

Inadequacies of gestational weight gain: prevalence and association with sociodemographic characteristics and the living environment

Inadequações do ganho de peso gestacional: prevalência e associação com características sociodemográficas e do ambiente de moradia

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ABSTRACT

Objective

To assess the association of gestational weight gain inadequacies with sociodemographic indicators and characteristics of the living environment.

Methods

Cross-sectional study conducted in 2019 with a probabilistic sample of 3580 postpartum women who gave birth in maternity hospitals of the Unified Health System in the State of *Santa Catarina*. Prevalence was calculated and, using logistic regression models, odd ratios of inadequate and adequate gestational weight gain were estimated according to sociodemographic and health indicators (Body Mass Index, age, marital status, race/skin color and education); and characteristics of the neighborhood (violence, social cohesion, encouragement to practice physical activity and access to healthy food).

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Results

It was observed that 29.6% of the mothers had adequate gestational weight gain, 29.3% insufficient and 41.1% excessive gestational weight gain. Lower chances of adequate weight gain were found in women with pre-pregnancy body mass index classified as overweight (43.0%) and obesity (58.0%) and who lived in an environment with social cohesion (25.0%). In contrast, the chances of adequate weight gain were 43.0% higher among women with 12 years of schooling or more when compared to those with 8 years or less.

Conclusion

Inadequate gestational weight gain is associated with high pre-pregnancy body mass index, with social cohesion in the living environment and with a low level of education of the pregnant woman, requiring public policies that go beyond prenatal care.

Keywords: Built environment. Gestational weight gain. Health status disparities. Socioeconomic factors. Unified Health System.

RESUMO

Objetivo

Analisar a associação do ganho de inadequações do peso gestacional com indicadores sociodemográficos e características do ambiente de residência.

Métodos

Estudo transversal realizado em 2019, com amostra probabilística de 3.580 puérperas que realizaram o parto no Sistema Único de Saúde em maternidades do Estado de Santa Catarina. Foram calculadas as prevalências e, por meio de modelos de regressão logística, foram estimadas razões de chance de ganho de peso gestacional inadequado e adequado, segundo indicadores sociodemográficos e de saúde (Índice de Massa Corporal, idade, estado civil, raça/cor da pele e escolaridade) e características da vizinhança de residência (violência, coesão social, estímulo à prática de atividade física e acesso à alimentação saudável).

Resultados

Observou-se que 29,6% das puérperas tiveram ganho de peso gestacional adequado, 29,3% insuficiente e 41,1% excessivo. Menores chances de ganho de peso adequado foram encontradas em mulheres com índice de massa corporal pré-gestacional de sobrepeso (43,0%) e obesidade (58,0%) e que viviam em ambiente com coesão social (25,0%). Já as chances de ganho de peso adequado foram 43,0% maiores entre as mulheres com 12 anos ou mais de estudo quando comparadas àquelas com 8 anos ou menos.

Conclusão

O ganho de peso gestacional inadequado está associado com o índice de massa corporal pré-gestacional elevado, com a coesão social no ambiente de moradia e com a baixa escolaridade da gestante, exigindo políticas públicas que transcendam o cuidado básico do pré-natal.

Palavras-chave: Ambiente construído. Ganho de peso na gestação. Disparidades nos níveis de saúde. Fatores socioeconômicos. Sistema Único de Saúde.

INTRODUCTION

Pregnancy is a clinical condition in which an increase in the supply of nutrients and maternal energy at levels sufficient to meet the needs of the mother and fetus are required [1]. Weight gain during pregnancy occurs due to the need for fetal growth, expansion of maternal tissues, increase in blood volume and intercellular fluid, and formation of amniotic fluid [2,3,1].

Insufficient weight gain during pregnancy is associated with a higher risk of preterm delivery, small-for-gestational-age babies, and low birth weight [4]. In contrast, excessive gestational weight gain increases the chance of hypertensive disorders, gestational diabetes, cesarean delivery, preeclampsia, macrosomia, fetal distress and stillbirth [5-7,4].

Socioeconomic and built environment factors are associated with variations in Body Mass Index (BMI) among women and influence gestational weight gain. Women with lower income are more likely to experience inadequate gestational weight gain because, in general, they are more exposed to situations of stress, food and nutritional insecurity (INSAN) and have less objective conditions to maintain a healthier diet [8,9,10]. Worse outcomes have also been reported among women who self-report black color/race [11,12]. Regarding environmental factors, the socioeconomic conditions of the neighborhood, such as high poverty, high unemployment rates, poor education and lack of social spaces, may be associated with adverse birth outcomes, such as low birth weight, macrosomia and prematurity [13-16]. However, there is a lack of studies that include in their analysis the potential influence of the dwelling neighborhood on gestational weight gain [16].

Furthermore, when it comes to assessing the influence of socioeconomic factors and gestational weight gain, there are still few studies published, as shown by a recent literature review [17]. In addition, most of these studies have methodological weaknesses (such as reduced sampling or are limited to users of specific health units) or do not assess Brazilian women data, which is reflected in the poor consistency of the literature regarding the relationship between gestational weight gain and potential socioeconomic inequalities in Brazil [17,18]. Finally, there is a gap in the literature on the influence of the living environment on gestational weight gain. Therefore, the present study aimed to evaluate the influence of sociodemographic indicators and characteristics of the living environment on the inadequacies of gestational weight gain.

METHODS

This is a cross-sectional study carried out between January and August 2019 with a probabilistic and representative sample of pregnant women in the State of *Santa Catarina*. The study population consisted of puerperal women who met the following inclusion criteria: 1) lived in *Santa Catarina* during all the pregnancy period; 2) performed all prenatal visits in the *Sistema Único de Saúde* (SUS, Unified Health System) or did not perform prenatal care; 3) they delivered in one of the maternity hospitals of the SUS system in *Santa Catarina* that performs more than 500 deliveries per year ($n=31$); (4) had at least 22 weeks of gestation, giving birth to a child weighing more than 500 grams, born alive, stillborn or who died within 48 hours after delivery. Postpartum women with multiple pregnancies and who did not meet the inclusion criteria were excluded from the survey, as were postpartum women who preferred not to participate in the study and those who decided to withdraw at any time.

The sample size calculation was based on 50,000 births/year, according to 2016 data, with a confidence level of 95%, a margin of error of 1.6% and an estimated prevalence of 50.0%. To cover losses and refusals, 5.0% was added to the value obtained. The number of interviews carried out in each establishment was proportional to the number of deliveries in 2016, estimating the final sample at 3,665 postpartum women.

Initially, a pilot study was carried out in three maternity hospitals included in the survey, covering 5.0% of the total sample. All interviewers were over 18 years of age and trained to apply appropriate interview and survey questionnaire techniques.

The application of the questionnaire was carried out up to 48 hours after delivery, in the hospital setting and using tablets. Data were stored on the RedCap platform and were sent daily from each municipality to the research central server. An eight questions questionnaire was applied by telephone to a random sample of 10.0% of the postpartum women interviewed, in order to control data quality. More details of the sampling procedure have been published in a previous article [19].

The outcome of the present study was gestational weight gain, comparing the weight reported by the puerperal woman before pregnancy with the weight reported at the end of pregnancy. Weight gain was categorized into: insufficient weight gain, adequate weight gain, and excessive weight gain. To that effect the pre-gestational nutritional status was initially classified based on the BMI, calculated from the pre-gestational height and weight reported at the time of the interview, according to the formula: weight / height². The pre-gestational BMI classification of adolescents (14-19 years) was based on the growth curves of the World Health Organization (WHO) [20]. The adequacy of weight gain in adult women was based on the recommendations of the Ministry of Health, as shown in Table 1 [2], considering insufficient weight gain when women exhibited values lower than the minimum value of the interval of gestational weight gain, and excessive weight gain when presenting values greater than the maximum value of the interval.

As exposure variables, the sociodemographic indicators and environmental characteristics were considered. The sociodemographic indicators were: age (14 to 19 years, 20 to 29, 30 to 39 and 40 to 46), marital status (married/common law marriage / with a partner and single), Divorced and widowed women were excluded due to the low number of respondents (1.1%), education (≤ 8 years of schooling, 9 to 11 years of schooling and ≥ 12 years of schooling), and self-reported race/skin color (white, black or brown, indigenous and yellow). were also excluded due to the low number of respondents (2.4% of the sample). The dwelling neighborhood was considered violent when the pregnant woman reported having frequently robberies or assaults in the last six months or if she did not feel safe walking during the day or at night in her neighborhood. Social cohesion was defined when the puerperal woman answered yes to the questions: "In your neighborhood, are people willing to help neighbors?" and "Your neighborhood is well-knit, that is, people are able and willing to join around common interests?" Encouraging the practice of physical activity was considered when there was a positive response to two questions: "Does your neighborhood offer many conditions for people to be physically active (for example, they can go for a walk, ride a bike, etc.)?" and "Is it pleasant to go for walks in your neighborhood?". Finally, access to healthy food was determined when the answer was positive for the question "Is there a wide variety of fresh fruits and vegetables on sale near your home?" and negative for "Are there many places for snacks and quick meals (fast-food) close to your home?". Environmental indicators were categorized into "yes" or "no".

To perform the logistic regressions, a dichotomous outcome was used, so that the categories "insufficient gestational weight gain" and "excessive gestational weight gain" were combined and transformed into "inadequate gestational weight gain", while the category "adequate gestational weight gain" was kept unchanged.

The absolute and relative frequencies of the variables investigated were estimated. Then, the association between the outcome variable and the exposure variables was estimated using Logistic Regression, obtaining as a measure of association the Odds Ratio (OR) with the relevant confidence intervals, calculated from raw and adjusted models. The variables were included according to the stepwise forward procedure. Data analysis was performed using the Stata Program version 15.1 (StataCorp, Texas, USA).

The research was approved by the *Comitê de Ética em Pesquisa com Seres Humanos* (CEPSH, Ethics Committee in Research with Human Beings) of the Federal University of *Santa Catarina* (Opinion nº 1,599,464), fully complying with the ethical precepts recommended by the National Health Council Resolution 510/16. All participants signed a Free and Informed Consent Form (FICF), and they were free to decide whether or not to participate in the survey.

RESULTS

The study showed a response rate of 96.7%, totaling the participation of 3,580 postpartum women. The mean age was 27 years (standard deviation [SD] = 6.4 years); most respondents were

under common-law marriage or were living with a partner (82.5%); they considered themselves white (63.4%) and had studied for more than 12 years (49.6%). Regarding the neighborhood, there was a higher frequency of residents in places without violence (83.9%), with social cohesion (82.8%), which encourages physical activity (66.0%) and with access to healthy food (93.4%) (Table 1).

Out of the total number of postpartum women, approximately 29.5% experienced insufficient gestational weight gain, a value similar to that observed for adequate gestational weight gain, and lower than the excessive gestational weight gain (40.8%). Regarding pre-gestational BMI, almost half of the sample was considered eutrophic and about 26.5% overweight (Table 1).

Table 1 – Recommended weight gain (in kg) during pregnancy according to the pre-gestational state.

Pre-gestational nutritional status	Gestational week	
	14 – 36	37 or more
Low weight	0,44 – 0,58 kg/week	12.5 to 18.0 kg
Eutrophy	0,35 – 0,50 kg/week	11.5 to 16.0 kg
Overweight	0,23 – 0,33 kg/week	7.0 to 11.5 kg
Obesity	0,14 – 0,27 kg/week	5.0 to 9.0 kg

Source: Ministério da Saúde [2].

The prevalence of insufficient weight gain was higher in women with low pre-pregnancy BMI weight (35.6%), who were over 40 years of age (36.3%), single (31.4%), of race/skin color black (35.3%) and with 8 or less years education. Adequate weight gain was more common among women with low pre-pregnancy weight (35.0%) and had a similar distribution among the other variables assessed. Excess gestational weight gain affected more than half of obese women (58.7%); in 42.2% of those aged between 30–39 years, in 41.2% of those married/under common law marriage/with a partner, of brown skin color/ethnicity (44.5%) and in at least one in three women in all income brackets. Regarding environmental indicators, women who lived in a neighborhood without violence (41.3%), with social cohesion (42.3%), that encourages physical activity (41.6%) and without access to healthy food (43.6%) had a higher prevalence of high gestational weight gain (Table 2).

Figure 1 shows the difference in weight before and at the end of pregnancy, according to maternal BMI before pregnancy. The mean weight gain was higher among women with low initial weight (15.1 kg; SD=6.2 kg) and lower among those who were obese (9.3 kg; SD=7.6 kg) before pregnancy. However, it is noteworthy that data dispersion was greater in the overweight and obese group. The standard deviation for obese women was 7.6 kg and for overweight women 6.7 kg, compared with 5.9 kg for the group that had adequate pre-pregnancy weight.

Table 3 presents the results of the crude and adjusted logistic regression analysis between women with adequate gestational weight gain with sociodemographic factors and environmental indicators. All associations observed in the crude analysis remained in the adjusted analysis. In this analysis, it was observed that women with overweight and obese prepregnancy BMI had 56.0% and 41.0%, less chances of adequate weight gain respectively, when compared with low weight prepregnancy BMI. Regarding the sociodemographic variables, greater chances of adequate weight gain were observed among postpartum women with higher education, that is, in women with 9 to 11 (59.0%) and 12 or more (44.0%) years of schooling, when compared with those with eight years of study or less. The only environmental variable

Table 2 – Prevalence of gestational weight gain according to sociodemographic characteristics and environmental indicators. *Santa Catarina, Brazil, 2019.*

Variables	Total sample		Prevalence of weight gain (%)					
	n	%	Insufficient		Adequate		Excessive	
			%	(95%CI)	%	(95%CI)	%	(95%CI)
Pre-pregnancy BMI (n=3,537)								
Low weight	118	3.4	35.6	(27.4-44.6)	39.0	(30.6-48.1)	25.4	(18.3-34.0)
Eutrophy	1611	45.6	35.0	(32.7-37.4)	35.0	(32.7-37.4)	27.1	(25.0-29.3)
Overweight	868	24.5	27.5	(24.6-30.6)	27.5	(24.7-30.6)	49.2	(45.9-25.5)
Obesity	940	26.5	21.3	(18.8-24.1)	21.3	(18.8-24.1)	58.7	(55.5-61.9)
Age (years) (n=3,538)								
14 – 19	472	13.3	28.1	(24.2-32.4)	32.0	(27.9-36.3)	39.9	(35.5-44.4)
20 – 29	1916	54.2	30.5	(28.5-32.6)	28.8	(26.8-30.8)	40.7	(38.5-42.9)
30 – 39	1048	29.6	27.6	(25.0-30.4)	30.2	(27.3-32.8)	42.2	(39.2-45.2)
40 – 46	102	2.9	36.3	(27.5-46.0)	32.3	(24.0-42.0)	31.4	(23.1-41.0)
Marital status (n=3,495)								
Married/ common law marriage /with partner	2883	82.5	29.1	(27.5-30.8)	29.6	(28.0-31.3)	41.2	(39.4-43.0)
Single	6212	17.5	31.4	(27.8-35.1)	29.7	(26.2-33.5)	38.9	(35.1-42.8)
Race/skin color/ethnicity (n=3,434)								
White	2176	63.4	29.4	(27.5-31.4)	31.0	(29.1-33.0)	39.5	(37.5-41.6)
Brown	934	27.2	27.5	(24.7-30.4)	28.0	(25.2-31.0)	44.5	(41.3-47.7)
Black	324	9.4	35.3	(30.3-40.7)	25.7	(21.2-30.8)	39.0	(33.8-44.4)
Education (n=3,487)								
≤ 8 years	656	18.8	33.0	(29.6-36.8)	23.0	(20.0-26.5)	43.8	(40.0-47.7)
9 – 11 years	1102	31.6	27.8	(25.2-30.6)	31.9	(29.2-34.7)	40.3	(37.5-43.3)
≥ 12 years	1729	49.6	29.6	(27.5-31.8)	30.9	(28.8-33.1)	39.5	(37.2-41.8)
Living in violent neighborhood (n=3,409)								
No	2860	83.9	28.9	(27.2-30.5)	29.8	(28.1-31.5)	41.3	(39.5-43.1)
Yes	549	19.1	32.1	(28.4-36.2)	30.2	(26.4-34.1)	37.6	(33.7-41.8)
Living in neighborhood with social cohesion (n=3,351)								
No	578	17.2	31.9	(28.2-35.9)	35.0	(31.3-39.0)	33.0	(29.3-36.9)
Yes	2773	82.8	28.9	(27.2-30.5)	28.7	(27.0-30.4)	42.3	(40.5-44.2)
Living in a neighborhood that encourages physical activity (n=3,455)								
No	1175	34.0	30.0	(27.4-32.6)	30.6	(28.0-33.2)	39.4	(36.7-42.3)
Yes	2280	66.0	29.0	(27.2-31.0)	29.3	(27.4-31.2)	41.6	(39.6-43.7)
Living in a neighborhood with access to healthy food (n=3,526)								
No	236	6.7	27.8	(22.4-33.9)	28.6	(23.2-34.8)	43.6	(37.3-50.0)
Yes	3290	93.3	29.7	(28.1-31.3)	29.8	(28.2-31.4)	40.5	(38.8-42.2)
Total	3515	100	29.5	(28.0-31.0)	29.7	(28.2-31.3)	40.8	(39.1-42.4)

Note: 95%CI: Confidence interval.

associated with gestational weight gain was social cohesion, in which women who lived in a neighborhood with social cohesion were 26.0% less likely to have adequate weight gain compared to those who reported not living in a neighborhood exhibiting that feature.

DISCUSSION

The present study aimed to evaluate the association between sociodemographic factors and environmental characteristics in the inadequacy of gestational weight gain. High gestational weight gain

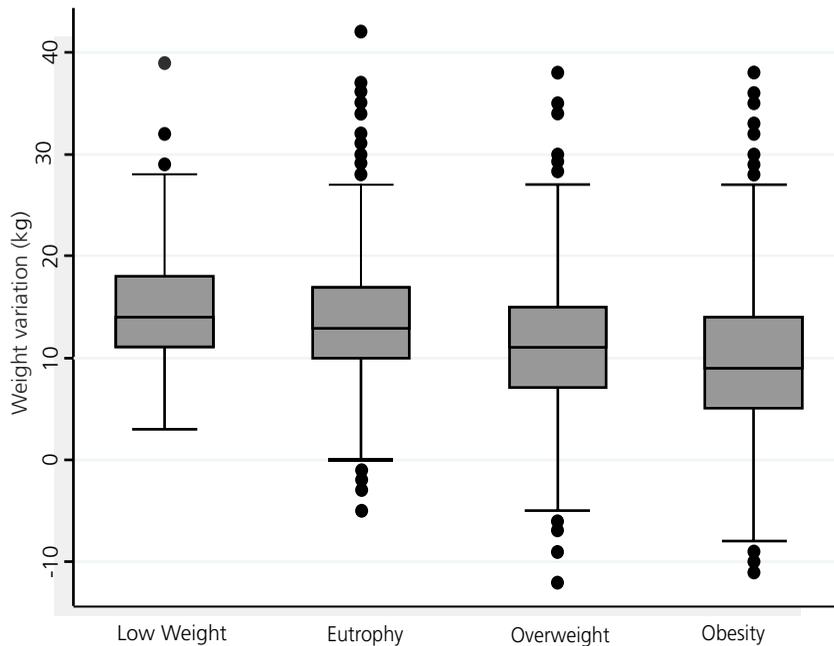


Figure 1 – Boxplot with weight variation before and at the end of pregnancy according to the maternal Body Mass Index before pregnancy. Santa Catarina, Brazil, 2019.

Table 3 – Crude and adjusted logistic regression analysis between adequate gestational weight gain with sociodemographic factors and environmental indicators. Santa Catarina, Brazil, 2019.

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Variables	Adequate weight gain			
	OR	(95%CI) ¹	OR	(95%CI) ²
Pre-pregnancy BMI				
Low weight	1.00	-	1.00	-
Eutrophy	0.84	(0.57-1.23)	0.81	(0.54-1.22)
Overweight	0.59	(0.39-0.88)	0.56	(0.36-0.85)
Obesity	0.41	(0.27-0.61)	0.41	(0.27-0.63)
Age (Years)				
14 – 19	1.00	-	1.00	-
20 – 29	0.85	(0.68-1.06)	0.91	(0.71-1.17)
30 – 39	0.91	(0.72-1.16)	1.06	(0.80-1.39)
40 – 46	1.02	(0.64-1.61)	1.31	(0.77-2.23)
Marital status				
Married/ common law marriage/with partner	1.00	-	1.00	-
Single	1.00	(0.83-1.21)	1.03	(0.84-1.28)
Race/skin color/ethnicity				
White	1.00	-	1.00	-
Brown	0.87	(0.73-1.03)	0.89	(0.74-1.07)
Black	0.77	(0.59-1.00)	0.89	(0.67-1.18)
Education				
≤ 8 years	1.00	-	1.00	-
9 – 11 years	1.57	(1.25-1.96)	1.59	(1.24-2.03)
≥ 12 years	1.49	(1.21-1.84)	1.44	(1.14-1.82)
Living in a violent neighborhood				
No	1.00	-	1.00	-
Yes	1.02	(0.83-1.24)	0.93	(0.81-1.15)

Table 3 – Crude and adjusted logistic regression analysis between adequate gestational weight gain with sociodemographic factors and environmental indicators. *Santa Catarina, Brazil, 2019.*

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Variables	Adequate weight gain			
	OR	(95%CI) ¹	OR	(95%CI) ²
Living in a neighborhood with social cohesion				
No	1.00	-	1.00	-
Yes	0.74	(0.61-0.89)	0.75	(0.61-0.93)
Living in a neighborhood that encourages physical activity				
No	1.00	-	1.00	-
Yes	0.93	(0.80-1.08)	0.97	(0.81-1.15)
Living in a neighborhood with access to healthy food				
No	1.00	-	1.00	-
Yes	0.94	(0.70-1.26)	1.00	(0.72-1.38)

Note: ¹Gross logistic regression; ²Logistic regression adjusted for pre-gestational BMI, age, marital status, skin color/race/ethnicity, schooling, *per capita* income, neighborhood with violence, neighborhood with social cohesion, neighborhood that encourages physical activity, and neighborhood with access to healthy food. OR: Odds Ratio; 95%CI: Confidence Interval.

was the most prevalent, while approximately only one in three women experienced adequate weight gain. Lower odds of adequate weight gain were found in women with overweight and obesity in pre-pregnancy BMI who lived in a socially cohesive environment, and greater odds of adequate weight gain were observed in women with higher education.

Data similar to those of the present study were found in other regions of Brazil when reviewing data of women assisted by the SUS (1,21–23). The reported prevalence of adequate weight gain was 27.5% in a study carried out in *Rio de Janeiro* [21] and 33.5% in *Pelotas* (RS), values very close to those of the present study (29.6%). Regarding excessive gestational weight gain, data from *Aracaju* (SE) indicate a prevalence of 45.4% [22] while in *Horizonte* (CE) [23] more than half of the women presented this classification (61.8%). Insufficient weight gain also had a high prevalence, being 35.1% in *Aracaju* and 32.6% in *Horizonte* (CE). Internationally, we also found high prevalence of excessive weight gain, very close to that found in the present study (40.8%) being 41.0% in Australia [24] and 40.91% in Mexico [25].

The results of the association between pre-gestational BMI and gestational weight gain are in line with those found in the literature. It is worth noting that according to the Ministry of Health's recommendations, women with low pre-pregnancy weight are expected to experience greater weight gain compared to overweight and obese women [2]. This result was actually found in the present study when assessing weight gain in kilograms. When analyzing categorized weight gain, in the state of *Rio Grande do Sul*, the study by Drehmer *et al.* [26] highlighted a higher risk of excessive weight gain in pregnant women who were overweight or obese at the beginning of pregnancy, and that pre-pregnancy low weight BMI increased the chance of insufficient weight gain; however in our study adequate weight was the most frequently observed weight in the latter group.

Lifestyles and psychosocial factors may be associated with the fact that women with a higher pre-pregnancy BMI tend to exhibit behaviors that enhance excessive weight gain during pregnancy [1,24]. It is noteworthy that excessive gestational weight gain may be associated with cases of diabetes and gestational hypertension, preeclampsia, fetal distress, cesarean delivery and cases of large-for-gestational-age newborns or stillbirths [4,7]. Furthermore, as long-term consequences, excessive weight gain during pregnancy is a major determinant of obesity among post-pregnancy women [5,6]. However, women with a low prepregnancy BMI and insufficient weight gain, are at greater risk of giving birth to a small-for-gestational-age newborn and occurrence of premature birth [27, 1]. Thus, even though most studies highlight

the concern with excessive weight gain, there should also be a concern with insufficient gestational weight gain [1]. Thus, weight gain and maternal nutrition must be constantly evaluated, as well as nutritional counseling during prenatal care [26,28].

The present study showed that women aged between 20 and 39 years were puerperal women with the highest rate of excessive weight gain. In Australia, Fealy *et al.* [24] found maternal age as the only demographic factor that influenced maternal weight gain, with older women (34 to 41 years old) being less likely to gain excessive weight when compared to younger women (18 to 24 years old). Adult women in the middle age group are in constant metabolic change, such as a reduction in the basal metabolic rate, which, when associated with lifestyle habits that promote an imbalance between caloric consumption and expenditure, can result in excess weight, especially during pregnancy [29].

Data from this study demonstrate that postpartum women with more education (9–11 years and ≥ 12 years) were the ones with the highest chances of adequate weight gain. National and international studies show that women with little schooling are more likely to have insufficient weight gain when compared to those with more than 16 years of education [30,18,23,21,31]. Women with a higher educational level tend to have greater knowledge about healthy eating and the benefits of physical activity and, therefore, are more likely to have better lifestyle habits [32,33]. It is also important to point out that low schooling may indirectly reflect on the purchasing power of pregnant women and hence, be possibly a mark of lower access to healthier foods because they do not have the economic conditions to purchase those foods [34,35].

Among the environmental indicators, women who lived in neighborhoods with social cohesion were less likely to gain adequate weight compared to those who lived in neighborhoods without social cohesion. These data do not corroborate with other studies that evaluated the influence of the interaction between neighbors. Messer *et al.* [36] describe that, during pregnancy, increasing social interaction at the neighborhood level and the perception of social support among women can facilitate beneficial maternal health behaviors [36]. Social support is considered an interpersonal facilitator of physical activity [37]; it can influence food choices and reduce stress and promote access and stimulation for prenatal consultations [38,36].

However, social cohesion may depend on other criteria, such as neighborhoods with social spaces, parks and sidewalks, which allow the presence of people. In addition, street paving and aesthetic qualities of neighborhoods can reduce perceived stress, increase physical activity, and promote the convenience of walking to the nearest place for food shopping and social interaction [36]. Thus, even though the majority of the population studied is united and willing to help neighbors, other characteristics of the neighborhoods can influence adequate social support for pregnant women, which may be associated with the result of greater inadequate gestation weight gain in these women.

The present study has limitations. Possible comorbidities and clinical conditions that have not been evaluated and that may be associated with weight gain during pregnancy stand out; differences in the beginning, follow-up and guidance received by pregnant women in their prenatal care; the exclusion of postpartum women with multiple pregnancies, and the impossibility of carrying out an assessment of gestational weight gain by trimester, as well as objective measurement of weight and height of the participants before and at the end of pregnancy. The data used were self-reported and may be subject to memory bias. However, the literature recommends the collection of self-reported data in epidemiological surveys with large populations, as is the case of this survey [39,40]. As strengths, we highlight the high number of interviewees, with extensive collection in all regions of *Santa Catarina* and the application of a questionnaire tested by extensively trained interviewers.

CONCLUSION

Even with existing efforts in prenatal care at SUS, it is necessary to expand strategies aimed at promoting adequate gestational weight gain. Thus, the survey results help to understand the socioeconomic factors and environmental indicators presented in this study, which can contribute to collective health actions and policies that promote adequate gestational weight gain in pregnant women assisted in the Primary Care services. It is also suggested that other studies be carried out on this subject, as there is a lack of studies that assess the influence of socioeconomic factors and, especially, the environmental factor on weight gain during pregnancy.

CONTRIBUTORS

CB ZANLOURENSI contributed to the study design, performed the data analysis and final writing; KJP WAGNER worked on the study design, data collection, data analysis and final writing. AF BOING worked on the study design, data collection and final writing.

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