DOI: 10.1590/1980-549720180019.supl.1

ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Simultaneous oral health risk behaviors among adolescents: evidence from the National School-based Student Health Survey

Simultaneidade de comportamentos de risco à saúde bucal em adolescentes: evidência da Pesquisa Nacional de Saúde do Escolar

Lidia Moraes Ribeiro Jordão[I], Deborah Carvalho Malta[II], Maria do Carmo Matias Freire[I]

ABSTRACT: ***Objective:*** To investigate the prevalence of simultaneous oral health risk behaviors and associated factors among Brazilian adolescents. ***Methods:*** The study comprised data of 109,104 adolescents participating in the Brazilian National School-based Student Health Survey. The simultaneous presence of less frequent toothbrushing (E), current smoking (C), no visits to the dentist (D), low fruit intake (F), and high sugar intake (A) was assessed by comparison of observed/expected prevalence (OP/EP). Logistic regression was used to assess sociodemographic and family factors associated with the clustering patterns of oral health risk behaviors. ***Results:*** The simultaneous occurrence of two or more oral health risk behaviors was of 60.40%. The highest prevalence values were found for the following patterns with OP/EP over 1.20: EDF, CFA, and EDFA. The odds for two or more combined oral health risk behaviors were higher for adolescents whose parents did not participate in homework, from public schools, males, and of Asian or Indigenous ethnicity (OR > 1.00; $p < 0.05$). Low family affluence level (FAL) acted as a risk factor for the pattern ECDFA (OR = 2.58; $p = 0.009$), while low and mean FAL functioned as protection factors for the pattern CFA (OR = 0.71; $p < 0.001$, and OR = 0.76; $p = 0.011$). ***Conclusion:*** The prevalence of simultaneous oral health risk behaviors was low and negatively associated with sociodemographic and family factors. Interventions aiming at reducing these behavior patterns should prioritize the groups that have been identified as being at most risk.

Keywords: Adolescent behavior. Oral hygiene. Health knowledge, attitudes, practice. Feeding behavior. Health surveys.

[I]Dentistry School, Universidade Federal de Goiás – Goiânia (GO), Brazil.
[II]Nursing School, Universidade Federal de Minas Gerais – Belo Horizonte (MG), Brazil.
Corresponding author: Lidia Moraes Ribeiro Jordão. Avenida Universitária, s/n, Setor Leste Universitário, CEP: 74605-020, Goiânia, GO, Brasil. E-mail: lidmr@hotmail.com
Conflict of interests: nothing to declare – **Financial support:** Coordination for the Improvement of Higher Level Personnel) (CAPES).

RESUMO: ***Objetivo:*** Identificar a prevalência da presença simultânea de comportamentos de risco à saúde bucal em adolescentes brasileiros e fatores associados. ***Métodos:*** Foram utilizados dados de 109.104 escolares provenientes da Pesquisa Nacional de Saúde do Escolar (PeNSE). A presença simultânea de baixa frequência de escovação dentária (E), uso recente de cigarros (C), baixa frequência de ida ao dentista (D), baixo consumo de frutas (F) e alto consumo de alimentos que contêm açúcar adicionado (A) foi avaliada pela razão entre as prevalências observada e esperada (PO/PE). Regressão logística foi utilizada para avaliar a associação entre as combinações de comportamentos e as variáveis sociodemográficas e do contexto familiar. ***Resultados:*** A ocorrência de dois ou mais comportamentos de risco à saúde bucal foi de 60,40%. As combinações mais prevalentes com razão PO/PE acima de 1,20 foram EDF, CFA e EDFA. A chance de concentrar dois ou mais comportamentos foi maior para adolescentes sem supervisão familiar dos deveres de casa, de escolas públicas, do sexo masculino e das raças indígena ou amarela (*odds ratio* — OR > 1,00; p < 0,05). O nível de afluência familiar baixo atuou como risco para a combinação ECDFA (OR = 2,58; p = 0,009), enquanto para a combinação CFA os níveis médio e baixo atuaram como proteção (OR = 0,71; p < 0,001 e OR = 0,76; p = 0,011). ***Conclusão:*** A prevalência da presença simultânea de comportamentos de risco à saúde bucal foi baixa e associada negativamente a fatores sociodemográficos e do contexto familiar. Intervenções que busquem reduzir os comportamentos de risco em saúde bucal em adolescentes devem priorizar os grupos identificados.

Palavras-chave: Comportamento do adolescente. Higiene bucal. Conhecimentos, atitudes e prática em saúde. Comportamento alimentar. Inquéritos de saúde.

INTRODUCTION

Health behaviors play an important role in determining and preventing chronic noncommunicable diseases (CNCDs). Unhealthy diet, smoking, lack of physical activity and excessive use of alcohol are recognized as behavior of risk for morbidity and mortality[1]. Similarly, inadequate behaviors establish an inverse relationship with oral health status[2]. The main behaviors related to oral health include eating habits, oral hygiene practices and smoking[2].

Adolescence is a crucial period for the promotion and establishment of habits, marked by gains in autonomy, transition between social roles and new experiences[3]. Health risk behaviors tend to start at this stage of life and continue into adulthood[4,5]. In Brazil, the increase in school adolescents with nonfrequent dental brushing between 2009 and 2012 have drawn attention[6], an attitude that may lead to the accumulation of dental biofilm throughout life and, consequently, to a higher risk of developing chronic oral diseases such as cavities and periodontal diseases[7].

Health risk behaviors in individuals do not occur in isolation: they tend to add to others[8]. Protection factors for oral health risk behaviors usually correspond to behaviors and patterns related to general health: being a female and having better socioeconomic level, for adults and adolescents[9-14]; parents with higher educational levels,[15] and more family support for adolescents[11,12,16].

Some studies have assessed the simultaneity of health risk behaviors in adolescents, mostly directed to the development of CNCDs[16-18]. In Brazil, studies of this nature have been carried out in some municipalities of the South Region[19-21]. But behaviors specifically related to oral health have not been included.

As part of surveillance actions for CNCDs, Brazil has conducted, since 2009, the National School Health Survey (PeNSE), which investigates the health risk and protection factors among Brazilian school adolescents. A previous study grouped behaviors related to general health using the database of the survey, but oral health variables were not analyzed[14]. Considering the approach to common risk factors for chronic diseases, part of the variables investigated also pose risk to the leading oral health problems, including diet, smoking and alcohol consumption[2]. However, there are behavioral factors that, combined with others, influence oral health specifically, such as toothbrushing frequency and visits to a dentist.

The present study sought to assess simultaneous behaviors related to oral health based on PeNSE data, also including those related to general health. When considering socio-demographic characteristics and family context, we sought to identify the groups of Brazilian adolescents who are vulnerable to multiple behaviors posing risk to oral health. The results could support the creation of integrated public policies to prevent multiple oral health risk behaviors,[22] with a view to reducing the burden of oral diseases, as well as the social and economic costs of treatment for adolescents across the country.

Therefore, the objective of this study was to investigate the simultaneous presence of oral health risk behaviors among Brazilian school adolescents and their association with sociodemographic factors and familial context in a sample of national representation.

METHODS

Cross-sectional study using data from PeNSE 2012. Access to this database is available on the website of the Brazilian Institute of Geography and Statistics (IBGE) in the current year.

METHODOLOGICAL ASPECTS OF PENSE 2012

PeNSE is a partnership between the Ministry of Health, IBGE and the Ministry of Education. The study population was made up of students attending the 9th year of elementary education in public and private schools of the 26 Brazilian State capitals, the Federal District and other municipalities in the five major regions of the country.

The survey was carried out in school environment for ease of access to schoolchildren, since most of the population aged 6 to 14 (98.20%) was enrolled in schools in 2011[23]. Of these, 85.6% were attending public schools and 14.4%, private schools.

The sample was estimated based on School Census 2010, excluding schools with less than 15 students in the grades chosen and night-shift classes. The choice for the 9th year is justified by the minimum schooling level needed to answer a self-administered questionnaire and the proximity to the reference age range recommended by the World Health Organization (WHO), which is 13 to 15 years.

The sampling process used a two-phase probabilistic method by cluster selection for the capitals: schools (primary units) and eligible classes in schools selected (secondary units); and three phases for non-capitals: groups of municipalities (primary units), schools (secondary units) and eligible classes in schools selected (tertiary units). All students present on the day of questionnaire application were invited to participate.

The sample size was estimated based on the following parameters: maximum relative error of 3 percentage points, 95% confidence interval (95%CI) and prevalence of 50.00% for the various situations that contemplate adolescent health. The sample size to test the associations between variables was evaluated and shown sufficient. Sample weights were calculated so that data collected could represent all students enrolled in the 9th grade who regularly attended classes in daytime period at public and private schools. Weights were obtained considering absences on the day of questionnaire application and students who did not give an answer to the variable "gender".

For data collection, a self-administered structured questionnaire (made available in a smartphone) was used, which included topics such as feeding habits, physical activity, smoking, alcohol and drugs consumption, oral health, violence and accidents, among others, based on Global Youth Risk Behavior Surveillance System[24]. Additional information on methodological aspects of PeNSE is available elsewhere[25].

In total, 109,104 adolescents from 2,842 schools agreed to participate. The response rate was 82.60%.

ETHICAL ASPECTS

PeNSE 2012 was approved by the National Research Ethics Committee (CONEP) of Ministry of Health. Participation by students was voluntary and conditioned to their signing an informed consent form.

VARIABLES ANALYZED

The following questions and respective categories, encompassing oral health-related behaviors, were extracted from the PeNSE questionnaire:

- Frequency of tooth brushing: "In the past 30 days, how many times per day did you usually brush your teeth?" (less than twice and twice or more times a day)[26];

- Recent use of cigarettes: "In the past 30 days, on how many days did you smoke cigarettes?" (one or more days and never)[26];
- Visits to the dentist: "In the past 12 months, how many times did you go to the dentist?" (once or more and not once)[12];
- Weekly fruit consumption: "In the past 7 days, on how many days did you eat fresh fruit or fruit salad?" (low consumption: none to four days, and high consumption: at least five days a week)[27];
- Two questions addressing weekly consumption of foods containing added sugar: "In the past 7 days, on how many days did you eat treats (sweets, candies, chocolates, chewing gum, or lollipops)?" and "In the past 7 days, on how many days did you have soda?". Responses were categorized as: low consumption (none to four days) and high consumption (five or more days), characterizing the intake of snacks or soft drinks at least five days a week[28].

For behaviors related to oral health, the response rate varied between 99.40 and 99.70%.

The socio-demographic variables analyzed were: age (<13, 13-15 and ≥ 16), gender (female, male), school network (private, public), skin color/ethnicity, parents' educational level expressed in years of study (<8, 8-11 and >11), and family affluence level (FAL). In familial context, family supervision of homework activities was also evaluated.

FAL was calculated from information on the possession of goods and services (landline, cell phones, computer, internet at home, car, motorcycle, number of bathrooms with shower and domestic employee service in the household). Each good/service scored 1 per positive response, or 0 for negative, except for the number of bathrooms containing shower reported, which received the corresponding value (0-4). Scores were summed to generate one per participant. This score was classified according to the criteria recommended in the family affluence scale, with three categories, where 0-3 indicates low level; 4-5 medium or moderate level, and 6 or more, high level[29].

Family supervision was assessed by the question: "In the past 30 days, how often did your parents/guardians check to see if your homework was done?" The answers were categorized in: never or rarely and yes (sometimes, most of the time and always)[30].

DATA ANALYSIS

A descriptive analysis of independent variables (sociodemographic and family context) of participants and oral health risk behaviors was carried out. Each behavior was categorized as 0 = healthy behavior or 1 = risk behavior, as per previous studies[12,26,28].

The number of possible combinations for oral health risk behaviors was 32 (2^5). Simultaneity of risk behaviors for oral health was evaluated by the ratio between observed and expected prevalence (OP/EP). OP was given by the sample, and EP was calculated by multiplying the individual probabilities of presenting each behavior, assuming that they occur independently.

Descriptive analyses of different combinations of behaviors in relation to the independent variables revealed small number of schoolchildren under the age of 13 presenting combinations. Therefore, we chose not to include the variable age in the models. The collinearity between independent variables was tested by a correlation matrix. Correlations between variables ranged from weak to moderate (from 0.10 to 0.50)[31], exception mother's and father's educational level ($r = 0.56$). Thus, the variable father's education was not included in regression.

Logistic regressions (simple and multiple) were used to test associations between each combination of behaviors (variable outcome) and independent variables. Only combinations with OP/EP ratio greater than 1.20 were included in the models[32,33].

To identify the variables associated with each outcome variable, odds ratio (OR) and 95%CI were used as an effect measure, obtained by logistic regression analysis. All variables with significance level less than 0.20 in the bivariate analysis were included in adjusted models. The multiple logistic regression analysis was based on models that included all pre-selected independent variables, and the variables with $p>0.05$ were removed step by step.

In all analyses, the sample design effect for complex samples was beared in mind and the *svy* command of the statistical program Stata 13.0 (Stata Corp., College Station, USA) was applied. The quality of model adjustment was evaluated by appropriate tests, by using Stata's *estat gof* command.

RESULTS

The sociodemographic profile of participants and the prevalence of behaviors are shown in Table 1. The sample consisted mainly of adolescents aged 13 to 15 (86.03%), females (52.16%) and enrolled in public schools (82.83%). Brown color/ethnicity was majority in the sample (42.22%) and mother's and father's schooling level was predominantly low (42.24 and 43.54%, respectively). The most frequent FAL was high (40.50%) and most participants had family supervision for homework (56.37%).

Prevalence values of oral health risk behaviors among adolescents was: 8.68% for low toothbrushing frequency, 5.07% for recent cigarette use, 36.39% for low frequency of visits to the dentist, 30.21% for low fruit consumption, and 55.28% for high consumption of foods with added sugar.

Of all participants, 32.40% had only 1 oral health risk behavior, 41.40% had 2 behaviors, 16.50% had 3 behaviors, 2.4% had 4 behaviors, and 0.10% had 5 combined behaviors. About 7% did not present any of the risk behaviors investigated.

Ten combinations of behaviors had OP/EP higher than 1.20, which characterizes simultaneity (Table 2): ECDFA, ECDF, ECDA, EDFA, ECA, ECF, EDF, CFA, ED and CA; where E refers to the low toothbrushing frequency, C to recent use of cigarettes, D to low frequency of visits to the dentist, F to low consumption of fruits, and A to high consumption of foods with added sugar. ECDA combination had the highest OP/EP ratio.

Table 1. Socio-demographic characteristics of participants and prevalence of oral health risk behaviors (n = 109,104). National School Health Survey, Brazil.

Variables	n	%*
Age (years)	109,104	100
< 13	859	0.77
13–15	93,589	86.03
≥ 16	14,656	13.20
Gender	109,104	100
Male	52,015	47.84
Female	57,089	52.16
School network	109,104	100
Private	22,504	17.17
Public	86,600	82.83
Skin color/ethnicity	109,035	99.03
White	37,674	36.75
Brown	48,237	42.22
Black	14,513	13.35
Yellow	4,821	4.09
Indigenous	3,790	3.52
Mother educational level (years of study)	108,781	99.75
More than 11	19,042	13.23
8-11	30,353	25.91
Less than 8	41,182	42.24
Unknown	18,204	18.37
Father educational level (years of study)	108,572	99.59
More than 11	16,888	11.35
8-11	24,023	21.06
Less than 8	43,113	43.54
Unknown	24,548	23.63
Family affluence level**	109,036	99.90
High (≥ 6)	47,926	40.50
Medium (4 – 5)	32,623	31.20
Low (0 – 3)	28,487	28.30

Continue...

Table 1. Continuation.

Variables	n	%*
Family supervision	108,256	99.80
Yes	58,578	56.37
No	49,678	43.63
Toothbrushing frequency	108,553	99.50
High	99,590	91.32
Low	8,963	8.68
Recent use of cigarettes	108,826	99.70
No	103,078	94.93
Yes	5,748	5.07
Visits to the dentist	108,453	99.40
High	69,841	63.61
Low	38,612	36.39
Weekly fruit consumption	108,453	99.70
High	77,154	69.79
Low	31,641	30.21
Consumption of foods with added sugar	108,726	99.70
High	49,338	44.72
Low	59,388	55.28

*Corrected for the sample design; **family affluence level: land line, cell phone, computer, home internet, car, and motorcycle ownership; number of bathrooms with shower and existence of domestic service employee in the household.

Table 3 displays the results of the multiple logistic regression analysis for the seven final models presenting good adjustment quality ($p>0.05$). Family supervision maintained its effect in all models ($p<0.01$). School network and gender maintained their significance in five and two models, respectively, wherein male adolescents enrolled in public schools were more likely to present the combinations. Skin color/ethnicity maintained its significance in two models: ECA, with Asian ethnicity exhibiting greater chance (OR = 3.05, $p < 0.05$), and greater chance of CA among individuals of Indigenous background (OR = 1.87, $p <0.05$). On the other hand, low FAL kept its higher probability of behaviors in one model (ECDFA), while mean and low FAL values acted as protective factors for CFA (OR = 0.71, $p <0.001$ and OR = 0.76, $p <0.05$, respectively). Association with mother's schooling was not maintained in the adjusted model.

Table 2. Prevalence of combined oral health risk behaviors. National School Health Survey, Brazil.

Oral health risk behavior	(E)	(C)	(D)	(F)	(A)	n	OP	EP	OP/EP
5	+	+	+	+	+	151	0.10	0.05	2.00
4	+	+	+	+	-	115	0.10	0.04	2.50
	+	+	+	-	+	64	0.10	0.02	5.00
	+	-	+	+	+	1564	1.40	1.03	1.35
3	+	+	-	-	+	82	0.10	0.04	2.50
	+	+	-	+	-	115	0.10	0.08	1.25
	+	-	+	+	-	1826	1.70	0.85	2.00
	-	+	-	+	+	1564	1.40	1.12	1.25
2	+	-	+	-	-	368	1.30	0.38	3.42
	-	+	-	-	+	746	0.70	0.50	1.40

E: low frequency of tooth brushing; C: recent use of cigarettes; D: low frequency of visits to the dentist; F: low fruit consumption; A: high consumption of foods with added sugar; OP: observed prevalence; EP: expected prevalence; OP/EP: ratio observed/expected prevalence; + presence of risk behavior; - absence of risk behavior; OP/EP > 1.20.

Table 3. Result of the multiple logistic regression between combined oral health risk behaviors and independent variables. National School Health Survey, Brazil.

Combinations/ characteristics	ECDFA OR 95%CI	ECDA OR 95%CI	EDFA OR 95%CI	ECA OR 95%CI	ECF OR 95%CI	CFA OR 95%CI	CA OR 95%CI
Females		ref.	ref.				
Males		2.31	1.58				
		1.31 – 4.08*	1.27 – 1.97*				
Private school		ref.	ref.	ref.	ref.	ref.	ref.
Public school		4.19	1.51	2.47	3.95	2.05	2.16
		1.15 – 15.20*	1.30 – 1.76*	1.04 – 5.86*	1.61 – 9.68*	1.80 – 2.34*	1.13 – 4.15*
High FAL	ref.					ref.	
Medium FAL	1.58					0.71	
	0.77 – 3.27					0.60 – 0.84*	

Continue...

Table 3. Continuation.

Combinations/ characteristics	ECDFA OR 95%CI	ECDA OR 95%CI	EDFA OR 95%CI	ECA OR 95%CI	ECF OR 95%CI	CFA OR 95%CI	CA OR 95%CI
Low FAL	2.58					0.76	
	1.27 – 5.24*					0.62 – 0.94*	
Supervision	ref.	ref.	ref.	ref.	ref.	ref.	ref.
No supervision	4.62	4.87	2.45	2.7	5.35	2.61	1.82
	2.82 – 7.57*	3.10 – 7.66*	2.18 – 2.76*	1.52 – 4.82*	4.13 – 6.93*	2.36 – 2.90*	1.53 – 2.16*
White skin				ref.			ref.
Black skin				1.44			1.18
				0.61 – 3.43			0.57 – 2.47
Yellow skin				3.03			1.02
				1.62 – 5.69*			0.50 – 2.09
Brown skin				0.84			0.89
				0.30 – 2.32			0.74 – 1.07
Indigenous				1.03			1.87
				0.23 – 4.53			1.19 – 2.93*

E: low frequency of tooth brushing; C: recent use of cigarettes; D: low frequency of visits to the dentist; F: low fruit consumption; A: high consumption of foods with added sugar; OR: adjusted *odds ratio*. 95%CI: 95% confidence interval; ref.: reference category; *p <0.05; FAL: family affluence level.

DISCUSSION

This study brings innovations while analyzing the simultaneous presence of oral health risk behaviors among adolescents in a sample representative of the country, its State capitals and five major regions. The main findings are: high prevalence of risk behaviors studied, the low prevalence of simultaneous behaviors, and the identification of vulnerable groups presenting simultaneous behaviors (adolescents without family supervision, enrolled in public schools, both males and females, with Indigenous or Asian ethnic background).

Another highlight is the inclusion of an unexplored variable as related to grouping of oral health risk behaviors by adolescents from countries outside the Western Europe-United States axis: family supervision of homework. When considering family supervision as a set of parental behaviors involving attention to the tracking of activities, places the adolescent goes to, and processes of children adaptation[34], the variable homework supervision is part of this set of positive parental practices[35]. This study reports a consistent association between lack of family supervision for homework and a greater chance of combining oral health risk behaviors, corroborating previous findings with positive association between more family supervision and less involvement of European and American adolescents in two or more health risk behaviors[11,36].

A highlight of the study is that, although the low frequency of toothbrushing and recent cigarette use had the lowest prevalence in the sample, these behaviors were the most frequent when combinations with OP/EP ratio were observed above that expected at random. For most combinations, the low frequency of toothbrushing was alongside less frequent visits to the dentist, while the recent use of cigarettes was combined with high consumption of foods with added sugar. These are worrisome results, since a high-sugar diet is known to be a risk factor for dental cavities, diabetes, obesity and cardiovascular diseases, while smoking contributes to several types of cancer, periodontal diseases and oral mucosa lesions[2].

Similar prevalence values for low toothbrushing and low fruit consumption have been reported among Danish adolescents[37]. Such findings suggest that oral health promotion interventions may benefit from an approach that can join these behaviors.

It is important to note that the combination of recent cigarette use, low fruit consumption and high consumption of foods with added sugar was less pronounced in adolescents of low and mean FAL. These results seem to suggest that higher economic resources may facilitate access to industrialized products such as cigarettes and foods with high sugar content, as observed by Mistry et al.[36] in the United States and by Gonçalves et al.[38] in Brazil, indicating the need for family monitoring when it comes to access to such items.

Studies have shown that male adolescents are more likely to adopt a number of unhealthy behaviors, such as less frequent toothbrushing[6,12], cigarette use[39] and less regular visits to the dentist[39]. When analyzing behavior combinations in our study, the male risk effect was maintained for two combinations, confirming the need for specific strategies that engage this audience in healthier lifestyle habits.

Because this was a cross-sectional study, it was not possible to make causal inferences about the factors studied. As the instrument for data collection was a questionnaire, likely information bias is related to social desirability, meaning that answers to some of the questions may have been under- or over-reported. However, self-reported behaviors in adolescents have validity[40] and the guarantee of anonymity in this questionnaire can minimize this tendency. Another type of information bias is memory, which is present in questions that require referring to longer time cuts, such as dentist visits in the year prior to survey.

PeNSE is consolidated as a tool to monitor the health of Brazilian school adolescents, and its continuity is of utmost importance. Its instrument of data collection has been improved:

the 2015 edition was added with questions related to the use of electronic cigarette and daily consumption of certain foods. As for oral health, additional questions addressing self-perception, the impact of oral health conditions on daily performance, and reasons for the last visit to the dentist are encouraged. It is recommended that strategies aimed at collecting health information from out-of-school adolescents be outlined.

The present study steps forward by identifying the factors associated with simultaneity of multiple oral health risk behaviors among adolescents, pointing to determinants that are common to risk behaviors for chronic diseases. The approach of common risk factors in intersectoral interventions involving the family, the school and social contexts of adolescents should be privileged, as it offers opportunities for an integrated tackling of challenges and the empowerment of adolescents.

CONCLUSION

The prevalence of simultaneous oral health risk behaviors was low, although associated with sociodemographic factors and familial context. Adolescents without family supervision for homework, enrolled in public schools, males, and of Indigenous or Asian ethnicity were more likely to present two or more behaviors combined.

Family supervision is highlighted as a protective factor for multiple oral health risk behaviors, which adds evidence to the importance of family's role in adolescents' health-related choices. Interventions aimed to reduce oral health risk behaviors among adolescents should prioritize the vulnerable groups identified.

REFERENCES

1. Mokdad AH, Forouzanfar MH, Daoud F, Mokdad AA, El Bcheraoui C, Moradi-Lakeh M, et al. Global burden of diseases, injuries, and risk factors for young people's health during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2016; 387(10036): 2383-401. https://doi.org/10.1016/S0140-6736(16)00648-6
2. Sheiham A, Watt RG. The common risk factor approach: a rational basis for promoting oral health. Community Dent Oral Epidemiol. 2000; 28(6): 399-406.
3. Patton GC, Coffey C, Cappa C, Currie D, Riley L, Gore F, et al. Health of the world's adolescents: a synthesis of internationally comparable data. Lancet. 2012; 379(9826): 1665-75. https://doi.org/10.1016/S0140-6736(12)60203-7
4. Mikkilä V, Räsänen L, Raitakari OT, Pietinen P, Viikari J. Consistent dietary patterns identified from childhood to adulthood: the cardiovascular risk in Young Finns Study. Br J Nutr. 2005; 93(6): 923-31.
5. Kristensen P, Wedderkopp N, Moller N, Andersen L, Bai C, Froberg K. Tracking and prevalence of cardiovascular disease risk factors across socio-economic classes: A longitudinal substudy of the European Youth Heart Study. BMC Public Health. 2006; 6(1): 1-9. https://doi.org/10.1186/1471-2458-6-20
6. Freire MCM, Jordão LMR, Malta DC, Andrade SSCA, Peres MA. Desigualdades socioeconômicas e mudanças nos comportamentos em saúde bucal de adolescentes brasileiros de 2009 a 2012. Rev Saúde Pública. 2015; 49: 50. https://doi.org/10.1590/S0034-8910.2015049005562
7. Broadbent JM, Thomson WM, Boyens JV, Poulton R. Dental plaque and oral health during the first 32 years of life. J Am Dent Assoc. 2011; 142(4): 415-26.

8. Spring B, Moller AC, Coons MJ. Multiple health behaviors: overview and implications. J Publ Health. 2012; 34(Supl. 1): i3-10. https://doi.org/10.1093/pubmed/fdr111
9. Payne BJ, Locker D. Relationship between dental and general health behaviors in a Canadian population. J Public Health Dent. 1996; 56: 198-204. https://doi.org/10.1111/j.1752-7325.1996.tb02436.x
10. Sanders AE, Spencer AJ, Stewart JF. Clustering of risk behaviours for oral and general health. Community Dent Health. 2005; 22(3): 133-40.
11. Wiefferink CH, Peters L, Hoekstra F, Dam GT, Buijs GJ, Paulussen TGWM. Clustering of health-related behaviors and their determinants: possible consequences for school health interventions. Prev Science. 2006; 7(2): 127-49. https://doi.org/10.1007/s11121-005-0021-2
12. Davoglio RS, Aerts DRGC, Abegg C, Freddo SL, Monteiro L. Fatores associados a hábitos de saúde bucal e utilização de serviços odontológicos entre adolescentes. Cad Saúde Pública. 2009; 25(3): 655-67. https://doi.org/10.1590/S0102-311X2009000300020
13. Silva DAS, Peres KG, Boing AF, González-Chica A, Peres MA. Clustering of risk behaviors for chronic noncommunicable diseases: a population-based study in southern Brazil. Prev Med. 2013; 56: 20-4. https://doi.org/10.1016/j.ypmed.2012.10.022
14. Azeredo CM, Levy RB, Peres MFT, Menezes PR, Araya C. Patterns of health-related behaviours among adolescents: a cross-sectional study based on the National Survey of School Health Brazil 2012. BMJ Open. 2016; 6(11): e01157. https://doi.org/10.1136/bmjopen-2016-011571
15. Malta DC, Porto DL, Melo FCM, Monteiro RA, Sardinha LMV, Lessa BH. Família e proteção ao uso de tabaco, álcool e drogas em adolescentes, Pesquisa Nacional de Saúde dos Escolares. Rev Bras Epidemiol. 2011; 14(Supl. 1): 166-77. https://doi.org/10.1590/S1415-790X2011000500017
16. Ottevaeare C, Huybrechts I, Benser J, Bourdeaudhuij I, Cuenca-Garcia JS, Dallongeville J, et al. Clustering patterns of physical activity, sedentary and dietary behavior among European adolescents: the HELENA study. BMC Public Health. 2011; 11: 328. https://doi.org/10.1186/1471-2458-11-328
17. Silva KS, Lopes AS, Vasques DG, Costa FF, Silva RCR. Simultaneidade dos fatores de risco para doenças crônicas não transmissíveis em adolescentes: prevalência e fatores associados. Rev Paul Pediatr. 2012; 30(3): 338-45. http://dx.doi.org/10.1590/S0103-05822012000300006
18. Busch V, Stel HFV, Schrijvers AJP, Leeuw JRJ et al. Clustering of health-related behaviors, health outcomes and demographics in Dutch adolescents: a cross-sectional study. BMC Public Health. 2013; 13: 1118. https://doi.org/10.1186/1471-2458-13-1118
19. Dumith SC, Muniz LC, Tassitano RM, Hallal PC, Menezes AM. Clustering of risk factors for chronic diseases among adolescents from Southern Brazil. Prev Med. 2012; 54: 393-6. https://doi.org/10.1016/j.ypmed.2012.03.014
20. Cureau FV, Duarte P, dos Santos DL, Reichert FF. Clustering of risk factors for noncommunicable diseases in Brazilian adolescents: prevalence and correlates. J Phys Act. 2014; 11(5): 942-9. https://doi.org/10.1123/jpah.2012-0247
21. Silva KS, Barbosa Filho VC, Del Duca GF, de Anselmo Peres MA, Mota J, Lopes Ada S, et al. Gender differences in the clustering patterns of risk behaviours associated with non-communicable diseases in Brazilian adolescents. Prev Med. 2014; 65: 77-81. https://doi.org/10.1016/j.ypmed.2014.04.024
22. Catalano RF, Fagan AA, Gavin LE, Greenberg MT, Irwin Jr. CE, et al. Worldwide application of prevention science in adolescent health. Lancet. 2012; 379(9826): 1653-64. https://doi.org/10.1016/S0140-6736(12)60238-4
23. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios (PNAD): síntese de indicadores, 2011. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2012.
24. Brener ND, Kann L, Kinchen SA, Grunbaum JA, Whalen L, Eaton D, et al. Methodology of the Youth Risk Behavior Surveillance System. MMWR. 2013; 62(1): 1-18.
25. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar 2012. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2013.
26. Vettore MV, Moysés SJ, Sardinha LMV, Iser BPM. Condição socioeconômica, frequência de escovação dentária e comportamentos em saúde em adolescentes brasileiros: uma análise a partir da Pesquisa Nacional de Saúde do Escolar (PeNSE). Cad Saúde Pública. 2012; 28(Supl.): s101-3. https://doi.org/10.1590/S0102-311X2012001300011
27. Brasil. Coordenação Geral da Política de Alimentação e Nutrição. Departamento de Atenção Básica. Secretaria de Assistência à Saúde. Ministério da Saúde. Guia alimentar para a população brasileira: promovendo a alimentação saudável. Brasília: Ministério da Saúde; 2006.
28. Levy RB, Castro IRR, Cardoso LO, Tavares LF, Sardinha LMV, Gomes FS, et al. Consumo e comportamento alimentar entre adolescentes brasileiros: Pesquisa Nacional de Saúde do Escolar (PeNSE), 2009. Ciênc Saúde Coletiva. 2010; 15(Supl. 2): 3085-97. https://doi.org/10.1590/S1413-81232010000800013

29. Currie C, Gabhainn SN, Godeau E, Roberts C, Smith R, Currie D, et al. Inequalities in young people's health, HBSC international report from 2005/2006 survey. Denmark: WHO Regional Office for Europe; 2008.
30. Alwan H, Viswanathan B, Rousson V, Paccaud F, Bovet P. Association between substance use and psychosocial characteristics among adolescents of the Seychelles. BMC Pediatr. 2011; 11(85). https://doi.org/10.1186/1471-2431-11-85
31. Cohen J. Statistical power analysis for the behavioral sciences. 2ª ed. Hillsdale, New Jersey: Lawrence Erlbaum Associates; 1988.
32. Schuit AJ, Van-Loon AJ, Tijhuis M, Ocké M. Clustering of lifestyle risk factors in a general adult population. Prev Med. 2002; 35: 219-24. https://doi.org/10.1006/pmed.2002.1064
33. Singh A, Rouxel P, Watt RG, Tsakos G. Social inequalities in clustering of oral health related behaviors in a national sample of British adults. Prev Med. 2013; 57: 102-6. https://doi.org/10.1016/j.ypmed.2013.04.018
34. Dishion TJ, McMahon, RJ. Parental monitoring and the prevention of child and adolescent problem behavior: a conceptual and empirical formulation. Clin Child Fam Psychol Rev. 1998; 1(1): 61-75.
35. AlMakadma AS, Ramisetty-Mikler S. Student, school, parent connectedness, and school risk behaviors of adolescents in Saudi Arabia. Int J Pediatr Adolesc Med. 2015; 2(3-4): 128-35. https://doi.org/10.1016/j.ijpam.2015.09.004
36. Mistry R, McCarthy WJ, Yancey AK, Lu Y, Patel M. Resilience and patterns of health risk behaviors in California adolescents. Prev Med. 2009; 48(3): 291-7. https://doi.org/10.1016/j.ypmed.2008.12.013
37. Cinar AB, Christensen LB, Hede B. Clustering of obesity and dental caries with lifestyle factors among Danish adolescents. Oral Health Prev Dent. 2011; 9(2): 123-30.
38. Gonçalves MM, Leles CR, Freire MCM. Associations between caries among children and household sugar procurement, exposure to fluoridated water and socioeconomic indicators in the Brazilian capital cities. Int J Dent. 2013; 2013: 1-7. https://doi.org/10.1155/2013/492790
39. Petersen PE, Jiang H, Peng B, Tai BJ, Bian Z. Oral and general health behaviours among Chinese urban adolescents. Community Dent Oral Epidemiol. 2008; 36: 76-84. https://doi.org/10.1111/j.1600-0528.2007.00375.x
40. Brener ND, Billy JO, Grady WM. Assessment of factors affecting the validity of self-reported health-risk behavior among adolescents: evidence from the scientific literature. J Adolesc Health. 2003; 33: 436-57.

Received on: 08/04/2017
Final version presented on: 11/05/2017
Accepted on: 11/16/2017