

## Energy and Macronutrient Content in the Immediate Postpartum Women's Diet: A Cross-Sectional Study in a Brazilian Metropolis

Taciana Maia de Sousa\*, Paula Martins Horta, Larissa Bueno Ferreira and Luana Caroline dos Santos

*Departamento de Nutrição, Universidade Federal de Minas Gerais, Escola de Enfermagem, Belo Horizonte, Minas Gerais, Brazil*

**\*Corresponding Author:** Taciana Maia de Sousa, Departamento de Nutrição, Universidade Federal de Minas Gerais, Escola de Enfermagem, Belo Horizonte, Minas Gerais, Brazil.

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### Abstract

**Introduction:** Monitoring women's diet during the postpartum period is an advisable practice to promote health and prevent overweight.

**Objective:** To evaluate the energy and macronutrient offered and consumed by immediate postpartum women in a public maternity hospital.

**Methods:** Cross-sectional study conducted in a public maternity hospital with immediate postpartum women (1<sup>st</sup> - 10<sup>th</sup> day after delivery). Women could only eat what was offered in the hospital. Three-day hospital menus were weighted and women's individual food intake was collected by 24-hour-dietary recall. Energy and macronutrient content of hospital food supply and women's diet was compared to the women's estimated energy requirement (EER) and to the Acceptable Macronutrient Distribution Range (AMDR). A sample size of 50 participants was estimated adopting a 95% confidence interval, 5% error, and formula for descriptive purposes and finite population.

**Results:** The majority had term (80.8%) and vaginal (72.7%) delivery. Pre-gestational overweight occurrence was 40.4% and 46.9% gained weight excessively during gestation. Mean energy intake (3594.2 kcal) was above the mean EER (2297.5 kcal) and below the mean energy supply (3594.2 kcal). Protein and carbohydrate participation in the hospital menus and women's diet were within the AMDR. Total and saturated fat participation in hospital menus and women's diet were above the dietary recommendations.

**Conclusion:** Women consumed less amount of energy comparing to what was offered in the hospital menus, but above their energy daily needs. This diet profile is not advisable to women's in the immediate postpartum period, considering the greater risk for weight retention.

**Keywords:** *Nutrient Intake; Maternal Nutrition; Postpartum Period*

### Introduction

The World Health Organization (WHO) estimates that 15% of the world's female population is obese and 40% is overweight [1]. Postpartum weight retention is an important risk factor for these outcome occurrences [2,3].

Therefore, monitoring women's diet during the postpartum period is an advisable practice to promote health and prevent overweight [3-6].

The pregnancy-puerperal cycle involves physiological adaptations that induce significant changes in weight and body composition. Excessive gestational weight gain and postpartum weight retention (PWR) are strong predictors of obesity among the female population. Therefore, it is recommended that women return to pre-pregnancy weight during the first year after delivery [7].

It has been previously established that homeostasis of postpartum maternal weight depends on the balance of energy intake and expenditure, mainly associated with breastfeeding and physical activity [8].

In addition, the assessment of food consumption in this life cycle must especially consider the postpartum stage, the nutritional status of women and the practice of breastfeeding [9]. The first postpartum period, known as the immediate postpartum, lasts until the tenth day of birth and is characterized by frequent incidence of infections, hemorrhages and breast complications. This is the period when the most important changes in women's body happen [3]. Usually, immediate postpartum women are interned in a maternity unit and food consumption evaluation should also focus on the quality of meals served in this institution [9].

Few previous studies have described excessive consumption of poor-nutrient foods during the postpartum period [10-13]. However, none of these studies have focused on the immediate postpartum period and on the food supply in maternity units.

### **Aim of the Study**

Thus, this study aimed to evaluate energy and macronutrient content in postpartum women's diet. Our sample comprised women interned in a maternity unit of Belo Horizonte, Brazil. For the first time, we analyzed hospital food supply nutrient content and compared it to postpartum women's food intake.

### **Methods**

This is a cross-sectional study conducted with women in the immediate postpartum period in a maternity unit of a Brazilian city hospital located in Belo Horizonte, the sixth most popular city in Brazil (1.43 million inhabitants, 330.9 km<sup>2</sup>), from August to December 2015. The study design and procedures were approved by the Research Ethics Committee under number 52537215.5.0000.5149.

We included women between the 1<sup>st</sup> and the 10<sup>th</sup> day after childbirth, without age, type of delivery or gestational age restrictions. We excluded women who had complications during delivery that required absolute rest or fasting. All the participants received oral and detailed explanation about the study and signed a consent form.

Using the Epi Info™ 7 software, we estimated a sample size of 50 participants, adopting a 95% confidence interval (95% CI), 5% error; a formula for descriptive purposes and a finite population. Our sample included all women who gave birth in the maternity in the study period in accordance to our inclusion criteria and comprised 99 immediate postpartum women.

Through personal interviews, we collected socioeconomic and demographic information such as age (years), marital status (single, married or stable union), occupation (student, employed, housewife, unemployed), schooling (elementary school, high school or higher education) and per capita income (in R\$, distributed in terciles).

Reproductive history was also investigated: parity (number of birth), gestational age (< 37 weeks, ≥ 37 weeks), days of postpartum (1 - 2 days, > 3 days), route of birth (vaginal delivery or cesarean section) and practice of breastfeeding (yes or no). Additionally, pre-gestational weight and weight gain during pregnancy were reported by the participants. We classified women's pre-gestational nutritional status

and the reported gestational weight gain according to the Institute of Medicine (IOM) cut-off points [14]. Socioeconomic and demographic and reproductive history information was used to describe the sample.

Women could only eat what was offered at the hospital. Then, a trained hospital worker weighed each food or dish served in the maternity hospital for three consecutive days using a Plenna® digital scale (capacity of 2000g and accuracy of 1g), to obtain an average value of the macronutrient and energy offered to the puerperal women. In addition, individual food intake was collected by a 24-hour food record (R24h), in the first 24 hours up to 10 days postpartum (period of stay of the woman in the hospital and viability of the collection). Women referred all food and beverages consumed in quantities the day before the interview. We used a food composition table specifically compiled for Brazilian dietary surveys [15] to analyze the energy and macronutrient content of hospital food supply and women's diet.

The estimated energy requirement (EER) equations were used to estimate women's daily energy needs [16]. All women were considered sedentary since they are lying down or sitting down most of the time during hospitalization. Women's weight and height were measured using a platform scale with a stadiometer (Lider® P150C) following the procedures proposed by the WHO [17]. Adequate energy supply/intake was considered when it represented 90 - 110% of the EER [18].

For macronutrients, we adopted the Acceptable Macronutrient Distribution Range (AMDR) as a recommendation for its participation in the diet [14]. For saturated fats, we adopted the WHO cutoff points [19]. In addition, we used the Estimated Average Requirement (EAR) for protein (in grams/kg/day) and carbohydrate (in grams/day) as a reference for daily intake [16]. Macronutrient participation within the AMDR or above the EAR was considered adequate [16]. For saturated fat, intake/supply above 10% was considered inadequate [19].

Finally, we estimated the mean and 95% CI of the energy and macronutrient content in the hospital food supply and in the women's diet. We considered statistically significant differences when the 95% CI did not overlap.

All analyzes were performed using the Stata software (version 12.0). The Kolmogorov-Smirnov tests were conducted to assess the adherence of the variables to the normal distribution. Subsequently, a descriptive analysis was performed, calculating frequencies and measures of central tendency and dispersion. The Wilcoxon test was used to compare the two dependent medians and Mann-Whitney or Kruskal-Wallis for the independent ones. All analyzes considered a significance level of 5%.

## Results

Among the 99 women investigated and who agreed to participate in the study, the vast majority of the sample was over 25 years old (87.8%) and more than a half worked (54.1%). High school was the most prevalent level of education (58.6%) and per capita income ranged from R\$ 125 (US\$ 32.9) to R\$ 1250 (US\$ 328.9). Most women had term (80.8%) and vaginal (72.7%) delivery and was breastfeeding (97%) in the moment of the study. Pre-gestational overweight occurrence was 40.4% and 46.9% of women gained weight excessively during gestation (Table 1).

Mean energy intake (3594.2 kcal) was above the mean EER (2297.5 kcal) and below the mean energy supply (3594.2 kcal) (Table 2).

Both protein supply and intake were above the EAR - 1.9 and 1.6 g/kg/day; however, when adjusted for energy (% of total calorie), protein supply and intake were within the AMDR. The same was noted for carbohydrate. However, total fat supply and intake were above the AMDR - 35.4% and 35.2%, respectively. Similarly, saturated fat content in hospital menus and women's food intake was above the cut-off point of 10% (Table 2).

Characteristics	N	%
<b>Age</b>		
< 25 years	22	22.2
25 - 30 years	51	51.5
> 30 years	26	26.3
<b>Marital status</b>		
Married or stable union	60	61.9
Single	37	38.1
<b>Occupation</b>		
Employed	53	54.1
Student or unemployed	17	17.4
Housewife	28	28.6
<b>Schooling</b>		
Elementary school (complete or incomplete)	34	34.4
High school (complete or incomplete)	58	58.6
Higher education (complete or incomplete)	7	7.1
<b>Per capita income</b>		
1 <sup>st</sup> tercile (R\$125-325)	33	35.1
2 <sup>nd</sup> tercile (R\$333-591)	30	31.9
3 <sup>rd</sup> tercile (R\$600-1250)	31	32.9
<b>Parity</b>		
1	49	49.5
> 1	50	50.5
<b>Gestational age</b>		
≥ 37 weeks	80	80.8
< 37 weeks	19	19.2
<b>Days of postpartum</b>		
1 or 2	68	68.7
≥ 3	31	31.3
<b>Route of birth</b>		
Vaginal	72	72.7
Cesarean	27	27.3
<b>Breastfeeding</b>		
Yes	96	97.0
No	3	3.0
<b>Pre-gestational nutritional status</b>		
Eutrophic	53	53.5

Low weight	6	6.1
Overweight	40	40.4
<b>Gestational weight gain</b>		
Adequate	20	24.7
Insufficient	23	28.4
Excessive	38	46.9

**Table 1:** Socioeconomic, demographic and reproductive history characteristics of the sample. Belo Horizonte, Brazil, 2015.

Note: As a result of participants’ memory bias and failure to complete the questionnaire, there were information losses for some variables.

Comparing macronutrient content in hospital food supply and women’s diet, we identified higher content, in grams, of fat and carbohydrate in hospital menus; however, after adjusting for energy (% of total calorie), macronutrient participation in both parameters were the same (Table 2).

Nutrient	Recommendation	Hospital menus Mean (95% CI)	Women’s diet Mean (95% CI)
Energy (kcal)	2297.5 (2261.0 to 2333.9)*	3594.2 (3251.3 to 3937.0)*	2811.9 (2704.5 to 2919.4)*
Protein (g/kg/d)	0.88	1.9 (1.2 to 2.6)	1.6 (1.5 to 1.7)
Protein (%)	10 to 35	15.7 (11.6 to 19.7)	15.9 (15.4 to 16.5)
Fat (g)	NA	141.6 (121.9 to 161.4)*	110.5 (105.3 to 115.6)*
Fat (%)	20 to 35	35.4 (33.6 to 37.3)	35.2 (34.4 to 36.1)
Saturated fat (g)	NA	35.6 (33.8 to 37.5)	44.7(38.9 to 50.4)
Saturated fat (%)	< 10	11.3 (10.9 to 11.7)	11.2 (10.7 to 11.6)
Carbohydrate (g)	160	446.6 (377.7 to 515.6)*	349.5 (334.5 to 364.6)*
Carbohydrate (%)	45 to 65	49.7 (45.9 to 53.4)	49.9 (48.4 to 51.6)

**Table 2:** Energy and macronutrient content in hospital menus and women’s diet in comparison to dietary recommendation.

Belo Horizonte, Brazil, 2015.

Note: Not Applicable. \*Statistically significant differences. 95% CI: 95% confidence interval.

## Discussion

The present study showed a high supply of energy and total and saturated fat for immediate postpartum women admitted to a maternity hospital. However, these women did not refer to the consumption of all foods and meals offered during hospitalization. Despite this, the amount of energy consumed was greater than the daily needs of women. Regarding the consumption of macronutrients, the participation of carbohydrates, proteins and fats (% of total calories) in the women’s diets and hospital menus was the same and contained excess total and saturated fat.

Our sample had a high prevalence of pre-gestational overweight and excessive weight gain during pregnancy. In Belo Horizonte, where our study took place, overweight comprised 46.2% of non-pregnant and non-lactating women in 2015 [20], similar to the prevalence of the sample in the pre-pregnancy period. Excessive weight gain during the occurrence of pregnancy was also similar to other investiga-

tions: a systematic review and meta-analysis of 23 studies (10 in the US, 8 in Asia and 5 in Europe) showed that gestational weight gain was above the guidelines in 47% of pregnancies [21]. In Brazil, studies have also shown excessive weight gain during pregnancy, ranging from 32.9% to 45.3% [22-24].

Thus, although the nutritional profile of the immediate postpartum women participating in this study has been shown to be extremely disturbing, it is in accordance with national data and evidence provided in the literature.

According to Santos, *et al.* nutritional counseling is effective in promoting the reduction of postpartum weight retention. However, there is a lack of a specific protocol in primary public health care in Brazil to monitor the nutritional status of women in the postpartum period. In addition, the commitment to nutritional care in the postpartum period is challenging due to the demands of motherhood, which are noticeably worse for low-income women [7].

Therefore, the practice of a healthy diet that provides adequate amounts of energy and macronutrients is highly recommended for these women. However, our data revealed an inadequate supply of nutrients in the maternity hospital, characterized by a greater amount of energy, total and saturated fats. Although the women said they did not consume all the food provided on the hospital's menus, their energy intake, total and saturated fat, was excessive in comparison to their needs.

The IOM recommends that breastfeeding women increase their energy consumption through a varied diet in order to meet the nutritional demands that lactation requires [25]. An additional 500 calories per day is required during the first six months postpartum and 400 for the following months. However, most investigations describe the insufficient energy intake among mothers [10,26,27].

Therefore, the greater energy supply in maternity might have encouraged women to consume greater amounts of energy, which can contribute to postpartum weight retention, obesity, adverse maternal outcomes in the next pregnancies and other non-communicable diseases [28-30].

Previous study conducted by Falivene and Orden pointed out that several epidemiological studies have shown that breastfeeding women increase their caloric intake, but decrease their energy expenditure. In addition, another study found a daily energy consumption of 2000 calories during the first postpartum trimester, against an energy expenditure of only 1870 calories. According to the authors, the excessive fat content of the hospital's menus it might have contributed to a greater energy intake [8].

Regarding the impact of consumption of excess total and saturated fat and health outcomes, there are still controversies. For cardiovascular health, substantial evidence supports the importance of the type of fat consumed, not the total fat intake [31]. Much of the evidence suggests that the risk of coronary heart disease is reduced by replacing saturated fat with polyunsaturated fat. However, there is no benefit in replacing saturated fat with carbohydrate [31]. However, research is needed to assess the long-term impact of a high-fat diet [32]. In this context, maintaining total fat and saturated fat within the actual dietary guidelines is most advisable.

Finally, this study presented the limitation of evaluating the food consumption of women with only one R24h, due to the high turnover of births common of the public Brazilian maternities. However, it is believed that the intrapersonal variability of consumption in the hospital environment would be reduced due to the standardization of food supply. Despite this, our study showed the nutrient content of hospital menus and showed great inadequacy. In the maternity ward, women will have their first meals after delivery. Thus, the review of the nutritional content of their menus creates the possibility of promoting healthy eating habits that can be maintained after hospital discharge.

## Conclusion

In summary, regarding food consumption, we observed a high supply of energy and total and saturated fat for immediate postpartum women admitted to a maternity hospital.

Considering that women will have their first meals after giving birth in the maternity ward, it is important to encourage healthy eating habits during this period and to ensure that they are maintained after hospital discharge. A good alternative would be to replace foods with a high energy density (mainly lipid sources) with those with low density and high in fiber, such as fruits, vegetables and whole grains, to promote satiety without exacerbating the supply of calories.

Considering a high prevalence of women who maintain weight gain during pregnancy in the postpartum period, which is a risk factor for obesity in this phase of the reproductive cycle, it is noteworthy that this postpartum period can offer a window of opportunity for the primary prevention of chronic non-communicable diseases and to promote health interventions resulting in favorable outcomes for the maternal public.

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