



## Frequency and factors associated with adolescents' consumption of fruits and vegetables

### *Frequência e fatores associados ao consumo de frutas, verduras e legumes de adolescentes*

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#### ABSTRACT

To evaluate the daily consumption frequency of fruits and vegetables and associated factors in adolescents. Cross-sectional study with 958 adolescents. The daily consumption frequencies were calculated as the main outcome and the prevalence ratio test (PR). The daily consumption frequency of fruit, vegetables, and their combined consumption was 47.7%, 41.5% and 33.7%, respectively. Daily fruit consumption was associated with females, between 16 and 19 years old and being overweight, and the daily consumption frequency of vegetables was associated with the socioeconomic class C, D and E and the habit of having breakfast. Adolescents had a low daily consumption frequency of fruits and vegetables. However, age and being overweight were associated with higher daily fruit consumption among girls. The higher daily consumption of vegetables was associated with lower income, being overweight and the habit of having breakfast.

**Keywords:** Adolescent health. Food consumption. Nutritional status. Risk factors.

#### RESUMO

Avaliar a frequência do consumo diário de frutas, verduras e legumes e fatores associados em adolescentes. Estudo transversal com 958 adolescentes. Foram calculadas frequências de consumo diário como desfecho principal e teste de razão de prevalência (RP). A frequência da ingestão diária de frutas, verduras e legumes e o combinado destes, foi de 47,7%, 41,5% e 33,7%, respectivamente. O consumo diário de frutas associou-se ao sexo feminino, entre 16 e 19 anos e excesso de peso, e a frequência do consumo diário de verduras e legumes associou-se à classe socioeconômica C, D e E e ao hábito do café da manhã. Adolescentes apresentaram, portanto, baixa frequência do consumo diário de frutas, verduras e legumes. Idade e excesso de peso, entretanto, associaram-se à maior ingestão diária de frutas em meninas. O maior consumo diário de verduras e legumes associou-se às rendas mais baixas, excesso de peso e ao hábito do café da manhã.

**Palavras-chave:** Consumo de alimentos. Estado nutricional. Fatores de risco. Saúde do adolescente.

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## INTRODUCTION

Adolescence is a complex phase, characterized by the experimentation of new attitudes and experiences that play risk factors for health, such as smoking, alcohol consumption, inadequate diet and sedentary lifestyle.<sup>1</sup> Currently, changes in the eating pattern of Brazilian adolescents are evident, marked by reduced consumption of fresh (such as fruits and vegetables) and minimally processed foods, associated with the excessive growth in the intake of ultra-processed foods.<sup>2</sup>

There is consistent evidence that a diet rich in fruits and vegetables has a protective effect. In fact, the adequate consumption of these foods is related to a lower incidence and prevention of chronic non-communicable diseases, such as the cardiovascular ones, type 2 diabetes, obesity and the development of cancer.<sup>3</sup>

In contrast, large national surveys point to low consumption of fruits and vegetables (FVL). The 2017-2018<sup>4</sup> Family Budget Survey shows that less than 10% of the general population achieves daily recommendations. Vigitel (The Surveillance System of Risk and Protective Factors for Chronic Diseases by Telephone Survey)<sup>5</sup> also indicates a low frequency of recommended FVL consumption in most of the cities studied, ranging from 23.0% in Belém to 44.7% in Florianópolis.

Likewise, famous studies carried out with adolescents, such as the National Adolescent School-based Health Survey (Pense),<sup>6</sup> reported that daily consumption was 32.7% for fruits and 37.7% for vegetables, while the Study of

Cardiovascular Risks in Adolescents (Erica),<sup>7</sup> showed that adolescents in the South Region consume 40.6% of vegetables and only 15% of fruits daily. With regard to international studies, most find that the daily consumption of these foods continues, year after year, being the least consumed food category.<sup>8,9</sup>

Given this scenario, there are few studies verifying factors that may be associated with the daily consumption of fruits and vegetables among adolescents in the countryside of Brazil. Thus, considering that the adequate consumption of fruits and vegetables is a challenge for public health policies, the hypothesis of this study is that adolescents who have healthy practices, with a minimum consumption of fruits and vegetables, also present other healthy behaviors, such as having breakfast, exercising and not using legal drugs.

Therefore, the present study aimed to assess the frequency and factors associated with daily consumption of fruits and vegetables in adolescents.

## METHODOLOGY

This is a cross-sectional study. The sample was considered non-probabilistic (convenience), with the participation of 958 adolescents out of a total of 1,317 enrolled (representing 73% of the population studied) from all schools - four public and one private - located in the central region of the municipality of Palmeira das Missões (RS). The inclusion criterion for schools was having the 8<sup>th</sup> grade and high school. Adolescents with special needs, autistic,

pregnant women and exchange students were excluded.

The main outcome was the frequency of daily consumption of fruits and vegetables, assessed using a semi-quantitative questionnaire on the frequency of food intake<sup>10</sup>. The definition of "daily consumption of fruits", "daily consumption of vegetables" and "daily consumption of fruits and vegetables" was carried out with those adolescents who had consumed at least one of the foods in these classes daily. The associated factors were sex, age, socioeconomic class, physical activity, use of legal drugs and the habit of having breakfast, observed through a self-administered questionnaire, explained below.

To analyze the consumption of breakfast, the 24-hour food recall was applied, evaluating whether the teenager had breakfast or not.

The computed demographic variables were age and sex. The socioeconomic class was categorized according to the methodology of the Brazilian Association of Research Companies (Abep).<sup>11</sup>

Consumption of legal drugs (alcoholic beverage and cigarettes) was assessed by means of a structured questionnaire, analyzing whether the adolescents have already consumed at some point in their lives, whether they currently use alcohol and cigarettes and whether they have already been drunk on any occasion.

The frequency of physical activity was assessed by the International Physical Activity Questionnaire (Ipaq).<sup>12</sup> For statistical purposes, adolescents were reclassified into two variables: "active" -

sufficiently active and active - and "sedentary" - insufficiently active.

The collection of anthropometric measures and the classification of the nutritional status of the participants was performed using the z score of the BMI for age and sex, according to the reference of the World Health Organization (WHO),<sup>13</sup> with the aid of the WHO AnthroPlus Software (version 3.2.2). For statistical analysis, the BMI classifications were grouped as: without excess weight (malnutrition and eutrophy) and with excess weight (overweight and obesity).

The research was approved by the Research Ethics Committee of the Federal University of Santa Maria (UFSM), under number CAAE 562,334. All participants, mandatorily, had their Terms of Free and Informed Consent signed and authorized by their guardians.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software, version 18.0, using simple descriptive statistics (mean and percentage). The frequencies of daily consumption were calculated as the main outcome, and, subsequently, the prevalence ratio (PR) test was performed. The analysis of proportions for comparisons between adolescents with daily consumption of fruits and vegetables and the combination of fruits and vegetables was performed using Poisson Regression with robust variance to estimate the crude and adjusted prevalence ratio. Significant differences were considered when  $p < 0.05$ .

## RESULTS

This study had the participation of 958 adolescents, with an average age of  $15.27 \pm 1.26$  years.

Table 1 shows that the majority of the sample is female (58%), aged 12 to 15 years (58.4%, n=559), enrolled in public schools (92.4%) who belong to classes A and B (70.6%). Of the adolescents who have

already used tobacco, 14.3% (n=17) currently smoke and 45.8% (n=291) drank in the last 30 days. The prevalence of daily consumption of fruits was 47.7% (n=457), vegetables 41.5% (n=398) and fruits and vegetables 33.7% (n=323). It is noted that most adolescents are active (87.2%, n=835), not overweight (77.8%, n=713) and 54.8% (n=541) have breakfast daily.

**Table 1.** Frequency of demographic, socioeconomic factors, anthropometry and daily consumption of fruits and vegetables, with adolescents from the municipality of Palmeira das Missões (RS) (n=958).

	N	%
<b>Sex</b>		
Male	402	42
Female	556	58
<b>Age</b>		
12-15 years old	559	58,4
16-19 years old	399	41,6
<b>School</b>		
Public	885	92,4
Private	73	7,6
<b>Socioeconomic Class</b>		
A and B	664	70,6
C, D and E	277	29,4
<b>Currently smoking</b>		
Yes	17	14,3
<b>Has drunk in the last 30 days</b>		
Yes	291	45,8
<b>Physical activity</b>		
Active	835	87,2
<b>Nutritional status</b>		
Overweight	203	22,2
Not overweight	713	77,8
<b>Consumption of breakfast</b>		
Yes	541	54,8
<b>Daily consumption</b>		
Fruits	457	47,7
Vegetables	398	41,5
Fruits and vegetables	323	33,7

Source: The author, 2016.

Table 2 shows that daily fruit consumption was higher in females (adjusted PR = 1.185, CI: 1.028-1.366, p=0.020), in adolescents aged 16-19 years (adjusted PR = 1.159, CI : 1.011-1.329, p=0.034) and in those with excess weight (adjusted PR=1.197, CI: 1.029-1.393, p=0.020).

**Table 2.** Prevalence of daily fruit consumption, according to socioeconomic variables, use of legal drugs, nutritional status, physical activity and breakfast consumption in adolescents in the municipality of Palmeira das Missões (RS) (n=958)

	Daily fruit consumption			Daily fruit consumption	
	% (n)	Crude PR (CI 95%)	P	Adjusted PR (CI 95%)	p <sup>a</sup>
<b>Sex</b>					
Female	50,9(283)	1,176 (1,024-1,351)	0,022	1,185 (1,028-1,366)	0,020
Male	43,3(174)	1,0		1,0	
<b>Age</b>					
16-19	51,9(207)	1,16 (1,017-1,324)	0,028	1,159 (1,011 – 1,329)	0,034
12-15	44,7(250)	1,0		1,0	
<b>Socioeconomic Class</b>					
C, D and E	50,2(139)	1,078(0,935-1,244)	0,301	-	
A, B	46,5(309)	1,0		-	
<b>Currently smoking</b>					
Yes	58,8(10)	1,304(0,830-2,049)	0,249	-	
No	45,1(46)	1,0		-	
<b>Has drunk in the last 30 days</b>					
Yes	50,5(147)	1,069 (0,912-1,254)	0,410	-	
No	47,2(163)	1,0		-	
<b>Physical activity</b>					
Active	48,7(407)	1,199(0,958-1,501)	0,113	-	
Not active	40,7 (50)	1,0		-	
<b>Nutritional Status</b>					
Overweight	53,2(108)	1,174(1,009-1,367)	0,038	1,197 (1,029-1,393)	0,020
Not overweight	45,3(323)	1,0		1,0	
<b>Breakfast</b>					
Yes	49,7(259)	1,099(0,960-1,259)	0,170	-	

PR: Prevalence ratio. CI: Confidence Interval. p<0,05. Adjusted PR: Prevalence ratio adjusted for sex, age and nutritional status. p<sup>a</sup>: Multiple Poisson regression with p <0.05.

Source: The author, 2016.

The adolescents who consume the most vegetables daily are those belonging to socioeconomic classes C, D and E (adjusted PR=1.177, CI: 1.004-1.380 p=0.045) and

those who have the habit of having breakfast (adjusted PR=1.233, CI: 1.045-1.431, p=0.012) (Table 3).

**Table 3.** Prevalence of daily consumption of vegetables, according to socioeconomic variables, use of legal drugs, nutritional status, physical activity and breakfast consumption in adolescents in the municipality of Palmeira das Missões (RS) (n=958)

	Daily consumption of vegetables			Daily consumption of vegetables	
	% (n)	Crude PR (CI 95%)	P	Adjusted PR (CI 95%)	p <sup>a</sup>
<b>Sex</b>					
Female	41,2(229)	0,980(0,842-1,140)	0,791	-	-
Male	42,0(169)	1,0			
<b>Age</b>					
16-19	44,1(176)	1,111(0,956-1,291)	0,171	-	-
12-15	39,7(222)	1,0			
<b>Socioeconomic Class</b>					
C, D and E	45,8(127)	1,162(0,991-1,632)	0,064	1,177 (1,004-1,380)	0,045
A, B	39,5(262)	1,0		1,0	
<b>Currently smoking</b>					
Yes	52,9(09)	1,286(0,776-2,130)	0,329	-	-
No	41,2(42)	1,0			
<b>Has drunk in the last 30 days</b>					
Yes	45,0(131)	1,086(0,909-1,298)	0,365	-	-
No	41,4(143)	1,0			
<b>Physical Activity</b>					
Active	42,2(352)	1,127(0,885-1,436)	0,332	-	-
Not active	37,4(46)	1,0			
<b>Nutritional Status</b>					
Overweight	42,4(86)	1,017(0,847-1,221)	0,856	-	
Not overweight	41,7(297)	1,0			
<b>Breakfast</b>					
Yes	45,1(235)	1,217 (1,042-1,422)	0,013	1,223(1,045-1,431)	0,012

PR: Prevalence ratio. CI: Confidence Interval.  $p < 0,05$ . Adjusted PR: Prevalence ratio adjusted for sex, age and nutritional status. p<sup>a</sup>: Multiple Poisson regression with  $p < 0,05$ .

Source: The author, 2016.

Adolescents who consume fruits and vegetables daily have a higher prevalence of being in class C, D and E (adjusted PR=1.278, CI: 1.025-1.593,  $p=0.030$ ), those with excess weight

(adjusted PR=1.274, CI:1.006-1.613,  $p=0.044$ ) and those who have the habit of having breakfast (adjusted PR=1.381, CI: 1.106-1.724,  $p=0.004$ ) (Table 4).

**Table 4.** Prevalence of daily consumption of fruits and vegetables, according to socioeconomic variables, use of legal drugs, nutritional status, physical activity and breakfast consumption among adolescents in the municipality of Palmeira das Missões (RS) (n=958)

	Daily consumption of fruits and vegetables			Daily consumption of fruits and vegetables	
	% (n)	Crude PR (CI 95%)	P	Adjusted PR (CI 95%)	p <sup>a</sup>
<b>Sex</b>					
Female	28,6(159)	1,074(0,872-1,324)	0,501	-	-
Male	26,6(107)	1,0			
<b>Age</b>					
16-19	29,6(118)	1,117(0,910-1,371)	0,290	-	-
12-15	26,5(148)	1,0			
<b>Socioeconomic Class</b>					
C, D and E	32,1(089)	1,255(1,012-1,556)	0,038	1,278(1,025-1,593)	0,030
A, B	25,6(170)	1,0		1,0	
<b>Currently smoking</b>					
Yes	41,2(07)	1,680(0,866-3,258)	0,125	-	-
No	24,5(25)	1,0			
<b>Has drunk in the last 30 days</b>					
Yes	29,2(085)	1,008(0,790-1,286)	0,951	-	-
No	29,0(100)	1,0			
<b>Physical Activity</b>					
Active	28,6(239)	1,304(0,919-1,850)	0,137	1,41(0,971-2,049)	0,071
Not active	22,0(027)	1,0		1,0	
<b>Nutritional Status</b>					
Overweight	32,0(65)	1,214(0,960-1,536)	0,105	1,274(1,006-1,613)	0,044
Not overweight	26,4(188)	1,0		1,0	
<b>Breakfast</b>					
Yes	31,1 (162)	1,321(1,067-1,634)	0,011	1,381(1,106-1,724)	0,004

PR: Prevalence ratio. CI: Confidence Interval.  $p < 0,05$ . Adjusted PR: Prevalence ratio adjusted for sex, age and nutritional status. p<sup>a</sup>: Multiple Poisson regression with  $p < 0,05$ .

Source: The author, 2016.

## DISCUSSION

The main finding of this study was the low daily consumption of fruits and vegetables. In addition, daily fruit consumption was associated with females, aged between 16 and 19 years and being overweight, while daily consumption of vegetables was associated with lower socioeconomic classes, with excess of weight and the habit of having breakfast.

Regarding the definition and categorization of the frequency of

consumption of fruits and vegetables for at least once a day, it does not express an outcome of healthy behavior, but an expectation, since the World Health Organization (WHO)<sup>14</sup> recommends the daily intake of at least 400 grams of fruits and vegetables, which is approximately equivalent to the daily consumption of five portions of these foods. Furthermore, the food pyramid<sup>15</sup> shows a daily consumption of three portions, at the same time that the Ministry of Health,<sup>16</sup> through the food guide for the Brazilian population, suggests that

fresh foods are the basis of their diet. There are, therefore, different forms of recommendations for the consumption of these foods, but the purpose of all of them is the same: the protection and maintenance of the health of this population.

When examining the literature, different evaluation methods are found for the food consumption of fruits and vegetables in adolescents, providing different ways of presenting the consumption of these foods, such as a semi-quantitative food frequency questionnaire (FFQ),<sup>17</sup> 24h food recall,<sup>7</sup> structured questionnaire about eating habits,<sup>17</sup> Previous Day Food Questionnaire (PDFQ-3),<sup>18</sup> and questionnaire of risk behaviors in adolescents from Santa Catarina (Compac).<sup>19</sup> Even in the face of this diversity of instruments for the assessment of FVL food consumption, the daily consumption of this food group is still low.

In the present study, it was noticed that less than half of the adolescents consume fruits and vegetables daily. Data from the National Adolescent School-based Health Survey (Pense),<sup>6</sup> however, found values lower than this study. In addition, the Family Budget Survey (2008-2009)<sup>20</sup> confirms that adolescents consume less vegetables (11g/day) when compared to adults (20g/day) and the elderly (18g/day).

In Rio Grande do Sul, research on the daily consumption of fruits and vegetables has shown that 33.8% of schoolchildren in Porto Alegre,<sup>17</sup> 42.2% in Santa Cruz do Sul (RS),<sup>2</sup> and only 5.3% in Pelotas,<sup>21</sup> consume the recommended

amount of fruits and vegetables daily. At the national level, studies have highlighted even lower values, in which 15% of students from Florianópolis (SC),<sup>22</sup> 6.5% from Caruaru (PE)<sup>19</sup> and 11.4% from Sergipe,<sup>23</sup> reported consuming the recommended amount of fruits and vegetables every day. This low consumption is also evident in other countries.<sup>9,24</sup> This scenario is a consequence of the change in adolescent eating behavior and its relationship with the consumption of ultra-processed foods.

Few studies<sup>18,25</sup> have evaluated the combined consumption of fruits and vegetables. In the present research it was noticed that for this category the value is even lower when compared to the daily consumption of fruits or vegetables. The daily consumption of fruits was higher than that of vegetables, perhaps because children and adolescents have greater acceptance and preference, since birth, for sweet foods, which is found in some fruits, and rejection of bitter and sour taste.<sup>26</sup>

In this study, it is observed that socioeconomic classes A and B consume less fruit daily when compared to lower classes. This association was not found in other studies, so further research is needed to clarify the interfering factors in this relationship. One hypothesis to be considered is that in families with greater purchasing power, there may be a compensation for the supply of fruits by offering ultra-processed and highly energetic foods.<sup>27</sup>



Regarding the factors associated with the consumption of fruits and vegetables, the daily consumption of fruits was higher in females, in older and overweight adolescents. Conversely, Muniz et al.<sup>19</sup> found that especially girls are the ones who consume the most vegetables (30.9%) daily compared to boys (25.8%), but there are few associations of this outcome with this variable. Ramos et al.<sup>28</sup> suggest that the higher consumption of fruit by girls may be related to the concern with body image and the multidimensional idealization of the perfect body ruled by numerous factors, such as culture, media and social environment.

Costa et al.,<sup>25</sup> when analyzing the food consumption of children and adolescents aged 6-10 years, argue that the daily intake of fruit by overweight adolescents may be related to the attitude of some parents in negotiating or leveling up food with sweets, compensating the consumption of fruits and vegetables, that is, there is not a low intake of ultra-processed foods, but rather a regular consumption of these foods concomitantly with fruits and vegetables.

The habit of having breakfast was associated, in the present study, with the habit of consuming fruits and vegetables daily. A study shows that the inconstant habit of having breakfast is a risk factor for the low frequency of fruit consumption.<sup>29</sup> Still, Blondin et al.<sup>30</sup> emphasize, in a review, that the habit of having breakfast has a possible protective effect in

preventing excess weight during childhood and adolescence.

The fact that the daily consumption of fruits and vegetables has no association with the variables cigarette and alcoholic drinks, leads us to believe that the consumption of these is related to other determining factors, such as sex and age, socioeconomic level, parents, siblings or friends smokers, school performance, paid work and parents' divorce, rather than eating behavior.<sup>31</sup> In addition, in this study we did not measure sedentary behavior and hours spent in front of screens, which are important variables when assessing physical activity.

The present study has an important sample of adolescents from the evaluated city, but it has limitations, since only adolescents studying at daytime were evaluated, and, therefore, it does not represent the population of adolescents in this city. The use of FFQ to assess food consumption has the probability of bias in completing the questionnaire, as well as of memory. As this is a cross-sectional study, there is a hypothesis of reverse causality that may be responsible for the lack of association with behavioral variables (cigarette, alcohol and physical activity).

Therefore, it is essential to strengthen strategies for food and nutrition education, involving both the family and the school community. What is more, including the theme of food and nutrition in the school curriculum and strengthening public policies, such as the National Food and Nutrition Policy, the National School Food

Program and the School Health Program, which encourage the promotion of intersectoral actions, are crucial for a healthier food consumption for children and adolescents, based mainly on the greater offer of fresh and minimally processed foods, such as fruits and vegetables. In addition, the regulation of school canteens and the advertising of ultra-processed foods in the school space, appears as an important measure so that this environment does not promote the consumption of large amounts of unhealthy foods.

## CONCLUSION

It is concluded that the evaluated adolescents present low daily consumption of fruits and vegetables, being below the recommended. The findings of the present study reinforce the need to strengthen the National Food and Nutrition Policy through strategies that will promote adequate and healthy food in the school environment. The encouragement of the constant increase of family farming food in school meals, the regulation of what foods may or may not be sold in school canteens, the curriculum of food and nutrition education in Elementary School and the strengthening of the School Health Program, are fundamental so that the teenagers' consumption of fruits and vegetables are increased. In addition, the need to regulate the abusive advertising of ultra-processed foods to this audience is an important factor for the impact on these numbers.

In this sense, we reinforce the importance of promoting good eating habits and quality of life in this cycle, given that these actions reflect on the consumption of fruits and vegetables.

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## REFERENCES

1. Oliveira-Campos M, De Oliveira MM, Da Silva SU, Santos MAS, Barufaldi LA, De Oliveira PPV, et al. Risk and protection factors for chronic noncommunicable diseases in adolescents in Brazilian capitals. *Rev Bras Epidemiol.* 2018; 1:21.
2. Molz P, Pereira CS, Reuter CP, Pra D, Franke SIR. Factors associated with the consumption of five daily servings of fruits and vegetables by students (Fatores associados ao consumo de cinco porções de frutas e hortaliças). *Rev Nutr.* 2019; 32:1-8.
3. Zhan J, Yu-jian L, Long-biao C, Xu F, Tao X, Qi-qiang H. Fruit and Vegetable Consumption and Risk of Cardiovascular Disease: a Meta-analysis of Prospective Cohort Studies. *Crit Rev Food Sci Nutr.* 2017; 57(8):1650-63.
4. IBGE. Pesquisa de orçamentos familiares 2017-2018. Rio de Janeiro; 2019.
5. Brasil. Ministério da Saúde. *Vigil Brasil 2018. Vigilância de fatores de risco e proteção para doenças crônicas*

- por inquérito telefônico. Brasília: MS; 2018.
6. Magalhães RJ, Alexandre B, Santos F, Alves da Silva MM, Henrique de Oliveira D, Rabello de Castro P, et al. Ministério da Saúde. Instituto Brasileiro de Geografia e Estatística-IBGE. 2016; 132 p.
  7. Macedo AH, De Moura Souza A, Augusta L, II B, De Azevedo G, III A, et al. ERICA: ingestão de macro e micronutrientes em adolescentes brasileiros. 2019; 50(supl 1):5s.
  8. Menon S, Philipneri A, Ratnasingham S, Manson H. The integrated role of multiple healthy weight behaviours on overweight and obesity among adolescents: a cross-sectional study. *BMC Public Health*. 2019; 19(1):1157.
  9. Myszkowska-Ryciak J, Harton A, Lange E, Laskowski W, Gajewska D. Nutritional Behaviors of Polish Adolescents: Results of the Wise Nutrition – Healthy Generation Project. *Nutrients*. 2019; 13; 11(7):1592.
  10. Araújo MC, Ferreira DM, Pereira RA. Reprodutibilidade de questionário semiquantitativo de frequência alimentar elaborado para adolescentes da Região Metropolitana do Rio de Janeiro, Brasil. *Cad Saude Publica*. 2008; 24(12):2775-86.
  11. Associação Brasileira de Empresas de Pesquisa. Critério de Classificação Econômica Brasil. 2009; 1-3. Available from: [www.abep.org](http://www.abep.org).
  12. Guedes DP, Lopes CC, Guedes JERP. Reprodutibilidade e validade do Questionário Internacional de Atividade Física em Adolescentes. *Rev Bras Med do Esporte*. 2005; 11(2):151-8.
  13. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. *Protoc do Sist Vigilância Aliment e Nutr – SISVAN – na assistência à saúde*. Brasília, DF; 2011.
  14. World Health Organization. *Fruit and Vegetable Promotion Initiative*. Geneva; 2003.
  15. Philippi, ST. *Alimentação saudável e a pirâmide dos alimentos. Pirâmide dos alimentos – Fundamentos básicos da nutrição*. Barueri, SP: Manole; 2008.
  16. Brasil. *Guia Alimentar para a População Brasileira*. 2. ed. Ministério da Saúde; 2014.
  17. Rieth MA, Moreira MB, Fuchs FD, Moreira LB, Fuchs SC. Fruits and vegetables intake and characteristics associated among adolescents from Southern Brazil. *Nutr J*. 2012; 11(95).
  18. Galego CR, D’Avila GL, de Vasconcelos F de AG. Factors associated with the consumption of fruits and vegetables in schoolchildren aged 7 to 14 years of Florianópolis, South of Brazil. *Rev Nutr*. 2014; 27(4):413-22.
  19. Muniz LC, Zanini R de V, Schneider BC, Tassitano RM, Feitosa WM do N, González-Chica DA. Prevalência e fatores associados ao consumo de frutas, legumes e verduras entre adolescentes de escolas públicas de Caruaru, PE. *Cien Saude Colet*. 2013; 18(2):393-404.
  20. IBGE. Instituto Brasileiro de Geografia e Estatística. *Pesquisa de Orçamentos Familiares 2008-2009: análise do consumo alimentar pessoal no Brasil*. Rio de Janeiro; 2011.

21. Neutzling MB, Assunção MCF, Malcon MC, Hallal PC, Menezes AMB. Hábitos alimentares de escolares adolescentes de Pelotas, Brasil. *Rev Nutr.* 2010; 23(3):379-88.
22. Assis MAA de, Calvo MCM, Kupek E, Vasconcelos F de AG de, Campos VC, Machado M, et al. Qualitative analysis of the diet of a probabilistic sample of schoolchildren from Florianópolis, Santa Catarina State, Brazil, using the Previous Day Food Questionnaire. *Cad Saude Publica;* 2010 Jul;26(7):1355-65.
23. Silva FM de Almeida, Smith-Menezes A, Duarte M de Fátima. Consumo de frutas e vegetais associado a outros comportamentos de risco em adolescentes no Nordeste do Brasil. *Rev Paul Pediatr;* 2016; 34(3):309-15.
24. Krueger H, Koot J, Andres E. The economic benefits of fruit and vegetable consumption in Canada. *Can J Public Heal.* 2017; 108(2):152.
25. Costa L da CF, de Vasconcelos F de AG, Corso ACT. Fatores associados ao consumo adequado de frutas e hortaliças em escolares de Santa Catarina, Brasil. *Cad Saú Púb.* 2012; 28(6):1133-42.
26. De Cosmi V, Scaglioni S, Agostoni C. Early taste experiences and later food choices. *Nutrients.* 2017; 9(2):107.
27. Valmórbida JL, Vitolo MR. Factors associated with low consumption of fruits and vegetables by preschoolers of low socio-economic level. *J Pediatr, Rio de Janeiro.* 2014; 90(5):464-71.
28. Ramos P, Moreno-Maldonado C, Moreno C, Rivera F. The Role of Body Image in Internalizing Mental Health Problems in Spanish Adolescents: An Analysis According to Sex, Age, and Socioeconomic Status. *Front Psychol.* 2019; 10:1952.
29. Lazzeri G, Pammolli A, Azzolini E, Simi R, Meoni V, De Wet DR, et al. Association between fruits and vegetables intake and frequency of breakfast and snacks consumption: A cross-sectional study. *Nutr J.* 2013;12(1).
30. Blondin SA, Anzman-Frasca S, Djang HC, Economos CD. Breakfast consumption and adiposity among children and adolescents : an updated review of the literature. *Pediatr Obes.* 2016; 11(5):333-48.
31. Morello P, Pérez A, Peña L, Braun SN, Kollath-Cattano C, Thrasher JF, et al. Risk factors associated with tobacco, alcohol and drug use among adolescents attending secondary school in three cities from Argentina. *Arch Argent Pediatr.* 2017; 115(2):155-8.