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Excess weight among women in a low-income urban community: socioeconomic, demographic and reproductive factors

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Abstract *The aim of the present study was to investigate the prevalence of excess weight and associated factors in women of reproductive age living in a low-income community. A cross-sectional study was conducted with a sample of 663 women 15 to 49 years of age residing in the neighborhood of Coelhos in the city of Recife, Brazil. Body mass index (BMI)-for-age was used to classify the nutritional status of the adolescents (15 to 19 years of age), adopting Z-score of ≥+1 for the definition of overweight. For the adults, BMI≥25.0 kg/m² was considered indicative of overweight. Socioeconomic, demographic and reproductive variables were analyzed as possible factors associated with overweight. The prevalence of excess weight was found in two thirds of the sample. The results of the Poisson multiple regression analysis showed a significantly higher prevalence of excess weight with the advance in age, among those with a younger menarche age, those who had three or more pregnancies, those living with their partner and those self-declared black or white. Multiparity was the only factor associated with excess weight that could be modified, which underscores the importance of prenatal and family planning services to its prevention and control.*

Key words *Poverty areas, Body Mass Index, Overweight, Menarche, Pregnancy*

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Introduction

Excess weight is a public health problem that affects a large portion of the adult population throughout the world[1,2] as well as a significant percentage of women of reproductive age[1,3-5]. Comparing data from the Brazilian National Family Expenses Study (1974-1975), which was the first Brazilian survey on food consumption, family expenses and nutritional status in a representative sample of the population, to data from the Surveillance of Risk and Protection Factors for Chronic Diseases (2017), excess weight among women nearly doubled, going from 28.7% to 51.2%[4,5].

Excess weight is a multifactor condition secondary to excessive food intake and the inadequate burning of calories. This process is triggered by genetic, biological, social and environmental factors, particularly inadequate dietary practices and a low level of physical activity[6-10]. The major associated biological factors related to the female reproductive cycle are age at menarche and number of pregnancies[10-14].

With regard to socioeconomic and demographic aspects, few studies have been conducted to analyze the increase in excess weight in the context of poverty, especially among women living in low-income communities, who are more vulnerable to social determinants of changes in weight[15-17]. In this scenario of social inequity, the hypothesis has been put forth that weight gain stems an inability to afford the maintenance of a healthy diet[17]. This hypothesis encompasses all contexts in which women are found and involves a combination of unfavorable socioeconomic, environmental and biological conditions, the interrelations of which favor the occurrence of excess weight.

Therefore, the aim of the present study was to evaluate the prevalence of excess weight and associated factors in women of reproductive age residing in a low-income community in the city of Recife, Brazil.

Methods

A cross-sectional study was conducted involving women of reproductive age residing in the neighborhood of Coelhos in the city of Recife, using data from the "Health, Nutrition and Health Services in a Low-Income Population of Recife: a baseline study". This community has a population of approximately 7,633 residents in 2,322 households, with a mean monthly household income of R$ 898.41. Women are the head of the household in 53.6% of homes. The literacy rate is 87.7% among the population aged 10 years or older and the mean number of residents per home is 3.6[18]. Primary health care is offered by two Family Health Units.

Simple random sampling without replacement was performed. To ensure the representativeness of the sample, households were selected by a random drawing method with probability proportional to the estimate of the total number of women 15 and 49 years of age residing in the study location.

The sample size was calculated considering the prevalence of excess weight reported in a previous study[6] (41.7% among women of reproductive age). Establishing a 5% maximum margin of error and 95% confidence interval, the total sample was estimated to be 374 adolescents and adults. Adopting the data obtained by Pinheiro et al.[19] who found a percentage of 54.0% of overweight in women between 15 and 49 years of age with menarche over 13 years of age and 67.7% of overweight among those with menarche 13 years of age or younger, a power of the study of 80.0%, confidence interval of 95.0% and a ratio of 1:3 among exposed women: unexposed we obtained a total sample estimate of 572 women (143 exposed:429 unexposed). The sample was increased by 16.0% to compensate for possible dropouts, resulting in a minimum sample of 663 women.

The eligibility criteria for inclusion of women in the study were: age between 15 and 49 years and living in the community of Coelhos. Women who, at the time of data collection, had not presented the menarche, were pregnant, and those with cognitive impairment that impeded answering the questionnaires and those with a physical limitation that prevented anthropometric evaluation were excluded from the study.

The dependent variable was nutritional status, which was assessed based on body mass index for age (BMI/A) in adolescents and BMI in adults. The independent variables were categorized as follows: economic class (B1/B2/C1; C2; D/E); age group (15-19; 20-35; 36-49 years); self-declared skin color (brown, yellow and indigenous; black; white); schooling (≤eight; ≥nine years of study); conjugal status (with partner; without partner); formal employment (no; yes); head of household (no; yes); beneficiary of Family Grant Program (no; yes); age at menarche (<12; ≥12 years); number of pregnancies (nul-

liparous; 1-2; ≥3); and screening for common mental disorders using the classification proposed by Mari and Williams[20] (<8 points=no; ≥8 points=yes).

Family information and anthropometric data were collected in the participants' households between June and December 2014 by a trained fieldwork team. Weight was determined using an electronic scale (Model MEA-03200/Plenna) with a capacity of 150 kg and sensitivity of 100 g. Height was measured using a portable stadiometer (Alturaexata® Ltd.) with a capacity of 213 cm and precision of 1 mm. Weight and height were determined in accordance with the techniques proposed by Lohman et al.[21] in duplicate followed by the calculation of the mean. To ensure consistency, the measurements were repeated if differences were larger than 100 g for weight and 0.5 cm for height and the mean of the two closest values was used.

The nutritional status of the adolescents was evaluated based on BMI/A expressed in z-scores using the AnthroPlus program, version 3.2.2. The cutoff points established by the WHO were considered[22]: <-2 z-scores=underweight; ≥-2 and <+1 z-score=ideal range; ≥+1 and <+2 z-scores=overweight; ≥+2 z-scores=obesity. For the statistical analysis, two categories were created: without excess weight (those categorized as underweight and in the ideal range) and with excess weight (overweight and obesity).

For the adults (20 to 49 years of age), nutritional status was evaluated based on the BMI using the WHO classification[23]: <18.5 kg/m²=underweight; 18.5 to 24.9 kg/m²=ideal range; 25.0 to 29.9 kg/m²=overweight; and ≥30.0 kg/m²=obesity. Two categories were created for statistical analysis, similar to those used in the evaluation of the nutritional status of adolescents.

The economic class of the families was determined using the Brazilian Economic Classification Criteria established by the Brazilian Association of Research Firms[24]. This classification involves a point attribution system based on the number of consumer goods and schooling of the head of the family. The sum of these points determines economic class, which is categorized from highest to lowest as A1, A2, B1, B2, C1, C2, D and E.

Screening for common mental disorders was performed using the Self-Reporting Questionnaire (SQR-20) developed by the WHO[25] and validated for the Brazilian population[20]. This instrument is composed of 20 questions. The total score ranges from 0 to 20 points, with a higher score denoting a greater probability of traits of depression and anxiety.

The questionnaires created with pre-coded closed-ended questions were revised throughout the data collection process. The data were entered into the database twice and checked for consistency using the *Data Compare* command of Epi-Info 3.5.4 for Windows.

The bivariate analyses were performed with the aid of the Statistical Package for the Social Sciences, version 13.0 (SPSS Inc., Chicago, IL, USA) to determine associations between the independent variables and outcome using Pearson's chi-square test. Variables with a p-value<0.20 in the bivariate analyses were incorporated into the multiple Poisson regression analysis.

Crude and adjusted prevalence ratios (PR) were estimated with respective 95% confidence intervals (CI) using STATA 7.0 (Stata, Texas, USA). The independent variables were incorporated into the regression models in blocks using a previously established hierarchical conceptual model, beginning with Block I (economic class, age, self-declared skin color and conjugal status), followed by Block II (age at menarche and number of pregnancies).

This study received approval from the Human Research Ethics Committee of the *Instituto de Medicina Integral Professor Fernando Figueira* (IMIP). The statement of informed consent[26] was signed by all participants older than 18 years of age and legal guardians of the participants less than 18 years of age.

Results

Table 1 displays the nutritional status of the participants based on BMI. Excess weight was identified in two thirds of the sample (66.3%). The proportion of overweight was discretely higher (35.7%) than the proportion of obesity (30.6%).

Table 2 displays the sociodemographic, reproductive and behavioral characteristics of the sample. More than half of the participants belonged to economic classes B1/B2 and C1/C2 (66.4%) and had more than eight years of schooling (64.6%). Half of the sample was between 20 and 35 years of age (50.5%), 40.6% lived with a partner, 30.6% were the head of the household and 62.0% were beneficiaries of the Family Grant Program. The percentages of women with excess weight were significantly higher with the increase in age, among those self-declared black or white, those who lived with a partner, those who report-

ed having their menarche prior to 12 years of age and those who had three or more pregnancies.

Table 3 displays the results of the simple and multiple Poisson regression analyses of the sociodemographic and reproductive variables associated with excess weight in the sample. The adjusted PRs were significantly higher with the advance in age, among participants self-declared black or white, among those who lived with a partner, among those who reported the occurrence of the menarche prior to 12 years of age and those with three or more pregnancies.

Discussion

This study was conducted in a low-income community in the city of Recife, Brazil, to investigate the prevalence of excess weight and associated factors in women of reproductive age. The findings reveal that two thirds of the women had excess weight, which was associated with the advance in age, skin color, conjugal status, age at the first menstrual episode and the number of pregnancies.

The high prevalence of excess weight in the present sample confirms that this is a problem in the female population, as demonstrated in data published by the WHO[1]. Other data in the literature also corroborate our results[27-29].

The prevalence of excess weight in the population studied is further evidence of the epidemic of obesity in emerging countries, such as Brazil. This growing trend was also reported in two population-based studies conducted in the state of Pernambuco (northeastern Brazil) in 1997 and 2006[6]. The same was also found on the national level through the VIGITEL Telephone Inquiry conducted with the female population in capital cities, with rates of 38.8% in 2006[29] and 51.2% in 2017[5]. The prevalence of excess weight in women has increased in developed countries, such as the United States (63.2%), United Kingdom (58.9%) and Canada (58.5%)[3], as well as developing countries, such as Chile (61%)[30] and Jamaica (62%)[31].

Age stands out among the factors associated with excess weight, as the advance in age was accompanied by an increase in the prevalence of the outcome. Similar results are described in previous studies[12,32,33]. The high prevalence of excess weight in older women likely occurs due to the greater accumulation of fat over the years due the reduction in the metabolism[34] and decrease in the level of physical activity.-

White and black skin color was also associated with excess weight. This finding is in contradiction with data described in the literature. A telephone survey involving the population of adults and seniors found a greater susceptibility to excess weight only in black women[35]. In contrast, a study conducted in northeastern Brazil found no significant association between excess weight and skin color[6]. This divergence may be due to the fact that skin color was self-declared, which may have led to the occurrence of a misclassification.

Living with a partner was another demographic variable associated with excess weight in the present sample. This result is in agreement with data described in two national studies conducted with secondary data from the 2006[35] and 2008[36] VIGITEL surveys as well as a study conducted in the United States with 20 years of data from the National Longitudinal Study of Youth[37]. Individuals with a stable conjugal life are more likely to have company at meals and may therefore have the habit of eating more regularly and/or having more high-calorie foods, favoring an increase in weight. Another possible explanation is that couples in a stable relationship may be less concerned with their body weight due to the fact that they are not seeking a partner[38].

The prevalence of excess weight was higher among the participants who had an early menarche. Similar findings have been described in other cross-sectional studies conducted in Brazil[7,32] and Japan[39], indicating that an early menarche is a contributing factor to overweight and obesity in adulthood. The findings of previous studies conducted in northeastern Brazil also suggest that an early menarche is a precursor of excess weight in women in the states of Ceará[32] and Pernambuco[19]. Moreover, as study conduct-

Table 1. Nutritional status of women 15 to 49 years of age. Recife, Brazil, 2017.

Nutritional status*	n=663	%
Underweight	21	3.2
Ideal range	202	30.5
Excess weight	440	66.3
Overweight	237	35.7
Obesity	203	30.6

*Evaluated by body mass index for age (BMI/A) in adolescents (WHO, 2009) and BMI in adults (WHO, 1995).

Source: Elaborated by the authors.

Table 2. Excess weight in women 15 to 49 years of age according to sociodemographic, reproductive and behavioral characteristics. Recife, Brazil, 2017.

Variables	Total		Excess weight			p-value
	n=663	%	n	%	95% CI	
Economic class						0.150
D, E	223	33.6	137	61.4	54.9-67.6	
C2	270	40.7	185	68.5	62.9-74.0	
B1, B2, C1	170	25.7	118	69.4	62.4-76.4	
Age group (years)						< 0.001
15-19	64	9.7	25	39.1	28.1-51.3	
20-35	335	50.5	212	63.3	58.0-68.2	
36-49	264	39.8	203	76.9	71.5-81.6	
Skin color						< 0.001
Brown, yellow, indigenous	452	68.2	281	62.2	57.6-66.6	
Black	76	11.5	57	75.0	65.0-84.9	
White	135	20.4	102	75.6	67.7-82.0	
Schooling (years)						0.858
≤8	235	35.4	157	66.8	67.7-82.0	
≥9	428	64.6	283	66.1	61.5-70.4	
Conjugal status						< 0.001
With partner	394	59.4	239	60.7	55.7-65.3	
Without partner	269	40.6	201	74.7	69.3-79.5	
Formal employment						0.581
No	323	48.7	211	65.3	60.0-70.3	
Yes	340	51.3	229	67.4	62.3-74.9	
Head of household						0.346
No	460	60.4	300	65.2	60.8-69.4	
Yes	203	30.6	140	69.0	62.3-74.9	
Beneficiary of Family Grant Program						0.988
No	252	38.0	162	64.3	58.2-69.9	
Yes	411	62.0	278	67.6	63.0-72.0	
Age at menarche (years)						0.033
≥12	515	77.7	331	64.3	60.0-68.3	
<12	148	22.3	109	73.6	66.0 - 80.0	
Number of pregnancies						< 0.001
Nulliparous	93	14.0	45	48.4	38.5-58.4	
1-2	301	45.4	188	62.5	56.9-67.7	
≥3	269	40.6	207	77.0	71.6-81.6	
Common mental disorder (SQR-20)						0.278
No (<8 points)	482	72.7	314	65.1	60.8-69.4	
Yes (≥8 points)	181	27.3	126	69.6	62.8-76.3	

CI: confidence interval; SQR-20: Self-Reporting Questionnaire; p-value: Pearson's chi-square test.

Source: Elaborated by the authors.

ed in the state of Minas Gerais (southeastern Brazil) found that women who had an early menarche were threefold more likely to be obese[12]. However, it has been questioned whether an early menarche is the cause or consequence of excess weight. Longitudinal studies indicate that the early occurrence of menstruation may be due to a greater amount of adipose tissue in childhood, triggering the production of estrogen through androgen precursors of the adrenal gland and leading to early sexual maturation[40,41].

The number of pregnancies was associated with excess weight, which is in agreement with data described in previous studies. Indeed, a

Table 3. Prevalence ratios for excess weight in women 15 to 49 years of age according to sociodemographic and reproductive characteristics. Recife, Brazil, 2017.

Variables	Crude PR	95%CI	Adjusted PR	95%CI	p-value
Block I					
Economic class					
D, E	1.00		1.00		
C2	1.11	0.97-1.27	1.11	0.98-1.27	0.083
B1, B2, C1	1.12	0.97-1.30	1.09	0.94-1.25	0.241
Age group (years)					
15-19	1.00		1.00		
20-35	1.62	1.18-1.22	1.50	1.09-2.07	0.013
36-49	1.97	1.44-2.49	1.83	1.33-2.51	<0.001
Skin color					
Brown, yellow, indigenous	1.00		1.00		
Black	1.20	1.03-1.39	1.16	1.02-1.38	0.041
White	1.21	1.07-1.37	1.17	1.03-1.30	0.013
Conjugal status					
With partner	1.00		1.00		
Without partner	1.23	1.11-1.37	1.14	1.03-1.27	0.019
Block II					
Age at menarche (years)					
≥12	1.00		1.00		
<12	1.15	1.02-1.29	1.17	1.05-1.31	0.005
Number of pregnancies					
Nulliparous	1.00		1.00		
1-2	1.29	1.03-1.62	1.09	0.87-1.37	0.506
≥3	1.59	1.28-1.98	1.26	1.00-1.59	0.043

PR: prevalence ratio; CI: confidence interval. Block II adjusted by variables in Block I.

Source: Elaborated by the authors.

greater number of pregnancies is considered a risk factor for obesity in women[12,42,43]. This result is secondary to the excessive calorie intake that influences weight gain during pregnancy and the retention of excess weight in the postpartum period[43-46], which could last throughout life[47], especially among women with a larger number of children[42].

Socioeconomic factors (economic class and schooling) were not associated with excess weight in the present study, possibly due to the fact that the sample was from a low-income community. In contrast, previous studies with greater representativeness of socioeconomic strata report a tendency toward a greater prevalence of excess weight in populations with less schooling and less purchasing power[5,32,33].

A major strength of the present study was the methodological care taken in selecting the participants through simple random sampling, which minimized the risk of selection bias. This study also has limitations that should be considered. The cross-sectional design does not enable the inference of cause-and-effect relations, which increases the risk of reverse causality. Moreover, memory bias is an inherent risk of studies involving the retrospective collection of information.

Conclusions

In the present study, two thirds of the population of women from a low-income community in Northeastern Brazil had excess weight, which was associated with demographic characteristics (age, skin color and living with a partner) and reproductive characteristics (early menarche and larger number of pregnancies). These results are similar to those found in representative samples of the region and country, demonstrating the pandemic of excess weight.

Multiparity was the only factor associated with overweight that could be modified, which underscores the importance of prenatal and fam-

ily planning services to the prevention and control of excess weight, as a considerable number of women with this nutritional problem use these services.

The reduction in the prevalence of excess weight contributes to the control of chronic diseases, such as hypertension and type 2 diabetes. The increase in the prevalence of excess weight with the advance in age underscores the importance of educational actions regarding healthy eating habits and regular physical exercise among younger members of the population as a way to promote changes of behavior that favor a reduction in excess weight.

Collaborations

L Dinegri and MC Lima participated in all steps of the study and wrote the manuscript. HVD Santos and PIC Lira contributed to the interpretation of the data and the final draft of the manuscript. M Batista Filho, SH Eickmann and PC Cabral participated in the writing and final revision of the manuscript.

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