles. The final process is to read and select eligible articles based on the criteria obtained 30 relevant articles (Figure 1). Articles were evaluated based on:

1. Inclusion criteria
   (a) The article discusses the dietary supplementation of mung bean biscuits on upper arm circumference and weight gain in pregnant women with CED.
   (b) Publication year 2019-2024
   (c) Articles in English and Indonesian
   (d) Original article, abstract, full text and open access
2. Exclusion Criteria
   (a) Type of research literature review
   (b) Publication in community service journals

**The article search strategy can be seen in Figure 1.**




**Article Search Flow Chart**

## 3. RESULT

This literature review was synthesised using a narrative approach by grouping the identified and extracted literature data according to the research objectives. The extracted literature was then read, reviewed and analysed based on the abstract and full text. A summary of the results of the review or analysis contained in the research results/findings is presented in

table 1.

**Table 1. Summary of Research Literature Extraction Results**

| No. | Author/ Year | Title | Type of Research | Sample | Data Analysis | Research Results |
|---|---|---|---|---|---|---|
| 1 | Oktavita, D. and Herdiani, N. (2023) | Risk Factors for Chronic Energy Deficiency in Pregnant Women at Gunung Anyar Health Centre Surabaya | bservational Analytic with cross sectional approach. | 30 pregnant women | Chi Square | There was an association between occupation and age, and no association between education, gestational age, and knowledge with Chronic Energy Deficiency in pregnant women. |
| 2 | Lestari, D.S., Nasution, A.S., Humaira, A.N (2023) | Factors Associated with the Incidence of Chronic Energy Deficiency (CED) among Pregnant Women in the North Bogor Primary Health Centre (PUSKESMAS) Working Area, 2022 | Analytical observation L with cross sectional design | Sample of pregnant women | Chi Square | There was a significant association between the variables of maternal knowledge (0.007) while the variables of age (0.184), economic status (1.000), pregnancy spacing (0.671), education (0.757), prenatal check-up (1.000) and infectious diseases (1.000), there was no significant association. |
| 3 | Sulistyaningsih, N. R., Mansur, S and Septiyanti (2023) | Factors influencing the incidence of chronic energy deficiency in pregnant women at the Masohi Community Health Centre, Central Maluku Regency | Cross sectional study. | Pregnant women 40 people purposive sampling technique | | The results showed that the variable that influenced the incidence of chronic energy deficiency was education. The variables that do not affect the incidence of chronic energy deficiency are income, consumption patterns and physical activity. |
| 4 | Fauziana, S., and Adhila, F. (2020 ) | Relationship between Knowledge, Food Diversity, and Macro-Micro Nutrition Intake on SEZ in Pregnant Women | Cross sectional design | 71 pregnant women respondents. | Chi square, while intake data uses spearman correlate analysis. | There is a relationship between knowledge, food diversity and energy and protein intake. There was no association between intake of carbohydrate, fat, vitamin C, folic acid, |

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| | | | | | | fe, calcium and iodine on SEZ in pregnant women. |
| 5 | Fransiska, Y, Murdiningsih, and Handayani, S (2022) | Factors Associated with Chronic Energy Deficiency in Pregnant Women | analytical survey with a cross sectiona approach | All multigravida pregnant women who came to the class of pregnant women in the working area of Puskesmas Muara Enim with a sample of 54 respondents. | Chi Square | There was a significant association (P-value 0.001), pregnancy spacing (Pvalue 0.011), and income (Pvalue = 0.005) with chronic energy deficiency. |
| 6 | Nur'aini, F., Ichayuen, A., and Tika N. P (2021) | Factors associated with the incidence of chronic energy deficiency (CHD) among pregnant women in the Tegal Gundil Community Helath Centre Area, Bogor, 2020 | quantitative with Cross Sectional design | population of ±1,022 pregnant women and a sample of 100 pregnant women simple random sampling | Chi Square | Statistical test analysis showed a significant relationship between age (p-value 0.000) with a high OR value (OR = 38.3), knowledge about nutrition (pvalue 0.000 and there was also a significant relationship between prenatal examination (p-value 0.000) with the incidence of CED in pregnant women in the Tegal Gundil Bogor Community Health Centre working area in 2020, |
| 7 | Yayuk dwi novitasari, Firdaus, (2019) | Factors associated with kek in pregnant women in the working area of Community Health Centre Rowosari, Semarang | Observational analytics with a case control approach | the sample consisted of 18 case samples and 58 control samples | Chi Square | Factors associated with the incidence of chronic energy deficiency (CHD) among pregnant women in the Rowosari Community Health Centre working area in Semarang were pregnancy spacing, economic status, family support and nutrient intake. The most dominant variable was nutrient intake. |

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| 8 | Rahmat, N.N., Jansen. L. L., Nurina, R. L (2019) | Relationship between pregnancy spacing and number of parities with the incidence of chronic energy deficiency among pregnant women in Kupang City | Observational analytical research conducted with a cross sectional study approach | 34 pregnant women | Chi Square | The results of the study found that the number of parities was not related to the incidence of CED in pregnant women with a value of P = 0.968. While the distance of pregnancy has a relationship to the incidence of CED in pregnant women with a value of P = 0.000. |
| 9 | Alhasany , N.F., Linda Yanti, and Surtining sih/2022 | Mung bean formula for Lila supplementatio n in pregnant women with chronic energy deficiency | Experiment: case study | Pregnant women with SEVERE | Pregnancy care using the SOAP method (Subjective, Objective, Analysis, Management ) | Mung beans given to pregnant women for 21 days had the effect of increasing UAC by by 0.7 cm and body weight by 0.6kg. |
| 10 | Khasanah , N. S., Dhita A.O and Intan, N/2020 | The effect of mung bean extract on increasing Lila in pregnant women at Community Health Centre Gubug 1, Grobogan Regency. | Experimental one group pretest post test | Pregnant women with SEVERE | Paired t-test | There is a difference in upper arm circumference before and after giving mung beans |
| 11 | Rofiah, M., Maryam, R., and Suwita I, K. | Substitution of mung bean *(Vigna radiata)* flour and tuna fish meal as PMT biscuits for pregnant women (*Thunnus sp*) as PMT biscuits for pregnant women on the proximate proximate, energy value, iron content, and organoleptic quality. | This research This research uses a type of laboratory experimental research with a research design Completely Randomised Design (CRD) using 3 levels of treatment, totalling 9 experimental units. experiment. Treatment level P1 with the proportion of wheat flour: mung bean flour: | mung bean flour *(Vigna radiata)* and tuna fish meal (*Thunnus sp*) | Proximate and organoleptic analysis | Substitution of mung bean flour and tuna fish meal gave a significant significant effect on moisture content, ash content, protein content, fat content, iron content, biscuit aroma. However, it had no significant effect on carbohydrate content, colour, taste, and texture. Treatment level P2 is the the best treatment |

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| | | | tuna flour (75:15:10), P2 (65:29:6), and P3 (55:41:4). | | | |
| 12 | Fadila N, 2019 | The use of mung bean (*Phaseolus radiates L*) sprout flour in flakes as an alternative food for pregnant women with high blood pressure. | This research This research uses a type of laboratory experimental research with a research design Completely Randomised Design (CRD) 2 times repetition, 4 times treatment | mung bean (*Phaseolus radiates L*) sprout flour | Friedman Test | Flakes with 30% mung bean sprout flour substitution was the most preferred *flakes* with 82% carbohydrate, 5.83% protein, 6.53% fat, 408.7 calories. The flakes did not contain *salmonella cereus* and *Bacillus Cereus* was below the standard. Mung bean sprout substitution *flakes* can be used as an alternative food for pregnant women. |
| 13 | Septiana, W., Ika A.H., Istiqamah, Ika M.U/2023 | Evaluation of the Supplementary Feeding Programme for Pregnant Women<br>with CED at Martapura 1 Health Centre | Descriptive method | Pregnant women with SEZ in January 2021-December<br>in 2022 as many as 122 people | Univariate analysis | PMT in pregnant women can reduce the occurrence of SEZ by increasing UAC in CED pregnant women |
| 14 | Putri R.H., Chandradewi, A.A.S., Reni S. and Made D. | Providing local food-based biscuits to increase body weight and UAC of women with SEVERE pregnancies | Pre Experiment with the research design The One Group Pre-test post-test | 7 pregnant women | Paired T test | The results showed an increase in energy consumption as much as 505.27 ± 273.80 kcal. There was an increase in body weight of 7.03 ± 2.10 kg and UAC of 1.55 ± 0.45 cm. There is a difference in body weight<br>and UAC of pregnant women with CED after being given biscuits ($p<0.05$). |
| 15 | Ayu, S. C. A., Suciawati, A., & Rukmaini. (2021) | Effectiveness of Feeding Pmt Biscuits on Increase in Circumference Upper Arm Circumference of Pregnant Women at | Quasy Experimental Design (Non Equivalent Control Group) | 36 pregnant women with SEZ<br>were divided into 2 groups (group control group was | Independent t test | There was an increase in UAC in pregnant women with CED who who received PMT 56 biscuits compared to women with<br>pregnant women who |

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| | | Rengas Dengklok Regency.Community Health Centre | | given 28 packs of PMT, and the intervention group were given PMT biscuits 56 biscuits) | | who received PMT as much as 28 biscuits (p = 0.000) |
| 16 | Jayanti, P.N and Nova, A/2022 | The Effectiveness of Biscuit Consumption of Pregnant Women on Increasing the Circumference of the Upper Arm in Pregnant Women With Chronic Energy Deficiency (CED) in the Karawang Kulon Health Centre Area | Pre-experimental research with a design of one group pretest-posttest design | 20 respondents, data collection by observation before and after being given biscuits for pregnant women in the Karawang Kulon Health Centre area. | the statistical test is testing T | The upper arm circumference condition in 20 respondents of pregnant women after being given biscuits showed a Chronic Energy Deficiency (CED) value of the upper arm circumference <23.5 by 3 respondents. Meanwhile, the CED value was ≥ 23.5 for 17 respondents. In addition, the Wilcoxon Singed Rank Test results showed an effect of giving biscuits on CED of pregnant women (p-value 0.000). |
| 17 | Damayanti, E., Rosmawati, I., Sulfianti A, and Yusuf (2023). | Effect of Supplementary Feeding on the Incidence of CED among Pregnant Women at Baito Health Centre | This type of research is quantitative with an analytical survey design that uses a cross sectional study approach. | All 166 pregnant women at Baito Health Centre in 2022. | logistic regression analysis | The results showed that there was an effect of supplementary feeding on the incidence of CED in pregnant women. |
| 18 | Rahman, H., Andi, N., and Kurnaesih, E (2022) | The Effect of Supplementary Feeding on Body Weight of Pregnant Women Who Have Chronic Energy | This research was conducted using a Quasi-Experimental method with a Pretest-Posttest | 32 pregnant women | Paired Sample t-Test | There was a difference in body weight (p=0.000) in CED pregnant women before and after supplementary feeding. |

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| | | Deficiency in Indonesia | Control Group Design. | | | |
| 19 | Asmiarti, M., Asriani, A., Andi Muhammad, H and Asnidar (2021) | The Effect of Providing Supplementary Food Companion (PMT) to Pregnant Women on the Incidence of Chronic Energy Deficiency in the Salasssae Health Centre Working Area | The design in this study used Quasi Experiment. | Pregnant women according to the inclusion criteria | Wilcoxon sum rank test | There was a difference in the mean CED of mothers who were given supplementary food assistance (PMT). |
| 20 | Adfar, T, D, Maria, N and Ice A (2022) | Effectiveness of Mentoring Pregnant Women with Low Energy Chronic to Improved Nutritional Status | This type of research is a quassy experiment with a one-way design. group pretest-posttest. | Subjects were obtained using the Simple Random Sampling as many as 19 people | Paired Sample T Test | Research results show that there is an effectiveness of mentoring pregnant women with chronic energy deficiency (CED) on improved nutritional status, namely UAC |
| 21 | Murniyati, and Lili, A (2023) | Effect of Nutrition Assistance on Behaviour Change Nutritional fulfilment for pregnant women with chronic energy deficiency (CED) | This research is a quasi-experimental | The study sample totalled 32 pregnant women who met the inclusion criteria. | A difference analysis was performed with Mann whitney test | There is a difference in the average behavioural score before and after mentoring The effect of the nutrition mentoring programme on improving nutrition behaviour was assessed as statistically significant. very effective. |
| 22 | Fatmawati, Petrus, Jusuf K and Ellyani, A (2023) | Nutritional Addition To Increase The Weight Of Pregnant Women With Chronic Energy Deficiency In The Coastal Area of Kendari City | This type of research is a quasi-experiment, two group pretest-posttest design with control. | The sample was pregnant women in the coastal area of Kendari City, 35 cases and 35 controls using purposive sampling. | Data were analysed using the Mann Whitney test | The average body weight of the intervention group before nutritional assistance was 50.95 kg and after assistance was 57.86 cm. Meanwhile, the average weight of the control group was 62.67 kg and after assistance it was 71.09 kg. The results of the Mann Whitney test obtained a p value |

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| | | | | | | of 0.000, so there is an influence of nutritional assistance on the weight of pregnant women. |
| 23 | Pertiwi, H.W., Martini, T. Dan Handayani, S.M (2021) | Relationship of Supplementary Feeding (PMT) with Changes in Upper Arm Circumference of Pregnant Women Deficiency Chronic Energy (CED) | Type research is retrospective by using data panel to get an overview more in-depth about the success of PMT programme for pregnant women with CED (input, process and output). | Research sample are all women who are pregnant with SEZ in the region Plupuh II Health Centre as many as 24 people | Univariate and bivariate analysis using Chi Square | PMT for 3 weeks can have an effect on changes in the size of the upper arm circumference (UAC) and an increase in body weight. |
| 24 | Santi, Masrin, Murlan, and Verawati (2023) | Effectiveness of the Supplementary Feeding Programme (PMT) in the form of Biscuits on the Nutritional Status of Pregnant Women in the Health Centre Working Area Nambo in 2022 | Design The research used was quassy experimental with a one group design. before and after design. | Samples in This study was conducted among women with CED who received PMT programme in the form of Biscuits in the Puskesmas Working Area Nambo during the period September - October 2022. Sampling technique by total sampling, namely 31 people. | Paired samples T-test with 95% confidence level | There is an effect supplementary feeding with biscuits on the nutritional status of pregnant women CED in the Nambo Health Centre working area. |

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| 25 | Bakri, S.H (2021) | Effect of supplementary feeding on weight gain, haemoglobin (Hb) and albumin levels in chronically undernourished pregnant women | Quasi-experimental with pretest-postest control group design | The intervention group of 22 pregnant women with SEVERITY were given PMT biscuits and Fe tablets, the control group of 22 pregnant women with SEVERITY were only given Fe tablets. | Paired T test | There was a difference in weight gain between the intervention and control groups before and after the provision of supplementary food biscuits and Fe tablets with p value=0.096 and p=0.066, respectively. |
| 26 | Pujiastuti, Herman Sudiman, Laila Ulfa (2023) | Evaluation of Supplementary Feeding for Pregnant Women with Chronic Energy Deficiency from the Corporate Social Responsibility (CSR) Program in the Working Area of PuskesmasTegal Angus, Tangerang Regency in 2022 | Mixed Methods with Sequential Explanatory Designs | The sample in this research was all Chronic Energy Deficiency (CED) pregnant women in Tegal Angus Health Centre, Tangerang Regency. | Data analysis was conducted using the Wilxocon test. | The results of the study showed that there were differences in the nutritional status of pregnant women with a significance value of 0.000. |
| 27 | Juliasari, F and Elsa, F.A (2021) | Supplementary Feeding (PMT)<br>With the Weight Gain of Pregnant Women with CED | Quantitative with Cross Sectional approach method | Samples were pregnant women with CED who conducted examinations and were taken by random sampling as many as 36 people. | Chi Square | The results of the study obtained data on those who were given PMT as much as 17.9% and those who were not given PMT.<br>82.1% were given. Respondents who experienced an increase in body weight were 98.5%<br>Statistical test results<br>There is a relationship between PMT and weight gain in women with SEVERE pregnancies |
| 28 | Setiyowati, N., and | Effect of PMT Biscuit | The type of research used | There were 29 pregnant | Wilcoxon | Results of univariate analysis mean LiLA |

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| | Yuliana N.S.U (2019) | Sandwich on Chronic Energy Deficiency of Pregnant Women at Bantarbolang Community Health Centre, Pemalang Regency | is quasi experiment with one group pre and posttest design. | women with second trimester SEZ. | | before giving sandwich biscuits is 21.879 cm ± 1.286 cm and the average LiLA given PMT was 22.4 cm ± 1.31 cm. The provision of additional sandwich biscuits further improved the chronic energy nutritional status. deficiencies of pregnant women |
| 29 | Retnaningtyas , E., Della, D., and Retno, P.Y.S (2023) | Provision of supplementary foods and diet against weight loss gain in pregnant women with chronic energy deficiency | Cross sectional correlational research. | Sample of 32 respondents with purposive sampling | Chi Square | The results of the study of 32 respondents Most of the 23 (71.9%) respondents consumed additional food, most of the 23 (71.9%) respondents ate regularly and the majority of 23 (71.9%) respondents had weight gain body. Analysis test using Chi Square significance 0.000 < α = 0.05. There is a relationship between supplementary feeding and dietary patterns on weight gain for pregnant women with CED. Provision of additional food and regular eating patterns in pregnant women can prevent CED. |
| 30 | Robiyati, Siti, A and Helni, A (2022) | Factors Associated with the Incidence of Chronic Energy Deficiency (CED) in Pregnant Women in the | This study uses analytical quantitative research using a cross-sectional research | The population in the study amounted to 245 people and the number of | Independent T test | The results of the bivariate analysis were a significant relation, honor between economic status with ap value of 0.000 <0.05, |

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| | | Working Area of the UPT Health<br>Great Banding Inpatient Centre in 2021 | design. | samples was<br>71 respondents | | knowledge with ap<br>value of 0.009 and eating patterns with ap value of 0.000 statistically proven. |
| 31 | Elisabeth Z, Mardiana A, Healty H, Suryani, A | The Effect Of Biscuits Made With Mung Beans (Vigna Radiata), And Star Gooseberry (Sauropus Androgynous) Leaves On Infants | This study uses quasy experiment with one group pre and postest design. | This study's sample was primiparous and multiparous postpartum mothers who had babies aged <30. Using purposive sampling technique with 28 intervention and 27 controls. | Paired sample T-Test, Independent t-test and Mann whitney test | All respondents did a light physical activity and were mostly highly educated. Most of the respondents were multiparous and had adequate nutritional intake (>80%) of the 2013 RDA. In the intervention group after treatment, there was an increase in baby weight of 1078.57 g while the control group was 1003.70 g with a p-value of 0.05. |

## 4. DISCUSSION

The nutritional status of the mother before and during pregnancy affects the nutritional status of the mother and baby, because the growth and development of the foetus is highly dependent on the mother's nutritional intake. One indicator of adequate nutritional needs of pregnant women can be seen from the mother's weight gain every month. Until now there are still many pregnant women who experience nutritional problems, especially malnutrition such as Chronic Energy Deficiency (CED) which is characterised by Upper Arm Circumference (UAC) below 23.5 cm.(4). Many factors influence the occurrence of CED in pregnant women. Research states that there is a relationship between maternal knowledge; occupation and age; socioeconomic status, knowledge and diet; pregnancy spacing and income(5,14,15,16)Fauziana and Adhila, (2020), knowledge, food diversity and energy and protein intake; Nur'aini, *et al* (2021), age (with a high OR value (OR = 38.3), knowledge about nutrition, pregnancy check-ups; pregnancy spacing factors, economic status, family support, nutrient intake, and PHBS.The most dominant factor causing CED is nutrient intake. (17).

Efforts to provide supplementary food for pregnant women with CED are the realisation of health efforts in the form of curative and preventive efforts to improve the nutritional status of pregnant women, so that they give birth to children who do not have nutritional problems. (18). According to the Regulation of the Minister of Health No. 51/2016 on Nutritional Supplementation Product Standards, supplementary food for pregnant women is biscuits containing protein, linoleic acid, carbohydrates, and enriched with 11 vitamins and 7 minerals.(2). Supplementary food given to pregnant women should use local foods that are easily available and have balanced nutritional value. The basic principle of providing additional food is carried out to fulfil the nutritional adequacy of pregnant women, the provision of PMT is given to pregnant women who have a UAC size below 23.5 cm, PMT in pregnant women is integrated with Antenatal Care (ANC) services. Each packet of Supplementary Food (MT) for pregnant women contains 3 pieces of layer biscuits (60 grams). In the first trimester of pregnancy, 2 pieces are given per day until the pregnant woman is no longer in the CED category according to the UAC examination. In the second and third trimester of pregnancy, 3 pieces were given per day until the pregnant women were no longer in the CED category according to the UAC examination. Monitoring weight gain according to the standard weight gain of pregnant women. If the weight is in accordance with the weight gain standard, then consume balanced nutritious food. (2).

Mung beans can be used as a formula to help pregnant women with chronic energy deficiency (CED).(11)The formula was 33g mung bean extract added with 25g brown sugar then boiled and consumed once a day for 21 days. Body weight and UAC were measured every 7 days. On the first 7 days, the mother's weight was 40.1 kg and UAC was 21.3 cm. On the second 7 days, the mother's weight became 40.2 kg and LILA 21.4 cm. On the third 7 days, the mother's weight became 40.5 kg and UAC 21.7 cm. The intervention of mung bean formula for 21 days had the effect of increasing body weight by 0.6kg and UAC by 0.7 cm. The content of 33 grams of mung beans has a content of 107 calories plus 25 grams of brown sugar

containing 94 calories which will add 201 calories in each serving. Pregnant women who consume mung bean extract once a day will add 201 calories of energy. Presentation of mung bean in the form of extract so that it is effective to be served because the nutrients are many / dense. Protein digestibility in raw mung beans is approximately 77% due to the presence of *polyphenols* (tannin) and *antitrypsin* which are anti-nutritional substances that make the protein easily digested, it needs to be processed by roasting, steaming and boiling. So the extract processing method makes it easy for pregnant women to eat mung beans directly.(11). Mung bean biscuits to increase their nutritional value can also be substituted with other ingredients such as tuna fish. Tuna fish, like mung beans, can be used as flour as a basic ingredient for making supplementary food biscuits for pregnant women that are organoleptically acceptable and have nutritional value according to supplementary food standards. This is based on research, the biscuit formula for the substitution of mung bean flour and tuna flour is divided into 3 formulas with the ratio of wheat flour: mung bean flour: tuna fish flour respectively, namely P1 (75: 15: 10); P2 (65: 29: 6) and P3 (55: 41: 4). The highest energy value in formula 1 is 450 cal, the highest protein in formula 3 (P3) is 11.7 grams, the highest fat in formula 1 (P1) is 13.9 grams. (19). Mung bean flour and tuna fish flour have high protein content, which is 25.14 grams / 100 grams of ingredients (19). The results of statistical analysis show that biscuits substituted with mung bean flour and tuna fish flour increase the nutritional value of energy, protein and fat so that biscuits substituted with mung bean flour and tuna fish can be used as additional food for pregnant women who experience CED Mung beans can not only be used as a basic ingredient for making biscuits, but also other foods that can be used as additional food for pregnant women with CED. One of them is *flakes*. Substitution of mung beans in making *flakes* will increase its nutritional value, especially protein and calories. The results of Fadila N's research (2019), 40% mung bean sprout flour substitution in flakes will produce 6.21% protein and 30% mung bean sprout flour substitution in flakes produces 5.83% protein. Consuming flakes as much as 45-70 g/day can be used as PMT for pregnant women because the calorie content is at the standard value of PMT for mothers (20).

(9) Suggests that supplementary nutrition has an impact on the occurrence of CED in pregnant women as measured by an effect coefficient of 4.911. The exp(B) value for supplementary feeding is 136.778, meaning that the risk of not receiving supplementary feeding on the incidence of SEE in pregnant women is 13 times that of mothers who receive additional nutrition in the form of supplementary feeding.

Research shows that there is an effect of supplementary feeding with biscuits on the nutritional status of pregnant women with SEZ in the working area of Puskesmas Nambo. ((21)22)In addition, PMT in pregnant women can reduce the occurrence of SEZ by increasing LILA in women with SEZ. Research from Pujiastuti, *et al* (2023), showed that there were differences in the nutritional status of pregnant women with SEVERITY in terms of LiLA after being given additional food and Fe tablets. (23). Adfar *et al* (2023), the results showed that the average nutritional status of pregnant women with SEZ, seen from the size of LILA before being given assistance was 21.26 cm ± 0.918 cm and after assistance to 23.53 cm ± 0.964 cm.(24). Research from Pertiwi (2021), PMT for 3 weeks can affect changes in the size of the Upper Arm Circumference (LILA) and an increase in body weight. (25). Then research conducted by Setyowati et al (2019), the average LiLA before giving sandwich biscuits was 21.879 cm ± 1.286 cm and the average LiLA given PMT was 22.4 cm ± 1.31 cm. (26). In Asmiarti's research (2021), the mean LILA in the group given additional food assistance (PMT) before the intervention was 6.33 ± 0.32 and after the intervention it increased to 8.06 ± 0.17 statistical test results significantly.(27).

The study found that there was an association between supplementary feeding and diet on weight gain of pregnant women with SEZ.(28). The average body weight of the intervention group before being given nutritional assistance (additional food) was 50.95 kg and after being given assistance was 57.86 cm.(29)Meanwhile, the average body weight of the control group was 62.67 kg and after the assistance was 71.09 kg.(30). There is a difference in the average body weight of women with SEZ after being given additional food. There was a difference in weight gain between the intervention and control groups before and after the provision of food biscuits.(31). The results of statistical tests there is a relationship between PMT and weight gain in pregnant women with SEZ (32).

Pregnant women who experience SEZ, if given mung bean extract, can increase the size of their upper arm circumference. (4). Before being given mung beans, the average LILA size was 21.9 cm and after being given mung beans it became 23.2 cm, a very significant increase of 1.3 cm. In women with SEZ, the adequacy of calories in the body means that it cannot be fulfilled. Not fulfilling the body's need for energy causes ineffective protein consumption because part of the protein nutrients consumed will be converted into energy to defeat its main function as a building substance and maintenance of body tissue cells. In order for protein substances in the body to play their proper role, the body's need for energy should be fulfilled first. The energy needs of pregnant women per day range from 2300 calories to 2500 calories. So there is an increase of 200 calories to 300 calories compared to women before pregnancy.(4). Pregnant women need about 2300 calories to 2500 calories every day so there is an additional 200 to 300 calories when compared to non-pregnant women. Mung beans as much as 100 grams have content: Vitamin C 10 grams, Vitamin B1 0.46 grams, Vitamin A 157 SI, Phosphorus 319 grams, Iron 7.5 grams, Calcium 223 grams, Carbohydrates 56.8 grams, Fat 1.5 grams, Protein 22 grams, Vitamin B10, 46 grams, 15.5 grams of water. (4). Looking at the content of mung beans, it means that mung beans are effective as additional food to overcome the problem of SEZ in pregnant women. Research by Ayu *et al* (2020), showed that giving biscuits to pregnant women with SEZ, before the intervention, the upper arm circumference for the intervention group was 21.7 cm, after the intervention it

was 24.2 cm while in the control group, the average initial LILA before the intervention was 23 cm and after the intervention was 22.1 cm. There was an effect of biscuit administration on upper arm circumference, because pregnant women with SEZ consumed 56 packs of layer biscuits made with special formulations and fortified with vitamins and minerals given to pregnant women with Chronic Energy Deficiency (SEZ) to meet nutritional needs. Each primary pack (3 pieces/60 grams) of supplementary food for pregnant women contains a minimum of 270 calories, a minimum of 6 grams of protein, a minimum of 12 grams of fat can increase the upper arm circumference of pregnant women with SEZ. (33).

In providing additional food, assistance should be provided so that pregnant women gain knowledge so that they have good or positive behaviour and attitudes in consuming additional food. In the study of Murniyati *et al* (2023) there was a difference in the average behaviour score before and after assistance which was considered statistically significant. The nutrition assistance program on improving nutrition fulfilment behaviour is considered very effective. (34).

Supplementary feeding using mung bean biscuits with the addition of belimbing wuluh leaves in breastfeeding mothers. Belimbing wuluh leaves contain streoid compounds and mung beans as a source of protein and vitamin B1 which has a good influence on weight gain in infants. Giving mung bean biscuits combined with star fruit leaf extract as much as 85gr/day for 30 days, giving mung bean biscuits combined with gooseberry leaves will increase the baby's weight more than biscuits made from mung beans alone. It was concluded that there is an effect of giving biscuits developed from mung beans and star fruit leaves on the weight of infants.(35).

## 5. CONCLUTION

Mung beans as much as 100 grams have content: Vitamin C 10 grams, Vitamin B1 0.46 grams, Vitamin A 157 SI, Phosphorus 319 grams, Iron 7.5 grams, calcium 223 grams, carbohydrates 56.8 grams, fat 1.5 grams, protein 22 grams, Vitamin B10, 46 grams, 15.5 grams of water. The use of mung beans in making additional food will increase nutritional value so that it can help in overcoming the problem of SEZ olah because the energy and protein content contained in mung beans can meet the deficiency of these nutrients in pregnant women. Mung beans can be made into various additional food products, namely besides biscuits, brownies and flakes can also be made. Mung beans as an additional food can increase body weight and upper arm circumference.

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