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FOOD PACKAGES AND NUTRITION EDUCATION IMPROVED PREGNANCY WEIGHT GAIN IN JAGAKARSA SUBDISTRICT, JAKARTA, INDONESIA: A PILOT STUDY

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ABSTRACT

The prevalence of low birth weight and stunting among infants in Indonesia remains high. Maternal nutritional status before pregnancy and weight gain during pregnancy critically affect the health status of infants. World Health Organization (WHO) recommended a balanced energy-protein (BEP) dietary supplement for pregnant women to reduce the risk of low birth weight of infant among the undernourished populations. A balanced energy-protein intervention are diverse and can be offered as food-based supplementation forms, commercially produced forms, food tokens, or vouchers. Although the Indonesian government implemented a supplementary food (biscuits) program for pregnant women, 35.4% of pregnant women did not consume all the provided biscuits. Therefore, there is a need to explore other alternatives, such as diversified food packages to improve gestational weight gain. This study aimed to determine the effect of nutrition education combined with food packages on the weight gain of pregnant women in Jakarta. This study was a non-randomized controlled trial consisting two groups: an intervention group and a control group. Seventy women were consecutively assigned to the intervention and control groups for a 2-month intervention period. The intervention group received nutritional education and food packages. The control group received the standard intervention given at the Primary Health Center (PHC), which was supplementary food in the form of biscuits. Statistical analysis was performed using multiple linear regression. Results showed that women who received food packages and nutritional education gained 1.15 kg more weight than those in the control group who did not receive these benefits. Study results also showed that pregnant women in the intervention group had higher intakes of energy (366 kcal), carbohydrates (66.4 g), vitamin B1 (0.14 mg), vitamin B6 (0.42 mg) and calcium 250 mg) compared to the control group. Over the two-month period, the average increase in body weight of women in the intervention group (3.6 kg) was significantly higher compared to women in the control group (2.7 kg). These findings underscore that intervention with food packages combined with nutritional education significantly increased the weight gain of pregnant women compared to the control group. Since the prevalence of stunting is steady, the Indonesian government needs to advise the local government to implement an alternative solution using food packages or locally sourced food supplementation to support adequate gestational weight gain. The findings from this study showed that free vouchers for food packages should be made available to pregnant women as a practical and impactful measure.

Key words: pregnant women, food packages, nutritional education, gestational weight gain

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INTRODUCTION

Pregnant women with undernutrition have potential risks that can severely affect the health status of children in the long term. For example, chronic energy deficiency during pregnancy can cause approximately 800,000 neonatal deaths annually [1, 2, 3]. Infants born with low birth weight face a high risk of becoming stunted, leading to permanent consequences after 36 months of age [4]. The prevalence of stunting in Indonesia has been steady, with a marginal decrease from 2022 (21.6%) to 2023 (21.5%) [5]. In 2023, the prevalence of infants with low birth weight (<2500 g) was 6.2% and the prevalence of infants with short body length (<48 cm) was 18.2%. Moreover, the prevalence of Chronic Energy Deficiency (CED) was 16.9% and the prevalence of anemia among pregnant women in Indonesia was 27.7% [5]. Since stunting is highly prevalent in Indonesia, there is an urgency to improve gestational weight gain to mitigate the high prevalence of stunting among children [6].

Mothers with gestational weight gain (GWG) below the recommended standard are at 1.5 times with increased risk of delivering an infant with preterm birth (OR = 1.52, 95%CI = 1.51–1.53) and at 1.4 times increased risk of low birth weight (OR = 1.46, 95%CI = 1.45–1.47) [7]. Low maternal body mass index (OR, 1.6; 95% CI, 1.6-1.7; p<0.001) is strongly associated with stunting issues in children [8]. The National Health Survey in 2018 showed that low energy intake among pregnant women in Indonesia was 52.9% in rural and 51.5% in urban areas [6]. Historical data from the Dutch famine of 1944-46 has revealed that less energy intake in the third trimester of pregnancy may increase the occurrence of low birth weight, increasing premature birth and infant mortality [9]. Inadequate food intake in the third trimester increases maternal complications during pregnancy, indirectly reducing birth weight by approximately 145 g (CI 95%: −21.39, −211.45) [10].

Interventions for maternal nutrition for example supplements of iron, folate, multiple micronutrients, calcium, and balanced energy and protein, can improve maternal and neonatal health outcomes and reduce birth complications; however, sufficient evidence to support these recommendations is lacking [11]. Since 2009, the Ministry of Health of Indonesia has been distributing supplementary food for pregnant women in the form of layered biscuits (sandwich-type) with a nutritional value of 500 kcal and 15 g protein per 100 g serving. However, there is no documented evaluation of the efficacy of this intervention [12], and a 2023 Indonesia Health Survey found that 35.4% of pregnant women did not eat all the biscuits, with the majority (67.8%) of them quoting their dislike for the taste. To address this issue, the government launched a new strategy of food supplementation in 2023 emphasizing the use of locally sourced food for supplementation programs [13].

In 2016, the World Health Organization (WHO) recommended a balanced energy-

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protein (BEP) dietary supplement for pregnant women to reduce the risk of stillbirth and small gestational-age neonates (SGA) among the undernourished populations [14]. The BEP interventions for pregnant women are diverse and can be offered as food-based supplementation forms, commercially produced forms, food tokens, or vouchers [14]. Studies on alternative food supplements for weight gain during pregnancy have been conducted in Indonesia, yielding mixed results. One study of food fortification interventions showed no significant impact on outcomes [15]. Another study in Indonesia revealed that pregnant women with chronic energy deficiency who received protein-sourced supplementary foods showed lower compliance and no significant differences in weight gain as compared to pregnant women who received the standard government supplementary food of biscuits ($p>0.05$) [16]. Meanwhile, the study including home-delivered local food supplementation combined with nutritional education showed a significant increase in pregnant women's body weight [17].

There are various types of nutritious supplemental foods (NSFs) for pregnant women. Supplemental food using a voucher is one form of NSF. Special Supplemental Nutrition Program for Women, Infants and Children (WIC) provided mothers in the United States with vouchers to purchase healthy food to supplement their diets. In this quasi-experimental study of 2.9 million infants, the WIC food package program was associated with reduced maternal preeclampsia and gestational weight gain as well as improvements in infant gestational age and birth weight outcomes [18]. In Indonesia, a *Program Keluarga Harapan (PKH)* is being offered which targets pregnant women from undernourished populations. In this program, undernourished pregnant women get cash, food packages and educational resources. A previous study showed that PKH positively impacted the increased antenatal care of pregnant women [19].

Despite these promising models, using a food package as food supplementation for undernourished pregnant women has not yet been extensively studied in the context of Indonesia. The primary objective of this study was to determine the effect of nutritional education combined with food packages on the maternal anthropometric status of undernourished pregnant women in Jagakarsa, Jakarta. The secondary goals were to examine the effect of the intervention, comprising nutritional education combined with food packages on energy and nutrient intake among undernourished pregnant women.

MATERIALS AND METHODS

Study setting

This study was conducted in Jagakarsa District and under the jurisdiction of the Jagakarsa Public Health Centre (PHC), Jakarta, Indonesia. Data was collected from

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June until October 2017. In 2021 population density in Jagakarsa had reached 16 people per km² and become the largest of total population percentage (17.22%) in South Jakarta. Furthermore, in 2023, crude birth rate had reached 11.6 births per 1000 population. There were 2661 families under wealth status and 31.321 wealth family stage 1, becoming the highest number in South Jakarta [20].

Participants and design

The study employed a non-randomized controlled trial design based on a similar study design implemented by Janmohamed, Mshanga, Nahar and Tabrizi [21, 22, 23, 24] while studying the effect of food basket or food supplementation on gestational weight gain. Subjects of this study were randomly categorized into two groups: 35 women for the intervention group and 35 women for the control group. The population for this study included pregnant women who visited the mother and child health clinic for antenatal care in six PHCs in Jagakarsa sub-districts. Computer-generated randomization was used to assign the subjects to the intervention and the control groups. However, practical constraints in the implementation prompted the need for an alternative approach to be embraced. Therefore, this study consecutively selected 35 pregnant women who had not received any treatment yet to be included in the intervention group. Meanwhile, 35 pregnant women who received the standard PHC biscuit supplementation were included in the control group. There was no significant difference between the two groups, except in terms of gestational age ($p < 0.05$).

The minimum sample size was calculated based on a previous study [25] using an estimated sample size for two-sample comparison means, which showed differences in maternal weight gain after intervention as follows: 3.33 kg ± 1.15 kg in the intervention group and 2.21 kg ± 1.39 kg in the control group. With a significance level of α=5%, power 1–β=90 %, and a two-sided t-test, the calculated minimum sample size for each group was 28, and to account for the 20% loss during the study, thus this study included 34 pregnant women in each group. Subjects were recruited based on cohort maternal and child health book recordings in PHC. The inclusion criteria were pregnant women with chronic energy deficiency based on mid-upper arm circumference (MUAC <23.5 cm) and gestational weight gain of less than 2 kg in the preceding month. Pregnant women with health complications were excluded from this study.

Intervention

The intervention group received nutritional education combined with local food packages delivered weekly by home visits for a period of two months. Nutritional education was offered by a nutritionist during home visits at a frequency of once-a-week sessions of nutritional education for each participant. Nutritional education was delivered via consultation, discussion, motivational sessions and demonstrating

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some examples of meal modification to pregnant women and their families [26]. The nutritional education sessions focused on key topics like the importance of nutrition during pregnancy, iron supplementation consumption, exclusive breastfeeding, and early initiation of breastfeeding. Information on food packages is shown in Table 1. Local food variations were delivered to participants each week, including chicken, eggs, fish, beans, and noodles under the supervision of *e-warung* as a part of the Family Welfare Program (locally known as Program Keluarga Harapan) in Jagakarsa district. Eight types of food packages were given to pregnant mothers, with an average nutrient value of 926 kilocalories and 27 g of protein each day. Local food packages worth 10000 Indonesian rupiah (IDR) each day (equal to 1 US dollar in 2017) or 70000 IDR per week (equal to 7 US dollar in 2017) were distributed among pregnant women. These food packages were cooked by participants and families with the aim of supplementing their daily diet with an additional 300–500 kilocalories and 10–30 grams of protein, in alignment with Indonesia's dietary guidelines for pregnant women and local food supplementation recommendations [27, 28, 29]. Meanwhile, the control group (non-intervention) received regular interventions at public health centers which included biscuits as their supplementary foods under the government initiative, serving as the baseline comparison for evaluating the effectiveness of the intervention.

Dependent Variables

The primary outcome of the study was a pregnant woman's body weight gain, which was measured using a weighing scale from SECA (a name of product manufacture) with 0.01 kg precision. The measurement was done by nutritionists at the PHC, at baseline, after one month and two months of completion of the intervention. If participants could not come to the PHC, nutritionists visited and weighed participants at their homes. This approach aligns with methodologies employed in similar studies by Janmohamed, Nahar and Tabrizi [21, 23, 24] evaluating gestational weight gain among pregnant women before and after intervention. A mid-upper arm circumference (MUAC) was measured on the left arm at the midpoint between the tip of the shoulder and the tip of the elbow using fiberglass tape with a unit precision of 0.1 cm. Chronic Energy Deficiency (CED) was defined by a mid-upper arm circumference (MUAC) measurement of less than 23.5 cm [30].

Independent Variables

Body Mass Index (BMI) before pregnancy was computed using body weight and height measurements before pregnancy which was found in midwife records. Body Mass Index (BMI) is calculated using the formula as follows:

$$\text{BMI} = \text{Body } \frac{\text{Weight (kg)}}{\text{Height (m)}2}$$

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The height of participants was measured using a stadiometer with a precision of 0.1 cm. The height is classified as >= 150 cm and <150 cm following Gibson's recommendations. During data collection, the food consumption of respondents from both groups was assessed using a 2x24-hour food recall technique in inconsecutive days [30]. It included food intake from food packages and biscuits provided to the participants. Energy and nutrient content from all foods eaten by respondents were analyzed using *Indonesian Nutrisurvey* software [31]. Demographic and clinical data including maternal age, education, occupation, gestational age, and hemoglobin (Hb) levels were obtained from midwife records of pregnant women who visited the PHC [32]. Hemoglobin (Hb) levels were then classified as normal if Hb >= 11 g/L or anemic if Hb < 11 g/L in line with WHO standards [33].

Statistical analysis

Analyses were done using chi-square/fisher's exact tests to compare baseline characteristics of pregnant mothers in the intervention and control groups. The mean difference was recorded before and after treatment in the intervention and control groups to assess the effectiveness using multiple linear regression. The estimates of the coefficient beta were presented. An independent t-test was conducted to compare energy and nutrient intake from supplementary foods between two groups during the course of the intervention. All statistical analyses were done using STATA 15.1.

Ethics approval

This study was designed following the principles outlined in the Declaration of Helsinki. This study received ethics approval from the Indonesian Health Development and Research Board of the Ministry of Health number LB.02.01/2/KE.290/2017. Informed consent was obtained from all the pregnant mothers willing to participate after the study procedure was thoroughly explained to them.

RESULTS AND DISCUSSION

Respondent Characteristics

The demographic and clinical characteristics of the participants are presented in Table 2. There was no significant difference between the intervention and control groups, except in terms of gestational age ($p < 0.05$). The participants were in the first, second, and third trimesters, with the majority being in the second trimester (82.9%) in the intervention group and the majority in the control group being in the third semester (60%). The average gestational age was 19 weeks in the intervention group and 26 weeks in the control group. The mean age of pregnant women was around 30 years in both groups.

The nutritional status of pregnant women in the intervention group reflected 74.3%

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with CED while 82.9% had CED in the control group. The remaining pregnant women in both groups showed an increase in body weight of less than 2 kg per month. In the intervention group 18.8% of pregnant women were anemic, while in the control group, 19.2% suffered from anemia.

Maternal Anthropometric Status

The study revealed that after adjusting the factors such as pre-pregnancy BMI, height, anemia, age, gestational age, energy intake, protein intake, and fat intake, pregnant women in the intervention group who received food packages and nutritional education exhibited 1.15 kg (95% CI 0.086, 2.21) weight gain more than those who did not, as shown in Table 3. After two months of intervention, both groups of pregnant women showed a significant increase in body weight as illustrated in Figure 1. The average increase in body weight after 2 months for women in the intervention group (3.6 kg) was significantly higher compared to women in the control group (2.7 kg), highlighting the effectiveness of supplementary food packages with nutritional education in increasing maternal weight gain during pregnancy.

A similar result study conducted in Iran showed that food packages given to pregnant women led to higher maternal weight gain by 9.1 kg ± 1.8 kg in the intervention group compared to 7.9 kg ± 1.6 kg in the control groups [24]. The higher weight gain observed in this study might be attributed to the longer period of intervention and the higher nutrient content provided in food packages (1500 kilocalories/day) compared to food packages (926 kilocalories/day) in the present study.

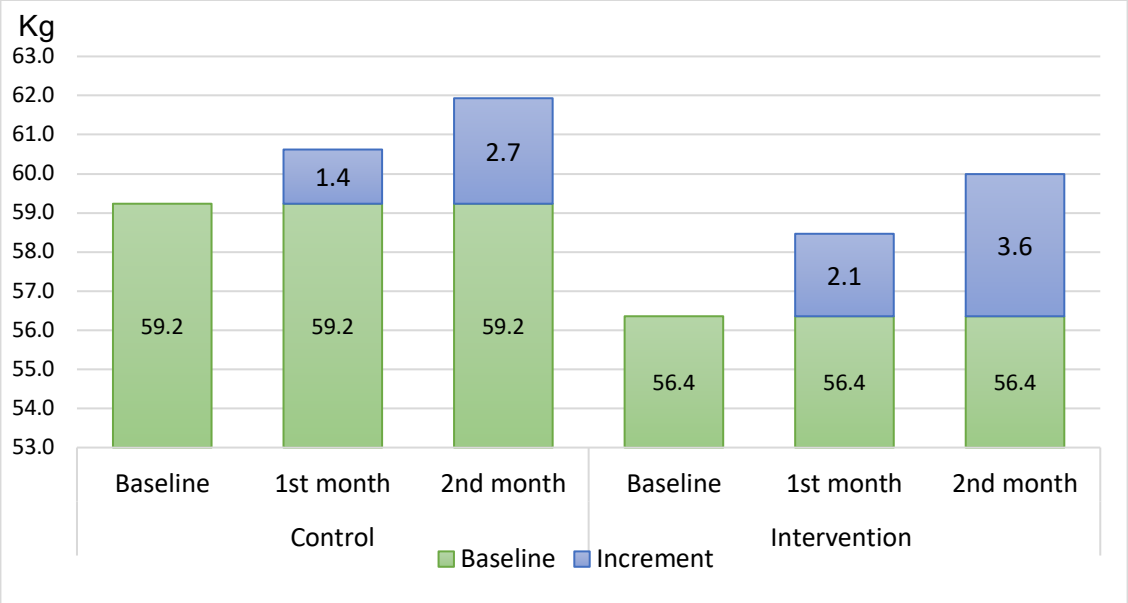

Figure 1: Body weight changes (kg) before and after intervention between two groups

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However, the findings differ from a study performed in Bangladesh, which found no significant increase in maternal weight gain among pregnant women who received food supplementation. Bangladeshi pregnant women consumed 600 kcal/day of food supplements consisting primarily of a cereal–pulse mixture with raw sugar (jaggery) and oil [23]. These results reflecting a lack of significant impact could be explained by the possibility that food supplementation might act as a dietary replacement rather than a supplement. The pregnant women felt "full" after consuming food supplementation, leading to their lower intake of regular household foods. This finding confirmed that intervention with food packages and nutritional education in the present study acted as a supplement and not a substitution for the regular diet of participants.

This finding is similar to a study in developed countries by Hamad [34], which recorded that WIC food packages for pregnant women (obtained using vouchers) were associated with reduced maternal preeclampsia and improved gestational weight gain as well as improvements in infant gestational age and birth weight. Another study by Soneji [35] also found that receipt of WIC benefits with Medicaid among pregnant women was associated with a lower risk of preterm birth and infant mortality. Studies addressing identical interventions have been barely conducted in low-income countries. However, research in Brazil found that an income transfer program for pregnant women of low socioeconomic status has been associated with a reduction in extremely preterm births, which is conditional to attending prenatal care appointments [36]. In Tanzania, the food basket with educational intervention for pregnant women showed a statistically significant increase in serum retinol ($p<0.001$) levels compared to the control group which received only education [22].

Energy and nutrient intake

Table 3 also showed that pregnant women in the intervention group experienced increased energy by an average of 366 kcal (95% CI 29.2, 702.7), increased carbohydrate by 66.4 g (95%CI 4.43, 128.4), increased vitamin B1 by 0.14 mg (95% CI 0.0034, 0.28), increased vitamin B6 by 0.42 mg (95% CI 0.13, 0.72), and increased calcium by 250 mg (95% CI 74.8, 424.1).

This present study showed that the intake of energy, carbohydrate, vitamin B1, vitamin B6, and calcium from food packages was significantly associated with gestational weight gain among pregnant women in the intervention group. Hamad [34] observed a similar result indicating that WIC food packages improved several measures of dietary quality and nutrient intake during pregnancy, although these benefits did not persist during the postpartum period.

Furthermore, the average intake of pregnant women in the intervention group from food packages was 210,880 kcal and 11.746 g protein while the intake of participants

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in the control group from biscuits was 154.285 kcal and 4.628 g protein per day based on dietary recall (Table 4). The additional energy and protein intake in both groups was less than the recommended 300-500 kcal and 10-30 g protein a day. Independent t-test showed that there was a significant difference ($p<0.05$) in protein, sodium, folic acid, and calcium intake between pregnant women in the intervention and control groups. These results highlight the intervention's enhanced efficacy in increasing nutritional consumption among pregnant women.

In the present study, the intake of pregnant women from food packages was significantly higher in protein, sodium, and calcium but lower in folic acid compared to respondents in the control group. The higher content of sodium in food packages is similar to the study conducted in Michigan which reported high sodium intake in the diet of pregnant women who participated in the WIC program [37]. The higher folic acid is derived from biscuit supplementation than from food packages because biscuits are fortified with folic acid [12]. Therefore, the food packages in the present study need to be evaluated and modified to get a better nutrient value for implementation in the program. The food packages for the WIC program in the United States underwent similar assessments and revisions in 2006 to address public health problems, and food supply, and improve their nutritional value [38].

Despite these enhancements, the subjects in intervention in this present study did not meet the Institute of Medicine (IOM) guidelines for pregnant women to gain 0.53 kg per week [39]. Inadequate gestational weight gain might be attributed to the additional intake of pregnant women from food packages which was lower than recommended. The reason for inadequate additional intake from food packages might be because the food was delivered as raw ingredients which was required to be cooked before eaten, thus deterring consistent consumption. In a previous study, higher food intake was observed because the food was cooked by catering service and home-delivered daily [17]. Nutritional education through home visits by nutritionists also revealed that pregnant women avoided eating from food packages every day, due to taste preferences or a lack of familiarity with the cooking process for the distributed ingredients. Nutritionists provided information and supported mothers in guiding them about the preparation of the food from packages to overcome such challenges. This suggests an alternative approach of providing vouchers to buy food packages, allowing pregnant women to choose the food they like, thereby potentially increasing both nutrient intake and gestational weight gain.

The strength of this study is that it is the first study in Indonesia that used food packages and nutritional education to improve the weight gain of undernourished pregnant women. The inclusion of fresh locally sourced food provided an opportunity for mothers to prepare food they liked. Additionally, the use of local food in packages is favorable for local farmers and provides food with less carbon footprint which

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promotes sustainability and supports environmental policy to prevent climate change. However, there are certain limitations to this study. First, the small sample size could interfere with the generalizability of the findings, and the lack of full randomization caused a gestational age imbalance between groups. Second, this study could not evaluate the effect of food packages alone on the outcome of pregnancy, such as birth weight and length. To overcome these limitations, it is suggested that future research should be scaled up with a better design, a larger sample size, robust randomization methods, and a longer time of research to determine the effect of the intervention on maternal and neonatal outcomes, thereby fortifying the evidence base for implementing such programs on a larger scale.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

Intervention using food packages combined with nutritional education provided by nutritionists significantly increased the weight of pregnant women compared to a control group that relied on food supplementation with biscuits as part of the current maternal nutrition program in Indonesia. Since the prevalence of stunting is steady, the Indonesian government needs to encourage local governments to implement alternative solutions using food packages or locally sourced food supplementation to improve gestational weight gain. The findings of this study indicate that free vouchers for food packages should be made available for pregnant women as a viable strategy for improving maternal and fetal health outcomes.

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Conflict of Interest

All authors declared that there was no conflict of interest.

Credit Authorship contribution statement

Didit D, the principal investigator, conceptualized and designed the study, conducted the research, data analysis, and interpretation, prepared the draft of the manuscript, reviewed the manuscript, and approved the final version of the manuscript to be published. Rosmida MM led the data collection in the region, provided guidance on the data analysis and interpretation, and reviewed the manuscript; Sa'diah MK led the data collection in the region and reviewed the manuscript. Kun AS advised on the data analysis and reviewed the manuscript. Ratih PP assisted in data analysis and contributed to drafting and reviewing the manuscript.

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Table 1: Energy and Protein Value of Food Package for Pregnant Women

Week	Food	Amount/ week	Energy (kcal)/day	Protein (g)/day	Suggestion Cuisine
1	Rice Chicken egg Green beans Coconut milk	500 g 14 items 250 g 160 g	557	24	Fried rice with egg Uduk rice, egg semur, yolk pickle, green bean porridge
2	Instant noodle Corned beef Milk powder	750 g 300 g 189 g	578	20	Fried noodle, fried corned beef, Noodles with corned beef and meatballs, milk chocolate
3	Rice Chicken egg Green beans Oil	500 g 14 items 250 g 500 g	1171	24	Rice, fried egg, green beans soup
4	Cassava Green beans Milk Powder Sugar	2000 g 250 g 189 g 250 g	914	23	Fried cassava, kolak, cassava and green beans porridge, milk pudding, milk
5	Instant vermicelli Chicken Butter cookies	750 g 550 g 120 g	555	23	Fried vermicelli, chicken, vermicelli and chicken soup
6	Rice Sardines Green beans Coconut milk Sugar	500 g 350 g 250 g 120 g 250 g	750	24	Rice, spicy sardines, fried sardines with egg, fried rice with sardines, green beans pudding
7	Instant noodles Chicken egg Salty crackers	750 g 14 items 450 g	775	21	Javanese fried noodle with egg, noodle martabak, crackers pudding
8	Rice Not salty medan anchovy Milk powder Oil	500 g 300 g 210 g 500 g	1185	32	Spicy anchoy and peanuts, anchovy fried rice, anchovy and tofu botok/pepes
			926	27	

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Table 2: Characteristics of study participants

Characteristics	Control	Intervention	p value
N	35 (50.0%)	35 (50.0%)	
Maternal age	30.6±6.4)	30.6±5.0	0.483
< 30y	19 (54.3%)	11 (31.4%)	0.053
>=30 y	16 (45.7%)	24 (68.6%)	
Education			
Primary school	1 (2.9%)	1 (2.9%)	0.651
Secondary school	4 (11.4%)	5 (14.3%)	
High school	22 (62.9%)	25 (71.4%)	
University/Diploma	8 (22.9%)	4 (11.4%)	
Occupation			
Housewife	24 (68.6%)	28 (80.0%)	0.068
Private	6 (17.1%)	7 (20.0%)	
Government employee	5 (14.3%)	0 (0.0%)	
Gestational age, weeks	26.5±10.1	19.6±5.9	<0.001
Trimester 1	3 (8.6%)	3 (8.6%)	<0.001
Trimester 2	11 (31.4%)	29 (82.9%)	
Trimester 3	21 (60.0%)	3 (8.6%)	
Hemoglobin, g/dl	11.6±1.1	12.2±1.2	0.969
Non-Anemic	21 (80.8%)	26 (81.2%)	0.963
Anemic	5 (19.2%)	6 (18.8%)	
Maternal height, cm	155.3±4.1	153.5 ±5.2	0.055
>=150cm	32 (91.4%)	29 (82.9%)	0.284
<150cm	3 (8.6%)	6 (17.1%)	
MUAC, cm	26.6±3.5	26.0±3.6	0.393
<23.5cm	29 (82.9%)	26 (74.3%)	0.382
≥23.5cm	6 (17.1%)	9 (25.7%)	

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Table 3: Effect of maternal food package supplementation on maternal intake, body weight, and MUAC

Outcomes	Control		Intervention		Unadjusted			Adjusted^		
	mean	±SD	mean	±SD	beta	ci	p	beta	ci	p
Weight increment (kg)^^	2.04	± 2.09	3.63	± 1.49	1.59***	[0.73,2.46]	<0.001	1.15*	[0.086,2.21]	0.035
MUAC increment(cm)^^	0.36	± 0.62	0.76	± 0.82	0.39*	[0.045,0.74]	0.028	0.35	[-0.20,0.89]	0.208
Macronutrient										
Energy (kcal)	1,621	± 507	2,009	± 486	387.5**	[150.6,624.5]	0.002	366.0*	[29.2,702.7]	0.034
Protein (g)	53.2	± 18.4	63.4	±14.8	10.3*	[2.29,18.2]	0.012	8.64	[-2.32,19.6]	0.120
Fat (g)	56.6	± 27.3	66.4	±20.9	9.81	[-1.77,21.4]	0.096	7.54	[-7.95,23.0]	0.332
Carbohydrate (g)	227.6	± 84.9	292.1	±92.7	64.5**	[22.1,106.9]	0.003	66.4*	[4.43,128.4]	0.036
Micronutrients										
Vitamin A (mcg)	1,577	± 3,021	1,145	±859	-431.6	[-1491.1,628.0]	0.419	43.6	[-1572.6,1659.8]	0.957
Vitamin B1 (mg)	0.6	± 0.2	0.7	±0.2	0.12*	[0.018,0.22]	0.022	0.14*	[0.0034,0.28]	0.045
Vitamin B2 (mg)	1.0	± 0.8	1.1	±0.4	0.034	[-0.27,0.34]	0.822	0.17	[-0.28,0.62]	0.452
Vitamin B6 (mg)	1.0	± 0.4	1.3	±0.5	0.32**	[0.098,0.54]	0.005	0.42**	[0.13,0.72]	0.006
Vitamin C (mg)	66.9	± 80.8	72.2	±47.6	5.29	[-26.3,36.9]	0.740	14.1	[-28.9,57.1]	0.512
Natrium (mg)	413.5	±325.1	484.2	±266.7	70.7	[-71.2,212.5]	0.324	69.7	[-118.6,257.9]	0.460
Folic acid (mcg)	186.1	±168.9	114.8	±64.3	-71.4*	[-132.3,-10.4]	0.022	-58.1	[-146.5,30.2]	0.192
Iron (mg)	8.1	±5.3	9.3	±2.9	1.18	[-0.85,3.21]	0.250	1.21	[-1.50,3.93]	0.373
Calcium (mg)	420.3	±247.7	579.9	±282.1	159.7*	[33.1,286.3]	0.014	249.5**	[74.8,424.1]	0.006
Zinc (mg)	6.1	±2.5	7.2	±2.0	1.18*	[0.11,2.25]	0.032	1.07	[-0.42,2.56]	0.156

^Adjusted by BMI before pregnant, height, anemic, age, gestational age

^^ Adjusted by BMI before pregnancy, height, anemia, age, gestational age, energy intake, protein intake, and fat intake

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Table 4: Average energy and nutrient intake per day of respondents from additional foods during the intervention

Energy and nutrients	Additional food from food packages	Additional food from food supplement biscuits	p value
Energy (kcal)	210.880	154.285	0.157
Protein (g)	11.746	4.628	0.000
Fat (g)	10.046	7.714	0.279
Carbohydrate (g)	24.706	16.354	0.073
Vitamin A (mcg)	73.893	74.359	0.979
Vitamin B1 (mg)	0.130	0.123	0.877
Vitamin B2 (mg)	0.200	0.132	0.071
Vitamin B6 (mg)	0.503	0.162	0.182
Vitamin C (mg)	9.800	8.577	0.685
Sodium (mg)	98.902	9.758	0.000
Folic acid (mcg)	23.435	58.028	0.009
Iron (mg)	1.524	1.113	0.164
Calcium (mg)	140.033	23.296	0.000
Zinc (mg)	7.425	0.220	0.570

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