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Overweight and associated factors in Quilombolas from the middle San Francisco, Bahia, Brazil

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Abstract *The aim of this article was to analyze the prevalence of overweight and associated factors in adult quilombolas (inhabitants of black communities) from the Middle San Francisco, Bahia. Cross-sectional study with a sample of 112 adults. Overweight was evaluated by body mass index (BMI). Linear regression was used to test associations. The mean age of the participants was 42.1 (standard deviation 18.5) years and there was a predominance of females (55.4%). The prevalence of overweight was 27.7% (95% confidence interval: 19.3;36.1), with a mean BMI of 23.1 (± 3.8) kg/m2. Factors that remained associated in multiple linear regression analysis ($p < 0.05$) were female gender, negative self-assessment of health, and increased mean arterial pressure (adjusted R2 0.326). The increase in BMI among quilombolas was associated with female gender, negative self-assessment of health and higher mean blood pressure levels.*

Key words *Group with African continental ancestry, Nutritional status, Body Mass Index, Anthropometry, Cross-sectional studies*

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Introduction

Excess body weight is an important public health problem that affects developed and developing countries, increasing morbidity and mortality of the population[1]. The main causes of this condition are the result of the interaction between biological and cultural factors that have undergone changes throughout human history, such as belonging to a certain population group and lifestyle[2].

National surveys alert to an increase in the prevalence of excess weight in the adult Brazilian population, which has increased by an average 1.3 percentage points between 2006 and 2013, ranging from 42.6% to 50.8% in the last assessment[3]. Sociodemographic factors such as male gender and older age were associated with this condition in the Brazilian population in 2013[3]. Furthermore, evidence indicates that excess weight is one of the main determinants of hypertension in the general population[4].

However, studies evaluating changes in the nutritional status of socially vulnerable groups are still sparse. As in national surveys, a high prevalence of excess weight has been found among adult quilombolas (inhabitants of black communities), between 42%[5] and 42.8%[6], but these studies indicated different sociodemographic and behavioral factors and associated comorbidities[5,6], a fact making it difficult to understand its predisposing factors.

Quilombos are ethnic-racial communities of black ancestry, which are linked to rural work and subsistence farming because of their geographic isolation and maintenance of cultural and religious customs[7]. However, these communities have suffered from environmental changes and are facing land problems which, in addition to precarious living conditions, may compromise health maintenance of this population[6,8].

It should be emphasized that contemporary quilombos differ from historical ones. The latter were inhabited by fugitive slaves, while contemporary quilombos, although formed by descendants of black slaves, are not necessarily composed of groups of fugitives[9].

Considering the limited information about this specific population segment and to permit a better understanding and screening of the health conditions of this population, the aim of the present study was to analyze the prevalence of excess weight and associated factors in adults of a quilombo community in the Middle São Francisco, Bahia, northeastern Brazil.

Methods

A cross-sectional study was conducted in the Tomé Nunes Quilombo Community located in the municipality of Malhada, Middle São Francisco region, Bahia, northeastern Brazil, whose Human Development Index (HDI) is 0.562[10]. The community studied is recognized as a rural quilombo, located 12 km from the urban area and installed at the right margin of the São Francisco River, with non-asphalt road access. Its main labor activity is subsistence farming[9].

According to the information of the notebook provided by the community health agent who attends 100% of the residents of the quilombo, the population was 201 adults (> 18 years) during the period of data collection. Sample size calculation assumed correction for a finite population, a prevalence of obesity among Brazilian adults of 15% (Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico - VIGITEL)[11], a sample error of five percentage points and a 95% confidence interval, adding 10% for losses and refusals. Thus, the minimum sample was 109 subjects. Simple random selection was performed by drawing lots and included the residents found on the opening page of the notebook that contained the list of the community health agent, which ensured an equal chance of all participants to be selected.

Visits were scheduled through the Association of Residents prior to data collection. For data collection, the subjects agreed to participate in the study by signing the free informed consent form that contained information about the study. All participants knew how to sign their name.

At the beginning of data collection, interviews were held by a trained team for interviewer testing, refinement and calibration. For this purpose, a questionnaire elaborated for the study based on the instrument proposed by VIGITEL[11] (containing questions about sociodemographic characteristics and lifestyle) for the adult Brazilian population was applied. The sociodemographic variables studied were gender (male or female), age (complete years), marital status (with or without a partner), education level (literate or illiterate), and employment situation (paid or unpaid work). Lifestyle-related variables included current smoking (smoker or non-smoker), current alcohol consumption (consumes alcoholic beverages or not), regular leisure-time physical activity (LTPA) and transportation physical activity (TPA) in minutes per week, and television viewing hours per week.

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Health-condition related variables (blood pressure and glucose) were measured by a single trained and experienced evaluator. In addition, health was self-rated by the participants, where 'excellent' and 'good' were defined as positive health and 'regular' and 'poor' as negative health.

Systolic (SBP) and diastolic (DBP) blood pressure were measured once on a single occasion after the interviews (with the participant remaining seated on average for 20 minutes). The measurements were obtained after at least 5 minutes of rest, with the subject sitting, feet on the floor, the right arm resting on a table at the level of the heart, and the palm of the hand facing upwards[12]. Blood pressure was measured with a mercury sphygmomanometer (Mercurial Sphygmomanometer Premium, model CE 0483), adjusting the cuff to the subject's arm circumference. The mean arterial pressure (MAP) was then calculated: [MAP = DBP + 1/3(SBP-DBP)][13].

Blood glucose levels were measured after fasting with a validated portable blood glucose monitoring system[14] (Accu-Chek Active, Roche®) using Accu-Chek test strips that provide the result in milligram per milliliter (mg/ml). For the measurement, a drop of blood was obtained from the subject's finger with the Accu-Chek Softclix® Pro lancing device and respective disposable lancets. To minimize the risk of infection, the finger of the subject was cleaned before the procedure and the evaluator used disposable gloves that were changed before each measurement.

Body weight was measured with the subject standing on the scale (erect, feet hip-width apart and the weight equally distributed among the lower limbs)[15], barefoot and wearing minimal clothing. A portable electronic scale (Camry Electronic, model EB9013, capacity of 150 kg and precision of 100 g) was used for the measurements. Height was measured with the subject in the orthostatic position, the head in the Frankfurt plane and the feet (barefoot and joined), buttocks, shoulders and head touching the wall[15]. A tape measure was fixed vertically to the wall to measure the distance, in centimeter, from the vertex (highest point of the head in the medial sagittal plane) to the floor. These measures were used to evaluate the nutritional status based on the body mass index [BMI = body weight (kg)/ height^2 (m)].

The BMI was the dependent variable. Nutritional status was classified as follows: low weight ($\leq$ 18.5 kg/m^2), eutrophy ($\geq$ 18.5 to $<$ 25.0 kg/m^2), overweight ($\geq$ 25.0 to $<$ 30 kg/m^2), and obesity ($\geq$ 30 kg/m^2)[16]. Subjects meeting the classification of overweight and obesity were considered to have excess weight. This variable was treated as continuous for regression analysis.

Frequencies, means, minimum and maximum values and standard deviations were calculated for descriptive analysis. Since analysis of the residual graph showed a normal distribution and homogeneous variances with few discrepant and influential points, inferential statistics based on simple and multiple linear regression was used following a hierarchical model[17] (Figure 1). In this model, the distal block (level 1) included the sociodemographic variables (gender, age, marital status, education level, and employment situation), followed by lifestyle-related variables (level 2) (smoking, alcohol consumption, LTPA, TPA, and TV viewing hours). Finally, the health condition-related variables (self-assessment of health, MAP, and glucose) were analyzed in the proximal block (level 3).

Variables showing statistical significance of at least 10% ($p \leq 0.10$) in crude analysis and that are of theoretical importance were included in the adjusted analysis following the order of a hierarchical model for the determination of outcomes. In this respect, higher level (distal) variables interact with one another and determine variables of the lower level (proximal). The effect of each exploratory variable on the outcome was controlled for by variables of the same level and of higher levels in the model. The statistical criterion to remain in the model was 10% ($p \leq 0.10$). The level of significance adopted in the study was 5%. The data were tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows, version 22.

The present study is part of the project "Black Quilombo Communities in Bahia: increased anthropometry and reduced physical activity as health risk factors", approved by the Ethics Committee of Universidade Estadual de Feira de Santana (CEP/UEFS), and was conducted in accordance with the Brazilian guidelines on research involving humans established by Resolution 466 of the National Health Council (December 12, 2012).

Results

Table 1 shows the characteristics (categorical variables) of the population studied. All subjects invited agreed to participate, answered all questions, and consented to all measurements. Among the subjects participating in the study,

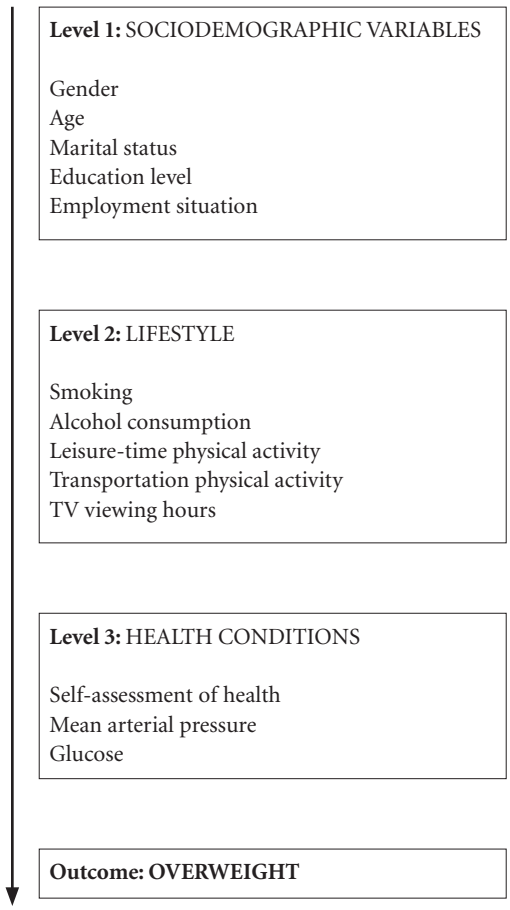

Figure 1. Hierarchical model for the analysis of factors associated with overweight in adult quilombolas from Bahia.

55.4% were women. Most participants reported to be in a relationship (63.4%), were literate (89.3%), had paid work (66.1%), and consumed alcoholic beverages (58.0%). Health status was rated negatively by 58% of the participants. The prevalence of excess weight among adults was 27.7% (95%CI: 19.3;36.1).

As can be seen in Table 2, the sample had a mean age of 42.13 (± 18.52) years, body weight of 58.7 (± 10.4) kg, and height of 1.60 (± 0.09) m. The participants reported to spent 84.12 (± 141.77) minutes per week in LTPA and 183.27 (± 137.95) minutes in TPA. With respect to sedentary behavior, the mean time spent watching television per week was 14.16 (± 11.07) hours.

Table 3 shows the results of simple and multiple linear regression analysis. Crude analysis indicates that an increase in BMI is associated with female gender, negative self-assessment of health, less time spent in LTPA, and higher MAP. In multiple linear regression analysis, female gender, negative self-assessment of health and increased MAP remained associated with the outcome (BMI). There was a positive linear correlation of BMI with MAP and self-assessment of health and a negative correlation with male gender.

Discussion

The main findings of this study indicate an important prevalence of excess weight, which was observed in approximately one-third of adult quilombolas. Female gender, negative self-assessment of health and health condition-related factors such as high MAP were associated with increased BMI.

Table 1. Description of sociodemographic characteristics, lifestyle variables and health conditions in the sample of adult quilombolas. Tomé Nunes, Malhada, Bahia, Brazil, 2012. (n = 112).

Variable		%
Gender		
Female	62	55.4
Male	50	44.6
Education level		
Literate	100	89.3
Illiterate	12	10.7
Work		
Paid	74	66.1
Unpaid	38	33.9
Smoking		
Smoker	37	33.0
Non-smoker	75	67.0
Alcohol consumption		
Yes	65	58.0
No	47	42.0
Self-assessment of health		
Positive		42.0
Negative	65	58.0
Body mass index		
Low weight	7	6.3
Eutrophic	74	66.1
Overweight	31	27.7

The prevalence of excess weight in the adult quilombolas studied was lower than that reported for Brazilian adults considering the data of the 2007-2008 Household Budget Survey (63.8%)[5] and of the 2013 VIGITEL (50.8%)[3]. The prevalence was also lower when compared exclusively to adults from the northeastern region of Brazil (52.8%)[5].

Table 2. Characteristics of the sample of adult quilombolas. Tomé Nunes, Malhada, Bahia, Brazil, 2012 (n = 112).

Variable	Mean (SD)	Median	Minimum	Maximum
Age (years)	42.1 (± 18.5)	39.0	18.0	94.0
Leisure-time physical activity (minutes/week)	84.1 (± 141.8)	0.0	0.0	840.0
Transportation physical activity (minutes/week)	183.3 (± 138.0)	174.0	0.0	660.0
Television viewing time (hours/week)	14.2 (± 11.1)	14.0	0.0	42.1
Body mass index (kg/m2)	23.1 (± 3.8)	22.2	16.0	34.3
Mean arterial pressure (mmHg)	91.4 (± 13.3)	90.0	70.0	146.7
Glucose (mg/ml)	116.2 (± 27.5)	110.0	76.0	278.0

SD: standard deviation.

Table 3. Association of excess weight with sociodemographic factor, lifestyle and health conditions in adult quilombolas in crude and adjusted analysis. Tomé Nunes, Malhada, Bahia, Brazil, 2012 (n = 112).

Variable	β_{crude} (95%CI)	p-value*	$\beta_{adjusted}$ (95%CI)	p-value**	$R^2_{adjusted}$
Gender					
Female	Reference				
Male	-0.289 (-3.611;-0.831)	0.002	-0.261 (-3.195;-0.817)	0.001[a]	0.326
Marital status					
Without partner	Reference				
With partner	0.218 (0.262;3.187)	0.021	0.231 (0.337;3.323)	0.017[a]	0.114
Age in years	0.140 (-0.10;0.680)	0.141			
Education level					
Literate	Reference				
Illiterate	0.135 (-0.641;3.984)	0.155			
Work					
Unpaid	Reference				
Paid	0.029 (-1.287;1.760)	0.759			
Alcohol consumption					
No	Reference				
Yes	-0.128 (-2.442;0.459)	0.178			
Smoking habit					
Non-smoker	Reference				
Smoker	-0.106 (-2.438;0.684)	0.268			
LTPA	-0.213 (-0.011;-0.001)	0.024			
TPA	-0.018 (-0.006;0.005)	0.847			
Television viewing hours	-0.035 (-0.077;0.053)	0.717			
Self-assessment of health					
Positive	Reference				
Negative	0.231 (0.364;3.210)	0.014	0.186 (0.088;0.177)	0.019[a]	0.326
Capillary glucose	0.048 (-2.202;1.312)	0.617			
MAP	0.492 (0.095;0.190)	< 0.001	0.458 (0.088;0.177)	< 0.001[a]	0.326

* Simple linear regression; ** multiple linear regression; [a] Variables that remained in the final model according to the hierarchical model; LTPA: leisure-time physical activity (hours); TPA: transportation physical activity (hours); MAP: mean arterial pressure (mmHg).

A study involving adult quilombolas from southwestern Bahia conducted in 2011 reported a prevalence of excess weight of 42% and a predominance among women[5]. In another study conducted in 2006 on remnant quilombolas from Paraná, excess weight was observed in 42.8% of adults[6]. Although excess weight was present in almost half the population of these two studies, this scenario was not observed in adults of the present study.

Weight gain was positively associated with female gender. Differences between genders, with higher prevalences of excess weight in female quilombolas[5] and among African women[18], have been documented and agree with the results of other studies involving general populations[19,20]. Hormonal and metabolic changes that occur in women[21] may be one explanation for the excess weight in this group. Other behavioral factors such as different labor activities may have also contributed to this association.

In the quilombo investigated, negative self-assessment of health was associated with increased BMI, in agreement with the results of a study involving quilombolas from southwestern Bahia[22]. In this respect, it is important to note that the concept of health reflects the social, economic, political and cultural conjuncture and varies between communities and individuals according to historic moment, location and social class, in addition to individual values and scientific, religious and philosophical concepts[23]. Negative self-assessment of health in excess weight individuals therefore plays a mediator role in the adoption of a healthy lifestyle[24].

There was a positive linear correlation between BMI and MAP in adult quilombolas. The relationship between excess weight and elevated pressure levels has been widely recognized[25,26]. A study conducted in quilombo communities in northeastern Brazil[27] showed that the classification of individuals as overweight and obesity increased the risk of being hypertensive by 1.22 (95%CI: 1.05;1.42) and 1.78 (95%CI: 1.33;2.37), respectively. Excess weight was the proximal determinant of hypertension even after adjustment for sociodemographic and behavioral factors.

Although the exact mechanisms underlying the relationship between overweight, obesity and hypertension are not fully understood, it is postulated that multiple potential mechanisms contribute to the development of high blood pressure in obese individuals, including hyperinsulinemia, activation of the renin-angiotensin-aldosterone system, stimulation of the sympathetic nervous system, and inadequate concentrations of certain adipocytokines[28,29]. Genetic factors have also been investigated[30]. Taken together, these findings indicate the multifactorial and polygenic nature of this relationship.

The present study has some limitations. One limitation is related to the characteristic of cross-sectional studies that do not permit to establish a temporal relationship between exposure (sociodemographic, lifestyle and health condition variables investigated) and outcome (excess weight). The sample size may have been insufficient for detecting associations of lower magnitude. Another limitation is the use of a double indirect method to evaluate excess weight relative to body fat. However, it should be emphasized that BMI is a widely used indicator in population studies. The measurement of the anthropometric and pressure variables only once might be another limitation, but the evaluator was trained and experienced.

The main findings of this study indicate that 1 in 3 of the quilombolas investigated was excess weight, suggesting that this group is less exposed to risk factors related to excess weight than Brazilian adults and other groups with a similar population profile[5,6]. These results reinforce the need for public policies on health promotion, particularly those related to factors known to combat excess weight such as access to a healthy diet. Additionally, the results indicate the importance of policies that consider the specificities of the quilombo population in the determinants of excess weight.

Collaborations

RFF Mussi: conception and design of the study. BM Queiroz e RFF Mussi: analysis and interpretation of data, drafting and critically revising the manuscript. EL Petróski: drafting and critically revising the manuscript. All authors have approved the final version of the manuscript and declare to be responsible for all aspects of the work, guaranteeing its accuracy and integrity.

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