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Consumption of school meals provided by PNAE among brazilian public school adolescents

Consumo de comidas escolares proporcionadas por PNAE entre adolescentes de escuelas públicas brasileñas

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ABSTRACT

Objective: Assess adherence to school food offered by the School Food Program (Programa Nacional de Alimentação Escolar - PNAE) and the associated factors among Brazilian adolescents. Methods: Cross-sectional study with data from the Study of Cardiovascular Risks in Adolescents conducted in 2013-2014, with 58,707 adolescents aged 12 to 17 years-old who attended public schools. Logistic regression models were stratified by sex and the significance level of 5% was adopted for all analyses. Results: There was low adherence to school meals (17.2%). The chance of regular consumption of school meals was higher among male adolescents belonging to the medium (p<0.05) and the low (p<0.05) socioeconomic score categories. For females, the chance of regular consumption of food offered at school was higher among black-skinned, brown-skinned, indigenous-skinned or yellow-skinned adolescents (p<0.05), aged 16 and 17 (p<0.05), who worked (p<0.001) and belonged to the medium (p<0.05) and low (p<0.05) socioeconomic score categories. The regular purchase of food in school cafeterias reduced the chance of regular consumption of school meals for males (p<0.001) and females (p<0.001). Conclusions: Adherence to the food offered by the PNAE is far from ideal, and it is important to create public policies that encourage the consumption of school meals and improve adherence. In addition, the strengthening and drafting of regulations aimed at the sale of food in the interior and surrounding schools' areas is necessary.

Keywords: Adolescent; Nutrition Policy; Public Health; Public Policy; School Food.

RESUMEN

Objetivo: Evaluar la adherencia a la comida escolar ofrecida por el Programa Nacional de Alimentación Escolar y los factores asociados entre los adolescentes brasileños. Métodos: Estudio transversal con datos del Estudio de Riesgos Cardiovasculares en Adolescentes realizado en 2013-2014, con 58.707 adolescentes de 12 a 17 años que asistieron a escuelas públicas. Los modelos de regresión logística se realizaron estratificados por sexo, y se aplicó el nivel de significancia del 5% para todos los análisis. Resultados: Hubo baja adherencia a las comidas escolares (17,2%). La posibilidad de consumo regular de comidas escolares fue mayor entre los adolescentes varones pertenecientes a las categorías de puntaje socioeconómico medio (p<0,05) y bajo (p<0,05). Para las mujeres, la probabilidad de consumo regular de alimentos ofrecidos en la escuela fue mayor entre las adolescentes de piel negra, marrón, indígena o amarilla (p<0,05), de 16 y 17 años (p<0,05), quién trabaja (p<0,001) y pertenece a las categorías de puntaje socioeconómico medio (p<0,05) y bajo (p<0,05). La compra regular de alimentos en las cafeterías escolares redujo la posibilidad de consumo regular de comidas escolares para hombres (p<0,001) y mujeres (p<0,001). Conclusiones: La adhesión a los alimentos ofrecidos por el PNAE está lejos de ser ideal, y es importante crear políticas públicas que fomenten el consumo de comidas escolares, mejoren su adherencia, además de

ayudar en el fortalecimiento y la redacción de regulaciones dirigidas a la venta de alimentos en el interior y las áreas de las escuelas circundantes.
Palabras clave: Adolescente; Alimentación escolar; Política de nutrición; Política pública; Salud pública.

INTRODUCTION

Adolescence is a period of intense changes, mainly biological and psychological, and, due to accelerated growth, there is an increase in the energy and nutrient needs of adolescents[1,2]. Inadequate food intake can cause damage to health and development[2], in addition to favoring weight gain[3]. According to data from the 2015 National School Health Survey (Pesquisa Nacional de Saúde do Escolar - PENSE), 23.7% of Brazilian adolescents were overweight and 7.8% were obese[4].

In this sense, school plays a fundamental role, as adolescents spend a good part of the day in this environment[5]. Thus, school is an ideal place to carry out actions to promote health, prevent disease and encourage healthy eating habits[6,7,8]. In addition, the habits and knowledge acquired in adolescence have an important influence on some aspects of adult life related to food, health, preferences, and psychosocial development, among others[9].

In Brazil, the National School Food Program (Programa Nacional de Alimentação Escolar - PNAE) offers healthy food and provides nutrition education to all students from federal, state, municipal and district public schools, helping to develop healthy eating habits and encouraging the consumption of healthy and adequate food[10]. The menus offered by PNAE must contain basic foods and respect the eating habits and food culture of the place, meeting the nutritional needs established for each educational category (daycare, preschool, elementary school, high school and education for young people and adults)[10]. Menus should be offer from one to three meals a day and vary according to nutritional needs and the category of education, with the times established by the technical nutritionist responsible for each school, respecting the food culture[10].

However, despite the fact that PNAE is available to all students in the public school system[10,11], previous studies have found low adherence to the foods offered by the program among adolescents, ranging from 20 to 60%[12,13,14,15,16]. This low adherence is related to social and demographic factors, such as the student's age and sex, per capita family income, nutritional status and parental education[13,14,15].

In view of the potential of the food offered by PNAE to influence school performance, student health and the promotion of adequate and healthy eating habits, the present study aims to assess adherence to school food offered by PNAE and the associated factors among Brazilian adolescents.

METHODS

Study population

This study analyzed the data taken from the Cardiovascular Risk Study in Adolescents (Estudo de Riscos Cardiovasculares em Adolescentes - ERICA) carried out between March 2013 and December 2014. ERICA is a cross-sectional, national, and school-based study, which aimed to estimate the prevalence of cardiovascular risk factors and metabolic syndrome among adolescents aged 12 to 17 years old who attended public and private schools located in Brazilian cities with a population more than 100,000 inhabitants[17].

The research population was stratified into 32 geographical strata: 26 state capitals, 1 federal district, and 5 strata, representing other municipalities in each macro-region of the country. For each geographic stratum, schools were selected with a probability proportional to size and inversely proportional to the distance from the capital. Thus, the sample is representative of medium and large cities (more than 100,000 inhabitants). Adolescents who were not in the age group of interest, had some degree of disability that hindered them from undergoing the anthropometric assessment and filling out the questionnaire, and pregnant adolescents were not eligible to participate. In the publications by Vasconcellos et al[17] and Bloch et al[18], further information regarding the sampling process, research protocol, and data collection is available.

ERICA's sample consisted of 85,000 eligible adolescents: 74,589 filled out the self-administered questionnaire using a personal digital assistant, model LG GM750Q which consisted of 100 questions divided into 11 blocks, covering sociodemographic, health, and lifestyle aspects. For the present study, only data from students in public schools have been used (78.7%, n= 58,707), as PNAE only offers school meals to public schools.

ERICA was approved by the Research Ethics Committees of the Institute of Studies in Collective Health of the Federal University of Rio de Janeiro and each state and the Federal District. All participants signed a consent form. When the local ethics committees required informed parental consent, such consent was obtained for students to participate in the study.

Study variables

Adolescent questionnaires covered specific questions for each of the 11 thematic blocks (sociodemographic characteristics, work and employment, physical activity, eating habits, smoking, alcohol consumption, reproductive health, oral health, referred morbidity, sleep duration and common mental disorders). For the present study, data from the sociodemographic block, such as work and employment (employed/unemployed) and eating habits, were used, as well as information on study schedule (morning/afternoon) and the region of the school in the municipality (urban/rural).

Regarding the information on the sociodemographic characteristics block, the following variables were used: sex, race/ethnicity and age. Socioeconomic level was defined using Brazil Criterion (Critério de Classificação Econômica Brasil - CCEB)[19], in which the possession of assets (color television, radio, bathroom, automobile, refrigerator, freezer, washing machine, and DVD player), presence of a domestic worker, and education of the head of the family[20] were

considered. However, in 30.8% of the questionnaires, no information on maternal education was obtained, making it impossible to use CCEB. Thus, we opted for the use of socioeconomic score adopted by Moura[20], which considers only the possession of assets and the presence of a domestic worker. The socioeconomic score was categorized into three equal intervals (low, 0 to 12; medium, 13 to 25; and high, 26 to 38)[20]. In the work and employment block, it was assessed whether the adolescent had worked in the last year receiving payment.

Regarding student eating habits, data on the consumption of foods offered at school and purchase of snacks from the school cafeteria were used. For the "consumption of food offered at school" variable, the categories "absence of cafeteria", "does not consume a snack from the school cafeteria", and "sometimes consumes a snack from the school cafeteria " were grouped in the category "does not consume/irregular consumption," whereas the categories "consumes cafeteria snack almost every day" and "consumes cafeteria snack every day" were grouped into "regular consumption".

Statistical analysis

The descriptive analysis included the calculation of frequencies and measures of position and central tendency. Bivariate analysis was performed using simple logistic regression models, with regular consumption of school meals offered by the PNAE as a dependent variable. The socioeconomic and demographic explanatory variables that obtained a p-value of less than 5% ($p<0.05$) were inserted as adjustment variables in the multivariate model of multiple logistic regression. Bivariate and multivariate analysis were performed stratified by sex. The Hosmer & Lemeshow test was used to verify the fit of the final model. The odds ratio (OR) with a 95% confidence interval (95% CI) was used as a measure of effect.

The data obtained were analyzed using Stata software version 14.1 (Stata Corp LP, College Station, United States). It is also noteworthy that in all the performed analyses, the sample complexity was considered, using the Stata svy command, with a significance level of 5%.

RESULTS

58,707 adolescents from public schools were evaluated: 55.5% female; 67.8% black-skinned, brown-skinned, yellow-skinned, and indigenous-skinned; 35.7% aged between 16 to 17 years old; 16.6% engaged in paid activities; 72.3% residents of regional capitals; 81.5% classified with an medium socioeconomic score; 17.2% regularly consumed school meals; and 48.8% regularly bought food from school cafeterias (Table 1).

The univariate and multivariate analysis of the factors associated with regular consumption of school meals offered by the PNAE stratified by sex are shown in table 2. Considering the multivariate model for males, the chance of regular consumption of food offered at school was higher among adolescents that belonged to the medium (OR: 1.40; 95% CI: 1.07-1.84) and the low (OR: 2.01; 95% CI: 1.19-3.39) socioeconomic score categories. In addition, the regular purchase of food in school cafeterias among males reduced the chance of regular consumption of school meals from the PNAE (OR: 0.48; 95% CI: 0.40-0.56).

For females, the chance of regular consumption of food offered at school was higher among black-skinned, brown-skinned, yellow-skinned, and indigenous-skinned adolescents (OR: 1.19; 95% CI: 1.01-1.40), aged 16 and 17 (OR: 1.67; 95% CI: 1.18-2.36), who worked (OR: 1.71; 95% CI: 1.40-2.08) and were in the medium (OR: 1.35; 95% CI: 1.13-1.60) and the low (OR: 1.49; 95% CI: 1.07-2.07) socioeconomic score categories. The regular purchase of food in school cafeterias among females also reduced the chance of regular consumption of school meals from the PNAE (OR: 0.60; 95% CI: 0.47-0.78).

DISCUSSION

In this cross-sectional study of Brazilian adolescents, 17.2% regularly consumed school meals offered by the PNAE, and the factors associated with greater adherence were: male adolescents that were in the medium or low socioeconomic score categories; or female adolescent who were black-skinned, brown-skinned, yellow-skinned, or indigenous-skinned, aged 16 and 17 years old, who worked and had a medium or low socioeconomic score. The strengths of this research was the sample size and representativeness (for cities with more than 100,000), which contributes to the identification of factors associated with adherence to the PNAE among Brazilian adolescents from public schools.

Regarding the factors associated with adherence to school meals, a Brazilian study carried out with students from the 9th grade from the day shift of public schools, found that 22.8% of adolescents consume school meals three or more times during the week[21]. Comparing the sociodemographic characteristics of schoolchildren who consume school meals or not, the authors found that the consumption of school meals was higher among male students, among those who did not live in capitals and among those who worked[21]. This higher consumption among adolescents who work may be due to the adolescent going straight to work after school, or vice versa, thus, the meal he/she consumes before or after going to work is at school, increasing adherence.

In the present study, there was a low adherence to school meals and this finding is common among adolescents[12,21], but also among students of other age groups. In Viçosa, Minas Gerais (Brazil), a study carried out in 2015 with 268 schoolchildren aged eight to nine years-old in the public-school system, found low adherence to school meals (36.1% of students consumed school meals four or more times a week) and reported that most students ate snacks brought from home[22]. Another study carried out with a representative sample of students from the Minas Gerais state school system, found that students aged 15 years old or older had a 1.63 times greater chance of adhering to the food provided at school, when compared to younger people16, a finding similar to the present study (1.67 times greater chance of adherence to the food provided at school among students aged 16 and 17).

Table 1. Characterization of the sample of adolescents from public schools from the ERICA study (n= 58,707), Brazil (2013-2014).

Variables	Absolute Frequency	Relative Frequency (%)
Sex		
Female	32,606	55.5
Male	26,101	44.5
Race		
White	18,325	32.2
Black/Brown/Indigenous/Yellow	38,610	67.8
Age (years)		
12-13	15,444	26.3
14-15	22,311	38.0
16-17	20,949	35.7
School schedule		
Morning	39,218	66.8
Afternoon	19,489	33.2
Works		
No	47,439	83.4
Yes	9,437	16.6
Region		
Midwest	7,481	12.7
North	13,106	22.3
Northeast	16,841	28.7
Southeast	13,782	23.5
South	7,497	12.8
Municipality location		
Interior	16,305	27.7
Capital	42,402	72.3
Socioeconomic Score		
Low	8,203	14.9
Medium	44,918	81.5
High	1,994	3.6
Consumes school meals		
No/Irregular consumption	48,626	82.8
Regular consumption	10,081	17.2
Buy snacks in the school cafeteria		
No/Irregularly	30,081	51.2
Regularly	28,626	48.8

Table 2. Simple and multiple logistic regression analysis stratified by sex: odds of regular consumption of food offered in public schools by Brazilian adolescents from the ERICA study (n= 58,707), Brazil (2013-2014).

Variables	Male		Female	
	OR[a] (CI 95%)	OR[b] (CI 95%)	OR[a] (CI 95%)	OR[b] (CI 95%)
Race				
White	1	-	1	1
Black/Brown/Indigenous/Yellow	1.18 (0.94–1.47)	-	1.19 (1.03–1.38)*	1.19 (1.01–1.40)*
Age (years)				
12-13	1	-	1	1
14-15	0.85 (0.67–1.08)	-	1.20 (0.93–1.56)	1.16 (0.88–1.53)
16-17	1.27 (0.94–1.72)	-	1.85 (1.31–2.60)**	1.67 (1.18–2.36)*
School scedule				
Morning	1	-	1	-
Afternoon	1.07 (0.78–1.47)	-	0.84 (0.61–1.15)	-
Works				
No	1	-	1	1
Yes	1.13 (0.89–1.42)	-	1.89 (1.51–2.37)**	1.71 (1.40–2.08)**
Municipality location				
Capital	1	-	1	1
Interior	1.23 (0.98–1.54)	-	1.31 (1.03–1.67)*	1.30 (0.99–1.68)
Socioeconomic Score				
High	1	1	1	1
Medium	1.45 (1.09–1.91)*	1.40 (1.0 –1.84)*	1.47 (1.26–1.71)**	1.35 (1.13–1.60)*
Low	2.22 (1.31–3.76)*	2.01 (1.19–3.39)*	1.64 (1.21–2.23)*	1.49 (1.07–2.07)*
Buy snacks in the school cafeteria				
No/Irregularly	1	1	1	1
Regularly	0.47 (0.40–0.55)**	0.48 (0.40–0.56)**	0.59 (0.45–0.77)**	0.60 (0.47–0.78)**

OR= Odds Ratio; CI= Confidence Interval.
[a] Simple Logistic Regression (crude odds ratio).
[b] Final multiple logistic regression model (adjusted odds ratio).
*p<0.05
**p<0.001

This study also found a relationship between the race/ethnicity of female adolescents and adherence to school meals. This might be explained by the fact that race/ethnicity are directly correlated with income. Data from the Brazilian Institute of Geography and Statistics (IBGE) point out that the average income of white individuals in Brazil is 74% higher than that of black and brown-skinned individuals, furthermore, the income of females is approximately 27% lower than that of males[23]. Also, it is known that socioeconomic factors, such as per capita income, are related to adherence to school meals[24]. In a study conducted in the city of Lapa, Paraná (Brazil), it was found that adherence to school meals was higher among adolescents who had a lower per capita income[25].

Regarding the acquisition and consumption of food that is not from PNAE, a study carried out with a representative sample of students from the Minas Gerais state school system found that 83.5% of students reported purchasing and consuming other foods, 13.2% of students reported bringing food from home, 15.1% buy food from people at school, 19.5% buy food from street vendors, 24.7% buy food from the school cafeteria, and 37.5 % buy from places close to the school[16]. In the present study, the prevalence of food purchases in the school cafeteria was higher, and buying food reduced the chance of consuming school meals by 52% for males and 40% for female adolescents.

The study by Leme et al[26] carried out with students from the 5th to the 8th grade of a public school, found that adolescents reported a preference for the taste and texture of food purchased at establishments close to the school or brought from home, that is, foods not offered by PNAE. Thus, the characteristics of the aforementioned foods can also be associated with low adherence to the food offered in schools. In addition, students also mentioned the monotony of meals, food presentation and the time meals are served as a barrier to the consumption of school meals[26]. As for the meal times and preparations offered, the biggest complaints related to the morning time. In some places, rice, beans and meat preparations are served, which may not be attractive for the time they are served (between 9 and 10:30 am). Food from home is also generally considered tastier than that offered at school[26].

Furthermore, studies show that the school food environment, understood as all spaces, infrastructure and conditions in and around the school premises where food is available for purchase and/or consumption, such as cafeterias, street vendors, food stores, kiosks and vending machines, can contribute to unhealthy food choices. Environments can be characterized as obesogenic, if they favor and contribute to the increase in the prevalence of obesity[27,28,29,30]. Carmo et al[31] characterized the food environment around the schools participating in the ERICA study and found that around 70.1% of public schools had street vendors and 56% had cafeterias and snack bars.

The present study has the limitation of not having evaluated the food brought from home that is consumed at school, the food purchased from other people at school (other than in the snack cafeteria) and the food purchased from street vendors and establishments near the school, as these establishments are part of the school food environment and are places where students can purchase food. Also, it was not possible to evaluate some of the possible reasons for low adherence mentioned in other studies, such as: acceptance of the offered preparations, monotony or diversity of the menus, the time of meals or type of preparation offered and the time devoted to food, since such questions were not included in the adolescent questionnaire. Finally, this study did not include adolescents from smaller cities, being a limitation, as the objective was to identify the factors associated with adherence to school meals, therefore, it is important to carry out the assessment of cities in Brazil as a whole, since the PNAE has national coverage.

Complementary studies are necessary in order to research the possible reasons cited above that may interfere with adherence to school meals. It would also be interesting to carry out studies that promote interventions in schools that aim to improve adherence. Furthermore, based on these results, it is possible to conclude that modifications are necessary to improve adherence to school meals, which may be the prohibition of school canteens in public schools (already in effect in some states and municipalities), changes in the menu to improve the taste and appearance, training food handlers or/and the adoption of a frequent system of assessment of school meals by students (planned as one of the mandatory activities of the responsible nutritionist).

CONCLUSION

Through this study it was possible to conclude that the adherence of adolescents from public schools included in the ERICA study to school meals offered by PNAE is far from ideal. Regular consumption of school meals was higher among male adolescent that had a medium or low socioeconomic score, and, among female adolescents, those who were black-, brown-, yellow-, or indigenous-skinned, aged 16 and 17 years old, who worked and had a medium or low socioeconomic score. Also, the consumption of school meals was lower among adolescents who purchase food in the school cafeteria.

The identification of factors associated with low and high adherence can assist in the design of more specific and efficient food and nutrition education actions for adolescents, aimed at encouraging the consumption of school food offered by the PNAE. As well, findings may help to improve valuing of the food offered by the program as a public investment to promote health and adequate healthy food in the school environment. In addition, the result of the present study serves as a basis for the

strengthening and elaboration of regulations aimed at the sale of food inside and around schools.

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