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ORIGINAL

Quality of the diet of pregnant women in the scope of Primary Health Care

Qualidade da dieta de gestantes no âmbito da Atenção Primária à Saúde

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ABSTRACT

Objective

To evaluate the quality of the diet of the pregnant women monitored by the Family Health Strategy teams and associated factors.

Methods

This is a population-based cross-sectional study, carried out with 1244 pregnant women between 2018 and 2019. The Diet Quality Index Adapted for Pregnant Women was used to measure the quality of the diet and associate it with risk

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factors (sociodemographic, obstetric, clinical, behavioral, nutritional status) during the pregnancy. A hierarchical model composed of three blocks was used. A multinomial logistic regression was applied.

Results

The general average of this Diet Quality Index was 72.75 points, the average of the 1st tercile was 56.06 points, the average of the 2nd tercile was 73.71 points and the average of the 3rd was 88.51 points. The worst diet quality was related to pregnant women with lower education (OR=2.36; 95% CI=1.39-4.01), sedentary women (OR=1.37; 95% CI=1.17-2, 61), those who had a negative self-perception of food (OR=2.00; 95% CI=1.45-2.76) and who had 3 to 5 meals a day (OR=1.83; 95% CI=1.26-2.77), and less than 3 (OR=2.64; 95% CI=1.13-6.18).

Conclusion

The present study identified that pregnant women with less education, sedentary, and with inadequate nutritional characteristics presented worse diet qualities.

Keywords: Diet, healthy. Diet, food, and nutrition. Prenatal nutrition.

RESUMO

Objetivo

Avaliar a qualidade da dieta das gestantes acompanhadas pelas equipes da Estratégia da Saúde da Familia e fatores associados.

Métodos

Trata-se de um estudo tranversal de base populacional, realizado com 1244 gestantes entre 2018 e 2019. O Índice de Qualidade da Dieta Adaptado para Gestantes foi utilizado para mensurar a qualidade da dieta adotada pelas gestantes e associá-la a fatores de risco (sociodemográficos, obstétricos, clínicos, comportamentais, estado nutricional) durante a gravidez. Utilizou-se um modelo hierárquico composto por três blocos. Aplicou-se a regressão logística multinomial.

Resultados

Observou-se que a média geral do Índice de Qualidade da Dieta foi de 72,75 pontos, sendo que a média do 1º tercil foi de 56,06 pontos; a média do 2º tercil foi de 73,71 pontos e que a do 3º tercil foi de 88,51 pontos. A dieta de pior qualidade esteve relacionada a gestantes com menor escolaridade (OR=2,36; 95% IC=1,39-4,01), sedentárias (OR=1,37 95% IC=1,17-2,61), que apresentavam autopercepção negativa da alimentação (OR=2,00; 95% IC=1,45-2,76) e que faziam de três a cinco refeições ao dia (OR=1,83; 95% IC=1,26-2,77) e menos de três (OR=2,64 ; 95% IC=1,13-6,18).

Conclusão

O presente estudo identificou que gestantes com menor escolaridade, sedentárias e com características nutricionais inadequadas apresentaram dieta de pior qualidade.

Palavras-chave: *Dieta saudável. Alimentos, dieta e nutrição. Nutrição da gestante.*

INTRODUCTION

Primary Health Care, preferably organized in Brazil by *Estratégia de Saúde Familiar* (ESF, the Family Health Strategy), is the main gateway to the health system in the country. It is also responsible for monitoring the health of pregnant women, with individualized dietary guidelines as a part of prenatal care [1,2]. Healthy food consumption is essential for the metabolic and functional capacities of the human body, especially during pregnancy, a period in which nutritional needs increase and food consumption reflects on the mother's nutritional status and fetal development [3,4]. Food choices and behaviors during pregnancy have an impact on the health of the mother and child and on gestational outcomes 4.

The pregnant woman's diet should be varied and balanced according to the recommendations of the food guide for the Brazilian population3 and the Institute of Medicine in the United States [4-7]. Previous studies carried out with pregnant women in primary health care have associated poor dietary

diversity with young pregnant women, cravings during pregnancy, food aversion, nausea, and low income [8,9]. Understanding the factors that motivate or prevent pregnant women from making changes in their diet is important for developing the adequate means to promote healthy eating behaviors in this population [10,11].

One of the ways to assess these diets is through dietary indices [12]. These are instruments developed to estimate the diet quality, food portions, nutrients, and calories, and to associate the food quality with health outcomes [12]. However, using these instruments requires adaptations according to the studied population [13]. During the pregnancy, dietary indices make it possible to identify food inadequacies and support a preventive or parallel intervention in the pregnancy, providing subsidies for the elaboration of diets and nutritional guidelines, and contributing to the health of the mother and the child from in the first years of life [14,15,4].

Having a bad diet quality is a risk factor that contributes to unfavorable health outcomes. However, the incorporation of the assessment of the nutritional status and food consumption in the routine of Primary Health Care (PHC) teams is still a great challenge [2]. The evaluation of the diet of pregnant women regarding the adherence to official nutritional recommendations makes it possible to subsidize nutritional intervention actions during prenatal care.

This study aimed to assess the quality of the diet of pregnant women assisted by the Family Health Strategies teams and associate sociodemographic, clinical, obstetric, and behavioral factors, as well as nutritional status variables.

METHODS

This is st population-based, cross-sectional study. This study is part of the research entitled "*ALGE Study – Assessment of the health conditions of pregnant women in Montes Claros, Minas Gerais*: *a longitudinal study*" .

The population of this research consisted of pregnant women registered in the teams of the Family Health Strategy (FHS), from the urban area of the municipality of *Montes Claros* (MG), Brazil. For the selection of the sample, the FHS poles of the municipality were considered – a total of 15 in the period of this research. The number of pregnant women sampled in each pole was proportional to their representativeness in relation to the total population of registered pregnant women.

The sample size was established in order to estimate population parameters with a prevalence of 50% (to maximize the sample size and because the project contemplates several events), a 95% confidence interval (95% CI), and a precision level of 2.0%. A correction was made for the finite population (n=1,661 pregnant women) and an addition of 20% was also established to compensate for possible non-responses and losses. The calculations showed the need for the participation of at least 1,180 pregnant women.

The number of pregnant women sampled in each pole was proportional to their representativeness in relation to the total population of registered pregnant women. Women who were pregnant with twins and those with cognitive impairment, according to information from the family member and/or the FHS team, were excluded.

The data collection took place between October 2018 and November 2019, in the health units of the family health teams or in the participants' homes, depending on the availability of the pregnant women. A questionnaire was used that included sociodemographic (age range, marital status, education, family income), obstetric (gestational trimester, number of prenatal appointments), clinical (self-reported

complaints, heartburn, nausea, vomiting, Cold, Self-reported pathologies, diabetes *Mellitus*, Anemia, Arterial hypertension), behavioral (practice of physical activity, alcohol consumption) and nutritional assessment (pre-gestational nutritional status, food guidelines received in prenatal care, nutritional monitoring in prenatal care, diet during pregnancy, number of daily meals, self-perception of feeding) characteristics (Figure 1).

The validated food frequency questionnaire (FFQ) was used to assess the food consumption [16]. The FFQ consisted of 70 items and for each item, a household measure or food unit was applied to assess the consumed amount. To assess the frequency of food consumption, a scale with eight options was used: "Never/Almost Never", "1 to 3 times/month", "1 times/week", "2 to 4 times/week", "5 to 6 times/week", "1 time/day", "2 to 3 times a day" and "More than 3 times/day" [16].

The nutritional composition of the dietary intake was estimated using the Dietbox® software (Online Nutrition Support Program), the Food Composition Table: support for nutritional decision, and the *Tabela Brasileira de Composição de Alimentos* (Brazilian Table of Food Composition Food) [17,18].The Diet Quality Index Adapted for Pregnant Women (IQDAG) was used to assess the quality of the diet. The IQDAG has nine components, and it is represented by three food groups, in servings/1,000 kcal ("Vegetables", "Legumes" and "Fruits), five nutrientes (Fiber", "Omega 3", "Calcium", "Folate" and "Iron") and a moderator component (% of energy from ultra-processed foods). A detailed description of the index can be found in the publication of Crivellenti et al 2018.

The pregnant women's diet quality was evaluated with IQDAG, an instrument developed based on the Ministry of Health's recommendations (2012), on the Revised Diet Quality Index (IQD-R) for the Brazilian population on the Healthy Eating Index for Brazilian Pregnancy (HEIP-B)7, and on the Dietary Guidelines for the Brazilian Population [19-21]. To define the number of portions from the "Vegetable", "Legumes", and "Fresh Fruit" groups, we used the 10-step guidelines of healthy eating for pregnant women, as recommended by the Ministry of Health19. The number of daily portions of the food groups in the guidelines was adapted to 1.000 kcal, as per the suggestion of IQD-R[20]. Thus, for each 1.000 kcal in the diet, we adopted the consumption of 1.5 "Vegetable" portions, 0.5 portions of "Legumes", and 1.5 portions of "Fresh Fruit". To define the nutrients of interest – calcium, folate, iron, and fibers – the HEIP-B was taken as a reference, but with distinct cut-off points [7]. Given the evidence of its health benefits for both the mother and the fetus, Omega-3 also composes the IQDAG nutrients [22]. In the present study, we did not consider the use of dietary supplements. Besides, IQDAG presents a moderating component, its energetic percentual from ultra-processed foods, as per the current Dietary Guidelines for the Brazilian Population [20,23]. These products include industrial formulations from substances derived from foods or synthetized from other organic sources, preserving only a tiny amount of the natural foods (*e.g.* sweetened drinks, cookies, bread with additives, instantaneous pasta, ready foods, *etc*.). The cut-off points for this component were established according to the HEI-2010 proposal [23].

For evaluating the Quality Index of the pregnant women's diets, scores were assigned to each component of the food groups, ranging from 0 to 10 points, with 10 being the maximum score and zero representing the lack of consumption, based on the studies by Melere *et al*. [7]. The first equation was used to determine the components related to food and nutrient groups. The second equation was used to determine the moderating food. Represented by the % total energy of ultra-processed foods, with scores ranging from 0 to 20 points. Equation:

$$\text{Equation 1} = \frac{(10^* (\text{QICx} - \text{Min})}{(\text{Max} - \text{Min})}$$

$$\text{Equation 2} = \frac{(20^* (\text{Min} - \text{QICx})}{(\text{Max} - \text{Min})}$$

In both equations, the QICx refers to the ingested amount of the component, Min represents the criterion to reach the minimum score and the Max. criterion to reach the maximum score. The final score of the index is represented by the sum of the scores for each component, ranging from 0 to 100 points. The independent variables analyzed were stratified into three levels, adapted according to the model proposed in a previous study carried out in another population (Figure 1) [24].

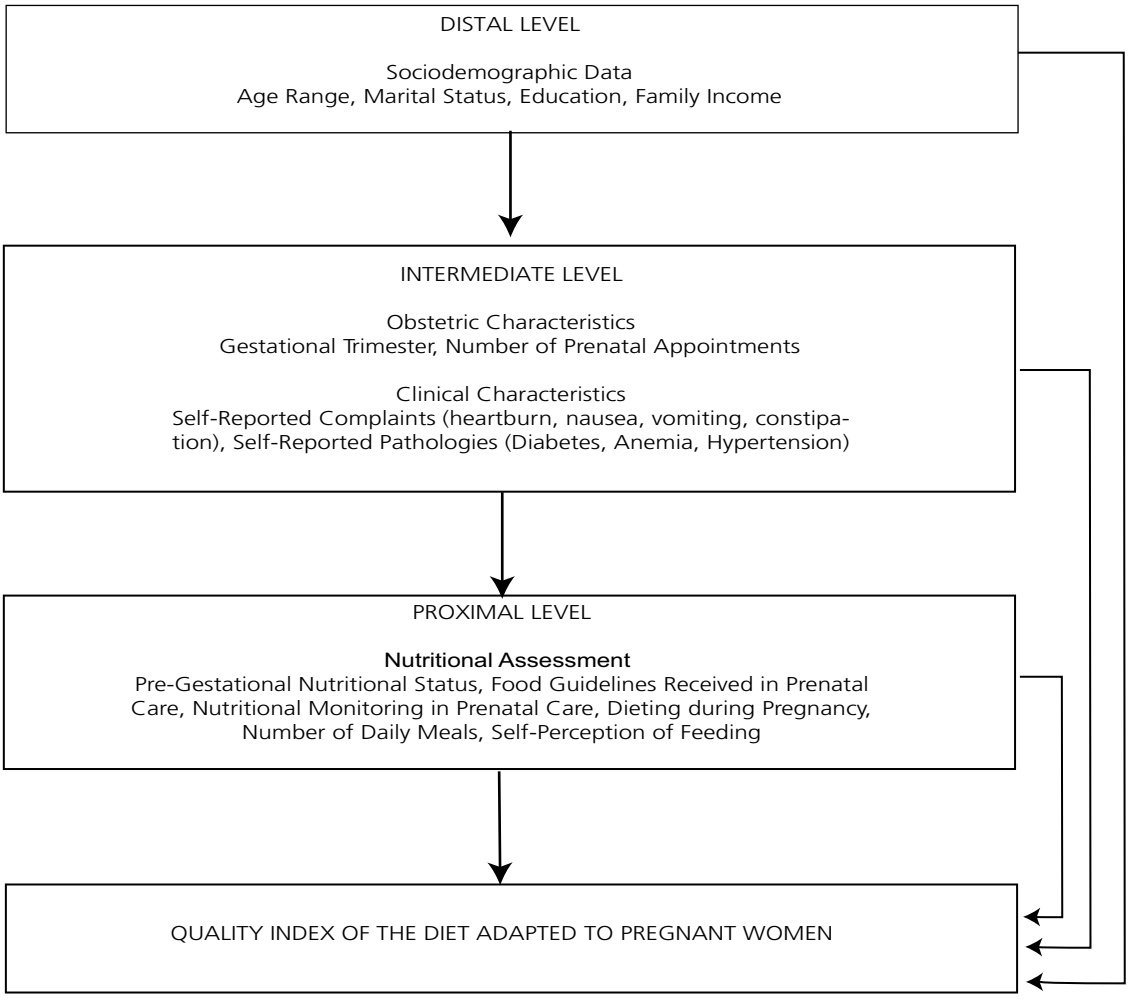

Figure 1 – Conceptual hierarchical model of the determining factors of the diet quality index adapted to pregnant women.

All categorical variables were described in absolute and relative frequencies and the final score of the diet quality index was described in means (95% CI), standard deviation, and minimum and maximum values.

To assess the factors associated with the diet quality, pregnant women were divided into three groups established from the tercile of the final score of the diet quality index. Therefore, the variable diet quality was divided into three categories: 1st tercile, 2nd tercile, and 3rd tercile and considered a dependent variable of the study. The other variables investigated were treated as independent variables. Bivariate analyzes were performed between the dependent variable and the independent variables, using the chi-square test. Variables with a descriptive level (p-value) of up to 20% were selected for multiple analysis.

The Multinomial Logistic regression model was used for the multiple analysis. At this stage, the input of variables into the model was hierarchically constituted by blocks of variables at distal, intermediate, and

proximal levels (Figure 1). The distal level, composed of sociodemographic characteristics, was the first to be included in the model, remaining as an adjustment factor for intermediate and proximal factors. Then, the block of variables at the intermediate level (obstetric, clinical, and behavial characteristics) was included, keeping it as an adjustment factor for variables at the proximal level. Finally, the block of variables at the proximal level (Classification of nutritional status) was included. Those variables that presented a descriptive level of $p<0.05$ remained in the model, after adjustment for the variables of the previous levels. The adjusted Odds Ratio (OR) were estimated with their respective 95% confidence intervals. The Deviance test was adopted to assess the quality of the multiple model fit diet. All analyzes were performed using the SPSS®IBM® software (version 23.0).

This study was approved by the Research Ethics Committee of the State University of *Montes Claros*, embodied in Opinion Report nº 2.483.623/2018. All pregnant women who agreed to participate in the study signed the Free and Informed Consent Term and in the case of minors, the Free and Informed Assent Term was applied.

RESULTS

A total of 1279 pregnant women participated in the study, of which 1244 answered all items of the food frequency questionnaire and were considered eligible for the study. Thus, the sample consisted of 1244 pregnant women, of which 55.7% were between 20 and 30 years old, most lived with a partner (76.7%) and were in the 2nd trimester of the pregnancy (40%). Among the pregnant women, 68% reported heartburn during the pregnancy, 42.9% reported performing light physical activity, and 66.6% had a negative self-perception of food.

Table 1 presents the descriptive measures of the overall food quality index and that of the three groups defined by the tercile. The general average of this index was 72.75 and ranged from 21.69 to 100.00. A distribution of the variable Diet Quality of pregnant women according to sociodemographic and obstetric characteristics is presented in Table 2. The table shows that a larger percentage of pregnant women with low schooling is found in the first tercile and graduated women are in higher percentages in the third tercile of the IQDAG. As to the income, the greater percentage of pregnant women who earn more than 2 minimum wages is in the third tercile. The following variables showed a significant association with food quality, at the level of 0.20, and were selected for multiple analysis: marital status (p=0.129), education (p=0.020) and family income (p=0.007).

Table 3 shows that a larger percentage of pregnant women with diabetes *Mellitus*, alcohol consumption, and dieting during pregnancy is in the score's third tercile. The pregnant women who practiced light/intense exercise, who self-assessed feeding as very good/good, and who had more than five meals a day, were also in this tercile. The following variables showed a significant association at the level of 0.20

Table 1 – Descriptive measures of the Diet Quality Index, general and by groups defined by terciles. *Montes Claros* (MG), Brazil, 2018-2019. (n=1244).

Terciles	n	M	SD	95% CI to mean		Min.	Max.
				Lower limit	Upper limit		
1st Third	415	56.06	8.90	55.20	56.92	21.69	67.05
2nd Third	415	73.71	3.68	73.36	74.07	67.06	80.05
3rd Third	414	88.51	5.38	87.99	89.03	80.07	100.00
Total	1244	72.75	14.71	71.93	73.57	21.69	100.00

Note: n: sample size; M: Mean; SD: Standard Deviation; CI: Confidence Interval. 21.69 to 100.00.

Table 2 – Distribution of the variable Diet Quality of pregnant women according to sociodemographic and obstetric characteristics. *Montes Claros* (MG), Brazil, 2018-2019. (n=1244).

Variables	Quality Index of the Diet Adapted to Pregnant Women						**p-value
	1st Third		2nd Third		3rd Third		
	*n	%	*n	%	*n	%	
Distal Level							
Sociodemographic Characteristics							
Age Range							0.691
Older than 30	115	28.9	117	29.4	102	26.3	
20 to 30 years	213	53.5	218	54.8	226	58.2	
Younger than 20 years	70	17.6	63	15.8	60	15.5	
Marital Status							0.129
With a partner	305	73.5	328	79.2	320	77.7	
Without a partner	110	26.5	86	20.8	92	22.3	
Education							0.020
Higher education	80	19.3	71	17.1	94	22.8	
High school	259	62.6	279	67.2	274	66.3	
Elementary school	75	18.1	65	15.7	45	10.9	
Family Income (minimum wages - MW)							0.007
Higherthan 2 MW	70	17.7	83	20.6	106	26.7	
Up to 2 MW	325	82.3	320	79.4	291	73.3	
Intermediate Level							
Obstetric Characteristics							
Gestational Trimester							0.298
1st quarter	124	29.9	107	25.8	97	23.4	
2nd quarter	124	29.9	107	25.8	97	23.4	
3rd quarter	162	39.0	171	41.3	170	41.1	
3rd trimester	129	31.1	136	32.9	147	355.0	
Number of Prenatal Appointments							0.849
Six or more	120	28.9	115	27.7	122	29.5	
Less than six	295	71.1	300	72.3	292	70.5	

Note: *The variation in totals is due to loss of information; **Chi-square test. n: sample size.

Table 3 – Distribution of the variable Diet Quality of pregnant women according to clinical and behavioral characteristics and nutritional status of pregnant women. *Montes Claros* (MG), Brazil, 2018-2019. (n=1244).

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Variables	Quality Index of the Diet Adapted to Pregnant Women						**p-value
	1st Third		2nd Third		3rd Third		
	*n	%	*n	%	*n	%	
Intermediate Level							
Clinical Characteristics							
Presence of gastrointestinal symptoms							0.852
No	31	7.5	27.0	6.5	30.0	7.2	
Yes	384	92.5	388	93.5	384.0	92.8	
Diabetes *Mellitus*							0.038
No	401	97.1	411	99.0	409.0	99.0	
Yes	12	2.9	4	1.0	4.0	1.0	
Anemia							0.574
No	321	77.9	322	77.6	331.0	80.3	
Yes	91	22.1	93	22.4	81.0	19.7	
Hypertension							0.754
No	395	95.6	400	96.6	396.0	95.9	
Yes	18	4.4	14	3.4	17.0	4.1	

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Table 3 – Distribution of the variable Diet Quality of pregnant women according to clinical and behavioral characteristics and nutritional status of pregnant women. *Montes Claros* (MG), Brazil, 2018-2019. (n=1244).

Variables	Quality Index of the Diet Adapted to Pregnant Women						**p*-value
	1st Third		2nd Third		3rd Third		
	*n	%	*n	%	*n	%	
Behavioral Characteristics							
Physical Activity Practice							0.031
Mild/intense	106	29.0	123	34.1	140.0	39.0	
Light	159	43.4	155	42.9	149.0	41.5	
Sedentary	101	27.6	83	23	70.0	19.5	
Alcoholism							0.176
No	356	86	371	89.6	369.0	89.6	
Yes	58	14	43	10.4	43.0	10.4	
Proximal Level							
Nutritional Status							
Pre-Gestational Overweight							0.829
No	189	55.9	185	53.8	187	55.7	
Yes	149	44.1	159	46.2	149	44.3	
Prenatal Food Guidance							0.566
No	283	68.4	291	70.3	297	71.7	
Yes	131	31.6	123	29.7	117	28.3	
Nutritional Monitoring in Prenatal Care							0.263
Yes	30	7.2	20	4.8	21	5.1	
No	385	92.8	394	95.2	392	94.9	
Diet during Pregnancy							0.153
Yes	51	12.3	36	8.7	37	8.9	
No	364	87.7	379	91.3	377	91.1	
Number of daily meals during Pregnancy							0.003
More than 5	68	16.4	88	21.2	111	26.8	
3 to 5	326	78.6	315	75.9	291	70.3	
Less than 3	21	5.1	12	2.9	12	2.9	
Self-Perception of Food							<0.001
Very good/good	246	59.3	278	67.0	306	73.9	
Very bad/bad	169	40.7	137	33.0	108	26.1	

Note: *The variation in totals is due to loss of information; **Chi-square test. n: sample size.

and were selected for multiple analysis: diabetes *Mellitus* (p=0.038), physical activity (p=0.031), alcohol consumption (p=0.176), dieting during pregnancy (p=0.153), number of daily meals (p=0.003), and self-assessment of feeding (p<0.001) during pregnancy.

It was evident that the greatest differences in the quality of food were predominantly identified among pregnant women classified between terciles 1 and 3. Table 4 shows the adjusted odds ratios, with their respective 95% confidence intervals for Diet Quality. The Deviance statistic indicated that the multiple models presented an adequate adjustment to the data: Deviance = 64.96; gl=56; p-value=0.193.

The chances of lower Diet Quality scores (1st tercile) compared to higher scores (3rd tercile) were higher in: pregnant women with less education (primary education) (OR=2.36) compared to those with higher education; sedentary pregnant women (OR=1.75) compared to non-sedentary women; those who had negative self-perception of their diet (OR=2,00) compared to those who had a positive self-perception; and in pregnant women who ate 5 or less meals a day (OR=1.83) when compared to those who ate more than 5 meals a day. The chances of moderate Diet Quality scores (2nd tercile) relative to the highest scores

Table 4 – Association of sociodemographic, obstetric, behavioral, and nutritional status characteristics and diet quality of pregnant women". *Montes Claros* (MG), Brazil, 2018-2019. (n=1244).

Variables	IQDAG – 1st Tercile*		IQDAG – 2nd Tercile*	
	OR (95% CI)	*p*-value	*OR* (95% CI)	**p*-value
Distal Level				
Education				
Higher education	1.00		1.00	
High school	1.16 (0.79-1.68)	0.455	1.48 (1.02-2.17)	0.042
Elementary scholl	2.36 (1.39-4.01)	0.002	2.41 (1.20-4.15)	0.001
Intermediate Level				
Physical Activity Practice				
Mild/intense	1.00		1.00	
Light	1.34 (0.95-1.88)	0,093	1.14 (0.82-1.59)	0.435
Sedentary	1.37 (1.17-2.61)	0.006	1.23 (0.82-1.84)	0.320
Proximal Level				
Self-Perception of Food				
Very good/good	1.00		1.00	
Very bad/bad	2.00 (1.45-2.76)	<0.001	1.42 (1.02-1.97)	0.037
Number of Meals				
More than 5	1.00		1.00	
3 to 5	1.83 (1.26-2.67)	0.002	1.61 (1.12-2.31)	0.010
Less than 3	2.64 (1.13-6.18)	0.025	1.31 (0.51-3.36)	0.511

Note: *The IQDAG reference category is 3rd Tercile. **Multinomial analysis. Model adjustment adequacy test: the Deviance statistic indicated that the multiple model presented an adequate fit to the data: Deviance = 93.98; df=86; *p*-value=0.26. CI: Confidence Interval; IQDAG Quality Index of the Diet Adapted to Pregnant Women; OR: Odds Ratio.

(3rd tercile) were higher in pregnant women who had completed Elementary (OR=2.41) and High School (OR=1.48) compared with those who had Higher Education levels; pregnant women who had a negative self-perception of their eating (OR=1.42) compared with those who had a positive self-perception and in pregnant women who ate 5 or less meals a day (OR=1.61) when compared with those who ate more than 5 meals a day.

DISCUSSION

This study showed that, compared to those categorized in the highest tercile, the lowest quality of the diet observed in the first tercile according to IQDAG was related to pregnant women with less education, (distal level), sedentary (intermediate level), who had a negative self-perception of food and a lower fractionation of meals (proximal level). When comparing the second tercile (moderate quality) with the highest tercile, the result was similar to that of the first tercile, with a difference in the sedentary behavior variable and number of daily meals.

Women with lower scores in the first and second terciles associated with education had low and moderate qualities of diet, respectively, compared to the same women in the highest tercile. A similar finding was obtained in a study in Poland that included 815 pregnant women [25]. In this study, pregnant women with elementary education showed worse eating behaviors compared to pregnant women with higher education. In another study of 315 pregnant women in Shashemane, it was observed that a lower level of education was significantly associated with worse food choices [26]. These findings may be related to sociocultural habits and social relationships, which may interfere with food choices, as well as inequality in income distribution in the family, which may limit access to food [2,27]. It is important to reflect that in

the pregnancy-puerperal period, women potentially receive guidance on feeding from family members and from health services, and in this perspective, the health professionals of the FHS teams play an important role in promoting healthy eating during pregnancy and prenatal care [28]. The low quality of diets associated with lower educational levels during pregnancy can lead to nutritional deficiencies, compromise maternal weight gain, and make pregnant women more susceptible to the risk of developing pathologies during this period. In addition, there are greater chances of delivering children with low weight or obesity and higher risks of preterm birth [29,30].

These results may reflect the social context in which these pregnant women live and its impact on the physical and financial access to natural and healthier foods. For pregnant women in situations of social vulnerability due to issues related to personal conditions, such as low education, unemployment, and sociocultural aspects, in addition to the difficulty of accessing policy, programs, and actions that would contribute to socioeconomic equity, there is a risk of inadequate food consumption [28].

Sedentary pregnant women in the first tercile were associated with a low quality of diet when compared to pregnant women with higher scores on the IQDAG. Sedentary behavior and poor maternal nutrition are risk factors for obesity, increasing the predisposition to hypertension and gestational diabetes and complications in childbirth. For children, it may reflect on fetal macrosomia, diabetes, and future obesity [31,32]. In a study carried out with Hispanic women during prenatal care, a higher percentage of active pregnant women was observed among those with better quality of life diet [33].

The risk or health-promoting behaviors are grouped on clusters of people, where the associations between two or more behaviors can be verified. Physical activity and fruit and vegetable intake can occur concurrently because they are inherently related. These behaviors can contribute to similar goals, such as weight loss and improved overall health. Both are energy-balancing behaviors that can be substituted for their opposite risk behaviors (i.e., being sedentary and consuming energy-rich foods). These results suggest the need to promote the concomitant adoption of multiple health-enhancing behaviors [34,35].

The regular practice of physical exercises and an adequate diet during pregnancy can reduce the risk of excess weight gain and other problems at this stage, contributing to the general improvement of the mother and newborn's health. The evaluation of these characteristics during pregnancy is a tool that can support important intervention targets for maternal and child health care and impact on health hospitalization costs [34,35]. The gestational period is an opportunity to promote positive health behaviors, such as diet and physical activity, which can have both short- and long-term benefits [36,37].

It was observed that pregnant women with negative self-perception had lower scores in the first tercile and in the second tercile compared to the highest scores. The self-perception of food consumption suggests that the recognition of dietary inadequacies is the first step towards making changes in eating behavior [38]. In a study carried out with 1246 adults, users of the Basic Health Units, 36.8% had a negative self-perception of eating [39]. However, no studies that used the IQDAG associated with the pregnant woman's self-perception about feeding were identified.

Another factor associated with the low and moderate diet qualities was the number of meals eaten in the first tercile <5 meals and 3 to 5 meals, respectively, when compared to the higher scores (third tercile). The quality and adequate intake of nutrients are essential to ensure a healthy pregnancy. These nutritional needs are met with a balanced diet in accordance with the proposed nutritional recommendations [5,40,41]. In a study carried out in *Rio Grande do Sul* with 94 pregnant women, it was found that 64% of pregnant women had between 1 and 3 meals/day [42]. Desta *et al.* [43] observed that 23.2% consumed 1 to 3 meals a day. The study by Englund-Ôgge *et al.* [44] demonstrated the consumption of less than 4 meals a day among pregnant women. The fractionation of meals throughout the day allows the consumption

and adequate distribution of nutrients [45], greater intake of cereals, vegetables, and dietary fiber, and adjusted energy consumption [27]. A previous study with women attended at a Health Promotion Service also showed that insufficient diet fractionation was associated with inadequate food consumption. The lower dietary fractionation can lead to a greater volume of food in the main meals with the inclusion of unhealthy foods and high calorie intakes and, therefore, contribute to deteriorate individuals' health status [46].

The results point to the need to identify the factors associated with the quality of the maternal diet to promote adequate nutrition and thus guarantee the quality of care during prenatal care. It is crucial to advance in the incorporation of this information into the routine and practices of health professionals in the PHC teams. That requires the implementation of actions that seek to investigate the factors that may interfere with food, associated with a broad approach that involves nutritional diagnosis, as well as the development of strategies to promote adequate and healthy eating and the practice of physical activities.

The recognition by PHC teams of the potential and difficulties of the territory in relation to healthy behaviors remains a challenge. In order to develop intersectoral actions that promote a healthy lifestyle, it is important to identify partners, resources, and environments that are conducive to this practice in the territory [2]. In the scenario of the present study, the Family Health Support Center (NASF), which is characterized by the constitution of multi-professional teams, possibly with a nutritionist, will be able to work in partnership with the ESF in order to expand and qualify the actions of Nutritional Care in their work process as part of the comprehensive health care of pregnant women in prenatal care [47]. However, we highlight that the NASF model was revoked and replaced by the *Previne Brasil* policy, as per the Technical Note nº 03/2020, granting autonomy to the city's management to compose their multi-professional teams [48].

Some limitations in this study must be considered. In the evaluation of the food frequency questionnaire, the use of food supplements was not included, which may have compromised the daily intake of nutrients. The extensive questionnaire may have limited some responses. The reporting bias may have been another factor that compromised the filling of the FFQ. Another problem is the reduced accuracy in quantifying food intake by using standardized measures. Finally, the study's transversal design makes it harder to identify the temporality between exposure and outcome. On the other hand, a robust and heterogeneous sample was evaluated with a hierarchical study, associated with sociodemographic, obstetric, and clinical factors, as well as behavioral characteristics and nutritional status, as analyzed by the IDQAG.

These findings bring about new scientific data and show the factors associated with the nutritional quality of pregnant women, which should be considered in public policy so that nutritional counseling and access to food reach more women. It is fundamental to implement strategies to support the Primary Health Care professionals in individual diet counseling based on the Dietary Guidelines for the Brazilian Population. Qualifying the professionals with validated instruments is essential to promote healthy eating standards in the national scenario [49]. In this context, the importance of evaluating food intake during pregnancy and the need for more research on the factors that interfere with the quality of food during pregnancy are highlighted. Finally, this study shows that pregnant women in Primary Health Care should be oriented during prenatal care regarding adequate nutrition, as well as other health actions that promote self-care, self-perception, encouragement of physical activity, awareness of the consequences of alcohol consumption during pregnancy, and health care that involves their social context, so that health impacts are minimized.

CONCLUSION

Data indicates that poorer diet qualities during pregnancy were associated with low education, sedentary lifestyle, negative self-perception of diets, and lower diet fractionation. The analysis suggests

that nutritional interventions promoting a healthy lifestyle during prenatal appointments are necessary for the overall diet quality in pregnant women. Moreover, we highlight the importance of prospective cohort studies that explore the sociodemographic, obstetric, clinical, and behavioral factors, as well as the nutritional evaluation-related factors, that might compromise the quality of the diet during pregnancy to confirm the present study's hypothesis.

CONTRIBUTORS

GMMS LEÃO and L PINHO contributed equally to the conception of the work and interpretation of the data. LC CRIVELLENTI and MF SILVEIRA also contributed to the data analysis. MFSF BRITO contributed to the conception of the work. All authors critically reviewed the manuscript and approved the final version.

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