

# Impact of actions of food and nutrition education program in a population of adolescents

## *Impacto das ações de um programa de educação alimentar e nutricional em uma população de adolescentes*

Juliana Garcia BALDASSO<sup>1</sup>

Andréa Polo GALANTE<sup>1</sup>

Aline DE PIANO GANEN<sup>1</sup>

### **ABSTRACT**

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#### **Objective**

To evaluate changes in food intake after adolescents attended a food and nutrition education program at a non-profit institution.

#### **Methods**

Fifty-four adolescents aged 16 to 19 years, of low socioeconomic level, enrolled in an non-governmental organization in *São Paulo*, underwent a nutritional intervention of six months consisting of six meetings with dietitians, as well as strategic communication and relationship actions. Body weight, height, body mass index, questionnaire on knowledge on nutrition and feeding practices, 24-hour recall, and diet quality assessment using the Diet Quality Index associated with the Digital Food Guide were collected at baseline and after the intervention. Dietary pattern improvement was defined as an increase of at least 5 points in Diet Quality Index associated with the Digital Food Guide.

#### **Results**

Understanding of food labels increased, and the dietary patterns on weekdays and weekends improved by 33 and 37%, respectively. The intake of legumes, milk, dairy products, fruits, and vegetables increased (adequacy components). However, intakes of nuts and whole grains were low, and intake of moderation components was high.

#### **Conclusion**

The program improved the dietary patterns of adolescents, making it a viable and inexpensive method to prevent disease and improve health and quality of life. In addition, the Diet Quality Index associated with the

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<sup>1</sup> Centro Universitário São Camilo, Mestrado Profissional em Nutrição: do nascimento à adolescência. R. Raul Pompéia, 144, Pompéia, 05025-010, São Paulo, SP, Brasil. *Correspondência para/Correspondence to:* A DE PIANO GANEN. E-mail: <aline.depiano@gmail.com>.

Digital Food Guide has proven to be a good nutritional tool for assessing changes in food intake and for guiding future counseling and nutritional intervention actions for this population.

**Keywords:** Adolescent. Food and nutrition education. Food consumption.

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## RESUMO

### Objetivo

Avaliar as mudanças no consumo alimentar após aplicação de um programa de educação alimentar e nutricional com adolescentes de uma instituição do terceiro setor.

### Métodos

Cinquenta e quatro adolescentes com idade entre 16 e 19 anos, de baixo nível socioeconômico, matriculados em uma organização não governamental de São Paulo foram submetidos à intervenção nutricional de seis meses, que consistiu de seis encontros com nutricionistas e ações estratégicas de comunicação e relacionamento. Massa corporal, estatura, índice de massa corporal, questionário sobre conhecimento de nutrição e práticas alimentares, recordatório de 24 horas e qualidade da dieta pelo Índice de Qualidade da Dieta associado ao Guia Alimentar Digital foram avaliados no início e no final da intervenção. Considerou-se como melhora no padrão alimentar o aumento de no mínimo cinco pontos no Índice de Qualidade da Dieta associado ao Guia Alimentar Digital.

### Resultados

Observaram-se maior conhecimento sobre as informações disponibilizadas no rótulo dos alimentos e melhora no padrão da dieta de 33% dos alunos durante a semana e 37% aos finais de semana. Verificou-se aumento na ingestão de alimentos dos grupos leguminosas, leites e derivados, frutas e hortaliças (componentes de adequação). Entretanto, houve baixa ingestão de oleaginosas e cereais integrais e elevada ingestão dos componentes de moderação.

### Conclusão

O programa promoveu melhoras no padrão alimentar dos adolescentes, tornando-se um método viável, de baixo custo e aplicável para a prevenção de doenças e melhoria da qualidade de vida e da saúde. Além disso, o Índice de Qualidade da Dieta associado ao Guia Alimentar Digital mostrou ser uma boa ferramenta nutricional para avaliar mudanças no consumo alimentar e nortear futuras orientações e ações de intervenção nutricional nessa população.

**Palavras-chave:** Adolescente. Educação alimentar e nutricional. Consumo de alimentos.

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## INTRODUCTION

Food and nutrition are basic requirements for health promotion and protection, enabling full attainment of human growth and development with quality of life and citizenship. Nutritional risks of different magnitudes and categories permeate the entire human life cycle, assuming various epidemiological configurations and function of each population's health/disease process<sup>1</sup>.

From the nutritional point of view, adolescents are considered vulnerable individuals because of their current dietary pattern, which is typically low in micronutrients and high in sugars and fats. Currently, adolescent obesity is a universal disease

with a growing global prevalence, assuming the epidemiological nature of a public health problem. The promotion of a healthy diet is one of the main public health strategies for facing these food and nutrition problems in the current context because they consist of a strategy capable of preventing nutritional deficiencies and of reducing the incidence of overweight and other Chronic Non-Communicable Diseases (NCD), such as obesity, diabetes, hypertension, and cancer<sup>2</sup>.

Regarding adolescents, the dietician's technical and scientific knowledge should be shared at the same rhythm as the adolescent's knowledge and life experiences are problematized since changing food habits requires more

understanding than food prescription or forbiddance, resulting in desired attitudes and behaviors. Providing these skills to adolescents at school encourages them and increases their knowledge about healthy eating<sup>3</sup>.

Education institutions, including philanthropic and aid-oriented entities and institutions, have been one of the preferred spaces for public food and nutrition policies that promote a healthy diet because they are recognized as one of the main locations for the formation of food habits and choices<sup>3,4</sup>. Large-scale health education programs should be provided in these environments, including food and nutrition education programs that focus on the development of actions that improve students' health and nutritional status. Such programs should be incorporated in the teaching plan, constructing knowledge in a cross-sectional manner, using active, fun, and interactive processes that promote changes in food attitudes and practices, guaranteeing the sustainability of the actions inside and outside the classroom<sup>5</sup>.

The development of nutrition education programs for youth attending non-profit institutions is essential for increasing their ability to understand proper food practices, encouraging these individuals to become active in a social transformation process by spreading these healthy food habits and contributing to the establishment of a society with better future perspectives.

Despite the incentive given to food and nutrition education in education institutions, there are very few reports in the literature about the implementation of successful actions in most Brazilian municipalities. There is also a scarcity of similar studies involving adolescents, making it necessary to reassess the usual nutritional interventions made on this group. The focus should cover knowledge of the food behavior of an individual and his social group, and the collective construction of the adopted strategies. Interventions based on the target population's concepts, requirements, and beliefs are more

likely to promote healthy food practices effectively<sup>6</sup>.

In face of the aspects discussed above, the search for successful intervention models is clearly a challenge for dietitians. Analysis of the effects of food and nutrition education interventions on this population allows the identification of their strengths and aspects that need more work, allowing professionals involved in their provision to improve them in a way that encourages participants to consider changing their food habits and to realize the importance of doing so, associating better food habits with better health. Thus, the objective of the present study was to assess changes in the dietary pattern of adolescents attending a non-profit institution located in the municipality of *São Paulo* after they were submitted to the actions of a food and nutrition education program.

## METHODS

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This is a non-controlled intervention study with assessments made before and after a 6-month food and nutrition education program. The study was developed at a Non-Governmental Organization (NGO) located in the city of *São Paulo*. The NGO aims to promote the professional, sociocultural, and personal development of socially and economically vulnerable youth using audiovisual aids. Youth of low socioeconomic level aged 16 to 21 years ( $18.0 \pm 0.54$ ) attend the institution full time on an annual basis, from Monday to Friday. The institution offers three meals a day (breakfast, lunch, and afternoon snack). The study population consisted of students enrolled in the institution from August 2013 to July 2014. In face of the challenge of nonprofit organizations, the scarcity of studies with adolescents, and the important mission of an NGO that works with vulnerable youth, which directly interferes on youth's dietary patterns, led the main researcher to choose this population over the many projects she has developed. Therefore, this is a convenience sample.

The study included male and female adolescents aged 16 to 19 years enrolled in a nonprofit institution. None of the participants were pregnant or had special needs. Their parents or guardians authorized their participation in the study. Students who participated in less than 75% of the actions of the food and nutrition education program were excluded from the study. The Research Ethics Committee of *Centro Universitário São Camilo* approved the study without restrictions under Protocol nº 446.036.

The educational actions were provided for six months at the institution. The food and nutrition education program included activities, such as lectures, nutritional counseling, cooking workshops, and group dynamics, distributed throughout six meetings with the nutrition team, in addition to communication and relationship actions and strategies using an announcement board for six months to support the program and strengthen the bond with the students.

The students' body weight and height were measured as suggested by *Sistema de Vigilância Alimentar Nutricional (Sisvan)*<sup>7</sup>. The body mass index of the adolescents was calculated, and their nutritional status was classified as recommended by the World Health Organization (WHO)<sup>8</sup>.

A specific questionnaire assessed the adolescents' knowledge on nutrition and food practices related to the main themes covered by the educational actions. The data were tabulated and analyzed statistically to investigate possible associations between the variables.

Food intake was assessed by a 24-Hour Recall (24HR). Food records of two non-consecutive days, namely a weekday and a weekend day, of each adolescent were also collected.

The data collected by the 24HR were processed by the software MSAccess® (Microsoft, *São Paulo*, Brazil) version 11 and converted by the system into food groups and corresponding servings according to the criteria provided by the "*Índice de Qualidade da Dieta associado ao Guia*

*Alimentar Digital*" (IQD-GAD, Diet Quality Index associated with the Digital Food Guide), created by Caivano & Domene<sup>9</sup>. The energy content was given by the "*Tabela Brasileira de Composição de Alimentos*" (Taco, Brazilian Food Composition Table)<sup>10</sup> and the nutrient database of the United States Department of Agriculture (USDA)<sup>11</sup>.

The Diet Quality Index associated with the Digital Food Guide assesses food choices, classifying food groups into two categories: moderation components, consisting of food groups that contain hazardous compounds when overeaten; and adequacy components, consisting of food groups that contain nutrients and bioactive compounds that provide essential nutrients. The IQD-GAD has a maximum score of 100 points. The scores are classified as follows: 0-49 points: poor quality diet; 50-80 points: intermediate quality diet; and 81-100 points: high quality diet.

According to the intervention model, an increase of at least five points between the IQD-GAD before and after the intervention indicated that the intervention improved the adolescents' dietary pattern. Although the IQD-GAD<sup>9</sup> was developed for adults, we chose to use it because it is recent, validated, geared towards the Brazilian dietary habits, based on the nutritional requirements established by the Institute of Medicine (IOM)<sup>12,13</sup>, encourages a dietary pattern that aims to prevent chronic diseases, and has reliability similar to that of foreign indices. The macro- and micronutrient (calcium, magnesium, iron, sodium, zinc, and vitamin A) contents of this index's reference diet are close to the nutritional quotas established by the Dietary Reference Intakes for the sex and age of the study adolescents.

The results were analyzed descriptively, which included measures of central tendency (mean and median), dispersion (standard deviation, minimum, and maximum), and frequency (%). The Kolmogorov-Smirnov test investigated whether the variables had normal distribution. The Pearson's Chi-square test compared the body

mass indices of the adolescents before and after the intervention. The binomial test analyzed whether the intervention improved the adolescents' dietary patterns by classifying the patterns as recommended by the IQD-GAD. The number of servings of each dietary component before and after the intervention was compared by the Student's *t* test for parametric variables, and by the Wilcoxon test for non-parametric variables. The statistical analyses were performed by the software Sciences Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois, United States) version 18 for Windows (Microsoft Corporation, Redmond, Washington, United States) and the significance level was set at 5% ( $p < 0.05$ ).

## RESULTS

Of the 135 individuals enrolled in the institution, 66.7% were adolescents. Of these, 96.7% met the inclusion criteria; of these, 37.9% were excluded because their participation in actions of the food and nutrition education program was below 75.0%. Hence, the study sample consisted of 54 students, most of which were females aged 17 to 18 years with complete high school education. Table 1 shows the anthropometric characteristics of the study participants.

Anthropometric assessment showed a prevalence of overweight and obesity of 24.2% before and after the intervention. However, the Body Mass Index (BMI) of 5.6% of the participants decreased, migrating from a status of obesity to overweight. Although the BMI of some students

remained inappropriate, the nutritional intervention improved their nutritional profile significantly (Table 1).

The adolescents' intakes of salt, sugar, and milk before and after the food and nutrition education program were investigated. After the intervention, 9.3 and 7.4% of the students no longer added salt to food or sugar to juice, respectively. The intervention increased the percentage of students who consumed milk from 70.4 to 90.7%, and 6.4% of the students substituted whole milk by either semi-skimmed (4.3%) or skimmed (2.1%) milk (data not shown).

Nutrition knowledge and understanding of food labels clearly increased after the intervention: 50% of the students started reading food labels, and 63% began to understand the information therein.

After the intervention, 33% of the sample had improved their diet during the week (from Monday to Friday), and 37% had improved their diet during the weekend by at least five points in the IQD-GAD.

Table 2 shows the change in dietary patterns according to IQD-GAD classification. Although not statistically significant, the percentage of students with low quality diet decreased by 16.6% during the week and by 11.1% during the weekend. All of these cases went from a poor-quality diet to an intermediate-quality diet, increasing the percentage of students with an intermediate-quality diet on weekdays and weekends. The percentages of students with

**Table 1.** Anthropometric characteristics of the students who participated in the program before and after the intervention. São Paulo (SP), Brazil, 2015.

Body mass index classification	Pre-intervention		Post-intervention	
	n	%	n	%
Underweight	0	0.0	1	1.9
Normal weight	41	75.9	40	74.1
Overweight	3	5.6	6	11.1
Obese	10	18.5	7	13.0
Total	54	100.0	54	100.0

Note:  $p=0.00$  according to Pearson's Chi-square test.

a good-quality diet on weekdays and weekends, before and after the intervention, did not change. None of the students had a good-quality diet on weekends.

Tables 3 and 4 contain data on the number of servings consumed of each food component before and after the intervention. Intake of legumes, milk, dairy products, fruits, and vegetables increased significantly during the week and

weekend, meeting the daily recommendations for legumes, milk, and dairy products. The intake of poultry, seafood, and eggs increased significantly on weekends, and the intake of vegetable oils during these days decreased but not significantly.

The intervention did not change the intake of nuts and whole grains, which remained inadequate after the intervention. Likewise, the intervention had no impact on most food groups

**Table 2.** Classification of diet quality before and after the intervention. São Paulo (SP), Brazil, 2015.

Variables	Diet Quality Index associated with the Digital Food Guide				<i>p</i> *
	Pre-intervention		Pre-intervention		
	n	%	n	%	
<i>Weekday</i>					
Low quality	51	94.4	42	77.8	0.10
Intermediate quality	2	3.7	11	20.4	
Good quality	1	1.9	1	1.9	
Total	54	100.0	54	100.0	
<i>Weekend day</i>					
Low quality	37	68.5	31	57.4	0.29
Intermediate quality	17	31.5	23	42.6	
Good quality	0	0.0	0	0.0	
Total	54	100.0	54	100.0	

Note: \*Binominal test.

**Table 3.** Number of servings consumed of each food component on weekdays before and after the intervention. São Paulo (SP), Brazil, 2015.

Components	Reference range (serving)	Pre-intervention		Post-intervention		<i>p</i> **
		Median	Min - Max	Median	Min - Max	
<i>Moderation components</i>						
Sugars and sweets	0.0 to 1.0	6.67	0.00 - 28.59	6.90	0.00 - 27.88	0.47
Refined grains and breads	0.0 to 1.0	5.44	0.00 - 21.03	6.26	0.00 - 21.65	0.11
Beef and pork	0.0 to 1.0	2.54	0.00 - 11.02	2.34	0.00 - 11.86	0.23
Animal fat	0.0 to 1.0	0.00	0.00 - 9.44	0.00	0.00 - 7.57	0.84
<i>Adequacy components</i>						
Poultry, seafood, and eggs	0.0 to 2.0	0.81	0.00 - 8.61	0.47	0.00 - 8.61	0.84
Whole grains and breads*	4.0 to 6.0	0.00	0.00 - 2.76	0.00	0.00 - 5.88	0.40
Fruits	3.0 to 5.0	0.00	0.00 - 3.95	2.00	0.00 - 4.28	0.05
Vegetables	4.0 to 5.0	1.08	0.00 - 6.75	3.23	0.00 - 22.78	0.00
Legumes	2.0 to 3.0	0.93	0.00 - 7.66	2.55	0.00 - 5.10	0.00
Milk and dairy products	1.5 to 2.5	0.55	0.00 - 7.45	1.91	0.00 - 19.90	0.00
Nuts	0.5 to 1.5	0.00	0.00 - 4.04	0.00	0.00 - 7.78	0.65
Vegetable oils	2.0 to 3.0	2.02	0.00 - 11.61	2.20	0.00 - 13.49	0.07

Note: \*Whole grains and bread, tubers, and roots; \*\*Tests for analyzing servings before x after intervention: Wilcoxon for nonparametric variables and Student's *t* test for parametric variables.

Min: Minimum; Max: Maximum.

**Table 4.** Number of servings consumed of each food component on weekends before and after the intervention. *São Paulo* (SP), Brazil, 2015.

Components	Reference range (serving)	Pre-intervention		Post-intervention		p**
		Median	Min - Max	Median	Min - Max	
<i>Moderation components</i>						
Sugars and sweets	0.0 to 1.0	3.52	0.00 - 29.12	3.29	0.00 - 28.88	0.97
Refined grains and breads	0.0 to 1.0	4.45	1.49 - 15.04	5.18	1.17 - 15.27	0.15
Beef and pork	0.0 to 1.0	1.84	0.00 - 9.75	1.60	0.00 - 14.75	0.26
Animal fat	0.0 to 1.0	0.00	0.00 - 4.36	0.00	0.00 - 7.50	0.96
<i>Adequacy components</i>						
Poultry, seafood, and eggs	0.0 to 2.0	0.00	0.00 - 9.42	0.62	0.00 - 12.84	0.02
Whole grains and breads*	4.0 to 6.0	0.00	0.00 - 2.17	0.00	0.00 - 11.06	0.13
Fruits	3.0 to 5.0	0.54	0.00 - 3.80	1.50	0.00 - 5.44	0.03
Vegetables	4.0 to 5.0	0.59	0.04 - 6.92	2.05	0.00 - 16.62	0.05
Legumes	2.0 to 3.0	1.28	0.00 - 6.38	2.56	0.00 - 7.76	0.00
Milk and dairy products	1.5 to 2.5	0.16	0.00 - 3.94	1.50	0.00 - 8.46	0.00
Nuts	0.5 to 1.5	0.00	0.00 - 0.00	0.00	0.00 - 6.80	0.31
Vegetable oils	2.0 to 3.0	2.25	0.46 - 10.77	1.72	0.20 - 24.67	0.90

Note: \*Whole grains and bread, tubers, and roots; \*\*Tests for analyzing servings before x after intervention: Wilcoxon for nonparametric variables and Student's *t* test for parametric variables.

Min: Minimum; Max: Maximum.

classified as moderation components, especially sugars and sweets, refined grains, beef, and pork. The intake of these items on weekdays and weekends exceeded the reference values.

## DISCUSSION

Health education seems to benefit when information is disseminated through different channels<sup>14</sup>. The food and nutrition education program conducted at the institution included strategies of nutritional counseling in different formats and channels, increasing group involvement and participation. The use of games, group dynamics, cooking workshops, and lectures was appropriate for the educational content, encouraged the students to reflect about and discuss the subject, and motivated all participants. These activities allowed a less formal interaction between the students and the technical team, encouraging the students to express their thoughts about the discussion themes more spontaneously.

Similar results using non-conventional teaching techniques, such as cooking workshops,

as a nutrition education tool have been described by Toassa *et al.*<sup>14</sup>, Marin *et al.*<sup>15</sup>, and Pereira & Sarmiento<sup>16</sup>, who aimed to promote adolescent health using educational practices. Thus, the use of active methodology techniques in adolescent education not only has good results, but also is recognized as the necessary measure for reducing food and nutrition education dropout rates.

The study food and nutrition education program improved the adolescents' nutritional profile significantly, even though some students still had inappropriate BMI after the intervention. The prevalence of overweight and obesity in this study was 24.2% before and after the intervention, which is higher than the prevalences reported by a nationally representative survey conducted in 2008-2009 with adolescents aged 16 to 17 years (17.5%) and adolescents aged 18 to 19 years (19.2%). These results deserve attention, since overweight and obese adolescents tend to maintain this nutritional status throughout adulthood, increasing their risk of NCD<sup>17</sup>. Changing the weight of most of these adolescents significantly, especially when excessive, requires an ongoing, long-term, and multidisciplinary

intervention<sup>18</sup>. Moreover, the obstacles and limiting factors in the treatment of excess weight also have to be considered, such as genetic factors, which influence individuals' susceptibility to obesity. This susceptibility manifests in favorable environments, where lifestyle also plays an important role. On the other hand, ideological, cultural, and emotional factors influence the formation of adolescents' food habits and their perception of hunger, appetite, and satiety. Most adolescents have some typical food behaviors and habits, such as skipping breakfast, high intake of energy-dense foods, and high vulnerability to the pressure exerted by the media and society for the attainment of often unattainable appearance or underweight, possibly increasing their odds of developing eating disorders<sup>19</sup>.

Studies that provided nutrition education to children and adolescents as one of the intervention strategies reported an increase in their subjects' nutritional knowledge and healthy food attitudes<sup>19,20</sup>. These data corroborate the present study, which observed a higher frequency of healthy food attitudes and practices, a reduction in the percentage of students who added salt to food or sugar to juice, better nutrition knowledge, and better understanding of food labels, evidencing the effectiveness of the study food and nutrition education program.

Although some students stopped adding sugar to juice, the IQD-GAD revealed that this population had high intake of sugars and sweets. This finding indicates the need of informing this group about the importance of reducing sugar intake since sugar increases energy intake significantly, contributing to weight gain and to the development of diseases associated with the metabolic syndrome<sup>21</sup>. In this context, sugar intake currently recommended by the WHO<sup>22</sup>, including the intake of glucose, sucrose, and fructose, decreased from 10 to 5% of the total daily energy intake, which affects the intake of beverages, doughs, and even the sugar naturally present in juice and fruits.

Foreign studies found that children's and adolescents' knowledge on nutrition increased after exposure to food and nutrition education programs at school. The researchers reported a significant impact on students' food knowledge and eating behavior, emphasizing lower intake of high-sodium and high-sugar foods<sup>23,24</sup>.

Although sodium intake was not assessed, its addition to food reported by the adolescents is in agreement with one of the premises of the new Brazilian Food Guide<sup>2</sup>, which is the use of sodium with moderation based on studies that relate high sodium intake with increased risk of cardiovascular diseases.

Knowledge on adolescents' diet quality provides information to substantiate the creation of nutritional health indicators that allow early interventions and monitoring the main dietary factors<sup>25</sup>. Since the intervention improved the dietary pattern classification and diet quality on weekdays and weekends, the study food and nutrition education program reached its objectives.

Studies that assess the diet quality of adolescents using the IQD-GAD were not found in the literature. Most studies of adolescents assess diet quality with traditional nutritional tools, such as the three-day food record and the food frequency questionnaire, and few studies use other indices. The present study was the first to use the IQD-GAD on adolescents. The intervention impacted most the food groups classified as adequacy components, which promote health when consumed adequately.

Gabriel *et al.*<sup>26</sup> also reported a significant increase in fruit intake by students after an intervention. However, like other studies<sup>27,28</sup> that used the IQD to estimate adolescents' fruit intake, fruit intake was below the recommended intake, except in the study by Wendpap *et al.*<sup>29</sup>.

Higher vegetable intake was also reported by Jaime *et al.*<sup>30</sup> in a study of low-income Brazilian families after an intervention, and by Baranowski *et al.*<sup>31</sup> in a study of adolescents after exposure to



food and nutrition education actions. However, in most cases vegetable intake was still short of the recommended intake, despite the higher intake promoted by interventions<sup>32,33</sup>.

Studies conducted in the United States, England, and Australia with children and adolescents report that food and nutrition education actions at school increase students' intake of fruits and vegetables and their knowledge on these subjects. These effects seem even greater when schools have gardens and/or include these foods in their meals<sup>34-36</sup>.

As the students increased their legume, milk, and dairy product intakes, they reached the recommended intakes for these foods, exceeding the intakes reported by other studies<sup>37,38</sup>.

The provision of healthy meals during meal breaks aims to supplement the students' diets, improving their nutritional status and learning ability, and forming good food habits<sup>1</sup>. In this context, another important aspect was the supply of fruits, vegetables, and legumes in the main meal (lunch), and milk in the smaller meals (breakfast and afternoon snack) served by the institution to the students during the food and nutrition education program. In the long run, this practice may have contributed to the students' higher intake of these foods.

The intervention actions did not affect the intake of most food groups classified as moderation components, especially sugars, sweets, and refined grains, reinforcing the need to review program actions that cover this subject, making them more effective.

Also deserving of attention are the contradictory messages that reach adolescents. Although education programs and health-promotion campaigns disseminate messages that encourage healthy food habits, processed and ultra-processed foods, most of which are high in sugars, fats, and refined grains, occupy an increasingly higher share of the food market. These foods are inexpensive, guaranteed to be practical, and lead to taste development and

dependence, which increasingly induces their preference. They reach young and low-income individuals, and strongly influence their food choices<sup>18,27,38</sup>. These results reinforce the importance of dieticians' influence in spaces frequented by adolescents, as well as of public policies on the marketing of these products.

A limiting factor of this study is the fact that little is known about the families' habits and culture, which proved to be a barrier to an effective intervention on inappropriate long-term food practices, which appears to be the case of excessive intake of high-sugar and high-fat foods. Not assessing the nutritional composition and value of the meals offered by the institution was also a limiting factor, which can be a determinant for a change in habit.

As discussed, there are many reports in the literature of school food and nutrition education programs, but long-term studies conducted in nonprofit institutions involving adolescents are rare. Even scarcer is the number of studies systematizing the methods and results of nationwide school experiences.

Although the reported intervention has achieved a positive result, the maintenance of healthy food practices requires the provision of long-term programs and not just isolated actions. food and nutrition education is a long process. Better results require continuity, permanence, and improvement, like any educational action, making food and nutrition education a challenge for health teachers and professionals<sup>39</sup>.

## CONCLUSION

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The study food and nutrition education strategy effectively promoted better nutritional status and dietary patterns in the participants, making it a viable and inexpensive method to prevent diseases, and improve health and quality of life.

The increase in diet classification and quality indicated that the food and nutrition

education program improved the eating pattern of the youth, having the greatest impact on the intake of most food groups classified as adequacy components, which benefit health when consumed adequately.

The Diet Quality Index associated with the Digital Food Guide instrument enabled the assessment of changes in the food intake of adolescents submitted to a food and nutrition education program, constituting an important tool for guiding future nutrition intervention actions in this population.

#### CONTRIBUTORS

J BALDASSO collected, analyzed, interpreted the data and drafted and wrote the article. A GALANTE supervised the study and revised the article. A DE PIANO GANEN supervised the study, drafted, wrote and revised the article.

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