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Trends in fruits and vegetables consumption by academic undergraduate nutrition students of a public university in 1999, 2004 and 2009

Tendência da ingestão de frutas e hortaliças por acadêmicas do curso de graduação em nutrição de uma universidade pública nos anos de 1999, 2004 e 2009

Abstract

Objective: To evaluate fruits and vegetables consumption by undergraduate Nutrition students of a public university, over the years. **Methods:** It is a cross-sectional study with 161 academic students. Data were collected through food records of two weekdays and one weekend day, from the years of 1999, 2004 and 2009. Fruits and vegetables consumption were evaluated in terms of weight. **Results:** There was significantly less vegetables consumption on weekends (30g; 35g; 44g) when compared to weekdays (49g; 49g; 75g) in all years, but there was no significant difference in fruits and vegetables consumption and in the consumption of the 3 days of registration over time. The prevalence of inadequacy was high in all years, ranging from 66% to 81.5%. The percentage of fruit mean consumption on weekdays (78.5%; 76.8%; 73.1%) was more than twice that of vegetables (21.5%; 23.2%; 26.8%) in 1999, 2004 and 2009, as well as on weekends (82.9%; 79.4%; 81.5%) (17.1%; 20.6%; 18.5%), respectively. **Conclusion:** It is necessary to implement dietary intervention to increase fruits and vegetables consumption of university students.

Keywords: Food Consumption. Food.Fruit. Vegetables. Students.

Resumo

Objetivo: Avaliar o consumo de frutas e hortaliças de acadêmicas do curso de graduação em Nutrição de uma universidade pública ao longo dos anos. **Métodos:** Trata-se de um estudo transversal com 161 acadêmicas. Os dados foram coletados por meio de registros alimentares, de dois dias da semana e um dia de fim de semana nos anos 1999, 2004 e 2009. O consumo de frutas e hortaliças foi avaliado em gramatura. **Resultados:** Houve consumo significativamente menor de hortaliças nos fins de semana (30g; 35g; 44g) quando comparado aos dias de semana (49g; 49g; 75g) em todos os anos, porém não houve diferença significativa do consumo de frutas e hortaliças e no consumo dos 3 dias de registro ao longo do tempo. A prevalência de inadequação foi elevada em todos os anos, variando de 66% a 81,5%. O percentual do consumo médio de frutas nos dias de semana (78,5%; 76,8%; 73,1%) foi mais que o dobro do de hortaliças (21,5%; 23,2%; 26,8%) em 1999, 2004 e 2009, assim como nos fins de semana (82,9%; 79,4%; 81,5%) (17,1%; 20,6%; 18,5%), respectivamente. **Conclusão:** Faz-se necessário implementar intervenção dietética para aumentar o consumo de frutas e hortaliças em universitárias.

Palavras-chave: Consumo de alimentos. Alimentos. Frutas. Verduras. Estudantes.

INTRODUCTION

In the 1990s, after Brazil suffered from long periods of economic stagnation, the market economy opened up, encouraging both foreign and national companies.¹ The country's socio-political context contributed to changes in the food system, allowing the loss of culinary traditions and the increase in industrial food production.² Over the 2000s, there was an economy growth and an improvement in the distribution of income and poverty.³ Individuals began having access to food with high energy density, less satiety capacity, high palatability and fast digestion and absorption. These characteristics point to an increase in the away-from-home food consumption that directly contribute to energy imbalance.⁴ Data from the Brazilian Household Budget Survey (POF 2008/2009) revealed a 43.7% prevalence of away-from-home food consumption in the Southeast region.⁵

The modern lifestyle in the cities makes the individual opt for practical and tasty food choices. In addition, the division of labor that was determined between sexes assigned the task of caring for the home to women, which may have resulted in a shorter time to plan for a healthy meal due to the non-redistribution of household chores.⁶ Thus, the excess of energy that is often accompanied by excess saturated fat, *trans* fat, cholesterol, free sugars and sodium consumed by Brazilians reflects directly on nutritional status, thus obesity already affects 18.9% of the Brazilian population.⁷

In view of the social changes experienced by the Brazilian population, which influenced their health and nutrition conditions, it was essential to reformulate the recommendations. Thus, the Ministry of Health of Brazil (MHB) published the 2nd edition of the Dietary Guidelines for the Brazilian Population, in order to protect the population against nutritional diseases, infectious diseases and chronic non-communicable diseases (NCD).⁸

The World Health Organization (WHO) recommends a daily intake of at least 400g of fruits and vegetables to prevent chronic diseases.⁹ According to Billson et al., this would correspond to five servings of fruits and vegetables containing 80g each.¹⁰ However, these foods consumption is still insufficient in Brazil. The POF (2008-2009) found a reduced fruits and vegetables consumption in more than 90% of the Brazilian population.⁵

It is possible to notice that some portions of the general population are more likely to have a diet marked by the high consumption of ultra-processed foods, that is, which include hydrogenated fats, dyes, flavorings, flavor enhancers, low nutritional content and high energy density in their formulations, instead of eating fruits, vegetables, and whole grains naturally rich in vitamins, minerals and dietary fibers, as in the case of Brazilian university students.^{11,12} The promotion of daily consumption of fruits and vegetables should be prioritized, as evidence indicates the protective effect of these food groups for NCDs.¹³ Entering a university is a significant step in the process of transition from adolescence to adulthood, since it is in this life cycle that a large portion of adolescents, previously accustomed to the daily relationship with their families, live the experience of leaving their homes to study, and thus have more freedom to make decisions.¹⁴

Not living with their families is one of the factors that interfere with the students' meals as well as providing their own food, housing, finances and managing their time simultaneously with their studies. The inexperience in fulfilling such tasks can lead to omission of meals such as breakfast and dinner and the replacement of large meals for snacks, resulting in inadequate food intake.^{12,15} In this context, the objective was to assess fruits and vegetables consumption by undergraduate nutrition students of a public university on weekdays (WD) and weekends (W) in 1999, 2004 and 2009.

METHODS

This is a cross-sectional study based on secondary data previously collected from a convenience sample. Data were collected through food records of two non-consecutive WD and one day of W, self-reported by students from the 2nd year of nutrition course, as a practical activity from classes of Nutrition and Dietetics II, from the State University of Rio de Janeiro (UERJ) in three different years, 1999, 2004 and 2009, with 5-year intervals between collections as standard. In addition, it was decided to investigate food consumption prior to the implementation of the University Restaurant. A total of 161 food records were collected. Records by male students were excluded due to low representativeness, beyond the records by students under the age of 18 years old.

Data such as age, body mass and height were reported and the Body Mass Index (BMI) was determined and classified according to the World Health Organization.¹⁶

Food records were made by writing all foods and beverages consumed in appropriate forms, in detail. The records were filled out by nutrition academic students who received guidance in nutritional assessment and nutrition and dietetics classes. Such guidance included the details of the information to be recorded. These details encompassed the way of informing the ingested portion, the details of recipes, and description on the addition of spices, sugar, salt, oils and fats. Nutrition students were also instructed to include the brand and specifics of industrialized products. In addition, to ensure the proper description of the food consumed and its quantities, the student herself, the monitor and professors of the classes reviewed the recorded data, together with the individual under investigation, shortly after the registration was completed. The respondent students reported the quantities, in household measures, of food and beverages consumed. These quantities were converted into weight by the Table for the Assessment of Household Measures.¹⁷ The amounts of fruits and vegetables eaten daily were collected, with a mean consumption of the two WD being calculated. All raw, dried, frozen, cooked, and fresh juices were considered as fruits, except fruits in syrups, fruit tarts, industrialized juices, and soft drinks. The juice analysis was made using the Table for the Assessment of Household Measures.¹⁷ From the total volume reported, only the amount of the fruit weight that was used in the preparation of the juice was considered. Similarly, all raw, cooked, braised, frozen, canned (such as heart of palm, mushroom and petit pois), and vegetable soup were considered as vegetables, except potatoes, yams, and cassava, that is, type C vegetables as tubers or roots.

Besides general information about fruits and vegetables collected, descriptive analysis was performed according to the variety, ways of preparation and in which meal these foods were most consumed. The consumption of these foods was showed in two ways: by the percentage of the fruit and vegetable mean consumption each year and by the quantity (in grams) eaten throughout the day by the student, compared with the WHO⁹ recommendation to verify the adequacy of the consumption over the years and in WD, W and in the 3 days of registration. The prevalence of inadequacy was obtained from the number of students who consumed less than 400g of fruits and vegetables. To calculate the percentage of fruit mean consumption, the following formula was used:

$$\frac{\bar{x} \text{ of fruit consumption (g) } \times 100}{\bar{x} \text{ of fruit consumption + vegetables (g)}}$$

And to calculate the percentage of vegetables mean consumption, the following formula was used:

$$\frac{\bar{x} \text{ of vegetables consumption (g) } \times 100}{\bar{x} \text{ of fruits consumption + vegetables (g)}}$$

This research was approved by the Research Ethics Committee of the Pedro Ernesto University Hospital of the State University of Rio de Janeiro (UERJ), under the number 1046-CEP / HUPE.

For statistical analysis, SPSS software version 19.0 was used. The Shapiro-Wilk test pointed out the non-normality of the data, so the quantitative results in weight were expressed in median consumption. To compare the age variables and anthropometric characteristics over the years, the Kruskal-Wallis test was used. To compare the quantities of fruits and vegetables consumption in WD with W during the three years analyzed, the Wilcoxon and Kruskal-Wallis tests were used, respectively. For prevalence of inadequacy, the Chi-square test was applied, with a significance level of $p \leq 0.05$.

RESULTS

The sample consisted of 161 students, 54 of whom were from 1999, 60 from 2004 and 47 from 2009. They presented with similar age, weight, height and BMI over the years, with no significant difference between them. The age of the students ranged from 18 to 29 years, the weight from 39 to 119 kg, the height from 1.48 to 1.80 m and the BMI from 15.4 to 43.7 kg / m² (Table 1).

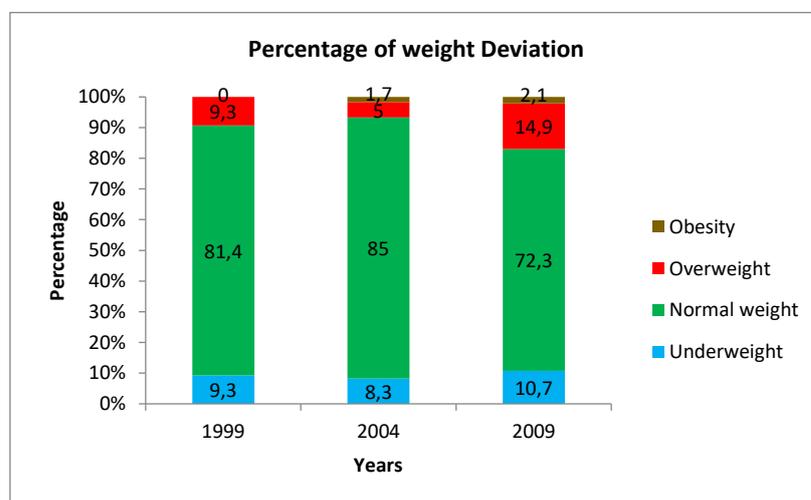
Table 1. Age and anthropometric characteristics of nutrition students over the years. Rio de Janeiro, RJ, 2017.

	1999 (n=54)			2004 (n=60)			2009 (n=47)			p value #
	Median	Min	Max	Median	Min	Max	Median	Min	Max	
Age (years)	21 [‡]	18	22	21	18	27	21	18	29	0.420
Weight (kg)	55	41	65	56	39	76	55	42	119	0.717
Height (m)	1.60	1.48	1.80	1.62	1.50	1.77	1.60	1.50	1.75	0.131
BMI (kg/m ²)	21.3	17.1	27.0	20.7	15.4	30.4	21.7	16.5	43.7	0.206

[‡] Age median of only 49 out of 54 nutrition students in 1999. # Kruskal-Wallis Test. Min – Minimum value; Max – Maximum value; BMI – Body Mass Index.

Regarding the BMI classification in 1999, 9.3% of students were considered underweight, 81.4% normal weight and 9.3% overweight. In 2004, 8.3% of the students were found to be underweight, 85% normal weight, 5% overweight and 1.7% obesity. And finally in 2009, it was observed that 10.7% of the students presented underweight, 72.3% normal weight, 14.9% overweight and 2.1% obesity (Figure 1).

Figure 1. Classification of the weight deviation of nutrition students over the years, by the Body Mass Index, according to WHO (1998). Rio de Janeiro, RJ, 2017.



The medians of fruit and vegetable consumption in the WD, W and in the 3 days of registration over the years were analyzed. All WD, W, and 3 days of registration did not show significant differences in fruit, vegetable and total consumption between years. When confronting fruit consumption between the WD and W, there was only a significant difference in 2004 (212g in the WD and 162g in the W), pointing to a higher consumption in the WD than in the W. When comparing the vegetables consumption between the WD (49g in 1999; 49g in 2004; 75g in 2009) and W (30g in 1999; 35g in 2004; 44g in 2009) there was a significant difference in all years, and it was also verified that the consumption during the week was higher than in the W (Table 2).

And when comparing the total consumption between the WD and the W, there was only a significant difference in 2004 (310g in the WD and 224g in the W), thus, the fruits and vegetables consumption was also higher during the week when compared to the W (Table 2). In addition, we observed that the median consumption of fruits and vegetables was below the WHO⁹ recommendation in all years, both in the WD, W and also in the 3 days of registration.

Table 2. The median consumption of fruits and vegetables on weekdays, weekends and 3 days of registration by nutrition students over the years. Rio de Janeiro, RJ, 2017.

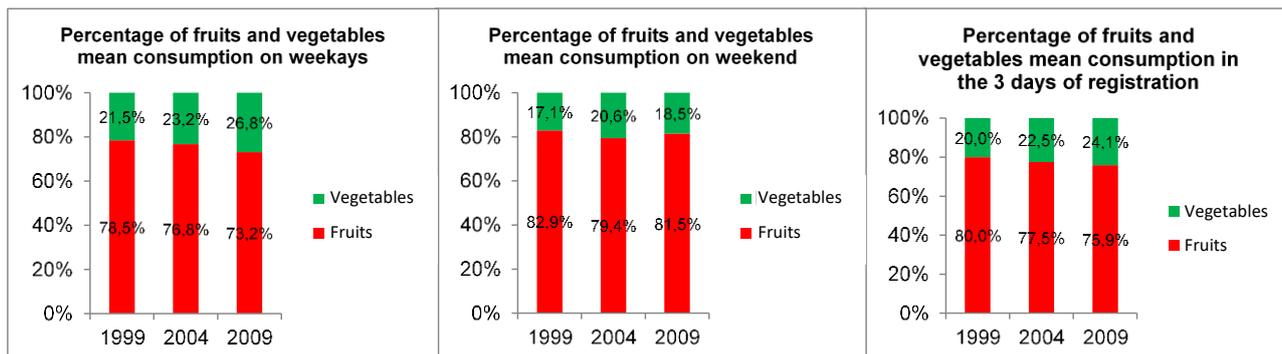
Year	Consumption								
	Fruits (g)			Vegetables (g)			Total (Fruits and Vegetables) (g)		
	Weekdays Median (Min – Max)	Weekend Median (Min – Max)	3 days of registration Median (Min – Max)	Weekdays Median (Min – Max)	Weekend Median (Min – Max)	3 days of registration Median (Min – Max)	Weekdays Median (Min – Max)	Weekend Median (Min – Max)	3 days of registration Median (Min – Max)
1999 (n=54)	191 (0-1280)	205 (0-1085)	203 (0-1215)	49 (0-243)	30* (0-230)	40 (0-238)	253 (0-1398)	241 (0-1145)	271 (23-1313)
2004 (n=60)	212 (0-1450)	162* (0-550)	221 (0-1145)	49 (0-310)	35* (0-198)	56 (0-232)	310 (0-1466)	224* (0-675)	294 (0-1166)
2009 (n=47)	192 (20-680)	240 (0-996)	232 (37-759)	75 (0-359)	44* (0-371)	69 (0-259)	303 (65-802)	255 (0-1096)	300 (43-884)

Paired Wilcoxon test for weekdays and weekend comparison: no statistical significance in 1999 (p=0.880 fruits; p=0.630 total); * with statistical significance in 1999 (p=0.049 vegetables); * with statistical significance in 2004 (p= 0.033 fruits; p=0.007 vegetables; p=0.004 total); no statistical significance in 2009 (p = 0.719 fruits; p=0.874 total); *with statistical significance in 2009 (p=0.05 vegetables).

Kruskall-Wallis Test. Comparison between years: Not statistically significant (p=0.609 fruits in weekdays); (p= 0.093 vegetables in weekdays); (p=0.351 total in weekdays); (p=0.075 fruits in the weekend); (p=0.853 vegetables in the weekend); (p=0.07 total in the weekend); : Not statistically significant (p=0.401 fruits in the 3 days of registration); (p= 0.144 vegetables in the 3 days of registration); (p = 0.370 total in the 3 days of registration);. Min – Minimum value; Max – Maximum value.

The percentage of fruits and vegetables mean consumption in the WD in 1999 was 78.5% and 21.5%; in 2004 was 76.8% and 23.2%; and in 2009 was 73.2% and 26.8%, respectively. While in the W, the percentage of fruits and vegetables mean consumption in 1999 was 82.9% and 17.1%; in 2004, 79.4% and 20.6%; and in 2009 was 81.5% and 18.5%, respectively. In the 3 days of registration, the percentage of mean consumption of 80% and 20% in 1999; 77.5% and 22.5% in 2004 and 24.1% and 75.9% in 2009 for fruits and vegetables, respectively, was observed. It is important to note that the percentage of fruits mean consumption is more than double of that of vegetables in all years (Figure 2).

Figure 2. Percentage of fruits and vegetables mean consumption by nutrition students over the years. Rio de Janeiro, RJ, 2017.



The prevalence of inadequacy was analyzed according to the WHO⁹ recommendation for fruits and vegetables consumption in the WD, W, and in the 3 days of registration. In 1999, 81.5% of students showed inadequacy in the WD, 72.2% in the W and 81.5% in the 3 days of registration. In 2004, 71.7% showed inadequacy in the WD, 80% in the W and 80% in the 3 days of registration. In 2009, 66% of students presented with inadequate fruits and vegetables consumption in the WD and W, and 72.3% showed inadequacy in the 3 days of registration. It is worth mentioning that the prevalence of inadequate consumption, at all years, reached 2/3 of the students. There was no significant difference between the distributions of inadequate consumption, indicating that they are similar between the years, both in the WD (p value 0.274) and in the W (p value 0.243), as well as in the 3 days of registration (p value 0.496). (Table 3)

Table 3. Prevalence of inadequate consumption of fruits and vegetables on weekdays, weekend, and 3 days of registration by nutrition students over the years. Rio de Janeiro, RJ, 2017.

Year	Consumption on weekdays			Consumption on the weekend			Consumption in the 3 days of registration		
	Adequate (≥400g)	Inadequate (<400g)	p value #	Adequate (≥400g)	Inadequate (<400g)	p value #	Adequate (≥400g)	Inadequate (<400g)	p value #
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
1999	10 (18.5)	44 (81.5)	0.274	15 (27.8)	39 (72.2)	0.243	10 (18.5)	44 (81.5)	0.496
2004	17 (28.3)	43 (71.7)		12 (20.0)	48 (80.0)		12 (20.0)	48 (80.0)	
2009	16 (34.0)	31 (66.0)		16 (34.0)	31 (66.0)		13 (27.7)	34 (72.3)	

Chi-square test

Regarding the fruit's variety, the most mentioned were orange (mainly by the fresh juice consumption), apple and banana in 1999. In 2004 and 2009, the same fruits were mentioned, first of all banana, followed by apple and orange (juice). While the vegetables were lettuce, tomato and carrot (tomato and lettuce were most consumed as salad and carrot had the highest consumption when cooked) in all years. Fruits were present in the most diverse meals, mostly at breakfast in 1999; at lunch in 2004; and as a snack in 2009. While vegetables were consumed predominantly at lunch every year. (Data not shown in tables)

DISCUSSION

The present study evaluated the fruits and vegetables consumption by undergraduate nutrition students of a public university in the years of 1999, 2004 and 2009. From this evaluation, it is possible to

observe low intake and high prevalence of inadequate consumption of fruits and vegetables both in the WD and the W over the studied years.

In the POF study (2008-2009) the mean food consumption per capita of each food was categorized. When counting all the fruits and vegetables mentioned in the POF (2008-2009), except vegetables C (tubers or roots), it is verified among Brazilian women that the sum for fruits mean consumption per capita was 91g (without the juices because they are classified together with reconstituted powdered juices) and for vegetables was 41g.⁵ In the present study, the medians of fruit consumption ranged from 162g to 240g in the WD and W over the years, therefore being higher than that found by the sum of the mean per capitae from the POF study (2008-2009), possibly because the intake of fruit juices among university students was considered, since the details of food records allowed differentiating fresh juices from industrialized ones. The median consumption of vegetables ranged from 30g to 75g in the WD and W over the years.

A study carried out in the United States based on data from the National Health and Nutrition Examination Survey (NHANES 2003 - 2012) using a 24-hour recall of 11,646 adults over 18 years old, estimated the changes that occur in the diet on Friday, Saturday and Sunday comparing with the Monday to Thursday diet. They observed that the diet of the W was less healthy than in the WD, and between the W days, Saturday was the day when Americans had a poorer quality diet, being used as markers, the highest energy consumption, saturated fats, cholesterol, alcohol, sugar and the lowest consumption of fiber and mainly of fruits and vegetables. Comparing the mean consumption of WD with the consumption of Saturday, it was found a reduction of 13.9g in fruit intake and of 16.76g in vegetables intake.¹⁸ In the present study, fruits had a higher median consumption in the WD than in the W only in the year of 2004, presenting 50g more ($p = 0.003$). Vegetables had a higher median consumption in the WD than in the W at all studied years.

Regarding the percentage of fruits and vegetables mean consumption, it is worth remembering that it was higher for fruits in both WD and W over the years. The fact that Brazil is the third largest producer of fresh fruits in the world, right after China and India,¹⁹ and that fruits do not require preparation, it could explain this result. In addition, in the study by Cansian et al.,²⁰ carried out with 122 nutrition students at the Federal University of Triângulo Mineiro (UFTM), vegetables were the food group most cited by students regarding food aversion, which could also influence the low intake of vegetables by the students of the present study.

The World Health Organization⁹ recommends a daily intake of at least 400g of fruits and vegetables, however, in the present study, we observed that over the years 1999 and 2004, both in the WD and in the W, less than 1/3 of the students managed to achieve such a recommendation. Economic factors are considered an impediment to fruits and vegetables intake and may partly explain the high prevalence of inadequacy found in the present study. Although there was no survey of socioeconomic data from the students of the present study, it was observed that in this same University in another study in 2011, 38.8% of the freshmen students were quota holders.¹⁵ According to Claro & Monteiro,²¹ the reduction by 20% of the average price of fruits and vegetables could increase the participation of these foods by around 16% in the Brazilians' diet.

Perez et al.¹⁵ conducted a study, with the participation of 1336 quota students and non-quota students entering the first semester of 2011, in different graduation courses at the same public university that carried out the present study. Most of them were female, aged up to 19 years old, who lived with their parents and had at least a high school education. The self-administered food frequency questionnaire was the instrument used for data collection. Regarding the food consumption, few students reported consuming fresh fruits and vegetables daily. The students presented a high frequency intake of industrialized foods such as sugary drinks, treats, cookies and snacks. In addition, students reported having the habit of replacing dinner for

snacks. It is important to note that the data collection preceded the opening of the University Restaurant, which could have contributed to healthy eating by these students. These results showed inadequate eating habits of these students, corroborating the results of inadequate consumption of fruits and vegetables by the nutrition students of the present study, despite the methodological difference since we used food records and not a food frequency questionnaire.

Data from the VIGITEL study of 2015 (a study that monitor risk and protective factors for chronic diseases by telephone survey) revealed a regular consumption frequency of fruits and vegetables of 35.2% in Brazilian adults aged 18 years or over. This consumption was considered regular when it occurred on five or more days of the week. Only one in three adults consumed fruits and vegetables five days a week. Women had a higher prevalence of regular consumption when compared to men, respectively 40.7% and 28.8%.⁶ Despite the methodological difference when compared to the present study, Jaime & Monteiro²² using a semi-quantitative food frequency questionnaire, highlighted in the Brazilian adult population, inadequate daily consumption of fruits and vegetables by 70% and 59%, respectively. In the present study, the inadequacy was even greater, affecting at least 2/3 of the students, in the WD and W over the years. It is worth mentioning that although the calculation of the prevalence of inadequacy is commonly used for micronutrient analyzes, the present study carried out a quantitative assessment and we opted for this approach, since the recommendation for fruits and vegetables is 400g per day.

Marcondelli et al.²³ applied a questionnaire developed by the authors to assess the eating habits of young people at a public university in Brasília. Among the items considered in the questionnaire, milk and dairy products, fruits and vegetables, complex carbohydrates, soft drinks and sweets, legumes and meat stand out. The authors considered as adequate the individual who presented a healthy diet with more than 3 of the 6 items surveyed, so in this stage, only 20.3% of the students presented adequacy. Regarding the group of fruits and vegetables, they found 75.1% of students with inadequate diet, which was similar to the inadequacy found in the present study, that ranged from 66% to 81.5% over the years.

Regarding the variety of fruits and vegetables consumed by the students in the present study, the results are similar to the research carried out based on the POF data 2008-2009, which selected 34,003 individuals to participate in the National Dietary Survey (INA). In this survey, bananas were the most cited fruit in all Brazilian regions, age groups and income quarters. While in relation to vegetables, the lowest quarter of income did not report any consumption of it, raw salad was mentioned by 15.5% of individuals in the second quarter and 18.3% of individuals in the third quarter of income. The quarter with the highest income, on the other hand, mentioned lettuce and tomatoes among the 20 most frequent foods, in addition to raw salad.²⁴

The low consumption of fruits and vegetables by students may be related to unhealthy habits acquired in adolescence, few hours of sleep, living away from home and becoming responsible for taking care of their own food. In addition, the university food environment can also be an unfavorable factor due to the lack of pantry or scullery so that students can properly store and warm up their food, or the lack of canteens that offer healthy food and the absence of a university restaurant, increasing expenses with meals away-from-home.¹⁵

Among the limitations of this study, we can mention the use of food records to assess fruits and vegetables consumption by nutrition students of a public university. Such instruments have limitations as to the accuracy and veracity of the information provided, which is of particular concern to the younger population. More than underestimating, the food record can influence consumption. However, the characteristic of the chosen instrument was respected, which is a method widely used for quantitative dietary assessment. In addition, this method has the advantage of not relying on the subject's memory as the

methods of food frequency questionnaire and the 24-hour recall.²⁵ For future research, it is considered important to investigate the possible factors that lead to the low fruits and vegetables consumption by nutrition academic students.

CONCLUSION

At all years, there seems to be a higher percentage of fruit consumption than vegetables. In 2004 (the year in which there was a greater number of observations), there was a lower intake of fruits, vegetables and both on weekends compared to weekdays. In addition, there was a high prevalence of inadequacy in all years, with consumption predominantly lower than the current recommendations.

Such results are worrisome since these academic students will become health promoters with the main role of encouraging healthy eating. These findings indicated the need to develop measures aimed at carrying out food and nutrition education projects since the students were in their 2nd year of study and perhaps still did not have enough knowledge, but mainly with a focus on what food choices or strategies can be used to carry out healthy eating in an unfavorable university environment and when living alone and conducting studies at the same time. It is also necessary to implement public policies that result in the price reduction of fruits and vegetables and greater entry into the food environment of Universities, in order to increase its consumption.

REFERENCES

1. Banco Nacional de Desenvolvimento Econômico e Social (BNDS). A economia brasileira nos anos 90. 1. ed. [Rio de Janeiro]:BNDS; 1999.
2. Monteiro CA; Louzada MLC. Ultraprocessamento de alimentos e doenças crônicas não transmissíveis: implicações para políticas públicas. Observatório Internacional de Capacidades Humanas, Desenvolvimento e Políticas Públicas 2015, p. 161-180.
3. Paula LF; Pires M. Crise e perspectivas para a economia brasileira. Estudos Avançados 2017, 31 (89). [Acessado em: 18 Set 2019.] Disponível em: <<http://www.scielo.br/pdf/ea/v31n89/0103-4014-ea-31-89-0125.pdf>>.
4. ABESO. Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica (ABESO). Diretrizes Brasileiras de Obesidade 2016. 4. ed. [São Paulo]: Assoc Bras Est Obes Sínd Metab;2016a. [Acessado em: 19 de Jun 2017]. Disponível em: <<http://www.abeso.org.br/uploads/downloads/92/57fcc403e5da.pdf>>.
5. Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2008-2009. Análise do consumo alimentar pessoal no Brasil [Internet] Rio de Janeiro; 2011. [Acessado em: 20 Jun 2017]. Disponível em: <<https://biblioteca.ibge.gov.br/visualizacao/livros/liv50063.pdf>>.
6. Souza, LP; Guedes, DR. A desigual divisão sexual do trabalho: sobre a última década. Estudos Avançados 2016, 30 (87). Disponível em: <<http://www.scielo.br/pdf/ea/v30n87/0103-4014-ea-30-87-00123.pdf>>. DOI: <<https://doi.org/10.1590/S0103-40142016.30870008>>.
7. Brasil. Ministério da Saúde (MS). Secretaria de Vigilância em Saúde, Secretaria de Gestão Estratégica e Participativa. Vigitel Brasil 2016: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. [Brasília]: MS;2016b. [Acessado em: 19 Abr 2017]. Disponível em: <<http://portal.arquivos2.saude.gov.br/images/pdf/2018/marco/02/vigitel-brasil-2016.pdf>>.
8. Brasil. Ministério da Saúde (MS). Guia alimentar para a população brasileira. 2. ed. [Brasília]: MS;2014. [Acessado em: 22 Abr 2017]. Disponível em: <http://bvsm.sau.gov.br/bvs/publicacoes/guia_alimentar_populacao_brasileira_2ed.pdf>.
9. Organização Mundial de Saúde. Diet, nutrition and the prevention of chronic diseases. Geneva: WHO; 2003.
10. Billson H, Pryer JA, Nichols R. Variation in fruit and vegetable consumption among adults in Britain. An analysis from the dietary and nutritional survey of British adults. Eur J Clin Nutr 1999;53(12):946-952. Disponível em: <<https://www.nature.com/articles/1600877.pdf>>. DOI: <<https://doi.org/10.1038/sj.ejcn.1600877>>.
11. Duarte FM, Almeida SDS, Martins KA. Alimentação fora do domicílio de universitários de alguns cursos da área da saúde de uma instituição privada. O Mundo da Saúde 2013;37(3):288-298. [Acessado em: 18 Jun 2017]. Disponível em: <http://www.saocamilosp.br/pdf/mundo_saude/106/1825.pdf>.

12. Feitosa EPS, Dantas CAO, Wartha ERSA, Marcellini PS, Netto RSM. Hábitos alimentares de estudantes de uma universidade pública no nordeste, Brasil. *Rev Alim Nutr* 2010;21(2):225-230. Disponível em: <https://edisciplinas.usp.br/pluginfile.php/52539/mod_resource/content/1/H%C3%A1bitos%20alimentares%20de%20universit%C3%A1rios.pdf>. Acessado em: 06 Abr 2017.
13. Ramalho AA, Dalamaria T, Souza OF. Consumo regular de frutas e hortaliças por estudantes universitários em Rio Branco, Acre, Brasil: prevalência e fatores associados. *Cad Saúde Pública* 2012;28(7):1405-1413. Disponível em: <<http://www.scielo.br/pdf/csp/v28n7/18.pdf>>. DOI:<<https://doi.org/10.1590/S0102-311X2012000700018>>.
14. Loureiro MP. Estado nutricional e hábitos alimentares de universitários. *Segurança Alimentar e Nutricional*, Campinas 2016;23(2):955-972. [Acessado em: 18 Set 2019]. Disponível em: <<https://periodicos.sbu.unicamp.br/ojs/index.php/san/article/view/8647612/14849>>.
15. Perez PMP, Castro IRR, Franco AS, Bandoni DH, Wolkoff DB. Práticas alimentares de estudantes cotistas e não cotistas de uma universidade pública brasileira. *Ciênc Saúde Coletiva* 2016;21(2):531-542. Disponível em: <<http://www.scielo.br/pdf/csc/v21n2/1413-8123-csc-21-02-0531.pdf>>. DOI: <<https://doi.org/10.1590/1413-81232015212.01732015>>.
16. Organização Mundial de Saúde. *Obesity: preventing and mananging the global epidemic*. Geneva: WHO; 1998.
17. Pinheiro ABV, Lacerda EMA, Benzecry EH, Gomes MCS, Costa VM. Tabela para Avaliação de Consumo Alimentar em Medidas Caseiras. 5. ed. [São Paulo]: Atheneu; 2009.
18. An R. Weekend-weekday differences in diet among US adults, 2003–2012. *Ann Epidem* 2016;26(1):57-65. Disponível em: <[https://www.annalsofepidemiology.org/article/S1047-2797\(15\)00449-4/pdf](https://www.annalsofepidemiology.org/article/S1047-2797(15)00449-4/pdf)>. DOI:<<https://doi.org/10.1016/j.annepidem.2015.10.010>>.
19. Treichel M, Kist BB, Santos CE, Carvalho C, Beling RR. Anuário Brasileiro de Fruticultura 2016. [Santa Cruz do Sul]: Gazeta St Cruz; 2016.
20. Cansian ACC, Gollino L, Alves JBO, Pereira EMS. Avaliação da ingestão de frutas e hortaliças entre estudantes universitários. *Rev Soc Bras Alim Nutr* 2012;37(1):54-63. Disponível em: <http://sban.cloudpanel.com.br/files/revistas_publicacoes/353.pdf>. DOI: <<https://doi.org/10.4322/nutrire.2012.005>>.
21. Claro RM, Monteiro CA. Renda familiar, preço de alimentos e aquisição domiciliar de frutas e hortaliças no Brasil. *Rev Saúde Pública* 2010;44(6):1014-1020. Disponível em: <<http://www.scielo.br/pdf/rsp/v44n6/1401.pdf>>. DOI:<<https://doi.org/10.1590/S0034-89102010000600005>>.
22. Jaime PC, Monteiro CA. Fruit and vegetables intake by brazilian adults. *Cad Saúde Pública* 2005;21(1):19-24. Disponível em: <<http://www.scielo.br/pdf/csp/v21s1/03.pdf>>. DOI:<<https://doi.org/10.1590/S0102-311X2005000700003>>.
23. Marcondelli P, Costa THM, Schmitz BAS. Nível de atividade física e hábitos alimentares de universitários do 3º ao 5º semestres da área da saúde. *Rev Nutr* 2008;21(1):39-47. Disponível em: <<http://www.scielo.br/pdf/rn/v21n1/a05v21n1.pdf>>. DOI: <<https://doi.org/10.1590/S1415-52732008000100005>>.
24. Souza AM, Levy RB, Pereira RA, Yokoo EM, Sichieri R. Alimentos mais consumidos no Brasil: Inquérito Nacional de Alimentação 2008-2009. *Rev Saúde Pública* 2013;47(1):190-199. Disponível em: <<http://www.scielo.br/pdf/rsp/v47s1/05.pdf>>. DOI:<<https://doi.org/10.1590/S0034-89102013000700005>>.

Contributors

Mattos-Pinheiro N and Monteiro-Brito M participated in the conception of the work, collection of information, bibliographic research, analysis and interpretation of data, writing of the study and approval of the manuscript for submission; Coelho GMO and Soares EA participated in the conception of the work, in the analysis and interpretation of data, final review and approval of the manuscript for submission.

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