




## Energy Consumption and Nutritional to Status Emotional Eating Behavior Among Pregnant Women in Malang, Indonesia

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### Abstract

Emotional eating behavior and increased food intake during emotional conditions are some factors that can contribute to obesity in pregnant women. This study examined the relationship between emotional eating behavior with energy consumption and nutritional status of pregnant women. This study was conducted from January to March 2024 and used an analytical observational method with a cross-sectional study. The subjects were 59 pregnant women in the second and third trimesters at Kedungkandang Community Health Center, Malang, Indonesia. Emotional eating, energy consumption, and nutritional status was tested with correlation rank spearman test. In this study, 45.7% of respondents were high emotional eaters, 40.7% had sufficient energy intake, and 72.9% had a normal nutritional status. Spearman correlation test showed  $p < 0.05$  for energy consumption ( $p = 0.008$ ) and  $p > 0.05$  for nutritional status ( $p = 0.548$ ). We concluded that emotional eating behavior has a significant relationship with energy consumption but has no relationship with nutritional status. It is important to consider the larger context in which emotional eating behaviors take place to comprehend nutritional status during pregnancy. Therefore, future studies should examine other different populations or areas.

### Introduction

Nutritional problems are one of the problems that need attention. Many nutritional problems occurred, including excess and deficiency of nutrients in the body. Excess nutrition in the body or obesity is a health problem due to excessive energy intake and lack of physical activity. Obesity is an abnormal or excessive accumulation of fat that can harm health (WHO, 2021). Excess weight, especially obesity, reduces almost all aspects of health, from reproductive and respiratory function

to memory and mood. Obesity increases the risk of several debilitating and deadly diseases, including diabetes, heart disease, and some types of cancer (Harvard T.H Chan, 2020). Nutritional problems such as obesity can occur at all ages, including pregnant women. Pregnant women are a group of people who are vulnerable to the risk of obesity. Based on 2018 Riskesdas data, currently the number of obesities in Indonesia for the population of pregnant women in 2007 was 10.5%. In 2013, it was 14.8% and increased in 2018 by 21.8%

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(Ramadhan, 2019).

Obesity can affect fertility in pregnant women, and they have a higher risk of miscarriage than non-obese women (Kerrigan & Kingdon, 2010). Apart from that, the baby will also be affected by the mother's excess weight, such as the risk of complications in the baby, such as birth defects, macrosomia, stillbirth, shoulder difficulties, and an increased risk of obesity and diabetes in adulthood. Pregnant women who are obese are also advised to undergo delivery by caesarean section. It is because obesity will make it difficult for the mother to give birth naturally and risks complications and bleeding if she continues to give birth naturally. Excessive nutrition or obesity in pregnant women can trigger bleeding during childbirth (Stubert et al., 2018). Being overweight or obese is not only influenced by the amount of calories consumed not matching those expended but also influenced by eating behavior. Emotional eating is an eating behavior that has the potential to cause obesity. Emotional eating is the tendency to increase food intake in response to pleasant and unpleasant emotions. We usually think of it as a strategy for regulating emotions. Emotional eating is the tendency to eat in response to negative emotions. People who experience emotional eating tend to choose foods with high fat, sugar, and simple carbohydrates that quickly make them feel full and relieve stress or emotional tension. In addition, continued emotional eating can affect inappropriate eating patterns, body weight, and health (Madali et al., 2021).

A study conducted in Norway during the pandemic found that emotional eating occurs more frequently in women and is present in more than half of the sample (54%) (Bemanian et al., 2020). The study in Türkiye explained that the score of emotional eating in tall women and emotional eating common in obese people (43.5%) compared to standard weight (33.5%) and thin (18.4%) people (Madali et al., 2021). A study on pregnant women in Mexico examined the relationship between pregnant women's sociodemographic and eating behaviors. It showed that eating behaviors were related to maternal education, maternal sociodemographic, and reproductive

variables. In addition, it was found that in pregnant women, emotional eating (EmoE) had a medium-high correlation with external eating (ExtE) and a low correlation with restrained eating (RestE) (Flores-Quijano et al., 2023). From that study, pregnant women can have emotional eating behavior. Some conditions, such as stress, fatigue, and hormonal changes in the body of pregnant women, can trigger poor eating patterns leading to emotional eating behavior, and this has the potential to result in obesity. Apart from that, feelings of pressure to fulfill the role of mother and the burden of household duties can also be risk factors for emotional eating (Lindsay et al., 2017). Some studies showed that emotional eating behavior has a relationship with energy consumption and nutritional status. A study conducted on men in Sweden showed that emotional eating can affect their energy consumption. Emotional eating is also associated with increased consumption of sweet and high-fat foods. In addition, a study conducted on hospital and university employees in Algeria showed that obese participants had higher emotional eating scores than normal participants (Benbaibeche et al., 2023).

Furthermore, a previous study in 2016 found that the level of obesity among pregnant women in Malang City was quite high, where of the 11,870 pregnant women there were 5,935 who were obese. Besides, research conducted in 2018 showed that 4 out of 18 second-trimester pregnant women in Malang City experienced weight gain that exceeded the recommendation. In addition, in several community health centers in Malang City, there are still many cases of pregnant women who are obese. The highest case of obese pregnant women is in the Kedungkandang Community Health Center, which is 40.77% (Ramadhan, 2019). Besides that, the researchers also examined the relationship between emotional eating and energy consumption since energy consumption also affects nutritional status (Winerungan et al., 2018). Moreover, there is still little research that addresses the issue of emotional eating behavior in pregnant women and its relationship with their nutritional status. Therefore, it is important to look further into whether emotional eating has a particular effect on pregnant women. Especially on their

nutritional status. This study aimed to examine the relationship between emotional eating behavior with energy consumption, and the nutritional status of pregnant women.

## Methods

This research uses an analytical observational method with a cross-sectional study. The dependent variable in this study was nutritional status and energy consumption, and the independent variable was emotional behavior. The nutritional status of pregnant women in this study was measured based on the size of the mother's middle upper arm circumference (MUAC). Then, the energy consumption was measured using 24-hour food recalls conducted for 3 days (2 days on weekdays and 1 day on weekend) within one week. The definition of emotional eating behavior in this study was one of the overeating behaviors that arose to cope with negative emotions such as stress, anger, and sadness a month ago, measured by the Emotional Eater Questionnaire (EEQ). The results of the EEQ are classified into 4 groups. Namely, not an emotional eater with a score of 0-5, moderate emotional eater with a score of 6-10, high emotional eater with a score of 11-20, and very high emotional eater with a score of 21-30. EEQ has good validity and reliability ( $r > 0.430$ ,  $p = 0.01$ ), and internal consistency Cronbach's alpha is 0.733.

The subjects in this study were second and third-trimester pregnant women with good health, good reading and writing skills, and were willing to participate in a series of studies by signing informed consent. Pregnant women who had hyperemesis gravidarum, excessive nausea and vomiting during pregnancy, or did not meet the above criteria were excluded from the study. Data in January 2024 showed that there were 120 pregnant women in the second and third trimesters in the work area of the Kedungkandang Community Health Center, Malang, Indonesia. This data was obtained from regional midwives and integrated service post (posyandu) cadres. Refer to the data, researchers used the Slovin formula to determine the sample needed. Researchers used a confidence level of only 90% with several considerations after discussing with integrated

service post (posyandu) cadres and community health center midwives, that is limited research time, respondent willingness, and research areas that were not easy to reach. Based on these calculations, the minimum sample size that must be used in research is 55 respondents. At the start of the study, 62 subjects who participated in this research, but three subjects did not fill out the questionnaire and were excluded, so only 59 respondents remained.

The research took time from January to March 2024. The data collection was in February 2024 after the observation of the respondents was finished. The data in this research was taken using two methods. Cluster random sampling and Simple random sampling. Cluster random sampling was used to determine the number of samples in this study, and simple random sampling method was used to determine respondents or research samples in each sub-district. The data processing and analysis process for the data obtained in this research used SPSS (Statistical Package for the Social Sciences) 23.0 for Windows software. The data obtained in this research was analysed using two types of analysis, namely univariate and bivariate. Univariate analysis was used in this research to analyse each variable studied including the sociodemographic characteristics (age, education level, and number of children). In this study, the relationship between emotional eating behavior with maternal energy consumption and the nutritional status of pregnant women was tested using the Spearman rank correlation test with  $p\text{-value} < 0.01$ . We obtained ethical clearance issued by Universitas Airlangga Faculty of Dental Medicine Health Research Ethical Clearance Commission on February 2, 2024, with the number 0065/HRECC.FODM/II.2024.

## Results and Discussion

Characteristics of the study population, including age, last education, and number of children were presented in Table 1. The results showed that most respondents were 21-30 years with a percentage of 64.4% ( $n = 38$ ). Several respondents who were still underage and in school, so permission and assistance from the respondents' parents was needed. Most respondents had the final education at the

Table 1. Respondent's Characteristics

Categories	Frequency	%
Age (years)		
<20	2	3.4
21-30	38	64.4
31-40	19	32.2
Last Education		
Elementary school	9	15.3
Junior high school	13	22
Senior high school	21	35.6
Diploma	3	5.1
Bachelor's degree	13	22
Number of children*		
0	25	42.4
1	17	28.8
2	13	22
3	2	3.4
> 3	2	3.4
Emotional eating behavior		
Non	8	13,6
Moderate	22	37,3
High	27	45,7
Very high	2	3,4
Energy consumption		
Very less	11	18.6
Less	19	32.2
Enough	24	40.7
Over	5	8.5
Nutritional status		
Underweight	3	5,1
Normal	43	72.9
Overweight	13	22

Note: \*The number of children is calculated based on children born alive (dead children and pregnancy losses are not included).

senior high school level (35.6%). In addition, most respondents were mothers who did not have children when the study was conducted, with a percentage of 42.4% (n = 25).

In Table 1, most respondents (45.7%) are high-emotional eaters. It supports previous research findings, which state that pregnant women have a fairly high risk of experiencing emotional eating behavior due to several

conditions such as stress, fatigue, and hormonal changes in the body of pregnant women can trigger poor diet, which lead to emotional eating behavior. Apart from that, feelings of pressure to fulfill the role of mother and the burden of household duties can also be risk factors for emotional eating [13]. Then, in the energy consumption section, most respondents had sufficient energy intake with a percentage of

Table 2. Emotional Eating Behavior Distribution Based on Energy Consumption

EEQ	Energy Consumption									
	Very less		Less		Enough		Over		Total	
	n	%	n	%	n	%	n	%	n	%
Non	3	5.1	2	3.4	3	5.1	0	0	8	13.5
Moderate	6	10.2	9	15.2	5	8.5	2	3.4	22	37.3
High	2	3.4	8	13.5	14	23.7	3	5.1	27	45.8
Very high	0	0	0	0	2	3.4	0	0	2	3.4

Source: Primary Data

Table 3. Emotional Eating Behavior Distribution Based on Nutritional Status

EEQ	Nutritional Status							
	Underweight		Normal		Obese		Total	
	n	%	n	%	n	%	n	%
Non	0	0	5	8.5	3	5	8	13.6
Moderate	2	3.4	16	27.1	4	6.8	22	37.3
High	1	1.7	22	37.3	4	6.8	27	45.7
Very high	0	0	0	0	2	3.4	2	3.4

Source: Primary Data

40.7% (n = 24). However, in terms of numbers, it can be said that more pregnant women with less and very little energy intake than those with standard and excessive energy intake, with 30 pregnant women or around 50.9% of all respondents. Apart from that, this research shows that the prevalence of pregnant women with normal nutritional status is 72.9%, then underweight pregnant women are only 5.1%; while overweight pregnant women are higher at 22%.

Emotional eating behavior distribution based on energy consumption is presented in Table 2. It shows that most pregnant women have sufficient energy consumption (following recommendations) but high levels of Emotional Eaters (EE). In this study, most

pregnant women with very low energy intake are moderate EE (10.2%). Meanwhile, a small percentage of pregnant women with low energy intake are non-EE (3.4%), and most are moderate EE (15.2%). Some pregnant women with excessive energy intake are higher EE (5.1%) than moderate EE (3.4%).

Emotional eating behavior distribution based on nutritional status is presented in Table 3. In this table, most respondents (37.3%) have normal nutritional status but high EE. Of the 3 pregnant women who had underweight nutritional status, 2 (3.4%) had moderate EE, while the remaining 1 person (1.7%) had high EE. Meanwhile, among pregnant women who are obese, most had moderate EE and high EE

Table 4. Result of Spearman Rank Test

Emotional eating behavior	Energy consumption		Nutritional status	
	<i>p-value</i>	Spearman's ρ (rho)	<i>p-value</i>	Spearman's ρ (rho)
	0.008	0.342**	0.548	-0.102

Note: \*\*Correlation is significant at the 0.01 level (2-tailed).

Source: Primary Data (Analysis Result)

with a percentage of 6.8% each; then 3.4% had very high EE; while non-EE is higher at 5%.

The relationship between emotional eating behavior with energy consumption and nutritional status was tested using the Spearman rank correlation test, which can be seen in Table 4. Spearman correlation test showed  $p < 0.05$  for energy consumption ( $p = 0.008$ ). We concluded that emotional eating behavior has a significant relation with energy consumption. Besides, the Spearman correlation test showed  $p > 0.05$  for nutritional status ( $p = 0.548$ ). It shows no significant relationship between emotional eating behavior and the nutritional status of pregnant women.

Emotional eating behavior in this study was measured using EEQ. The EEQ is a questionnaire that identifies three factors, including questions related to disinhibition (lack of control) of food under certain conditions, the type of food that respondents find most difficult to control and the patient's emotions and their relationship with weight gain and feelings of guilt about eating "forbidden" foods such as sweets or snack. Energy consumption in pregnant women was measured using 24-hour food recalls conducted for 3 days within one week. The nutritional status of respondents in this study was measured based on the size of the mother's MUAC. WHO classified the MUAC into 3 groups to determine the nutritional status of pregnant women. MUAC  $< 23$  cm indicates undernutrition, MUAC  $23 - 33$  cm means normal nutritional status, while MUAC  $> 33$  cm indicates obesity. It is supported by the previous study, which stated that the MUAC threshold for diagnosing obesity during pregnancy is 33 cm (Okereke et al., 2013).

In addition to the mother's nausea and vomiting condition during pregnancy, the energy needs of pregnant women are also adjusted to other factors that can affect such as the mother's age, gestational age, and physical activity. The calculation of the energy consumption of pregnant women is also adjusted to the ideal weight that pregnant women should have during pregnancy according to the proportion of height that the mother has. Researchers calculated the energy needs of pregnant women one by one according to the condition of each respondent. Researchers used

the Harris-Benedict formula to determine the energy needs of pregnant women. There are some examples of calculations of the energy needs of pregnant women used by researchers:

When collecting data regarding energy consumption, we found that several respondents had the same type of food at breakfast and lunch. Some of them even have the same meal menu from breakfast to dinner. In addition, pregnant women who are highly emotional eaters or experience emotional eating behavior tend to eat foods that are high in fat and contain simple carbohydrates. At the time of the interview, most respondents had no problems describing their food. We tried to get the right amount of food that respondents ate through pictures of food utensils, and so on. Apart from that, we also tried to check precisely the amount of certain types of food ingredients that influence the number of calories they consume, such as cooking oil, flour mixture, and sugar. The calories consumed is calculated using the NutriSurvey application and adjusted to the types of food available in Indonesia.

In this study, researchers hypothesized that emotional eating behavior is related to the mother's energy consumption. In this study, the Spearman rank correlation test showed that emotional eating behavior is significantly related to energy consumption. It is per a theory, stating that restrained (sometimes referred to as dietary restraint), external, and emotional eating can affect daily food intake. One of these 3 eating behaviors is usually more dominant in an individual and can be different for each person. In previous research, higher levels of emotional eating behavior can harm a person's nutrition, including increased intake of foods that can increase weight, such as fast food and snacks high in fat and/or sugar (Benbaibeche et al., 2023). Apart from that, the research conducted on female nursing students shows that emotional eating behavior has a strong and significant relationship with food intake, especially sweet foods, fast food, and soft drinks (Iglesias López et al., 2023).

In the aspect of maternal nutritional status, researchers provide exclusion criteria in this study where pregnant women who are sick or have infectious diseases that can affect nutritional status, such as diarrhea

Table 5. Calculations of Energy Needs of Pregnant Women

Mother's age (years)	Pregnancy age (weeks)	Mother's ideal weight during pregnancy* (kg)	Mother's height (cm)	Physical activity**	Additional calorie needs*** (cal)	Total energy needs (cal)
25	20	61	160	1.3	300	2,145.5
23	31	60.35	155	1.3	300	2,137.5
30	25	61	158	1.4	300	2,249.5
28	35	57.25	150	1.3	300	2,056.4
35	28	68.3	165	1.4	300	2,333

Note:

\*Maternal weight at pregnancy was calculated based on the mother's ideal weight before pregnancy, maternal height, and gestational age.

\*\*Physical activity was adjusted to the daily activities of pregnant women (1.1=bed rest, 1.2=bed rest but still moving freely, 1.3=light activity, 1.4=moderate activity, 1.7=heavy activity) (Evifebriyanti, 2021).

\*\*\*Addition of calorie needs based on pregnancy trimester in AKG Kemenkes 2019.

Source: Primary Data

and tuberculosis, are not respondents in this study. Before the study, researchers conducted interviews and brief health screening to confirm whether pregnant women were healthy. If the pregnant women are healthy, the research can continue. The researcher would stop the data collection process if the pregnant woman sick. In this study, researchers also hypothesized that emotional eating behavior is related to the mother's nutritional status during pregnancy. Based on the correlation spearman rank test (presented in table 3), emotional eating behavior is considered to be related to the nutritional status of pregnant women if  $p < 0.05$ . However, the test results above show that  $p\text{-value} = 0.548$ , which is  $> 0.05$ . It shows that whether  $H_0$  is accepted or there is no significant relationship between emotional eating behavior and the nutritional status of pregnant women. During the research, the researchers discovered one unique thing that pregnant women who were obese in higher numbers had emotional eating behavior that was still within the normal range or were not even emotional eaters. Although the respondents who were very high emotional eaters (3.4%) all came from obese pregnant women. Based on these findings, researchers assume that the nutritional status of mothers during pregnancy may be influenced by poor diet. It is in line with research which states that pregnant women may develop unhealthy eating

habits, such as consuming too much sugar or fat, which can cause excessive weight gain and other health problems (Kusrini et al., 2021).

Apart from that, the nutritional status of pregnant women may have been experienced by pregnant women before pregnancy and was not influenced by the emotional eating behavior of pregnant women during pregnancy. It is in line with previous research, which states that obesity before pregnancy can increase the risk of obesity in pregnancy (Eriksson et al., 2014) to the risk of gestational diabetes, preeclampsia, neonatal and perinatal death (Poston et al., 2016). Obesity before pregnancy has a complex 2-way relationship with perinatal mood disorders, where someone who is obese can increase the risk of depression, and people with depression also have the potential to increase their risk of obesity. Besides, research in 2023 showed that 95,4% of women who were malnourished pre-pregnancy also experienced malnourished during pregnancy (Helmizar, Ferry, Elda, & Azrimaidaliza, 2024). It follows previous research showing obese people can have depressive moods and can experience a significant increase in depression (Ha et al., 2017). It can be applied during pregnancy so that it can be strongly predicted that pregnant women will experience excessive weight gain during pregnancy if the mother experiences pre-pregnancy obesity or depression (Hecht et

al., 2021). Depression during pregnancy can be related to emotional eating behavior because, basically, emotional eating behavior is one way a person responds to the negative emotions they feel. Emotional eating behavior is often associated with physical problems, including weight gain and negative psychological effects such as depression, eating disorders, and poor psychological health (Spinosa et al., 2019).

In this study population, there was no significant relationship between emotional eating behavior and nutritional status in pregnant women. According to another study, emotional eating does not affect the mother's diet during pregnancy, where diet is one of the things that influences the mother's nutritional status during pregnancy (Shriver et al., 2023). Apart from that, obesity or excessive weight gain in pregnant women is more associated with internal negative emotions such as depression and anxiety, not with eating behavior caused by these negative emotions (Banafshe et al., 2024). Several studies show that nutritional status in pregnant women is mostly related to nutritional intake, infectious diseases, level of education, knowledge of pregnancy, age at pregnancy, and pregnancy spacing (Ervinawati et al., 2019). Apart from that, a study states that the nutritional status of pregnant women is related to the economic status of the family, where inadequate family income can cause malnutrition in pregnant women (Ramadhani et al., 2021). However, some studies found that emotional eating is described as a reason for increasing BMI or even one of the things that hinders weight loss over time (Ruiz et al., 2023). It does not mean that there is completely no relationship between emotional eating behavior and nutritional status, despite a lack of studies examining this relationship in other populations. Therefore, it is important to carry out further research regarding the relationship between emotional eating behavior and nutritional status.

### Conclusions

In this study, most respondents are highly emotional eaters. Then, the majority of respondents had sufficient energy intake. However, in terms of numbers, it can be said that there are more pregnant women who

have less and very low energy intake than those who have normal and excessive energy intake. Apart from that, this research shows that most of the respondents had normal nutritional status. Then there were more obese respondents than underweight respondents. In this study, emotional eating behavior had a significant relationship with maternal energy consumption during pregnancy. Meanwhile, emotional eating behavior has no relationship with the mother's nutritional status during pregnancy. It is imperative to conduct additional studies related to this topic to clarify deeper understanding. For future research, researchers can use indicators of acute nutritional status, such as maternal weight gain during pregnancy, so that the results of measuring the nutritional status of pregnant women are more focused while minimizing the influence of the mother's nutritional status before pregnancy. Apart from that, matters relating to the nutritional status of mothers during pregnancy, such as the tendency for obesity in pregnant women caused by factors other than food, also need further and specific attention, so that research results relating to the nutritional status of pregnant women can be more accurate and clearer.

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