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Quality of Food in the University Community based on the Food Guide for the Brazilian Population

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Abstract

Studies show that the consumption of ultra-processed foods increases the risk of non-communicable chronic diseases. Therefore, this study aimed to investigate the quality of the food of a university community based upon the Dietary Guidelines for the Brazilian Population. An analytical observational study was carried out, with a cross-sectional design. University students, professors, academic coordinators, and other employees participated in the study, respecting the following inclusion criteria: both sexes, 18-60 years old, formally associated with the Institution, who have access to the internet, and who accepted to participate through an electronic informed consent form. An electronic QR-Code questionnaire was applied to qualitatively assess the health habits and especially the dietary habits of the sample. Data was collected from September-December/2019. The study is approved by the Ethics Committee. The total sample consisted of 710 volunteers. The average age was 26.7±9.2 years old, considering 87.2% women, and 85.5% students. The average body mass index (BMI) was 24.2±4.5 kg/m² (61.4% eutrophic, 34.5% overweight, 4.1% malnourished). The average score was 39.4±10.9 points. The distribution of the dietary pattern was 41.4% "Excellent", 36.8% "Intermediate", and 21.8% "Deficient diet". When considering the relationship with the institution, the employee's quality of the food was lower than student, professor, and coordinator ($p \leq 0.001$). In the total sample, the eutrophic students had a better quality of the food. Correlations with BMI were found with food score ($r=-0.224$; $p \leq 0.001$) and age ($r=0.319$; $p \leq 0.001$) and confirmed through a linear regression of BMI with the food score ($\beta=-0.283$; $p \leq 0.001$) and with age ($\beta=0.343$; $p \leq 0.001$). Therefore, most of the sample reported excellent food quality, however, 1 out of 3 members was overweight. The food score and age influenced the BMI value.

Keywords: Food Consumption. Adults. Nutrition.

INTRODUCTION

In recent decades, Brazil has gone through a nutritional transition where more traditional food patterns, such as *in natura* and minimally processed foods, have been progressively replaced by ultra-processed foods. Ultra-processed foods are rich in fats and sugars, which combined with the increase in a sedentary lifestyle, results in a high number of cases of overweight and obesity. In this sense, these changes in patterns and new eating habits have placed the Brazilian population over 2 years of age at a greater risk for chronic non-

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-communicable diseases (NCDs)[1,2].

Following a healthy lifestyle can be responsible for preventing various diseases throughout life. With the adoption of good eating habits and the regular practice of exercise, 90% of the cases of type 2 diabetes mellitus, 80% of the cases of cardiovascular diseases, and 33% of the cases of any type of cancer could be avoided[1]. The Implementation of the Dietary Guidelines for the Brazilian Population helps the population improve their diet. Based on clear, objective, and simple communication, the Guide aims to improve the visualization and understanding of the recommendations for the entire Brazilian population over 2 years of age[1,3].

According to the Dietary Guidelines for the Brazilian Population, the basis of the individuals' diet must include *in natura* and minimally processed foods, in order to guarantee a greater variety of nutrients for the body. On the other hand, the Guide recommends that the consumption of ultra-processed products should be avoided to reduce NCDs[3,4].

One factor that determines what we eat and why we eat it is our social environment. Studies have identified a whole range of motivations for eating, showing that not only the feeling of hunger, but also factors such as the social environment and eating habits play an important role in choosing foods[5].

Eating behavior is considered to be a set of cognitions and affects that govern eating actions and behaviors, whereas behaviors are highlighted as controllable events, which if repeated may modify habits. The fact that human eating behavior reflects interactions between the physiological, psychological state and the external environment that individuals live in must be considered. In addition, there are several influences such as nutritional, demographic, economic, social, cultural, environmental, and psychological aspects of an individual or a community. As the determinants of eating behaviors become known, whether by an individual or a population group, the chances of success and the impact of an action to promote healthy eating practices are considered to increase[5-7].

Thus, the present study aims to investigate the quality of the food of an academic environment according to the recommendations of the Dietary Guidelines for the Brazilian Population. And based on this, find out if the target audience has eating practices that are related to healthy habits and, consequently with a higher consumption of *in natura* and/or minimally processed foods.

METHODS

An analytical observational study was carried out, with a cross-sectional design, involving the population of the university community (SP/Brazil).

A questionnaire called QR HEALTHY FOOD was applied to qualitatively assess the habits related to the academic community's diet. The proposed questionnaire is electronic, using the Quick Response Code (QR Code) technology.

The common characteristic within the study sample is the formal relationship with the university community, in the city of São Paulo (SP), at different levels (university students, coordinators, professors, and other employees, regardless of positions, in all undergraduate and graduate courses, on-site and distance education).

The study participants consisted of a convenience sample (one of the main types of non-probability sampling methods), without

prior sample size calculation.

Therefore, inclusion criteria were that individuals must be literate, who have a cell phone with a QR Code reader and / or access to email, with a formal relationship with the Institution, from 18 to 60 years old, and who voluntarily expressed interest in participating in the study after acceptance of the informed consent form. Research participants were recruited via email and the institution's social media. Data was collected from September to December / 2019, upon approval by the Ethics Committee of São Camilo University Center (SP) (CAAE: 16336619.5.0000.0062; protocol number: 3.523.931).

The QR HEALTHY FOOD study included 2 phases applied in sequence, with an average filling time of 15 minutes. The first phase presented 8 questions regarding sample characteristics (explanatory variables) and 1 question to fill in the email address, in case the participant wanted to receive the food score assessment and an educational message regarding healthy eating habits. Volunteers did not provide telephone numbers.

The second phase of the QR HEALTHY FOOD consisted in a validated questionnaire that assesses diets according to the recommendations from the current Dietary Guidelines for the Brazilian Population. This questionnaire has 24 four-point Likert-type items ("strongly disagree", "disagree", "agree", and "strongly agree"), with 0-3 points, comprising four dimensions of adequate and healthy eating addressed in the Guide: food choice, modes of eating, planning, and household organization. The score on the scale is calculated by simply adding up the answers to these items (ranging from 0 to 3 points), whereby the total score can vary between 0 and a maximum of 72. In the case of the 13 items in line with the Guideline recommendations, the highest point is given to the answer showing most agreement (strongly agree = 3 points); while the points given to the 11 items contrary to the recommendations are the opposite (strongly disagree = 3 points)[8]. This mode was chosen because it is self-administered, developed for the Brazilian adult population, with easy-to-understand questions, and because it allows for the use of technology for its application.

In addition to presenting scores that make it possible to offer feedback to the research participant.

No withdrawal was identified in completing the questionnaire.

A descriptive analysis was performed for total and each group. Sex, education, nutritional status, diagnosis of diseases, and answers of the validated questionnaire from the Food Guide were calculated using chi-squared ($\chi 2$) and Fisher's exact test. The normality of distribution of the data was tested using the Kolmogorov-Smirnov method. The data was submitted to an ANOVA and post-hoc Tukey's range test, the Kruskal-Wallis test (for age and BMI) and Spearman correlation test, and linear regression for confirmation of the correlation. Statistical analyses were performed with the aid of the Statistical Package for the Social Sciences® (SPSS), version 20.0 (SPSS Incorporation, 2006). The significance value considered was $p < 0.05$.

RESULTS

The sample consisted of 710 individuals, mainly linked to the Nutrition course, among which 607 (85.5%) are students, 63 (8.9%) are employees and 40 (5.6%) are professors. Table 1 shows the characteristics of the studied sample. There was a greater amount of female participants, 619 (87.2%), while only 91 (12.8%) were male participants. Regarding education, as expected ($p < 0.01$), 466 (65.6%) individuals have completed a high school education, 116 (16.3%) have completed higher education, and 128 (18.1%) have completed a specialization, masters, doctorate and/or post-doctoral degree.

The median and p25 and p75 of the age of the total sample was 22.5 (20.5-29.9) years old. The group of professors [42.8 (36.0-53.0) years old] had a higher average age compared to employees [34.0 (24.5-40.0) years old] and students [22.0 (20.3-26.5) years old] ($p < 0.001$).

Regarding the nutritional status, the median (p25-p75) body mass index (BMI) was 23.2 (21.1-26.2) kg/m². Only 29 (4.1%) had malnutrition, and all of them were part of the student group. Among the 436 (61.4%) who had a eutrophic nutritional status, 388 (63.9%) are students, 25 (39.7%) are employees and 23 (57.5%) are professors. In addition, 245 (34.5%) individuals were diagnosed with overweight, 190 (31.3%) students, 38 (60.4%) employees, and 17 (42.5%) professors ($p < 0.001$). The group of employees [27.0 (24.2-30.8)] had a higher BMI compared to students [23.1 (20.9-25.8)] and professors [24.2 (22.5-26.7)] ($p < 0.001$).

In relation to diagnosis of diseases, 97 (13.7%) individuals answered yes (most frequent reported diseases: 27.4% respiratory disease; 18.8% thyroid disease and 10.3% systemic arterial hypertension), 87 (14.3%) of them are students, 8 (12.7%) are employees, and 2 (5.0%) are professors.

According to Figure 1 (A-D), BMI demonstrated a positive correlation with age for the total sample ($r = 0.319$; $p < 0.001$), and this was confirmed through a linear regression of BMI with age ($\beta = 0.343$; $p \leq 0.001$). And regarding the groups, the BMI for students ($r = 0.248$; $p < 0.001$), employees ($r = 0.403$; $p = 0.001$), and professors ($r = 0.328$; $p = 0.039$) also showed a positive correlation with age.

Table 2 presents the results of the 24 questions (2nd part), which were separated by the total sample, students, employees, and professors, in addition to the p values among groups. There was a difference between the groups for the consumption of industrialized juices in general ($p = 0.001$); soft drinks ($p = 0.003$); sandwiches, snacks and/or pizza replacing lunch or dinner ($p = 0.013$); coffee or tea with sugar ($p < 0.001$); fruits or nuts in small snacks ($p = 0.025$); fruits and vegetables that are locally produced ($p = 0.011$); and fruit for breakfast ($p = 0.012$). Moreover, differences between behavior associated with eating meals sitting on the sofa in the living room or on the bed ($p = 0.012$); "Skipping" at least one of the main meals (lunch and dinner) ($p = 0.011$); meals at the table ($p = 0.020$); habit of taking food along in case the individual gets hungry throughout the day ($p < 0.001$) were also observed.

An adaptation was made in the interpretation of the data, which presents the same 24 questions that assessed the frequency of consumption of *in natura*, minimally processed, processed, and ultra-processed food; however, the answers were grouped as follows: strongly disagree with disagree (with scores on questions 1-11 out of 2.5; and those on 12-24 0.5 points), and strongly agree (with sco-

res on questions 1-11 out of 0.5; and those on 12-24 2.5 points). There was a difference between the groups for the consumption of industrialized juices in general ($p < 0.001$); soft drinks ($p < 0.001$); sandwiches, snacks, and/or pizza replacing lunch or dinner ($p = 0.012$); coffee or tea with sugar ($p < 0.001$); fruits or nuts in small snacks ($p = 0.001$); and fruit for breakfast ($p = 0.001$). And a difference between behavior associated with eating meals sitting on the sofa in the living room or on the bed ($p = 0.038$); meals at the table ($p = 0.011$); habit of taking some food with me in case I feel hungry throughout the day ($p < 0.001$); and use of whole flour ($p = 0.033$).

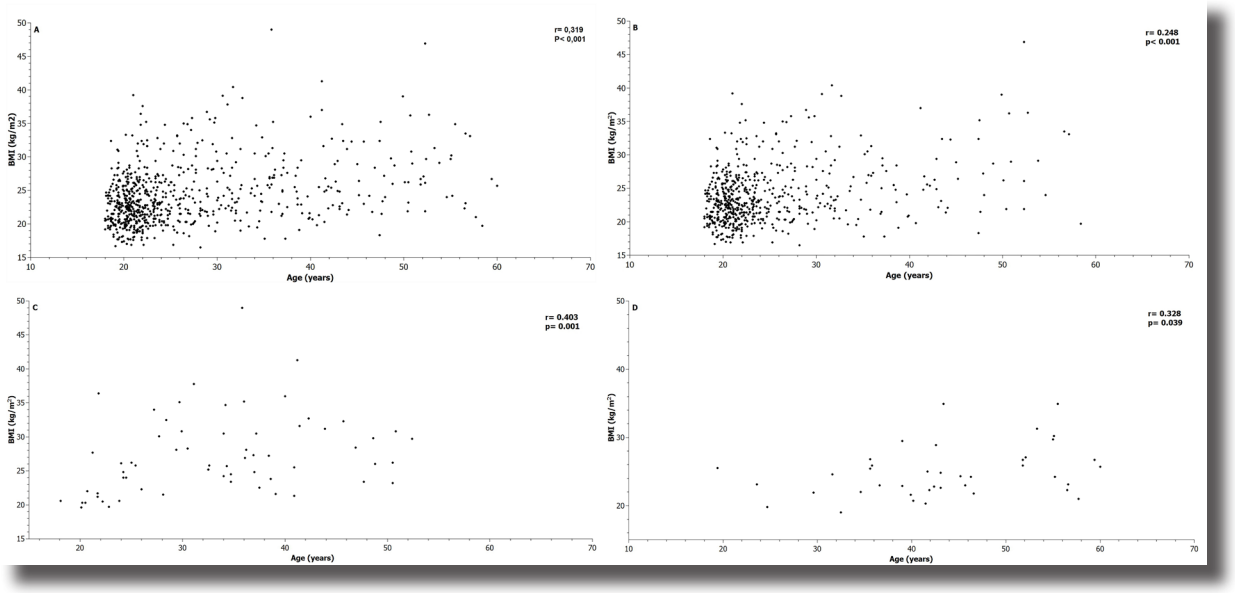
The average score was 39.4 ± 10.9 points. The distribution of the dietary pattern showed 41.4% had an "Excellent diet", 36.8% "Intermediate diet", and 21.8% "Deficient diet". Figure 2 shows the average score of the QR HEALTHY FOOD of the total sample and for each group. The average score of students and professors did not show any significant difference ($p = 0.919$); however, the score of employees was lower than that among students ($p <0.001$) and professors ($p = 0.014$). In the total sample, the eutrophic students had a better food quality. Regarding the classification proposed by GABE and JAIME, (2018), it was demonstrated that all groups had scores between 31 and 41, staying in the same intermediate level assessment range, called "keep moving ahead"[8].

According to Figure 3 (A-D), the BMI showed a negative correlation with the score for the total sample ($r = -0.224$; $p < 0.001$), the student ($r = -0.192$; $p < 0.001$) and employee ($r = -0.267$; $p = 0.034$) groups, but not significant for professors ($r = -0.273$; $p = 0.088$). This data was confirmed through the linear regression of BMI with the food score ($\beta = -0.283$; $p \leq 0.001$), for the total sample.

Table 1 – Characteristics of the total sample (São Paulo-Brazil, 2018).

	Sample	Group			p
		Student	Employee	Professor	
	n (%)	n (%)	n (%)	n (%)	
Sex*					**0.259**
Male	91(12.8)	73 (12.0)	12 (19.0)	6 (15.0)	
Female	619 (87.2)	534 (88.0)	51 (81.0)	34 (85.0)	
Education**					**<0.001**
High School	466 (65.6)	435(71.7)	29 (46.0)	2 (5.0)	
Higher education	116 (16.3)	98 (16.1)	17 (27.0)	1 (2.5)	
Postgraduate[a]	128 (18.1)	74 (12.2)	17 (27.0)	37 (92.5)	
Nutritional Status**					**<0.001**
Malnutrition	29 (4.1)	29 (4.8)	0 (0.0)	0 (0.0)	
Eutrophic	436 (61.4)	388 (63.9)	25 (39.7)	23 (57.5)	
Overweight	167 (23.5)	135 (22.2)	19 (30.2)	13 (32.5)	
Obesity	78 (11.0)	55 (9.1)	19 (30.2)	4 (10.0)	
Diagnosis of Diseases*					**0.243**
Yes	97 (13.7)	87 (14.3)	8 (12.7)	2 (5.0)	
No	613 (86.3)	520 (85.7)	55 (87.3)	38 (95.0)	

*Chi-squared Test. ** Fisher's exact Test. a sum of specialization, masters, doctorate, and post-doctoral.



BMI = body mass index. BMI and age are non-parametric variables. Spearman Correlation. A = Total Sample; B = Student Group; C = Employee Group; D= Professor Group.

Figure 1 – Correlation between body mass index values and age of the total sample and groups.

Table 2 – Frequency of responses from the total sample and groups from the QR HEALTHY FOOD questionnaire.

	Group				
	Sample n (%)	Student n (%)	Employee n (%)	Professor n (%)	p
I usually eat candies, chocolates, and other sweets*					**0.524**
I strongly disagree	49 (6.9)	42(6.9)	3(4.8)	4(10.0)	
Disagree	149 (21.0)	132(21.7)	10(15.9)	7 (17.5)	
Agree	322 (45.4)	267(44.0)	33(52.4)	22 (55.0)	
I strongly agree	190 (26.8)	166(27.3)	17(27.0)	7 (17.5)	
I usually drink industrialized juices, in a box, powder, bottle, or can*					**0.001**
I strongly disagree	246(34.6)	216(35.6)	11 (17.5)	19 (47.5)	
Disagree	189 (26.6)	167(27.5)	12 (19.0)	10 (25.0)	
Agree	198 (27.9)	158(26.0)	32 (50.8)	8 (20.0)	
I strongly agree	77 (10.8)	66(10.90)	8 (12.7)	3 (7.5)	
I usually go to fast-food restaurants or snack bars*					**0.155**
I strongly disagree	104 (14.6)	93 (15.3)	6 (9.5)	5 (12.5)	
Disagree	196 (27.6)	174(28.7)	13 (20.6)	9 (22.5)	
Agree	337 (47.5)	276(45.5)	36 (57.1)	25 (62.5)	
I strongly agree	73 (10.3)	64 (10.5)	8 (12.7)	1 (2.5)	
I have a habit of "snacking" between meals**					**0.154**
I strongly disagree	124 (17.5)	106(17.5)	8 (12.7)	10 (25.0)	
Disagree	230 (32.4)	190(31.3)	24 (38.1)	16 (40.0)	

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continuation table 2...

	Group				
	Sample	Student	Employee	Professor	p
	n (%)	n (%)	n (%)	n (%)	
Agree	263 (37.0)	226(37.2)	23 (36.5)	14 (35.0)	
I strongly agree	93 (13.1)	85 (14.0)	8 (12.7)	0 (0.0)	
I usually drink soda*					**0.003**
I strongly disagree	270 (38.0)	248(40.9)	13 (20.6)	9 (22.5)	
Disagree	170 (23.9)	146(24.1)	15 (23.8)	9 (22.5)	
Agree	198 (27.9)	154(25.4)	27 (42.9)	17 (42.5)	
I strongly agree	72 (10.1)	59 (9.7)	8 (12.7)	5 (12.5)	
I usually exchange food at lunch or dinner for sandwiches, snacks and/or pizza*					**0.013**
I strongly disagree	223 (31.4)	197(32.5)	15 (23.8)	11 (27.5)	
Disagree	274 (38.6)	239(39.4)	19 (30.2)	16 (40.0)	
Agree	149 (21.0)	116(19.1)	20 (31.7)	13 (32.5)	
I strongly agree	64 (9.0)	55 (9.1)	9 (14.3)	0 (0.0)	
When I drink coffee or tea, I usually add sugar**					**<0.001**
I strongly disagree	270 (38.0)	245(40.4)	8 (12.7)	17 (42.5)	
Disagree	99 (13.9)	86 (14.2)	5 (7.9)	8 (20.0)	
Agree	202 (28.5)	158(26.0)	36(57.1)	8 (20.0)	
I strongly agree	139 (19.6)	118(19.4)	14 (22.2)	7 (17.5)	
I take advantage of mealtimes to solve other things and I end up not eating*					**0.065**
I strongly disagree	303(42.7)	267(44.0)	28 (44.4)	8 (20.0)	
Disagree	264 (37.2)	220(36.2)	21 (33.3)	23 (57.5)	
Agree	101 (14.2)	83 (13.7)	11 (17.5)	7 (17.5)	
I strongly agree	42 (5.9)	37 (6.1)	3 (4.8)	2 (5.0)	
I usually eat meals at my work or study desk*					**0.184**
I strongly disagree	316 (44.5)	269(44.3)	33 (52.4)	14 (35.0)	
Disagree	236 (33.2)	198(32.6)	22 (34.9)	16 (40.0)	
Agree	120 (16.9)	104(17.1)	6 (9.5)	10 (25.0)	
I strongly agree	38 (5.4)	36 (5.9)	2 (3.2)	0 (0.0)	
I usually eat my meals sitting on the sofa in the living room or on the bed*					**0.012**
I strongly disagree	261 (36.8)	228(37.6)	17 (27.0)	16 (40.0)	
Disagree	184 (25.9)	150(24.7)	18 (28.6)	16 (40.0)	
Agree	189 (26.6)	157(25.9)	24 (38.1)	8 (20.0)	
I strongly agree	76 (10.7)	72 (11.9)	4 (6.3)	0 (0.0)	
I usually "skip" at least one of the main meals (lunch and dinner)*					**0.011**
I strongly disagree	326 (45.9)	292(48.1)	19 (30.2)	15 (37.5)	
Disagree	174 (24.5)	141(23.2)	20 (31.7)	13 (32.5)	
Agree	149 (21.0)	119(19.6)	18 (28.6)	12 (30.0)	
I strongly agree	61 (8.6)	55 (9.1)	6 (9.5)	0 (0.0)	
I usually eat my meals sitting at the table*					**0.020**
I strongly disagree	30 (4.2)	27 (4.4)	3 (4.8)	1 (2.5)	
Disagree	116 (16.3)	102(16.8)	13 (20.6)	25 (62.5)	

to be continued...

continuation table 2...

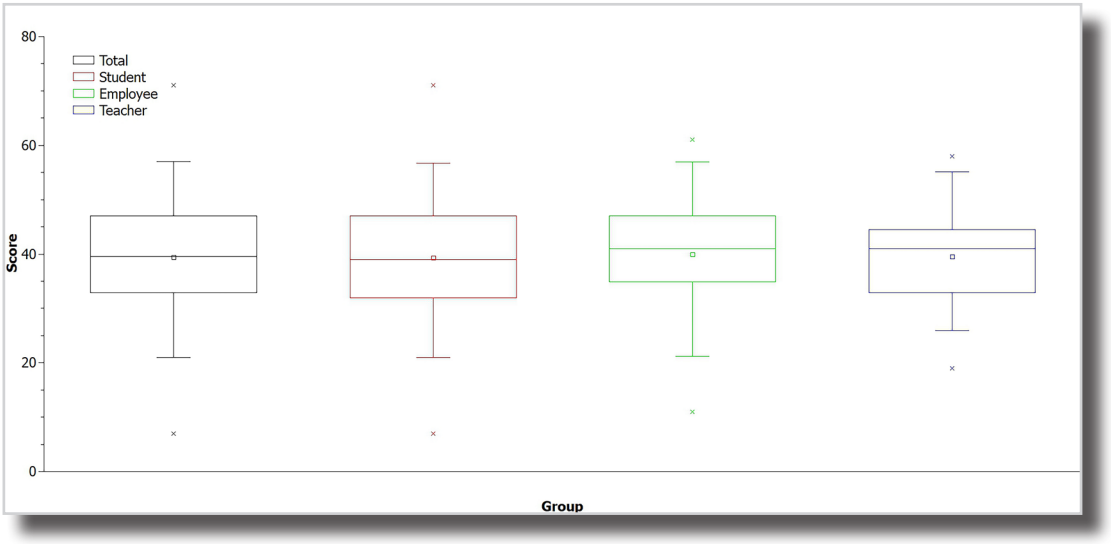
	Group				
	Sample	Student	Employee	Professor	p
	n (%)	n (%)	n (%)	n (%)	
Agree	302 (42.5)	247(40.7)	30 (47.6)	14 (35.0)	
I strongly agree	262 (36.9)	231(38.1)	17 (27.0)	0 (0.0)	
I try to eat meals calmly*					**0.477**
I strongly disagree	42 (5.9)	38 (6.3)	3 (4.8)	1 (2.5)	
Disagree	189 (26.6)	157(25.9)	17 (27.0)	15 (37.5)	
Agree	326 (45.9)	275(45.3)	34 (54.0)	17 (42.5)	
I strongly agree	153 (21.5)	137(22.6)	9 (14.3)	7 (17.5)	
I usually participate in the preparation of food at my home*					**0.407**
I strongly disagree	67 (9.4)	58 (9.6)	6 (9.5)	3 (7.5)	
Disagree	183 (25.8)	153(25.2)	20 (31.7)	10 (25.0)	
Agree	233 (32.8)	195(32.1)	25 (39.7)	13 (32.5)	
I strongly agree	227 (32.0)	201(33.1)	12 (19.0)	14 (35.0)	
At my house we share the tasks that involve preparing and consuming meals**					**0.145**
I strongly disagree	136 (19.2)	109(18.0)	16 (25.4)	11 (27.5)	
Disagree	222 (31.3)	192(31.6)	19 (30.2)	11 (27.5)	
Agree	241 (33.9)	204(33.6)	25 (39.7)	12 (30.0)	
I strongly agree	111 (15.6)	102(16.8)	3 (4.8)	6 (15.0)	
I usually buy food at street fairs**					**0.227**
I strongly disagree	100 (14.1)	86 (14.2)	9 (14.3)	5 (12.5)	
Disagree	194 (27.3)	165(27.2)	18 (28.6)	11 (27.5)	
Agree	288 (40.6)	242(39.9)	32 (50.8)	14 (35.0)	
I strongly agree	128 (18.0)	114(18.8)	4 (6.3)	10 (25.0)	
When I make small snacks throughout the day, I usually eat fruits or nuts**					**0.025**
I strongly disagree	110 (15.5)	86 (14.7)	14 (22.2)	7 (17.5)	
Disagree	191 (26.9)	153(25.2)	26 (41.3)	12 (30.0)	
Agree	309 (43.5)	278(45.8)	17 (27.0)	14 (35.0)	
I strongly agree	100 (14.1)	87 (14.3)	6 (9.5)	7 (17.5)	
When I choose fruits and vegetables, I prefer those that are organic*					**0.205**
I strongly disagree	190 (26.8)	162(26.7)	16 (25.4)	12 (30.0)	
Disagree	290 (40.8)	242(39.9)	32 (50.8)	16 (40.0)	
Agree	188 (26.5)	167(27.5)	14 (22.2)	7 (17.5)	
I strongly agree	42 (5.9)	36 (5.9)	1 (1.6)	5 (12.5)	
When I choose fruits and vegetables, I prefer those that are locally produced*					**0.011**
I strongly disagree	142 (20.0)	124(20.4)	14 (22.2)	4 (10.0)	
Disagree	325 (45.8)	275(45.3)	29 (46.0)	21 (52.5)	
Agree	207 (29.2)	179(29.5)	20 (32.7)	8 (20.0)	
I strongly agree	36 (5.1)	29 (4.8)	0 (0.0)	7 (17.5)	
I usually take some food with me in case I feel hungry throughout the day**					**<0.001**
I strongly disagree	86 (12.1)	69 (11.4)	14 (22.2)	3 (7.5)	
Disagree	150 (21.1)	121(19.9)	21 (33.3)	8 (20.0)	

to be continued...

continuation table 2...

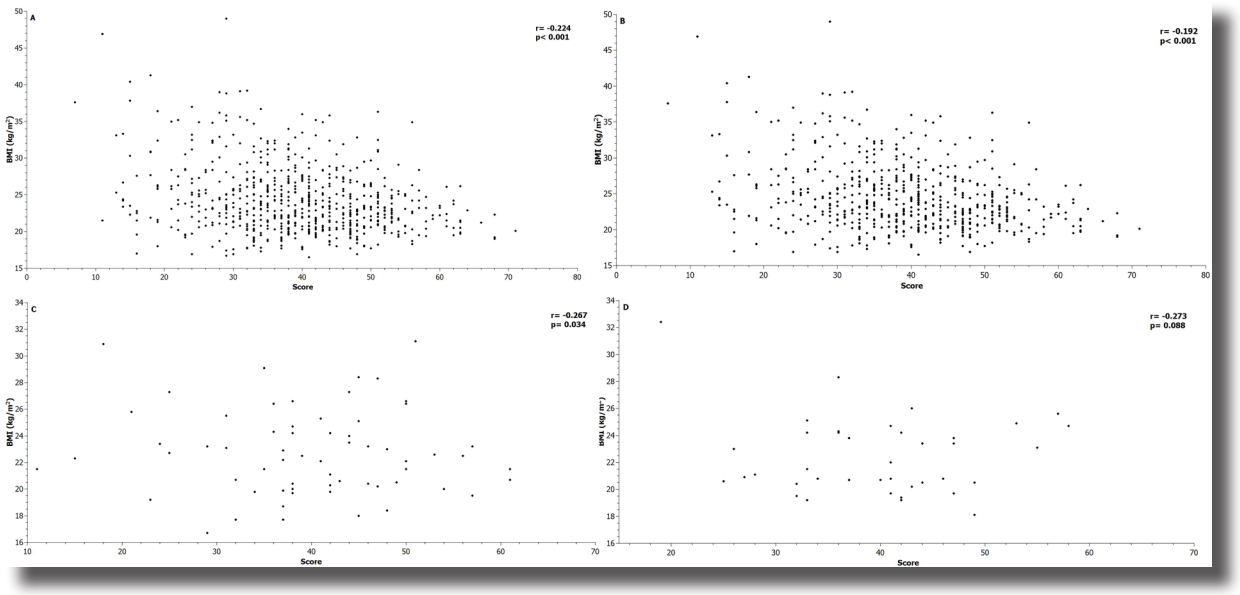
	Group				
	Sample	Student	Employee	Professor	p
	n (%)	n (%)	n (%)	n (%)	
Agree	283 (39.9)	238(39.2)	24 (38.1)	21 (52.5)	
I strongly agree	191 (26.9)	179(29.5)	4 (6.3)	8 (20.0)	
I usually plan the meals I will have for the day**					**0.333**
I strongly disagree	117 (16.5)	102(16.8)	10 (15.9)	5 (12.5)	
Disagree	233 (32.8)	191(31.5)	28 (44.4)	14 (35.0)	
Agree	243 (34.2)	208(34.3)	20 (31.7)	15 (37.5)	
I strongly agree	117 (16.5)	106(17.5)	5 (7.9)	6 (15.0)	
I usually diversify my consumption of beans, with peas, lentils, or chickpeas*					**0.354**
I strongly disagree	259 (36.5)	222(36.6)	27 (42.9)	10 (25.0)	
Disagree	221 (31.1)	185(30.5)	21 (33.3)	15 (37.5)	
Agree	157 (22.1)	133(21.9)	12 (19.0)	12 (30.0)	
I strongly agree	73 (10.3)	67 (11.0)	3 (4.8)	3 (7.5)	
In my house it is common to use whole wheat flour*					**0.086**
I strongly disagree	237 (33.4)	202(33.3)	19 (30.2)	16 (40.0)	
Disagree	272 (38.3)	224(36.9)	35 (55.6)	13 (32.5)	
Agree	153 (21.5)	138(22.7)	7 (11.1)	8 (20.0)	
I strongly agree	48 (6.8)	43 (7.1)	2 (3.2)	3 (7.5)	
I usually eat fruit for breakfast**					**0.012**
I strongly disagree	161 (22.7)	134(22.1)	19 (30.2)	8 (20.0)	
Disagree	215 (30.3)	173(28.5)	29 (46.0)	13 (32.5)	
Agree	191 (26.9)	169(27.8)	10 (15.9)	12 (30.0)	
I strongly agree	143 (20.1)	131(21.6)	5 (7.9)	7 (17.5)	

* Fisher's exact Test. ** Chi-squared Test.



Score is parametric variable. ANOVA. Student x Professor Group (p = 0.919), Employee x Student Group (p <0.001), Employee x Professor Group (p = 0.014).

Figure 2 – Average score of the total sample and the groups in QR HEALTHY FOOD.



BMI = body mass index. BMI is non-parametric and score is parametric variable. Spearman Correlation. A = Total Sample; B = Student Group; C = Employee Group; D= Professor Group.

Figure 3 – Correlation between body mass index values and score of the total sample and groups.

DISCUSSION

One of the main findings in this study was related to the average score of students and professors who showed no significant difference and was higher than the employee scores. In addition, employees had a higher BMI compared to professors and students.

It is evident that the high BMI and inadequate diet have a correlation with lifestyles, social practices related to leisure, pleasure and culture, high consumption of ultra-processed foods, physical inactivity, and behavioral factors. Although these factors are crucial for weight gain, the economic factor can be a major influence on behaviors, habits and food choices, since industrialized foods have a low cost, in addition to having attributes such as excessive flavor promoting easy satisfaction, quickly and conveniently[9-11], as well as access to information, which is apparently a positive thing but is also a source of confusion for people. Therefore, contradictory information, fads, and personal reports are examples of how access to information needs to be used in favor of health care for all individuals[12].

Furthermore, a food shopping simulation experiment with 358 participants, using eye tracking equipment, was carried out with adults, in the United States, to assess attention to nutritional information contained on food labels. As an evaluation, three criteria were used, the change status with the use of a questionnaire based on the transtheoretical model, whether or not individuals looked at the label when making purchases, and finally, the dietary quality of the selected products. After analysis, the hypothesis was raised that those who pay more attention to food labels were more likely to consume a healthy diet according to pre-established criteria. In addition, the quality of the diet assessed by the Healthy Eating Index (HEI) was positively associated with both self-reported and objective mea-

sures of the use of labels, such as sex, BMI, educational instruction index, and economic factors[13]. Thus, the educational instruction index reiterates the findings of the present study, that employees have more harmful habits compared to professors and students, given that the majority had a position requiring a high school education (data not shown).

Another finding was that employees consume more added sugar than students and professors. This habit together with the excessive consumption of ultra-processed foods are aspects that increase the risk for the development of overweight and obesity, considering that more than half of adult Brazilians are overweight, and that obesity is observed among 16.8% of the men and 24.4% of women[14]. Therefore, these are risk factors that deserve attention, as they seem to coexist greatly among individuals with diabetes and systemic arterial hypertension[15].

Associating NCDs with inadequate nutrition, as well as other risk factors, has a large and cumulative impact on the health system. Thus, the economy is affected by the loss of productivity. To minimize these damages, to reverse certain scenarios and to reduce expenses, investing in food and nutrition education programs for the Brazilian population is essential[15,16].

A systematic review looked at factors that contribute to a successful nutrition education intervention among individuals aged 2-19 years. Among the 48 studies, seven factors coincided with those that were successful, namely: (1) meetings or activities involving professors and parents, carried out at school or at home (2) lasting at least 6 months and with frequent stimuli; (3) family interaction; (4) practical experiences appropriate to the age range of the target audience; (5) standardization of the team responsible for providing activities and training; (6) comparison of the influence that the environment has on eating behavior; (7) the objectives were previously defined, as well as the intervention and the desired result, affecting weight or the final BMI[17].

In relation to the habit of drinking industrialized juices, in a "box", powder, bottle or can and/or soft drinks, the data revealed greater consumption among employees. These results are in line with the Family Budget Survey (FBS), carried out between 2017-2018, showing that drinks and teas had the highest annual average, being around 52.5 kg / per capita / household, this group included alcoholic beverages, such as beer and wine, and non-alcoholic beverages, such as mineral water, soft drinks, bottled fruit juice, and energy drinks. Another factor is also the annual per capita household food acquisition presented in the FBS (2017-2018), with individuals having an income of up to 1 minimum wage having the highest average acquisition with beverages and teas, approximately 32.2 kg / per capita / household[18].

Similarly, while comparing FBS (2017-2018) with previous FBSs it was possible to identify that *in natura* or minimally processed foods and processed culinary ingredients are moving towards a downward trend in relation to processed foods and, there is an emphasis on ultra-processed foods. Fortunately, there is a slowdown in this trend, which may be due to the possible effects of the public policy actions implemented. In addition, the publication of the Dietary Guidelines for the Brazilian Population, in 2014, may have contributed to the population adhering to a better diet, based on clear, objective and simple language material, aiming to provide a better visualization and understanding of the recommendations for the entire Brazilian population[1,3,18].

In the present study, the responses from students and professors to the questions "When I drink coffee or tea, I usually put sugar", "I usually drink industrialized juices, such as from a box, powder, bottle, or can", "When I have

small snacks along the day, I usually eat fruits or nuts", "I usually take some food with me in case I feel hungry throughout the day", and "I usually exchange lunch or dinner food for sandwiches, snacks and/or pizza" represent frequent healthy habits, and similarly relate to the 10 steps in the Dietary Guidelines for the Brazilian Population[3].

According to a qualitative study, based on the perceptions of undergraduate Nutrition students, the university appears to have a direct influence on access, availability, variety, and cost of food, considering the options provided on the campus itself. On the other hand, they also verified the relationship with the environment determining students' eating practices, which may inhibit or encourage healthy eating practices[19].

Along with this, a study carried out with 718 students, in a public university in the Northeast of Brazil, in the health sector, used an adapted questionnaire on healthy eating proposed by the Ministry of Health "How is your diet?". As a result, they observed positive adequacies for all evaluated eating behaviors, such as removing the apparent fat from meat or chicken (77.7%), avoiding the consumption of fried foods, sausages, and sweets (51.1%), the use of vegetable oil in food preparation (78.1%), no salt added to meals (78.8%), not exchanging meals for snacks (58.9%), and rarely/never consuming alcoholic beverages (65.3%)[20]. Therefore, these results are comparable to those obtained in the present study, supporting the hypothesis that the health area contributes to education and the development of healthier habits among students and professors.

When asked about "eating while sitting on a bed or sofa", employees responded in agreement more to this topic than other groups. The results presented are inadequate, according to the Dietary Guidelines for the Brazilian Population, which recommends eating regularly and paying attention to meals, in appropriately adequate environments and whenever possible, eating with company. In addition to always eating in clean, comfortable and quiet places and where there is no incentive to consume excessive amounts of food[3].

In addition to this, it was shown that the act of eating along with another daily activity can decrease the attention that would be devoted to food, such as watching TV and using a cell phone during meals, which have a positive correlation with weight gain and obesity[21]. Furthermore, based on the results obtained through the Surveillance of Risk and Protection Factors for Chronic Diseases by Telephone Survey (VIGITEL), between 2006 and 2014, individuals who reported watching TV for more than 3 hours a day showed a lower frequency of healthy food consumption indicators and a higher frequency of unhealthy indicators[11]. In addition, habits of watching TV for long periods have been more frequent in extreme age groups and among people that have a lower educational level[22].

According to some studies, regular consumption of fruits and vegetables (≥ 5 days / week) was higher among those who reported watching TV for less than three hours a day (35.1% and 30.6%, respectively), while the consumption of soft drinks was higher among individuals with the habit of watching TV daily for three or more hours (30.9% and 24.1% respectively). Aligned to this, eating in suitable places, such as the dining table, helps and favors the increase in the quality of food and prevents obesity[3,19,23].

In a randomized and controlled study, 253 university students' ability to classify food according to its processing level was assessed. The survey sent by email consisted of 25 foods that should be classified based on the criteria of the MyPlate groups (US Dietary Guidelines), Limite Status (foods with excessive fat, sugar or sodium), and all NOVA categories (*in natura* or minimally processed foods, culi-

nary ingredients, processed foods, and ultra-processed foods). They were distributed in three intervention groups that received nutrition education materials: MyPlate, MyPlate + NOVA, and the control group that did not receive any intervention. It is suggested that some participants already had existing knowledge of MyPlate and perhaps NOVA, due to the higher performance in MyPlate questions (61% correct) compared to the questions in the NOVA categories (35% correct). An increase in performance was observed after the intervention in the MyPlate + NOVA treatment group compared to the MyPlate group, suggesting that the NOVA principle was more easily understood, which could consequently increase understanding about the quality of foods to be consumed, as well as emphasize the importance of the Dietary Guidelines for society[24].

This study has some limitations. It is possible that the convenience sample of the study is composed of people more interested in food and, therefore, does not represent the university community. Furthermore, the groups did not have homogeneous distribution (Student > Employee > Professor group). The strengths are the use of a validated and self-administered questionnaire to assess the food quality of adults, which can be used on a large scale.

CONCLUSION

Although based upon a convenience sampling, most of the sample reported excellent food quality; however, 1 out of 3 members is overweight. The dietary pattern of students, professors, and coordinators was higher than that of employees. It should be noted that the eutrophic students had a better dietary pattern. And the dietary pattern and age influenced the BMI value.

This study has an innovative characteristic regarding the evaluation of the academic community's diet according to the Dietary Guidelines for the Brazilian Population in a fully electronic format. This type of study should be encouraged as a model for future research related to the assessment of food quality and the implementation of programs to promote health and balanced nutrition.

Author statement CRediT

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