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The Effect of Local PMT Provision on the Nutritional Status and Weight of Pregnant Women

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Abstract. *The nutritional status of pregnant women is crucial for the health of both mothers and fetuses. Nutritional deficiencies during pregnancy can lead to chronic energy deficiency (CED) and suboptimal pregnancy outcomes. In Indonesia, one intervention developed to address this issue is providing supplementary foods made from local ingredients for pregnant women at risk of malnutrition. This study aimed to analyze the effect of local PMT (supplementary foods) on the nutritional status and body weight of pregnant women. Using a one-group pretest–posttest design, the study involved 20 pregnant women selected through total sampling. Nutritional status was measured using the Mid-Upper Arm Circumference (MUAC) indicator before and after the intervention. Data analysis, including the Shapiro–Wilk normality test, revealed the data were not normally distributed, so the Wilcoxon Signed Rank Test was used. The results showed an increase in the mean MUAC from 21.43 cm before the intervention to 22.11 cm afterward, but this change was not statistically significant (p = 0.099). The findings suggest that local PMT may improve the nutritional status of pregnant women, but the effect is not yet statistically significant. It is recommended that local PMT be combined with nutritional counseling and routine monitoring for more impactful results.*

Keywords: *Local PMT; LILA; Nutritional Status; Pregnancy Nutrition; Pregnant Women.*

1. INTRODUCTION

The nutritional status of pregnant women is a key determinant of maternal and fetal health, as energy, protein, and micronutrient requirements increase with the physiological adaptations of pregnancy. When intake is inadequate, mothers are at risk of inadequate gestational weight gain, anemia, and chronic energy deficiency (CED), which ultimately impacts fetal growth and birth outcomes. Globally, UNICEF emphasizes that malnutrition in pregnant and lactating women remains a significant burden and tends to worsen in the context of food crises with an increase in cases of acute malnutrition in pregnant/lactating women in affected countries since 2020 making primary and community-based interventions increasingly urgent (UNICEF, 2023). To accelerate the reduction of malnutrition and anemia in pregnancy, UNICEF has also published Improving Maternal Nutrition: An Acceleration Plan 2024–2025, which emphasizes essential service packages, including quality dietary support, supplementation, and strengthening maternal nutrition service systems in antenatal care (UNICEF, 2024).

In Indonesia, the issue of maternal nutrition remains prominent and is closely related to the agenda of accelerating stunting reduction. The Ministry of Health reported based on the 2018 Riskesdas that 48.9% of pregnant women suffer from anemia and 17.3% of pregnant women are at risk of KEK, a picture that shows that the problem of nutritional and

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micronutrient deficiencies is still widespread in the community (Kemenkes RI, 2022). Anemia and KEK during pregnancy are not just numbers; they reflect low reserves of energy and nutrients needed to support placenta formation, increased blood volume, and maternal and fetal tissue growth. Therefore, interventions to improve intake during pregnancy are very strategic in preventing the intergenerational cycle of malnutrition.

From a clinical theory perspective, weight gain during pregnancy and maternal nutritional status reflect energy-protein adequacy and metabolic adaptation. The WHO recommends nutritional counseling during pregnancy to help mothers maintain their health and prevent excessive weight gain, and in malnourished populations, the WHO emphasizes education on increasing energy and protein intake to reduce the risk of adverse outcomes such as low birth weight babies (WHO, 2023). In addition to counseling, the WHO also supports balanced energy and protein (BEP) supplementation in populations with malnutrition problems, as evidence shows that this intervention can improve fetal growth and reduce the risk of adverse birth outcomes especially in undernourished mothers (WHO, 2023). Conceptually, BEP is a food supplement that adds energy with a "balanced" (not high) proportion of protein, making it safer and more relevant as a nutritional intervention during pregnancy (Dewey, 2025).

Recent research evidence also reinforces the biological pathway and practical benefits of dietary supplementation during pregnancy. Individual participant data analysis from controlled trials in low- and middle-income countries shows that BEP supplementation during pregnancy increases gestational weight gain and reduces the risk of inadequate weight gain (Wang et al., 2025). However, the literature also highlights product, context, and comparator heterogeneity, as well as large-scale implementation challenges meaning that real-world effects are highly dependent on adherence, targeting (e.g., KEK mothers), product quality, and integration with ANC services (Wang et al., 2025; Dewey, 2025). Even in some trials, fortified BEP did not always show improvements in specific maternal outcomes (e.g., anemia or weight gain) compared to standard supplementation, highlighting the importance of intervention design and implementation context (Hanley-Cook et al., 2022).

In the Indonesian context, a highly relevant approach is the provision of supplementary food (PMT) made from local foods for pregnant women, which is primarily targeted at women with KEK through integrated early ANC detection, case management, and standard menus/implementation (Indonesian Ministry of Health, 2023). The technical guideline document emphasizes that SSF for pregnant women aims to improve the nutritional status of pregnant women in accordance with established standards, as well as to guide implementation

principles and referrals (Directorate General of Public Health/Ministry of Health of the Republic of Indonesia, 2024). The emphasis on local food has added value: ingredients are more accessible, costs are potentially more efficient, and they can be adapted to local eating habits, thereby supporting program acceptance and sustainability.

However, there are still important research gaps. First, many evaluations of PMT programs in the field tend to focus on process aspects (distribution, compliance, logistical constraints), while quantitative evidence measuring standardized changes in the nutritional status and weight of pregnant women before and after local PMT interventions still needs to be strengthened in various regions and service contexts. Second, because local PMT is greatly influenced by menu composition, duration, and educational assistance, its effectiveness can vary between regions; this means that contextual evidence is crucial for developing targeted implementation recommendations. Third, global literature on BEP emphasizes the importance of targeting undernourished groups; in Indonesia, targeting often uses indicators such as LILA and/or KEK status, so studies are needed to examine whether local PMT actually promotes improved nutritional status and better weight gain in targeted pregnant women according to program standards (Indonesian Ministry of Health, 2023; WHO, 2023).

The urgency of this topic is even greater because improving the nutrition of pregnant women is the gateway to preventing adverse outcomes from the first 1,000 days of life. Amidst the high burden of anemia and KEK, practical interventions that can be implemented in primary care services and utilize local foods have the potential to be effective strategies for strengthening ANC, improving diet quality, and improving weight gain during pregnancy (Indonesian Ministry of Health, 2022; UNICEF, 2024). Additionally, the WHO's global document on maternal-infant nutrition implementation plans emphasizes that strengthening maternal nutrition interventions remains a priority until 2025, placing this issue on the current global health policy agenda (WHO, 2025).

Based on the above description, the purpose of this study is to analyze the effect of local PMT provision on the nutritional status and weight of pregnant women. The study is expected to produce empirical evidence that can strengthen the policies and practices of local food-based PMT programs in Indonesia, as well as provide input for targeting strategies, nutritional education assistance, and weight gain monitoring during pregnancy within the framework of integrated ANC.

2. RESEARCH METHOD

This study used a quantitative approach with a pre-experimental design and a one-group pretest–posttest design. This design was chosen because the study aimed to determine the effect of providing supplementary food made from local ingredients on the nutritional status and weight of pregnant women, by comparing the conditions before and after the intervention in the same group without a control group. This design is appropriate for use in evaluating nutrition programs in primary care, especially when the intervention is part of a routine program and ethical considerations do not allow for withholding the intervention from a control group. The study was conducted in health care facilities that implemented local PMT programs for pregnant women, focusing on pregnant women identified as being at risk of nutritional problems. The selection of research locations was based on the availability of local PMT program data, ease of monitoring respondents, and the relevance of nutritional problems among pregnant women in the area. The research population consisted of all pregnant women who received PMT with local food ingredients during the research period. This population included pregnant women of various gestational ages who had been identified as PMT program targets by health workers.

The research sample consisted of pregnant women who met the inclusion criteria, namely pregnant women who received local PMT in accordance with the program, were willing to be respondents, and had complete data on their nutritional status and weight before and after receiving PMT. The exclusion criteria included pregnant women with chronic diseases or severe pregnancy complications that could significantly affect their nutritional status, as well as pregnant women who did not complete the PMT intervention period. The sample size was determined using total sampling, meaning that all pregnant women receiving local PMT who met the inclusion criteria were included as respondents. Total sampling was used to maximize the number of respondents and to accurately describe the impact of local PMT in the field.

The sampling technique used was non-probability sampling with a total sampling approach, as the entire target population was accessible and could be analyzed. This technique is suitable for program evaluation research with a limited number of targets. The independent variable in this study was the provision of local PMT, namely supplementary food made from local ingredients given to pregnant women in accordance with health program standards. The dependent variables included the nutritional status of pregnant women and their body weight. The nutritional status of pregnant women is assessed using relevant anthropometric indicators, such as Upper Arm Circumference (UAC) or nutritional status categories according to applicable guidelines, while body weight is measured in kilograms using standard scales.

Nutritional status and body weight measurements are taken before PMT administration (pretest) and after the PMT administration period is complete (posttest).

Data collection was conducted using observation sheets and program records sourced from primary and secondary data. Primary data was obtained through direct measurement of the body weight and nutritional status of pregnant women by health workers or researchers, while secondary data was obtained from maternal and child health (KIA) books, antenatal care (ANC) registers, and PMT program records. All measurements were conducted using the same procedures to ensure data consistency. Data analysis was conducted in stages. Univariate analysis was used to describe the characteristics of respondents, nutritional status, and body weight of pregnant women before and after the provision of local PMT. Next, data normality was tested using the Shapiro–Wilk test to determine the distribution of body weight data and nutritional status indicators. If the data were normally distributed, the effect of local PMT administration on changes in body weight and nutritional status was analyzed using a paired t-test. If the data were not normally distributed, the Wilcoxon Signed Rank Test was used. The statistical significance level was set at $\alpha = 0.05$, where a p-value < 0.05 indicated a significant effect of local PMT administration on the nutritional status and body weight of pregnant women. With this research method, it is hoped that a comprehensive picture of the effectiveness of PMT using local food ingredients in improving the nutritional status and weight of pregnant women can be obtained. The results of this study are expected to form the basis for evaluating and strengthening local PMT programs in health services, as well as supporting efforts to improve maternal health and prevent nutritional problems during pregnancy.

3. RESULTS AND DISCUSSION

Table 1. Demographic data.

Var		n	F (%)
Age	< 20 years old	3	0
	20-35 years old	17	15
	>35 years old	0	85
Education	Elementary school	0	0
	Junior high school	8	40
	High School	11	55
	College/university	1	5
Employment	Housewife	19	95
	Farmer	0	0
	Private employee	0	0
	Government employee	1	5
Trimester	1	12	60
	2	7	35
	3	1	5
Total		20	100

(source: primary data, 2025)

Based on the results of a study of 20 pregnant women who received local Supplementary Feeding (PMT), the distribution of respondents by age shows that the majority of pregnant women were in the 20–35 age group, namely 17 people (85%). The <20 age group numbered 3 people (15%), while there were no respondents in the >35 age group. This distribution indicates that most respondents were in the safe reproductive age range, which is physiologically considered optimal for pregnancy.

In terms of education level, most respondents had a high school education or equivalent, namely 11 people (55%). Respondents with a junior high school education numbered 8 people (40%), while respondents with a college education numbered only 1 person (5%). There were no respondents with an elementary school education. This picture shows that the majority of pregnant women have a secondary education level, which could potentially affect their understanding and acceptance of nutritional information during pregnancy.

Based on employment status, almost all respondents were housewives, totaling 19 people (95%). Only one respondent (5%) worked as a civil servant, and none of the respondents worked as farmers or private employees. The dominance of housewives indicates that most respondents were engaged in domestic activities and likely had more flexible schedules to participate in local PMT programs and antenatal visits.

Based on the stage of pregnancy, the majority of respondents were in their first trimester, namely 12 people (60%). There were 7 respondents (35%) in the second trimester, while only 1 respondent (5%) was in the third trimester. This distribution shows that most pregnant women received local PMT from the beginning of their pregnancy, which is an important period for nutritional intervention to support fetal growth and improve the nutritional status of mothers.

Overall, the characteristics of the respondents show that pregnant women receiving local PMT are predominantly of safe reproductive age, have a secondary education level, are housewives, and are in the early trimester of pregnancy. These characteristics provide an important context for analyzing the effect of local PMT on the nutritional status and weight of pregnant women, as factors such as age, education, occupation, and gestational age can influence the response to nutritional interventions.

Table 2. Variable Data.

Var	N	min	max	Mean	SD
LILA before	20	19.00	23.00	9:43	1.14
LILA after	20	10:00	24.80	22.11	4.26

(source: primary data, 2025)

The results of Upper Arm Circumference (UAC) measurements in 20 pregnant women before and after the provision of local Supplementary Feeding (PMT) showed changes in UAC values. Before the local PMT intervention, the ARM measurements of pregnant women ranged from 19.00 cm to 23.00 cm, with an average value of 21.43 cm and a standard deviation of 1.14 cm. This average value indicates that most pregnant women were at risk of chronic energy deficiency (CED), given that the risk threshold for CED is generally set at an ARM circumference <23.5 cm.

After the administration of local PMT, the LILA values of pregnant women showed an increase. The range of LILA values after the intervention was between 10.00 cm and 24.80 cm, with an average value of 22.11 cm and a standard deviation of 4.26 cm. The increase in the mean LILA value after the intervention indicates an improvement in the general nutritional status of pregnant women after receiving local PMT, although the variation in LILA values between respondents became greater than before the intervention.

The difference in mean LILA values before and after local PMT administration illustrates a tendency toward improved nutritional status in pregnant women after intervention. However, the large standard deviation in measurements after intervention indicates heterogeneity in response to local PMT, which may be influenced by factors such as gestational age, PMT consumption compliance, health status, and daily food intake of pregnant women outside of PMT.

Descriptively, these results indicate that local PMT administration has the potential to have a positive impact on the nutritional status of pregnant women as measured by LILA. These findings provide an important basis for further statistical analysis to assess the significance of changes in nutritional status before and after local PMT administration.

Table 3. Logistic regression analysis for implant contraception interest.

Independent variable	n	P Value	
LILA before	20	0.130*	
LILA after	20	0.000	
		Shapiro Wilk	
Independent var	N	P Value	Dependent Var
LILA before	30	0.099	LILA after
		Wilcoxin	

*significant

(source: primary data, 2025)

The Shapiro–Wilk normality test shows that the LILA value before local PMT administration has a p-value of 0.130, which means that the data is normally distributed ($p > 0.05$). Conversely, the LILA value after local PMT administration shows a p-value of 0.000, indicating that the data is not normally distributed ($p < 0.05$). Based on the results of the normality test, the analysis of the difference in LILA before and after local PMT administration was performed using the Wilcoxon Signed Rank Test, because one of the data groups was not normally distributed.

The Wilcoxon test results show a p-value of 0.099, which is greater than the statistical significance threshold of $\alpha = 0.05$. This indicates that there is no statistically significant difference between LILA values before and after the administration of local PMT to pregnant women. Thus, statistically, the administration of local PMT has not been proven to have a significant effect on changes in the nutritional status of pregnant women as measured by the LILA indicator.

Although not statistically significant, descriptively there was an increase in the mean LILA value after local PMT administration. These findings indicate a tendency toward improvement in the nutritional status of pregnant women after the intervention, but the magnitude of the change is not yet strong enough to achieve statistical significance. This condition may be influenced by several factors, including the relatively small sample size, the duration of PMT administration, PMT consumption compliance, and varying gestational ages at the time of intervention.

These results indicate that improving the nutritional status of pregnant women is a gradual process influenced by various factors, so that the impact of local PMT on LILA may require a longer intervention period and more intensive monitoring to produce statistically significant changes.

Discussion

This study aims to analyze the effect of providing supplementary food (PMT) made from local foods on the nutritional status of pregnant women, as measured by upper arm circumference (LILA). The results of the study show that descriptively, there was an increase in the mean LILA value after the provision of local PMT. However, based on statistical analysis using the Wilcoxon test, the change in LISA before and after the intervention did not show a statistically significant difference ($p = 0.099$). These findings indicate that although there is a tendency for nutritional status improvement, the impact of local SSFW on LISA is not strong enough to achieve statistical significance in the period and context of this study.

The increase in mean LILA after local PMT intervention remains clinically significant. LILA is a relatively stable anthropometric indicator that is often used to detect the risk of chronic energy deficiency (CED) in pregnant women. Changes in LILA generally occur gradually and take longer than other indicators such as body weight. Therefore, the lack of statistical significance may reflect that the duration of the local PMT intervention was not long enough to produce large and consistent changes in LILA among all respondents.

In clinical theory, the nutritional status of pregnant women is influenced by adequate and sustained energy and protein intake, metabolic adaptation during pregnancy, and the mother's general health. During pregnancy, the mother's body experiences an increased energy requirement to support the growth of the fetus, placenta, and maternal tissue. If the increase in intake is insufficient or inconsistent, improvement in nutritional status indicators such as LILA may be slow (King, 2016). Local PMT is basically designed to increase the daily energy and protein intake of pregnant women, but its effects are highly dependent on consumption compliance, menu quality, and duration of provision.

The results of this study are in line with several studies that report that nutritional supplementation interventions in pregnant women show descriptive improvements in nutritional status, but are not always statistically significant, especially in studies with small sample sizes and limited intervention periods (Hanley-Cook et al., 2022). Other studies also show that the impact of food-based nutritional interventions on anthropometric indicators in pregnant women tends to be more pronounced when administered over a longer period and targeted at women with very poor nutritional status (Leroy et al., 2019).

Conversely, studies with stronger designs and longer intervention durations reported that balanced energy-protein supplementation during pregnancy can increase gestational weight gain and significantly improve maternal nutritional status (Wang et al., 2023). These differences in results indicate that the effectiveness of PMT is greatly influenced by the context

of implementation, including the duration of the intervention, maternal compliance, and integration with adequate nutrition education and antenatal care.

The insignificant findings in this study may also be influenced by the relatively small sample size, which limits the statistical power of the test. Methodological studies indicate that small sample sizes increase the risk of type II errors, which is the failure to detect effects that actually exist (Polit & Beck, 2021). In addition, variations in the gestational age of respondents where most mothers were in their first trimester may have influenced their responses to PMT, as anthropometric changes in the early trimester are generally minimal compared to the second and third trimesters.

Nevertheless, these findings still have important clinical implications. First, local PMT has the potential to contribute positively to the nutritional status of pregnant women, especially when administered consistently and accompanied by adequate nutrition education. Second, the results of this study confirm that local PMT cannot stand alone, but needs to be integrated with nutritional counseling, weight gain monitoring, and improvement of the daily diet of pregnant women. Third, monitoring the nutritional status of pregnant women should not rely on a single indicator, but should be combined with other indicators such as weight and dietary assessment.

For midwifery and public health practices, this study highlights the importance of early detection of KEK risk and the provision of local PMT from the beginning of pregnancy, accompanied by continuous monitoring. Health workers need to ensure that pregnant women understand the purpose and benefits of PMT, and encourage compliance through a humanistic and contextual approach. On the policy side, the results of this study can be used as evaluation material to improve the design of local PMT programs, including the duration of administration, menu composition, and assistance strategies.

Overall, although the provision of local PMT in this study did not show a statistically significant effect on changes in LILA, the descriptive findings showing an improvement in nutritional status still have clinical value. This study provides an initial contribution to evaluating the effectiveness of locally sourced PMT and underscores the need for further research with a stronger design, longer intervention duration, and larger sample size to ensure a more comprehensive assessment of the impact of locally sourced PMT on the nutritional status of pregnant women.

4. CONCLUSION

This study shows that providing supplementary food (PMT) made from local foods to pregnant women tends to improve their nutritional status, as indicated by an increase in the average Upper Arm Circumference (UAC) after the intervention. However, statistical analysis shows that the change in UAC before and after the provision of local PMT is not statistically significant. These findings indicate that the impact of local SSFW on improving the nutritional status of pregnant women is gradual and influenced by various factors, such as the duration of the intervention, consumption compliance, gestational age, and the initial nutritional status of pregnant women. Therefore, local PMT cannot yet stand as a single intervention, but needs to be integrated with nutritional counseling, routine pregnancy monitoring, and improvement of daily eating patterns to achieve optimal results.

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