

# Lifestyle, food consumption and body composition of university students

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## Abstract

Upon entering higher education, individuals experience changes that are reflected in their lifestyle. Therefore, the objective of this study was to know the lifestyle, body composition and food consumption of university students attended by the National Student Assistance Program. To this end, a cross-sectional study with 70 students was developed and questionnaires were applied to obtain information about lifestyle, level of physical activity, how they considered their food and a food frequency questionnaire to assess food consumption; weight and height were measured for the body mass index; waist circumference and a four skinfolds were measured for body fat percentage. Spearman's descriptive analysis and correlation was performed on IBM SPSS Statistics 21.0 to characterize, respectively, the sample and evaluate the relationship between the variables of income, their diet, nutritional status, physical activity, sex and area of study; food was assessed using food groups. The students considered themselves black and brown (80%), with a monthly income below one minimum wage (54.29%) and 45.71% were alcoholics. 67.14% were found to be eutrophic, 87.14% were not at risk for metabolic diseases, 47.14% had a body fat percentage above average and had a family history of chronic non-communicable diseases (77.14%). They demonstrated a varied diet, composed of all food groups resulting in a healthy diet profile. It is concluded that the students have a lifestyle that is not compatible with a healthy one, even though the food profile is closer to such a pattern.

**Keywords:** Lifestyle. Body composition. Student Health. Food Service.

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## INTRODUCTION

Admission to higher education courses is a condition for changes that are reflected in the lifestyle of individuals. It is characterized by the narrowing of new relationships of friendship, the absence or reduction of physical activity, which for many is added to distancing from family nuclei caused by the distance between the University and their city of origin, which consequently contributes to behavioral changes as in diet, experimentation/ use of licit

and illicit drugs, among others<sup>1,2,3</sup>.

Changes regarding diet are mainly reflected in not having important meals such as breakfast or lunch; choice of places offering low nutritional quality food for meals such as snack bars, bakeries, fast food; preparation of foods rich in fat and sugar and the choice of foods<sup>1,4,5</sup>.

Studies show the consumption of improper food among university students, many of which were below the recommendations for most

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food groups as well as the replacement of main meals with snacks and displayed inappropriate eating habits<sup>2,4</sup>.

By adopting certain lifestyles and dieting profiles, as shown in some studies<sup>6-9</sup>, these students are candidates in the medium to long term of significantly increasing the risk for the development of Chronic Non-Communicable Diseases (CNCDs), such as Diabetes Mellitus (DM), Systemic Arterial Hypertension (SAH) and obesity<sup>4</sup>. Even at a young age, these diseases are already the main causes of morbidity and mortality<sup>3,10</sup>.

A systematic review carried out by researchers in Germany<sup>11</sup> to assess whether the risk of development for some chronic diseases can be reduced with increased consumption of fruits and vegetables concluded that there is evidence that high consumption of these foods can reduce the occurrence of hypertension, coronary disease and stroke. This increased consumption may also contribute to not gaining weight and, consequently, the incidence of type II Diabetes Mellitus, in addition to providing benefits for certain eye diseases, dementia and the risk of osteoporosis.

With regard to the consumption of food by the university students population, Brazil has the National University Student Assistance Program (PNAES), a decree established by no. 7.234 of July 19, 2010<sup>12</sup>, which, among its objectives, includes the provision of meals to low-income students through University Restaurants (UR) in public universities in the country. Students awarded with the PNAES do not pay for the meal, and for the rest of the student community, the meal is offered at low cost.

Even though it is a topic in constant discussion, the factors that contribute to lifestyle changes and their subsidies for the health status of these students continue to be challenging; especially due to the fact that each population has its social and cultural particularities that, in a way, will influence these habits. Therefore, in the current epidemiological scenario for CNCDs, it becomes relevant to identify how

these issues develop in certain groups when entering the University. This study assumes as a hypothesis that the lifestyle and dietary profile of university scholarship holders from PNAES is not compatible with a healthy lifestyle and dietary profile. Therefore, the relevance of the present study is justified by aiming to know the lifestyle, body composition and food consumption of university students attended by the National Student Assistance Program.

## METHODOLOGY

This was a cross-sectional study carried out between June and August 2017 with students from a public university in a capital city of northeastern Brazil. The study is part of a larger project, approved by the Ethics and Research Committee of the Faculty of Nutrition of the Federal University of Bahia (no. 228.318/2012).

The sample was defined based on a pilot study previously developed in the larger project, where data were obtained from a continuous quantitative variable (Body Mass Index - BMI), to determine the mean ( $\mu$ ) and standard deviation ( $\sigma$ ) for determining the sample size. Thus, the mean ( $\mu$ ) and standard deviation ( $\sigma$ ) of the BMI was obtained, under a 95% confidence interval, with a sampling error of 22% of the standard deviation and a BMI of 24.12 kg/m<sup>2</sup> to 26.21 kg/m<sup>2</sup>. Thus, in a population of 800 students, 70 (8.7%) were randomly selected from the list of cafeteria attendance, as long as they met the inclusion criteria: age  $\geq 18$  years old, being a food grant recipient from the Pro-Rectorry University Student Assistance, and has at least three meals a week at the University Restaurant (UR). The exclusion criteria were being pregnant and having physical conditions that limited anthropometric measurements. Participation was formalized with the signing of the Informed Consent

Form.

The data were collected by students from the seventh semester of the undergraduate course in Nutrition at the University, trained for such activities and under the supervision of nutritionists from the Food Security Nucleus of the UR. For personal data, lifestyle and socioeconomic data, participants completed a questionnaire prepared by the researchers. The assessment of the level of physical activity was carried out through the application of the International Physical Activity Questionnaire (IPAQ) validated by Matsudo *et al.*<sup>13</sup>, with the results being classified as sedentary, irregularly active (A and B), active and very active, according to the IPAQ.

Information regarding food was assessed in two ways: I. To find out how students considered their diet, the questionnaire "How is your diet?" of the General Coordination of Food and Nutrition of the Ministry of Health<sup>14</sup> was used and the score was classified as: bad (for scores up to 28), regular (for 29 to 42 points) and good (if scores  $\geq 42$ ); II. The frequency of food consumption was assessed using a quantitative Food Frequency Questionnaire adapted from the validation performed by Voci *et al.*<sup>15</sup>, which had a list of 69 foods distributed in nine food groups. Respondents reported the frequency of consumption of related foods as: never; 1 to 3 times a month; once a week; 2 to 4 times a week; 1 time a day; 2 times or more a day. The adaptations made in the instrument were to rename the food groups and reorganize the food between the groups, considering the similarity of the nutritional characteristics of the food and regional aspects.

For use of only one time unit, each food had its consumption transformed into daily frequencies, where a value of 1 represented the consumption of once a day and was

multiplied by the reported daily frequency interval if the food was consumed more than once a day. Among the options with time intervals, the average of the frequency interval was used, divided by the weekly (7) or monthly (30) period, following the methodology of Camilo *et al.*<sup>16</sup>.

Body weight was obtained with the aid of a portable scale (Plenna, model MEA 07400, capacity of 150 kg and sensitivity of 100 grams), with the student barefoot, with no objects in the pockets such as keys, belts, glasses, cell phones or any other thing while wearing light clothing<sup>17</sup>. Height was measured using a SECA stadiometer, model E0123, 125 mm wide, fixed at 2.20 meters, vertical in relation to the floor and along a wall without a baseboard. For this, the individuals were in a standing position, erect, with their arms extended along the body, their heads up, their heels against each other, with their shoulders and buttocks in contact with the wall<sup>17</sup>.

BMI was calculated using the relationship between weight (kg) and height squared ( $m^2$ ), and for the classification, the recommendations of the World Health Organization were followed<sup>17</sup>. These recommendations consider the individual as underweight if  $BMI < 18.5 \text{ kg}/m^2$ , normal weight if between  $18.5 \text{ kg}/m^2 - 24.99 \text{ kg}/m^2$ , overweight if between  $25 \text{ kg}/m^2 - 29.99 \text{ kg}/m^2$  and obese if the BMI is  $\geq 30 \text{ kg}/m^2$ .

The measurement of waist circumference (WC) followed what was recommended in the Lohman, Roche and Martorell technique<sup>18</sup>. The values were considered according to the WHO risk reference for metabolic complications associated with obesity<sup>17</sup>. For men with  $WC \geq 94 \text{ cm}$ , they are considered at a high risk and  $\geq 102 \text{ cm}$  was considered very high risk, while for women  $\geq 80 \text{ cm}$ , they were considered as high risk and  $\geq 88 \text{ cm}$  very high risk.

The percentage of body fat was obtained from the sum of four skinfold measurements, which were performed as recommended by Lohman, Roche and Martorell<sup>18</sup>, with the aid of a calibrated Skinfold Caliper – Saehan adipometer, model SH50<sup>20</sup>. For the classification, the reference described by Lohman *et al.*<sup>19</sup> was used: for men a low reserve was considered  $\leq 5\%$ , below the average 6% - 14%, adequate reserve/average 15%, above the average 16% - 24%, excess fat  $\geq 25\%$ . For women, low reserve was considered  $\leq 8\%$ , below the average 9% - 22%, adequate reserve/average 23%, above average 24% - 31%, excess fat  $\geq 32\%$ .

Anthropometric measurements were performed in duplicate and the value considered was the result of their average. If there was a difference of 100g for weight, 0.2 cm for height and/or WC and 0.2 mm for skin folds, the measurements were repeated.

The database was built in Microsoft Excel version 2010 and the analyses were performed on IBM SPSS Statistics 21.0. The normality of the data was verified using the Kolmogorov-Smirnov test. A descriptive analysis was performed to characterize the sample. Spearman's correlation test, using the Monte Carlo method, was used to assess the relationship between income (<1 minimum wage, 1 and 2 minimum wages, > 2 minimum wages), how their diet is (bad, regular, good), nutritional status (underweight, normal weight, overweight, obese) and physical activity (sedentary, active, irregularly active A and B, very active); as well as the relationship between how their diet is (bad, regular, good) and sex (male, female); and between how their diet is (bad, regular, good) and their area of study (humanities, science/mathematics, health).

## RESULTS

In this study, 38.57% of the students were from the humanities area. According to ethnic-racial origin, 80% considered themselves black and brown, and in relation to their monthly family income, 54.29% declared to receive less than one minimum wage (Table 1).

In addition to studying, a portion of respondents (14.29%) had another occupation. As for lifestyle, it was found that 45.71% of students were alcoholics. Regarding family history of CNCDS, 77.14% had a relative with some CNCDS, and among the interviewees 7.14% had some CNCDS (Table 1).

Regarding their anthropometric status, it is observed that 67.14% had an adequate weight for height, according to the BMI, while 25.72% were overweight. Of the interviewees, more than 12% had some high risk of developing metabolic diseases (Table 2).

When evaluating the percentage of body fat (% BF) of the students, 47.14% of those evaluated were at risk for developing diseases associated with obesity (Table 2). This result is worrying since 15.71% were sedentary, 2.86% were insufficiently active (A and B), 27.14% were active and 8.57% were classified as very active.

Exposed in Table 3, the results demonstrate that there is a positive correlation between how diet and physical activity were among women ( $p=0.003$ ). Meanwhile there was a negative correlation between diet and physical activity among the men with the variable of family income, demonstrating a relationship with the state anthropometric measurements ( $p=0.011$ ).

There was no statistically significant difference between variables such as food and sex ( $p=0.369$ ); however, female students (62.16%) clearly had a regular diet, while 18.92% and 18.92% were considered having a poor or good diet, respectively. Concerning the males, 78.79% had a regular diet, followed by 12.12% considered to be poor and 9.09% considered to be a good diet (data not shown in table).

There was also no statistically significant difference between the variables such as the student's diet and their area of study ( $p=0.409$ ). However, it was observed, descriptively, that students who had a good diet were from the areas of health (60%) and humanities (30%) (data not shown in the table).

Table 4 illustrates the frequency of consumption of the food groups. Because some foods in the questionnaire were never consumed by students, they were excluded from the analysis (30 foods); however, there was no exclusion of any of the food groups. The group of meats and eggs (45.7%), fruits (40%) and oils (40%), had the highest percentage of consumption.

In the horticultural group, the most consumed foods were lettuce, carrots and tomatoes with a frequency of consumption of 0.42 times a day (data not shown in the table); however, chard, watercress/arugula/spinach, cauliflower and chayote were never consumed and were, therefore, excluded. In the dairy group, the food that had the highest daily consumption frequency (1x a day - data not shown in the table) was whole milk.

The drinks and sugars/sweetened food groups were consumed at 32.8% and 34.7%, respectively, of which coffee and natural juices were the most frequently consumed daily (twice a day - data not shown in table) from drinks group, and refined sugar was the most frequently consumed in the sugars and sweetened foods group (twice a day - data not shown in table).

**Table 1** – Sociodemographic conditions, lifestyle and how the 70 university students were eating. Salvador, Bahia, 2017.

Variables	n	%
<b>Ethics</b>		
No	38	54.29
Yes	32	45.71
<b>Smoking</b>		
No	68	97.14
Yes	2	2.86
<b>Family history for CNCD</b>		
No	16	22.86
Yes	54	77.14
<b>Has CNCD</b>		
No	65	92.86
Yes	5	7.14
<b>Color</b>		
Brown	28	40.00
White	10	14.29
Black	28	40.00
Other	4	5.71
<b>Course</b>		
Humanities	27	38.57
Science/Mathematics	19	27.14
Health	24	34.29
<b>Another Occupation</b>		
No	60	85.71
Yes	10	14.29
<b>Family income</b>		
<1 MW	38	54.29
Between 1 and 2 MW	29	41.43
>2 MW	3	4.28
<b>How is your diet?</b>		
Bad	11	15.71
Regular	49	70.00
Good	10	14.29

Caption: CNCD - Chronic Noncommunicable Disease. MW - Minimum Wage.

**Table 2** – Anthropometric status of 70 university students. Salvador, Bahia, 2017.

Variables	n	%
<b>Anthropometric State</b>		
Underweight	5	7.14
Eutrophic	47	67.14
Overweight	16	22.86
Obese	2	2.86
<b>Waist circumference</b>		
Without risk	61	87.14
High risk	7	10.00
Very high risk	2	2.86
<b>Body fat</b>		
Excess fat	23	32.86
Above average	33	47.14
Below average	11	15.71
Adequate reserve	3	4.29

**Table 4** – Frequency of consumption of university students' food groups. Salvador, Bahia, 2017.

Group	Group Frequency	Relative Frequency (%)
Fruit	28.0	40.0
Meat and eggs	32.0	45.7
Vegetables	23.6	33.7
Dairy products	18.6	26.6
Grains	25.0	35.7
Oils	28.0	40.0
Cereals, Pastas and Flour	25.5	36.4
Sugars and Sweetened foods	24.3	34.7
Drinks	23.0	32.8

**Table 3** – Correlation between physical activity, anthropometric status, how their diet is, and income according to sex. Salvador, Bahia, 2017.

Variáveis	Physical Activity	Anthropometric Status	How is your diet?
	Female		
Family income	0.188	0.230	0.268
How is your diet?	0.479**	0.112	
Anthropometric Status	0.151		
Male			
Family income	-0.013	-0.442*	-0.056
How is your diet?	0.110	0.042	
Anthropometric Status	0.322		

Spearman's correlation - significant correlations  $p < 0.01^{**}$  and  $p < 0.05^*$ .



## DISCUSSION

Data analysis showed that 77.14% of university students had a family history of CNCDS, 22.86% were overweight, 10% were at a high risk for developing metabolic diseases and 47.14% were at risk for diseases associated with obesity. These findings are worrisome, as heredity and lifestyle adopted by the individual are essential factors for the emergence of chronic non-communicable diseases<sup>20-23</sup>. In another study, when investigating the family history of CNCDS among health students in Ceará, Nóbrega<sup>20</sup> found that 60.1% had family members with SAH, 46.2% with DM and 33.4% with obesity. Knowing that abdominal adipose tissue is a risk factor for metabolic diseases<sup>24</sup>, which is one of the reasons for its routine evaluation in clinical practice<sup>25,26</sup>, if lifestyle changes are not adopted, these students will become more prone to develop CNCDS in the long term.

Still, the fact that 45.17% of students are sedentary and together the insufficiently active (A and B) students, they add up to 18.54% which makes the picture more worrisome. Studies show that regular physical activity helps with weight loss, prevents the onset of diseases, improves bone mineral density, pulmonary and cardiovascular functions<sup>27-31</sup>. The data in this study are similar to those by Araújo, Vasconcelos and Silva<sup>26</sup> who, when assessing the nutritional status of university students in Patos-PB, identified that 53% of the interviewees did not practice physical activities; whereas, in the study by Bandeira, Bernardo and Kupek<sup>32</sup> 38.61% of Santa Catarina students practiced less than 10 min/day of physical activity.

It is important to reflect that the changes in the lives of individuals when they enter universities, presented, due to the high number of curricular and extracurricular activities, may converge so that they do

not acquire healthy eating habits or do not perform physical activity, consequently impacting their health<sup>33,34</sup>.

Another practice observed in the universe of these students is the habit of drinking alcohol, which sometimes starts when entering higher education<sup>35</sup>. In the present study, 45.71% of the interviewees declared themselves to be alcoholics. Bandeira, Bernardo and Kupek<sup>32</sup> found that 79.47% of university students from Santa Catarina did not drink or drank less than twice a week. Carvalho *et al.*<sup>36</sup>, on the other hand, showed an excessive consumption of alcoholic beverages among male university students (30.9% vs. 16.7%,  $p < 0.001$ ). Such a habit is favorable for weight gain, depending on the frequency and amount of intake since alcoholic drinks have high caloric values.

In this study, a positive correlation was found between the variables such as diet and physical activity among girls ( $p = 0.003$ ). This finding makes sense, whereas anyone who practices physical activity, whatever it may be, consequently has a greater concern with eating habits demonstrating a healthy pattern<sup>37</sup>. The study also showed that there is an influence between the variables of family income and anthropometric status ( $p = 0.011$ ) in males. Diverging from this finding, Hamam *et al.*<sup>5</sup>, found that family income was not related to body weight ( $p = 0.186$ ) among university students from Taif, Saudi Arabia.

This study did not find any statistically significant difference between the variables such as diet and the sex of the interviewees ( $p = 0.369$ ). However, 18.92% of women considered having a good diet when compared to men (9.09%). Previous research has also shown that women tend to have healthier eating habits than men<sup>3,37,38</sup>.

Regarding the interviewees' area of

study, the present study found that those in the health field considered their diet to be good (60%); however, this relationship was not statistically significant. These data are consistent with the study by Feitosa *et al.*<sup>39</sup> who, when investigating the eating habits of university students from different academic areas in Sergipe, found no association between these variables. This suggests, therefore, that the area of knowledge does not seem to influence food choices.

Regarding food consumption, the present study found a varied diet, with the presence of all food groups. The horticultural group had a daily frequency of consumption of 33.7%, and these findings are comparable to those of Oliveira *et al.*<sup>4</sup>. These findings suggest that it is a reflection of the composition of the UR menu under study; where, there was a daily offer of two types of salads in the self-service system, fruit as a dessert, an ovo-lacto-vegetarian option and the presence of vegetables in preparations such as meat and rice. These conclusions are also validated by the findings of Hartmann *et al.*<sup>40</sup> in a study carried out in the UR of the University of Brasília, in which they concluded that during the week the scholarship holders had a high consumption of food from these groups. Moreover, the restaurant's lowest contribution to this consumption was 59% and the composition of the menus contributed to this, thus representing the importance of the UR for the promotion of a healthy diet.

The consumption of foods from the meat and eggs group (45.7%) is important because they are foods with great sources of proteins of high biological value; however, meats can become more of a fat source food option, requiring attention to the type of meat consumed and the method of preparation<sup>41</sup>. When these findings were added to the oil group (40%), these precautions must be redoubled given that this group also had a higher frequency of consumption

in the studied population. Similar to these findings, Santos *et al.*<sup>2</sup> also found a high daily frequency in the consumption of meat/eggs and oils/fat. In this sense, it is important to take into account that the consumption of such foods at a high frequency and/or in large quantities, leads to increased plasma concentrations of all cholesterol fractions and, consequently, cardiovascular risk<sup>41</sup>. Moreover, when added to the lifestyle adopted by the population under study, attention must be doubled.

In the grains group (35.7%) and cereals/pasta/flour group (36.4%), there was a similarity in the frequency of consumption. Respectively, carioca beans (twice a day) and white rice (once a day) were the only foods that had a higher daily frequency of consumption. Studies already carried out in Brazil, presented similar results, like that of Santos *et al.*<sup>2</sup> in which 37.5% of the students consumed rice daily. The combined consumption of these foods in Brazil is part of the national food culture and was served daily at lunch and dinner in the UR under study, thus, contributing to the frequency of consumption.

Sugar, coffee and natural juice were the foods that had the highest daily frequency of consumption (twice a day) between the drinks and sugar/sweetened food groups. In a study with a undergraduate students in the nutrition course in Sergipe, Oliveira *et al.*<sup>4</sup> found a daily consumption of juices at 61% and coffee at 62%. In general, coffee and natural juice do not have great caloric contributions to the individual, which will depend on the amount (and frequency) of sugar added to them. However, Oliveira *et al.*<sup>6</sup>, when evaluating the eating habits of nutrition students in Maranhão, suggest that abandoning less healthy habits, such as the consumption of these food groups, may be more difficult than introducing new healthy eating habits.

The study developed here with



beneficiaries of PNAES shows that their food profile approached a healthy profile; although less frequently, poor nutritional quality foods were present. This profile was thus characterized by the consumption of foods that valued variety, accessibility, representations of the local food culture, nutritional quality, naturally colored and hygienically safe<sup>6,14</sup>. Such a dietary profile has numerous positive impacts on health, highlighting weight control, academic performance and prevention of CNCs; however it is important to note that such benefits have greater results when associated with the change in other aspects of lifestyle, such as physical activity. This result is similar to that of Pereira-Santos *et al.*<sup>42</sup>, who, among the eating patterns of university students in Bahia, identified a traditional eating pattern composed of healthy foods that explained 21.53% of the variance.

Among the participants in this study,

54.29% reported having a monthly income lower than one minimum wage, reinforcing what Veroneze *et al.*<sup>43</sup> have reported concerning the influence of socioeconomic conditions on the food choices of university students. However, given the fact that the students investigated here were unanimously beneficiaries of the sustainability policy, they had direct access to a healthy food profile at the university restaurant.

In this study, two main limitations could be observed. The first refers to the instrument used for discovering the dietary profile that was provided by a food frequency questionnaire; however, procedures were used to minimize errors according to Fisberg *et al.*<sup>44</sup>. The small sample size is still considered limiting, however with the sample calculation, the findings are relevant to the study population. Moreover, in other studies in the literature similar sample numbers were used.

## CONCLUSION

Based on the analyzed data, it was possible to know the lifestyle and dietary profile of university students served by the National Student Assistance Program. Sedentary students with a family history for chronic non-communicable diseases, percentages of excessive or above average body fat and a diet with the presence of foods from all food groups, especially fruits, meat/eggs and oils were identified.

Even exposing a healthy eating profile, the lifestyle demonstrated by the students requires greater changes, especially concerning the practice of physical activity; especially since in addition to being sedentary, these were students who had a significant family history for chronic diseases. Therefore, this study allowed us to

conclude that PNAES scholarship holders have a lifestyle that is not compatible with a healthy one, even though the dietary profile is closer to such a pattern.

As contributions of this study to the field of collective dieting, the relevance of the presence of nutritionists as managers of the meal production is highlighted for the promotion of a healthy diet. Regarding the importance of the study for society, the need for a greater reflection with regard to diet and other habits associated with the health of the study population is evident. With regard to public health, the results of the study can contribute to support the planning of educational strategies aimed at promoting healthy living habits, in addition to contributing to public health policies

aimed at university students.

In general, the public investigated here lacks public policies aimed at their health, therefore, more studies need to be conducted taking into account scholarship and non-scholarship students; assessment of the food

environment; use of other anthropometric measures combined with biochemical tests for better nutritional diagnosis; application of a 24-hour food recall in a serial way to know their usual intake and build dietary patterns.

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