Factors related to healthy and unhealthy food consumption among school adolescents

RESUMO | Objetivo: avaliar a prevalência e fatores relacionados ao consumo alimentar saudável e não saudável entre adolescentes escolares. Método: estudo de corte transversal, realizado com 634 escolares de 10 a 16 anos pertencentes a cinco escolas estaduais do município de Montes Claros, Minas Gerais, entre agosto/2016 e julho/2017. Resultados: houve prevalência do sexo feminino (60,1%). Com relação ao consumo de tabaco e álcool, 97,8% dos adolescentes negaram tabagismo e 92,4% negaram etilismo. Um total de 59,5% relatou praticar alguma atividade física e 95,1% dos adolescentes escolares têm uma autopercepção da saúde como sendo "excelente", "ótima" ou "boa". Os padrões de consumo alimentar saudável e não saudável estiveram associados à maior idade e ao consumo de álcool. Conclusão: o presente estudo contribui no sentido de estimar a ocorrência de marcadores de consumo alimentar de interesse para o monitoramento de fatores de risco para as doenças não transmissíveis.
Descritores: Fatores de risco; Dieta saudável; Comportamento alimentar.

ABSTRACT | Objective: to assess the prevalence and factors related to healthy and unhealthy food consumption among schoolchildren. Method: cross-sectional study, conducted with 634 schoolchildren aged 10 to 16 years belonging to five state schools in the municipality of Montes Claros, Minas Gerais, between August/2016 and July/2017. Results: there was a prevalence of female gender (60.1%). Regarding tobacco and alcohol consumption, 97.8% of adolescents denied smoking and 92.4% denied alcoholism. A total of 59.5% reported practicing some physical activity and 95.1% of school adolescents have a self-perception of health as "excellent", "great" or "good". Healthy and unhealthy food consumption patterns were associated with older age and alcohol consumption. Conclusion: the present study contributes towards estimating the occurrence of food consumption markers of interest for monitoring risk factors for non-communicable diseases.
Keywords: Risk factors; Diet, healthy; Feeding behavior.

RESUMEN | Objetivo: evaluar la prevalencia y los factores relacionados con el consumo de alimentos saludables y no saludables entre los escolares. Método: estudio transversal, realizado con 634 escolares de 10 a 16 años pertenecientes a cinco escuelas estatales del municipio de Montes Claros, Minas Gerais, entre agosto/2016 y julio/2017. Resultados: predominó el sexo femenino (60,1%). En cuanto al consumo de tabaco y alcohol, 97,8% de los adolescentes negó haber fumado y 92,4% negó haber consumido alcohol. Un 59,5% declaró practicar alguna actividad física y 95,1% de los adolescentes escolarizados tiene una autopercepción de la salud como "excelente", "estupenda" o "buena". Los patrones de consumo de alimentos saludables y no saludables se asociaron con la edad avanzada y el consumo de alcohol. Conclusión: el presente estudio contribuye a estimar la aparición de marcadores de consumo de alimentos de interés para el seguimiento de los factores de riesgo de las enfermedades no transmisibles.
Palabras claves: Factores de riesgo; Dieta saludable; Conducta alimentaria.

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INTRODUCTION

Chronic Non-Communicable Diseases (NCDs) are an important public health problem and are

responsible for 68% of deaths worldwide. [1] Of these, approximately 42% are considered premature (before age 70) and preventable, and there is an estimated increase in the number of deaths worldwide from 38 million in 2012 to 52 million in 2030. [2] The severity of NCDs and their impacts on health systems and society led the United Nations (UN), in 2011, to discuss global commitments on the subject, which resulted in a political declaration, with the objective of combating the growth of NCDs through actions to prevent their main risk factors, in addition to the effort to guarantee adequate health care. [3]

With regard to risk factors for NCDs, smoking, excessive consumption of alcoholic beverages, inadequate diet and physical inactivity stand out; since the majority of deaths from NCDs and a substantial fraction of the disease burden due to these diseases are attributed to the aforementioned factors. [4] Additionally, in the Strategic Action Plan to Combat NCDs 2011-2022, outlined by Brazil, one of the national goals proposed by the plan is to reduce the prevalence of obesity in adolescents due to the aforementioned risks.

Exposure to risk factors and health prevention, focusing on the adolescent age group, has become, in recent decades, one of the most explored topics in the literature. [5,6] The importance of studies based on this theme is related to the vulnerability of children and adolescents during the transition period to adulthood. Research points to the likelihood of overweight adolescents becoming obese adults, therefore, obesity in childhood and adolescence is considered an independent risk factor in the development of several NCDs. [7,8,9]

In a study carried out with parents of overweight and/or obese children residing in the city of Divinópolis, Minas Gerais, it is discussed that children's autonomy to choose their food and consumption schedule without a routine established by parents and the difficulty they have in offering a balanced diet to their children contributes to the increase of risk factors in the acquisition of CNCD. Still, it is observed that, with the evolution of technological devices, children are more predisposed to a sedentary lifestyle and, consequently, to an inadequate diet in order to potentiate the emergence of NCDs. [10]

In the municipality of Montes Claros, Minas Gerais, another cross-sectional population-based study was carried out, which consisted of a representative sample of 544 children under 24 months of age, being that, when completing 180 days of life, 4% were exclusively breastfed; 22.4% on predominant breastfeeding; and 43.4% in complementary breastfeeding. In the municipality of Montes Claros, Minas Gerais, another cross-sectional population-based study was carried out, which consisted of a representative sample of 544 children under 24 months of age, being that, when completing 180 days of life, 4% were exclusively breastfed; 22.4% on predominant breastfeeding; and 43.4% in complementary breastfeeding. [11]

Adolescents interviewed at a school in the interior of Pernambuco, despite having knowledge about healthy eating, it was observed that they do not always put it into practice due to the multiplicity of factors that interfere in their food choices. The school and the family played a fundamental role in encouraging healthy eating in order to identify the need for the school to carry out food education practices that encourage the consumption of healthy foods produced in the locality. [12]

Given the direct association between overweight and the occurrence of NCDs, interest in this line of investigation on the consumption of food groups considered to define healthy and unhealthy dietary patterns emerges. Additionally, the pattern of food consumption, more than the specific absence of nutrients in the diet, expresses real situations of food availability and different conditions of insertion or not of populations in different social scenarios. [13,14]

Given the above, the present study aims to assess the prevalence and factors related to healthy and unhealthy food consumption among school adolescents.

METHOD

This is a cross-sectional study carried out with schoolchildren aged 10 to 16 years old from five state schools in the municipality of Montes Claros, Minas Gerais, Brazil, whose data collection took place between August 2016 and July 2017. The population of the present study consisted of 77,833 schoolchildren, of both sexes, who met the following inclusion criteria: [1] aged between 10 and 16 years; [2] were regularly enrolled in the city's state education network in 2016; [3] attended elementary or high school; and who [4] obtained the consent of parents and/or guardians to participate in the research.

A cover letter and an Institutional Consent Term (TCI), together with a copy of the research project, were sent to the Municipal Education Department (SME - Secretaria Municipal de Educação), as well as to the Directorate of each school, for authorization of the study. The institutions were duly oriented as to the study guidelines so that they signed the TCI authorizing the research to be carried out. Considering that the sample is about underage children/adolescents who are students of these educational institutions, each student was given a copy of the Term of Assent (TA) and the Term of Free and Informed Consent Form (FICF) so that these documents were signed by their respective legal guardians, authorizing data collection to be carried out.

The sample size was determined by adopting a reliability of 95%, with an acceptable margin of error of 5%. The

selection of the elements of the clusters occurred in a random and probabilistic way, in such a way that each element had an equal probability of being drawn to the sample. A frequency of 0.50 was established for the event studied. Correction for finite population and correction for design effect were performed, adopting deff equal to 1.5. To correct possible losses and non-responses, an increase of 10% was also instituted, totaling a sample of 634 individuals.

The sample selection was made by a probabilistic cluster (the population was divided into regions, and later a representative drawing of the selected universe was carried out). The population involved was selected by dividing the city of Montes Claros into regions: north, south, east and west; the number of public schools was listed and the number of students enrolled was quantified. A total of 63 schools were used as clusters (sampling units) and grouped. Therefore, complex sampling by stratification and clustering was performed in two stages.

In the first stage, the selection of schools (primary sampling unit) was carried out by systematic sampling with probability proportional to the number of schools in the strata. The second stage corresponded to the selection of students (secondary sampling unit) within each selected group, according to the age group of interest (10 to 16 years old). The selection of students was based on a systematized probabilistic sampling process, using the student's registration number as a reference.

The final sample totaled 635 students from five schools evaluated, and followed the representativeness of the population, having as a reference for this proportionality the number of students in terms of sex and age.

The sociodemographic variables investigated were: age, sex, ethnicity, parents' marital status, family income, tobacco and alcohol consumption, physical activity and health perception.

Regarding food consumption, this was evaluated using the validated questionnaire of "Evaluation of Food and Nutrition of the Ministry of Health", composed of 18 categories, namely: average daily consumption of cereals, vegetables, fruits, legumes, milk, meat and eggs, sugars, oils, water intake, consumption of alcoholic beverages and the practice of regular physical activity.

The existence of food consumption patterns was evaluated by cluster analysis, using the following variables: intake of fruits, vegetables, consumption of apparent fat from chicken meat and skin, sweets (sweets of any type, cakes stuffed with icing, and sweet biscuits, soft drinks and industrialized juices) and fried foods (fried or packaged snacks, salted meats, hamburgers, hams and sausages). The daily frequency of fruit consumption was evaluated based on the number of portions ingested, dichotomized into "less than three times a day" and "three or more times a day", according to the Food Guide recommendations. On the other hand, sweets of any kind, cakes stuffed with frosting, sweet biscuits, soft drinks and industrialized juices and foods: fried foods, fried snacks or in packages, salted meats, hamburgers, hams, sausage, bologna, salami and others were evaluated based on their daily consumption frequency.

For the cluster analysis, the k-means procedure of the Statistical Package for the Social Sciences (SPSS) version 20.0 was used, a non-hierarchical clustering technique that classifies individuals into a predefined number of clusters based on the Euclidean distance, allowing the distances between observations within a cluster to be minimized relative to the distances between clusters, and requires the prior definition of the number of clusters to be used in the analysis. [15]

The analysis was performed with two hypothetical clusters: a healthy cluster and an unhealthy cluster. In this analysis, the values of the F statistic identify the food items that most contribute to the solution of the clusters. Variables with high values of F present greater separations between clusters.

To assess the association between the independent factors (sociodemographic variables) and the dependent variable (healthy and unhealthy food consumption), binary, univariate and multiple logistic regression models were used. For the multiple analysis, the variables that presented a descriptive level below 20% and those that could explain some behavior, according to theoretical references, were tested. The variables that presented statistical significance of up to 5% remained in the final model.

This study complied with the ethical precepts established by Resolution No. 466, of December 12, 2012, of the National Health Council (CNS), which regulates the conduct of research involving human beings. The research project was reviewed and approved by the Research Ethics Committee of the State University of Montes Claros (CEP UNIMONTES), under the substantiated opinion nº 1.876.375, Certificate of Presentation for Ethical Assessment (CAAE) nº 51040315.3.0000.5146.

RESULTS

In the population studied, the female gender prevailed (n=381; 60.1%), non-white (n=512; 80.8%), with parents living with a partner (n=397; 62.6%), family income of up to three minimum wages (n=516; 81.4%), deny smoking (n=620; 97.8%) and alcohol consumption (n=586; 92.4%), report practicing some physical activity (n=377; 59.5%) and have a self-perception of health as being excellent, excellent or good (n=603; 95.1%).

As for the cluster analysis, two groups were identified: cluster I, composed of the items fat from meat and chicken skin, sweets and fried foods

(unhealthy foods), and cluster II, characterized by the consumption of fruits and vegetables (healthy foods). According to the F values obtained in the ANOVA table, the variable that presented the greatest separation between the clusters was frying (Table 1).

In the bivariate analysis, the variable age (p=0.031) and alcohol consumption (p=0.023) showed a significant association with unhealthy and healthy consumption patterns. It is important to consider that the health perception variable (p=054) remained in the model because it presented a borderline descriptive level, as shown in Table 2.

In the multiple analysis, the following variables remained associated with unhealthy and healthy food consumption: age (p=0.014) and alcohol consumption (p=0.040), adolescents aged 13 to 14 years are 1.74 times more likely to have an unhealthy food consumption pattern and, among adolescents who consume alcoholic beverages, the chance of an unhealthy food consumption pattern is 1.99 times greater compared to those who do not consume alcoholic beverages, as shown in Table 3.

DISCUSSION

The dietary patterns observed characterize the food consumption of schoolchildren aged 10 to 16 years old from public schools in a municipality in the north of Minas Gerais. Two dietary patterns were identified: unhealthy and healthy. Of the investigated items, frying (fried snacks or in packages, salted meats, hamburgers, hams and sausages) was the one that presented the greatest separation between the clusters, demonstrating that this item, among those evaluated, it is the one that most discriminates food consumption and is, therefore, an essential item in research analyzes of food consumption in populations.

In general, healthy and unhealthy

Table 1 – Grouping of food items identified by cluster analysis, F statistics, number (n) and percentage (%) of individuals adhered to each cluster. Montes Claros, Minas Gerais, 2016.

Foods	Cluster I		Cluster II		F
Fruits	0,37		0,75		107
Green leaves	0,87		0,95		8
Meat fat and chicken skin	0,62		0,21		133
Sweets	0,58		0,07		276
Fry foods	0,56		0,05		295
n(%) of individuals in each cluster	n	%	n	%	
	263	41,5	358	56,5	

Source: Own authorship, 2016

Table 2 – Prevalence of unhealthy and healthy eating indicators among schoolchildren aged 10 to 16 years according to sociodemographic variables. Montes Claros, Minas Gerais, 2016. (n=634)

Variables	Total		Unhealthy		Healthy		p Value
	n	%	n	%	n	%	
Age (years)							
10-12	151	24,3	55	20,9	96	26,8	0,031
13-14	184	29,6	92	35,0	92	25,7	
15-16	286	46,1	116	44,1	170	47,5	
Gender							
Female	376	60,5	156	59,3	220	61,5	0,324
Male	245	39,5	107	40,7	138	38,5	
Ethnicity							
White	118	19,0	48	18,3	70	19,6	0,381
Not white	503	81,0	215	81,7	288	80,4	
Parents' marital status							
With partner	392	63,3	161	61,5	231	64,7	0,228
Without partner	227	36,7	101	38,5	126	35,3	
Family income							
≥ 3 MW	111	17,9	47	17,9	64	17,9	0,543
< 3 MW	510	82,1	216	82,1	294	82,1	
Smoking Habits							
No	611	98,4	257	97,7	354	98,9	0,230
Yes	09	1,4	06	2,3	03	0,8	
Alcohol intake							
No	578	93,4	238	90,8	340	95,2	0,023
Yes	41	6,6	24	9,2	17	4,8	
Physical activities							
No	247	39,8	112	42,6	135	37,8	0,132
Yes	373	60,2	151	57,4	222	62,2	
Health perception							
Excellent, great and good	596	93,6	248	94,7	348	97,5	0,054
Bad or very bad	23	3,7	14	5,3	09	2,5	

Source: Own authorship, 2016. MW = Minimum wage

food consumption patterns were associated with older age and alcohol consumption. Regarding age, our results corroborate the results found, which observed higher frequencies of consumption of fruits, vegetables and vegetables (healthy food consumption pattern) in older individuals. [15,16]

Regarding alcohol consumption, considered an important risk factor and evaluated as prevalent among women aged ≥ 18 years, alcohol consumption was associated with a greater risk of an unhealthy dietary pattern. [17] The WHO adopted a target of a relative reduction of 10% in the per capita consumption of alcohol in the population ≥ 15 years by 2025. Specific measures aimed at this population must be built, among which include regulatory actions for trade and advertising and advertising, as well as increased inspection, both provided for in the Strategic Action Plan to Combat CNCDs. It is estimated that, among deaths caused by alcohol, more than 50% are due to NCDs, including several types of cancer and liver cirrhosis. [1]

The investigation model adopted in the present study proved to be feasible and provided relevant information about the factors associated with healthy and unhealthy consumption patterns, however some limitations should be considered, such as: the use of a questionnaire can increase the incidence of bias; since there is the possibility that inaccurate information was provided by the students, led to deny or affirm some habit, such as alcohol consumption, which could cause some embarrassment. It is also necessary to consider that the comparison of the findings of the present study with those of other investigations should be carried out with caution due to the differences in the characteristics of the population studied and in the instruments used to assess food consumption. In addition, there are numerous ways to extract consumption patterns, which further

Table 3 – Odds Ratio (OR) and p-value of unhealthy eating indicators among schoolchildren aged 10 to 16 years according to sociodemographic variables. Montes Claros, Minas Gerais, 2016. (n=634)		
Variables	**OR**	**p-valor**
Age (years)		
10-12	1	0,014
13-14	1,74	
15-16	1,10	
Alcohol intake		
No	1	0,040
Yes	1,99	
Health perception		
Excellent, great and good	1	0,074
Bad or very bad	2,20	

Source: Own authorship, 2016.

limits the comparability between studies. [18]

In this sense, a comparison was not carried out with specific data from specific studies, but a comparison with the general results - such as the methodology used to identify the patterns, the number of patterns identified and their central characteristics – from research carried out in different parts of the world that aimed to identify the dietary pattern of adolescents. Until then, the two main methods used to identify dietary patterns in this age group have been factor analysis and cluster analysis. [19]

CONCLUSION

This is a local study, carried out with children and adolescents in only five educational institutions in the municipality of Montes Claros. Therefore, the sample becomes insufficient in order to carry out a more in-depth comparative analysis on the dietary factors that interfere with their quality of life (QoL) at the local level, thus characterizing a limitation of the study. Still, the study design itself configures another limitation, since the cross-sectional analytical study is not able to evidence the temporal relationship between the risk factor and the disease, which may impair inferences about the cause and effect relationship, as well as not allowing the determination of absolute risk.

The use of cluster analysis allowed the identification of dietary patterns capable of classifying adolescents in terms of the presence of risk factors and health protection related to food. Thus, even though it does not generate precise estimates of the amount ingested of certain foods, the present study contributes towards estimating the occurrence of food consumption markers of interest for monitoring risk factors for NCDs.

The potential results of this study can instruct and direct parents of children and adolescents in school age regarding their posture and behaviors that directly affect their children's eating habits in order to have a direct impact on the reduction of the prevalence of CNCDs. Along with the changes in these habits, the results of this study can add to the monitoring of the multiprofessional health team, together with the parents, providing an improvement in the QoL of these children and adolescents.

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