

Trend of the risk and protective factors of chronic diseases in adolescents, National Adolescent School-based Health Survey (PeNSE 2009 e 2012)

Tendência dos fatores de risco e proteção de doenças crônicas não transmissíveis em adolescentes, Pesquisa Nacional de Saúde do Escolar (PeNSE 2009 e 2012)

Deborah Carvalho Malta^{I,II}, Marco Antonio Ratzsch de Andreatzi^{III}, Maryane Oliveira-Campos^I, Sylvania Suely Caribé de Araújo Andrade^I, Naíza Nayla Bandeira de Sá^{IV}, Lenildo de Moura^V, Antonio José Ribeiro Dias^{III}, Claudio Dutra Crespo^{III}, Jarbas Barbosa da Silva Júnior^I

ABSTRACT: Objective: To compare the prevalence of major risk and protection factors for chronic non-communicable diseases in school-aged children in Brazilian capitals surveyed in the National Adolescent School-based Health Survey in its two editions, 2009 and 2012. **Methods:** The frequencies, with Confidence Interval of 95%, of the following demographic variables were compared: food intake, body image, physical activity, smoking, alcohol and other drugs. Prevalence was compared in the two editions of the survey. **Results:** The proportion of students who attend two physical education classes a week was maintained at 49% between 2009 and 2012, increasing in public schools from 50.6% (95%CI 49.8 – 51.4) to 52.5% (95%CI 49.2 – 55.7), and decreasing in private schools. There was no change in the proportion of students who watch two hours or more of television daily, about 80%. As for body image, there was no change between the two editions, and about 60% considered themselves being of normal weight. There was a reduction in the percentage of adolescents who experienced cigarettes, from 24.2% (95%CI 23.6 – 24.8) to 22.3% (95%CI 21.4 – 23.2), and the prevalence of smoking was maintained at about 6% (there was no statistical difference between 2009 and 2012). The consumption of beans, fruits, sweets and soft drinks also decreased. Frequency of drug experimentation was of 8.7% (95%CI 8.3 – 9.1) in 2009, and 9.6% (95%CI 9.0 – 10.3) in 2012, with no difference between confidence intervals, and the frequency of alcohol experimentation was maintained at about 70%; the percentage of use in the past 30 days was also maintained at around 27%. **Conclusion:** In the Brazilian capitals, the vast majority of prevalence of risk factors were kept stable in the two editions of the National Survey of School. These data generate evidence to guide the implementation of public policies to minimize the exposure of adolescents to risk factors.

Keywords: Adolescence. Risk factors. Physical activity. Smoking. Alcohol. Drugs. Food consumption. Body image.

^IHealth Surveillance Secretariat, Ministry of Health – Brasília (DF), Brazil.

^{II}Universidade Federal de Minas Gerais – Belo Horizonte (MG), Brazil.

^{III}Brazilian Institute of Geography and Statistics – Rio de Janeiro (RJ), Brazil.

^{IV}Universidade Federal do Pará – Belém (PA), Brazil.

^VPan-American Health Organization – Brasília (DF), Brazil

Corresponding author: Deborah Carvalho Malta. Departamento de Vigilância de Doenças e Agravos Não Transmissíveis e Promoção da Saúde, Secretaria de Vigilância em Saúde, Ministério da Saúde. SAF Sul – Trecho 02, Lotes 05 e 06, Edifício Premium, bloco F, Torre 1, térreo, sala 16, CEP: 70070-600, Brasília, DF, Brasil. E-mail: dcmalta@uol.com.br

Conflict of interests: nothing to declare – **Financing source:** none.

RESUMO: *Objetivo:* Comparar as prevalências dos principais fatores de risco e proteção para doenças crônicas não transmissíveis em escolares nas capitais brasileiras, investigados na Pesquisa Nacional de Saúde do Escolar nas suas duas edições, 2009 e 2012. *Métodos:* Foram comparadas as frequências com Intervalo de Confiança de 95% das seguintes variáveis demográficas: consumo alimentar, imagem corporal, atividade física, tabagismo, consumo de álcool e outras drogas. As prevalências foram comparadas nas duas edições da pesquisa. *Resultados:* A proporção de alunos que praticam duas aulas semanais de educação física foi mantida em 49% entre 2009 e 2012, tendo aumentado nas escolas públicas de 50,6% (IC95% 49,8 – 51,4) para 52,5% (IC95% 49,2 – 55,7), e reduzido nas escolas particulares. Não houve mudança nos que assistem duas horas ou mais de televisão diária, cerca de 80%. Quanto à imagem corporal, não houve mudança nas duas edições, e cerca de 60% se consideraram com peso normal. Houve uma redução no percentual de adolescentes que experimentou cigarros de 24,2% (IC95% 23,6 – 24,8) para 22,3% (IC95% 21,4 – 23,2), e a prevalência de fumantes foi mantida em cerca de 6% (não há diferença estatística entre 2009 e 2012). O consumo de feijão, frutas, guloseimas e refrigerantes também reduziu. A experimentação de drogas foi de 8,7% (IC95% 8,3 – 9,1) em 2009 e de 9,6% (IC95% 9,0 – 10,3) em 2012, sem diferença entre os intervalos de confiança, e a frequência de experimentação de bebidas alcoólicas foi mantida em cerca de 70%; a porcentagem de uso nos últimos 30 dias também foi mantida, em cerca de 27%. *Conclusão:* Nas capitais brasileiras, foram mantidas estáveis a grande maioria das prevalências de fatores de risco nas duas edições da Pesquisa Nacional de Escolares. Estes dados geram evidências para orientar a implementação de políticas públicas para minimizar a exposição a fatores de risco dos adolescentes.

Palavras chaves: Adolescência. Fatores de risco. Atividade física. Tabagismo. Álcool. Drogas. Consumo alimentar. Imagem corporal.

INTRODUCTION

Adolescents aged between 10 and 19 years old respond for 18% of the world population, and around 90% of them live in low and mid-income countries¹. Adolescence constitutes an important phase of biological, cognitive, emotional and social changes. This phase is marked by increasing autonomy, independence with regard to family and experimentation of new behaviors and facts²⁻⁵. Some of these experiences are risk factors for health, as the use of tobacco, alcohol consumption, inadequate diet and sedentary lifestyle. The early exposure to these factors is associated with the development of most Non-Communicable Diseases (NCD) (cardiovascular diseases, diabetes and cancer), which can lead to accumulated exposure throughout life and, therefore, more risks of NCDs. There is evidence showing that establishing health promotion measures early, for instance, in intrauterine life, in childhood and adolescence, improves the quality of life, besides having an impact on the reduction of morbimortality in the population^{1,6}. Studies estimate that 70% of the premature deaths among adults are mainly caused by behaviors that began in adolescence, and, in general, it is common to share several risk factors at any stage of life, thus potentializing the action¹.

The control of health among adolescents has been an global tendency¹ due to the transitions and experiences that take place in this stage of life, which can lead to present and future risks to health^{1,7-9}. Therefore, it is important to turn adolescence into a target for universal prevention^{1,2}.

In order to guide public policies, the World Health Organization (WHO) has recommended the implantation and the maintenance of surveillance systems of factors that offer risk to health addressed to adolescents. The main monitoring systems related to the health of the students are:

1. The Global School Based Student Health Survey (GSHS), which is present in more than 70 countries⁸, coordinated by WHO together with the Center for Disease Control and Prevention (CDC);
2. The Health Behavior in School-aged Children (HBSC), initiated in 1982 and coordinated by WHO in 40 European countries, besides Israel, Canada and others²;
3. The Youth Risk Behavior Surveillance System (YRBSS), in the USA, whose data have been collected every two years by the CDC since 1991¹⁰.

These studies have supported public policies in several countries^{2,8}. In Brazil, the National Adolescent School-Based Survey (PeNSE)³ was the first to investigate the risk and protective factors concerning the health of adolescents. The first edition of the survey, conducted in 2009, represented only the Brazilian capitals and the Federal District. PeNSE 2012⁴, the second edition, amplified the sample in order to represent Brazil, its five major regions and capitals. Besides, the questionnaire was expanded by the insertion of new themes and the adaptation of some questions in order to compare it with other studies, including international ones. The survey is conducted every three years, as a result of the partnership between the Ministry of Health, the Brazilian Institute of Geography and Statistics (IBGE) and the Ministry of Education (MEC). PeNSE contributed with the elaboration of the Plan of Strategic Actions to Tackle Non-Communicable Diseases (NCD) in Brazil, 2011 – 2022, as well as to define goals to monitor this age group⁶.

This study aimed at comparing the prevalence of the main risk and protective factors for NCDs among students in Brazilian State capitals and in the Federal District, who were investigated in both editions of PenSE, in 2009 and in 2012.

METHODS

The analyzed population was comprised of 9th graders in elementary school (former 8th grade) of public and private schools in Brazilian State capitals and the Federal District, in 2009 and in 2012. The sample of PeNSE 2009 represented the 26 Brazilian capitals and the Federal District (63,411). PeNSE 2012 had a larger sample, representing Brazil, its five major regions and the 26 State capitals and the Federal District (n = 109,104).

In order to compare the results between 2009 and 2012, only the sample representing the 26 Brazilian State capitals and the Federal District was used in this study ($n = 61,145$)^{3,4}.

Each capital and the Federal District were defined as a geographic stratum. The sample of each geographic stratum was allocated proportionally in relation to the number of schools registered in the School Census, according to the administration of the schools (private and public). For each of these strata, a two-stage cluster sample was selected, being the first stage comprised of schools, and the second stage composed of eligible classrooms in the selected schools (9th grade of elementary school). In the selected classrooms, all students who were present were included in the study sample^{3,4}.

The record excluded schools with less than 15 students in the analyzed grade, because, even if they represented about 10% of the schools, they accounted for less than 1% of the total of students. The record also excluded classrooms in the evening period, because these students are older and may present with differentiated risk in relation to the other students in the same grade. The 9th grade was chosen because most students, aged between 13 and 15 years old, had already acquired the necessary skills to answer the questionnaire, since they were prone to being exposed to several risk factors, and because it was possible to compare these data with systems of other countries^{2,8}.

The interview was conducted by means of a self-applicable structured questionnaire, inserted in a palmtop, in 2009, and in a smartphone, in 2012. Students were guided by the researchers as to how to handle the devices.

The current study compared the variables whose questions remained similar in both editions:

1. Sociodemographic variables: age, ethnicity/color, sex, maternal schooling;
2. Dietary intake:
 - Healthy diet:
 - Intake of beans (percentage of students who reported consuming beans in at least five of the seven days prior to data collection);
 - Intake of fruits (percentage of students who reported consuming fruits in at least five of the seven days prior to data collection);
 - Unhealthy diet:
 - Intake of dainties (percentage of students who reported consuming dainties, such as candy, caramels, chocolate, bubble gum, bombons or lollypops in at least five of the seven days prior to data collection);
 - Intake of soft drinks (percentage of students who reported consuming soft drinks in at least five of the seven days prior to data collection);
3. Body image: Percentage of students based on self-perceived body image, in the following categories: very thin, thin, average, fat, and very fat.
4. Smoking:
 - Lifetime use of tobacco (experimentation): percentage of students who have tried cigarettes at least once;

- Use of cigarettes in the past 30 days: percentage of students who reported smoking at least once in the 30 days prior to data collection. The use of tobacco in the past 30 days, regardless of frequency and intensity, was considered as current use of cigarettes;
 - Students who had at least one smoking parent/person in charge: percentage of students who had at least one parent or person in charge who smoked cigarettes;
5. Alcohol consumption:
- Trying alcohol: percentage of students who reported having tried alcohol at least once;
 - Alcohol consumption in the past 30 days: percentage of students who reported having consumed alcohol at least once in the 30 days prior to data collection;
6. Trying illicit drugs: percentage of students who reported having tried illicit drugs, such as marijuana, cocaine, crack, solvent-based glue, ether and chloroform inhalants, poppers, ecstasy, oxy etc;
7. Physical activity:
- Sedentary lifestyle: percentage of students who reported spending two hours or more a day watching television;
 - Frequency of physical education classes: percentage of students who attended two or more physical education classes at school, in the past seven days.

Frequencies were estimated with a 95% confidence interval (95%CI), concerning the variables age, sex, ethnicity/color, maternal schooling, dietary intake, body image, physical activity, smoking, consumption of alcohol and other drugs. The SAS statistical package was used¹¹. The comparison of prevalence ratios was conducted by the 95%CI, in order to verify if there were differences between 2009 and 2012.

The study was approved by the Research Ethics Committee of the Ministry of Health, report n. 192/2012, concerning registration n. 16805, CONEP/MS, on 27/03/2012.

RESULTS

By comparing the sociodemographic results of PeNSE 2009 and 2012, the proportion of students aged between 13 and 15 years old was maintained in both editions at about 90%, even though there had been a reduction in the proportion of students aged 13 years old in public and private schools, with increasing proportion of 14-year old students in 2012. The percentage of students who reported being mulattos increased from 35.7% (95%CI 34.7 – 36.7) in 2009 to 39.9% (95%CI 38.6 – 41.2), in 2012, with reduced proportion of the ones who declared to be white, from 41.6% (95%CI 40.6 – 42.7) to 37.7% (95%CI 36.2 – 39.3). This happened both in public and private schools, among male and female participants, except for the reduction in the white color, which only occurred among girls. The proportion of students whose mothers had middle schooling (complete high school and incomplete higher education) increased from 32.3% (95%CI 31.2 – 33.4) to 35.0%

(95%CI 34.0 – 36.1), and there was a reduced proportion of students whose mothers had completed higher education, from 21.6% (95%CI 20.8 – 22.5) to 16.8 (95%CI 14.9 – 18.7), in 2009 and in 2012, respectively.

With regard to dietary intake, after comparing both surveys, there was a reduction in the intake of beans, from 62.5% (95%CI 61.8 – 63.3), in 2009, to 60.0% (95%CI 58.5 – 61.5), and of fruits, from 31.5% (95%CI 30.8 – 32.2) to 29.8% (95%CI 29.1 – 30.5), in 2012. The percentage of students who reported the consumption of soft drinks also decreased, from 37.2% (95%CI 36.5 – 37.5) to 35.4% (95%CI 34.6 – 36.2), and the same was true for the intake of dainties, from 50.9% (95%CI 50.1 – 51.6) to 42.6% (95%CI 41.6 – 43.6). Most changes related to dietary habits occurred in both sexes and in public and private schools, except for the prevalence of the consumption of beans and soft drinks in public schools and the prevalence of fruits in private schools, which remained the same.

The prevalence of students who spent two daily hours watching TV was maintained in both editions, being 79.5% (95%CI 78.9 – 80.0), in 2009, and 78.6% (95%CI 77.9 – 79.3), in 2012, for both sexes and types of school. The prevalence of students who attend two or more physical education classes a week was also maintained: 49.3% (95%CI 48.6 – 50), in 2009, and 49.3% (95%CI 46.5 – 52.1), in 2012, in both sexes and types of schools; there was a higher proportion of physical education classes in public schools, 52% (95%CI 49.2 – 55.7) *versus* 40.1 (95%CI 33.7 – 46.5).

There were no differences concerning body image in both years. Most students are considered to have normal weight: 60.1%, in 2009, and 59.1%, in 2012; 22.1% (2009) and 23.1% (2012) consider themselves to be thin or very thin, and about 18% reported being fat or very fat in both editions. In general, girls reported being fat more often than boys, and there was no difference in the perception of body image between sexes and schools in both editions. There were no differences in relation to lifetime use of alcohol, being 71.4% (95%CI 70.8 – 72.0) in 2009 and 70.5% (95%CI 69.7 – 71.4) in 2012; the alcohol consumption in the past 30 days was maintained, being 27.3% (95%CI 26.7 – 28.0) and 26.8% (95%CI 25.9 – 27.8). In both indicators, there were no changes in prevalence ratios concerning sex and schools.

As to smoking indicators, there was a reduction in the experimentation of cigarettes, from 24.2% (95%CI 23.6 – 24.8) to 22.3% (95%CI 21.4 – 23.2). There was also a reduction in the frequency of students who reported having parents who smoke, from 30.1% (95%CI 29.1 – 31.1) to 28.1% (95%CI 27.2 – 29.0) in the studied period. The reduction occurred for both sexes and types of school, except for the experimentation of cigarettes in the public school, which did not reduce. The percentage of current smokers remained similar, of 6.3% (95%CI 6.0 – 6.7), in 2009, and 6.1% (95%CI 5.5 – 6.6), in 2012, in both sexes and schools. Lifetime use of illicit drugs was of 8.7% (95%CI 8.3 – 9.1), in 2009, and 9.6% (95%CI 9.0 – 10.3), in 2012, with superposed intervals. The frequencies of tobacco and drug indicators were usually higher in public schools, in comparison to private schools.

Table 1. Distribution of study population by age, ethnicity/color and maternal schooling, by gender, among 9th grade students for all the Brazilian State Capitals and the Federal District. PeNSE, 2009 and 2012.

Variable	2009			2012		
	Female % (95%CI)	Male % (95%CI)	Total % (95%CI)	Female % (95%CI)	Male % (95%CI)	Total % (95%CI)
Age (years)						
< 13	0.8 (0.7 – 0.9)	0.6 (0.5 – 0.7)	0.7 (0.6 – 0.8)	0.5 (0.4 – 0.6)	0.5 (0.3 – 0.6)	0.5 (0.4 – 0.6)
13	26.7 (25.8 – 27.6)	20.5 (19.6 – 21.3)	23.7 (23.1 – 24.4)	21.6 (20.5 – 22.7)	15.4 (14.4 – 16.4)	18.5 (17.7 – 19.4)
14	48.2 (47.2 – 49.2)	45.8 (44.8 – 46.9)	47.1 (46.4 – 47.8)	52.1 (51 – 53.3)	48 (46.5 – 49.6)	50.1 (49.0 – 51.2)
15	15.9 (15.3 – 16.6)	20.8 (20.0 – 21.6)	18.2 (17.7 – 18.8)	16.9 (16.1 – 17.7)	21.9 (20.7 – 23.1)	19.4 (18.5 – 20.2)
16 and older	8.3 (7.9 – 8.8)	12.3 (11.7 – 12.9)	10.2 (9.8 – 10.6)	8.9 (8.2 – 9.6)	14.2 (13 – 15.5)	11.5 (10.6 – 12.4)
Color or ethnicity						
White	40.1 (39.4 – 40.9)	38.8 (37.8 – 39.8)	41.6 (40.6 – 42.7)	35 (30.1 – 40)	38.7 (33.3 – 44.1)	37.7 (36.2 – 39.3)
Black	12.9 (12.4 – 13.3)	11.0 (10.5 – 11.6)	14.9 (14.2 – 15.7)	11.4 (9.2 – 13.5)	15.5 (13 – 18)	14.2 (13.4 – 14.9)
Mulatto	39.1 (38.4 – 39.8)	42.3 (41.3 – 43.2)	35.7 (34.7 – 36.7)	45.7 (42.6 – 48.8)	38.5 (35.3 – 41.6)	39.9 (38.6 – 41.2)
Yellow	3.7 (3.5 – 4.0)	4.0 (3.7 – 4.4)	3.4 (3.1 – 3.8)	4.4 (3.3 – 5.6)	3.8 (3.4 – 4.1)	4.5 (4.2 – 4.8)
Indigenous	4.1 (3.8 – 4.3)	3.9 (3.5 – 4.2)	4.3 (3.9 – 4.7)	3.5 (2.8 – 4.2)	3.6 (2.7 – 4.5)	3.7 (3.4 – 3.9)
Maternal schooling*						
None or incomplete elementary school	31.8 (31.1 – 32.5)	34.4 (33.4 – 35.4)	28.9 (27.9 – 29.9)	31.6 (29.8 – 33.4)	28.7 (26.7 – 30.7)	30.2 (28.4 – 31.9)
Compl. elementary school./ incomplete high school	16.9 (16.3 – 17.4)	16.6 (15.8 – 17.3)	17.2 (16.4 – 18.1)	18.8 (17.6 – 19.9)	17.3 (16.4 – 18.2)	18 (17.3 – 18.8)
Compl. high school/ incomplete higher education	31.5 (30.8 – 32.3)	30.9 (29.9 – 31.9)	32.3 (31.2 – 33.4)	34.5 (33.2 – 35.9)	35.5 (34.3 – 36.7)	35.0 (34.0 – 36.1)
Superior completo	19.8 (19.3 – 20.4)	18.2 (17.4 – 18.9)	21.6 (20.8 – 22.5)	15.1 (13.2 – 17)	18.5 (16.4 – 20.6)	16.8 (14.9 – 18.7)

*Of the total students, 18.5% in 2009 and 18.9% in 2012 could not inform maternal education.

Table 2. Distribution of the population of adolescent students by age, ethnicity/color and maternal schooling, according the administration of the schools in all Brazilian State Capitals and the Federal District. PeNSE, 2009 and 2012.

Variable	2009			2012		
	Administration			Administration		
	Public % (95%CI)	Private % (95%CI)	Total % (95%CI)	Public % (95%CI)	Private % (95%CI)	Total % (95%CI)
Age (years)						
< 13	0.6 (0.5 – 0.7)	1.0 (0.8 – 1.2)	0.7 (0.6 – 0.8)	0.4 (0.3 – 0.6)	0.7 (0.5 – 0.9)	0.5 (0.4 – 0.6)
13	21.2 (20.5 – 21.9)	33.4 (32.1 – 34.7)	23.7 (23.1 – 24.4)	15.8 (14.7 – 16.8)	26.7 (25 – 28.4)	18.5 (17.7 – 19.4)
14	45.4 (44.6 – 46.3)	53.4 (52.0 – 54.8)	47.1 (46.4 – 47.8)	47.9 (46.5 – 49.2)	56.6 (55 – 58.2)	50.1 (49.0 – 51.2)
15	20.6 (20.0 – 21.3)	9.1 (8.4 – 9.9)	18.2 (17.7 – 18.8)	21.9 (20.8 – 23)	11.8 (10.7 – 13)	19.4 (18.5 – 20.2)
16 and older	12.1 (11.6 – 12.6)	3.1 (2.7 – 3.5)	10.2 (9.8 – 10.6)	14 (12.9 – 15.1)	4.2 (3.5 – 4.9)	11.5 (10.6 – 12.4)
Color or ethnicity						
White	35.0 (34.2 – 35.8)	59.7 (58.3 – 61.0)	40.1 (39.4 – 40.9)	31.7 (30.4 – 33)	55.3 (52.1 – 58.5)	37.7 (36.2 – 39.3)
Black	14.7 (14.1 – 15.2)	6.1 (5.5 – 6.7)	12.9 (12.4 – 13.3)	16.4 (15.5 – 17.2)	7.8 (6.9 – 8.8)	14.2 (13.4 – 14.9)
Mulatto	42.9 (42.0 – 43.7)	25.1 (24.0 – 26.2)	39.1 (3.4 – 39.8)	44.2 (42.9 – 45.4)	27.5 (25.1 – 29.8)	39.9 (38.6 – 41.2)
Yellow	3.3 (3.1 – 3.6)	5.3 (4.6 – 5.9)	3.7 (3.5 – 4.0)	4 (3.7 – 4.4)	5.8 (5.1 – 6.5)	4.5 (4.2 – 4.8)
Indigenous	4.2 (3.9 – 4.5)	3.9 (3.4 – 4.4)	4.1 (3.8 – 4.3)	3.7 (3.4 – 4)	3.6 (3.1 – 4.1)	3.7 (3.4 – 3.9)
Maternal schooling*						
None or incomplete elementary school	39.4 (38.6 – 40.3)	5.8 (5.2 – 6.5)	31.8 (31.1 – 32.5)	38.2 (36.6 – 39.9)	8.4 (7 – 9.8)	30.2 (28.4 – 31.9)
Compl. elementary school./ incomplete high school	19.3 (18.6 – 20.0)	8.5 (7.8 – 9.3)	16.9 (16.3 – 17.4)	20.8 (20.1 – 21.6)	10.4 (9.5 – 11.4)	18.0 (17.3 – 18.8)
Compl. high school/ incomplete higher education	31.1 (30.3 – 32.0)	32.9 (31.6 – 34.3)	31.5 (30.8 – 32.3)	33.4 (32.1 – 34.6)	39.5 (37.4 – 41.5)	35.0 (34 – 36.1)
Complete higher education	10.1 (9.5 – 10.7)	52.8 (51.4 – 54.2)	19.8 (19.3 – 20.4)	7.5 (6.7 – 8.4)	41.8 (38.5 – 45)	16.8 (14.9 – 18.7)

*Of the total students, 18.5% could not inform maternal education, being excluded.

Table 3. Frequency (%) of risk and protective factors, by sex, among 9th grade students for all Brazilian State Capitals and the Federal District, PeNSE, 2009 and 2012.

Variable	2009			2012		
	Female % (95%CI)	Male % (95%CI)	Total % (95%CI)	Female % (95%CI)	Male % (95%CI)	Total % (95%CI)
Dietary intake						
Beans	57.4 (56.5 – 58.3)	68.3 (67.4 – 69.2)	62.5 (61.8 – 63.3)	54.3 (52.6 – 56)	65.9 (64.3 – 67.6)	60.0 (58.5 – 61.5)
Fruits	31.6 (30.7 – 32.5)	31.4 (30.4 – 32.4)	31.5 (30.8 – 32.2)	29.7 (28.7 – 30.6)	29.9 (28.8 – 30.9)	29.8 (29.1 – 30.5)
Dainties	58.3 (57.4 – 59.3)	42.6 (41.5 – 43.6)	50.9 (50.1 – 51.6)	48.8 (47.6 – 50)	36.2 (34.8 – 37.6)	42.6 (41.6 – 43.6)
Soft drinks	36.6 (35.7 – 37.5)	37.9 (36.9 – 38.9)	37.2 (36.5 – 37.9)	34.5 (33.4 – 35.5)	36.5 (35.4 – 37.6)	35.4 (34.6 – 36.2)
Body image						
Very thin or thin	21.4 (20.6 – 22.1)	23.0 (22.1 – 23.8)	22.1 (21.5 – 22.7)	22.7 (21.9 – 23.5)	23.5 (22.6 – 24.5)	23.1 (22.5 – 23.7)
Normal	57.3 (56.4 – 58.3)	63.3 (62.3 – 64.3)	60.1 (59.5 – 60.8)	56.1 (55.0 – 57.2)	62.3 (61.3 – 63.4)	59.1 (58.4 – 59.9)
Fat or very fat	21.3 (20.5 – 22.1)	13.8 (13.1 – 14.5)	17.7 (17.2 – 18.3)	21.2 (20.3 – 22.1)	14.1 (13.4 – 14.9)	17.8 (17.1 – 18.4)
Physical activity						
≥ 2 Physical education classes	47.9 (47 – 48.9)	50.8 (49.7 – 51.0)	49.3 (48.6 – 50)	47.7 (44.8 – 50.5)	51.0 (48.1 – 53.9)	49.3 (46.5 – 52.1)
≥ 2 hours in front of TV	79.5 (78.7 – 80.3)	79.4 (78.5 – 80.3)	79.5 (78.9 – 80.0)	78.1 (77.2 – 79.0)	79.1 (78.2 – 80.0)	78.6 (77.9 – 79.3)
Smoking habit						
Trying cigarettes	24.0 (23.2 – 24.8)	24.4 (23.5 – 25.2)	24.2 (23.6 – 24.8)	22.2 (21.0 – 23.4)	22.3 (21.2 – 23.4)	22.3 (21.4 – 23.2)
Current smoker	6.3 (5.8 – 6.7)	6.4 (5.9 – 6.9)	6.3 (6.0 – 6.7)	6.1 (5.4 – 6.8)	6.1 (5.6 – 6.6)	6.1 (5.6 – 6.6)
Smoking parents	31.0 (30.3 – 31.6)	31.7 (30.8 – 32.7)	30.1 (29.1 – 31.1)	29.0 (27.9 – 30.0)	27.2 (25.9 – 28.4)	28.1 (27.2 – 29.0)
Consumption of alcohol and other drugs						
Trying alcohol	73.1 (72.3 – 73.9)	69.5 (68.5 – 70.5)	71.4 (70.8 – 72.0)	72.7 (71.8 – 73.6)	68.3 (67.0 – 69.5)	70.5 (69.7 – 71.4)
Alcohol in the past 30 days	28.1 (27.2 – 29.0)	26.5 (25.5 – 27.5)	27.3 (26.7 – 28.0)	28.2 (27.1 – 29.3)	25.4 (24.2 – 26.6)	26.8 (25.9 – 27.8)
Trying illicit drugs	6.9 (6.4 – 7.4)	10.6 (10.0 – 11.3)	8.7 (8.3 – 9.1)	9.0 (8.2 – 9.8)	10.3 (9.5 – 11.1)	9.6 (9.0 – 10.3)

Table 4. Frequency (%) of risk and protective factors among school-aged adolescents, by sex and administration of the school, for all Brazilian State Capitals and the Federal District. PeNSE, 2009 and 2012.

Variable	2009			2012		
	Administration			Administration		
	Public % (95%CI)	Private % (95%CI)	Total % (95%CI)	Public % (95%CI)	Private % (95%CI)	Total % (95%CI)
Dietary intake						
Beans	65.8 (65.1 – 66.6)	50.1 (48.8 – 51.5)	62.5 (61.8 – 63.3)	63.9 (62.5 – 65.3)	48.6 (46.4 – 50.9)	60.0 (58.5 – 61.5)
Fruits	31.8 (30.5 – 33.0)	31.4 (30.7 – 32.2)	31.5 (30.8 – 32.2)	29.7 (28.9 – 30.5)	30 (28.3 – 31.6)	29.8 (29.1 – 30.5)
Dainties	51.1 (50.3 – 51.9)	49.9 (48.6 – 51.3)	50.9 (50.1 – 51.6)	43.6 (42.4 – 44.8)	39.7 (38.2 – 41.3)	42.6 (41.6 – 43.6)
Soft drinks	36.7 (35.9 – 37.5)	39.1 (37.7 – 40.4)	37.2 (36.5 – 37.9)	35.5 (34.5 – 36.5)	35.3 (33.8 – 36.7)	35.4 (34.6 – 36.2)
Body image						
Very thin or thin	22.1 (21.5 – 22.8)	22.1 (21 – 23.3)	22.1 (21.5 – 22.7)	23.4 (22.6 – 24.2)	22.3 (21.3 – 23.3)	23.1 (22.5 – 23.7)
Normal	61.5 (60.7 – 62.3)	54.8 (53.4 – 56.1)	60.1 (59.5 – 60.8)	60.6 (59.7 – 61.6)	54.9 (53.8 – 56.0)	59.1 (58.4 – 59.9)
Fat or very fat	16.3 (15.7 – 16.9)	23.1 (22 – 24.3)	17.7 (17.2 – 18.3)	16.0 (15.3 – 16.7)	22.8 (21.8 – 23.9)	17.8 (17.1 – 18.4)
Physical activity						
≥ 2 Physical education classes	50.6 (49.8 – 51.4)	44.3 (43.1 – 45.6)	49.3 (48.6 – 50)	52.5 (49.2 – 55.7)	40.1 (33.7 – 46.5)	49.3 (46.5 – 52.1)
≥ 2 hours in front of TV	80.0 (79.3 – 80.6)	77.5 (76.4 – 78.7)	79.5 (78.9 – 80.0)	79.5 (78.8 – 80.2)	75.9 (74.3 – 77.4)	78.6 (77.9 – 79.3)
Smoking habit						
Trying cigarettes	25.7 (25.0 – 26.4)	18.3 (17.2 – 19.3)	24.2 (23.6 – 24.8)	24.6 (23.5 – 25.7)	15.6 (14.5 – 16.6)	22.3 (21.4 – 23.2)
Current smoker	6.6 (6.2 – 7.0)	5.3 (4.7 – 6.0)	6.3 (6.0 – 6.7)	6.8 (6.2 – 7.4)	4.1 (3.5 – 4.6)	6.1 (5.6 – 6.6)
Smoking parents	32.9 (32.1 – 33.7)	23.6 (22.3 – 24.8)	31.0 (30.3 – 31.6)	30.9 (30.0 – 31.8)	20.0 (18.7 – 21.3)	28.1 (27.2 – 29.0)
Consumption of alcohol and other drugs						
Trying alcohol	70.3 (69.5 – 71.0)	75.7 (74.6 – 76.8)	71.4 (70.8 – 72.0)	69.5 (68.5 – 70.5)	73.6 (71.9 – 75.3)	70.5 (69.7 – 71.4)
Alcohol in the past 30 days	26.8 (26.1 – 27.5)	29.5 (28.2 – 30.8)	27.3 (26.7 – 28.0)	27.7 (26.5 – 28.9)	24.3 (22.8 – 25.9)	26.8 (25.9 – 27.8)
Trying illicit drugs	9.0 (8.5 – 9.5)	7.6 (6.9 – 8.3)	8.7 (8.3 – 9.1)	10.3 (9.5 – 11.2)	7.7 (6.9 – 8.5)	9.6 (9.0 – 10.3)

DISCUSSION

PeNSE has two editions, and it consists of a system that monitors the health of students focusing on specificities about adolescents. By approaching the school environment as a place of health promotion, it allows to recognize the risk and protective factors involving the population of Brazilian students, therefore generating evidence to guide the implementation of public policies and monitor the changes that take place in future segments.

By comparing both editions, in Brazilian capitals, the prevalence of smokers and the current alcohol consumption, as well as the presence in two or more physical education classes at school remained stable for both years. Among sociodemographic factors, it was observed that 9th graders who were interviewed in 2012 are a bit older than those of 2009, thus presenting a higher percentage of students aged 14 and 15 years old. In this aspect, it is important to consider the influence of the fact that in 2012, data collection lasted until the second semester in some capitals, which may explain part of the difference⁴. There was an increasing proportion of students whose mothers had complete high school or incomplete higher education, besides a high percentage of students (20%) in both editions who could not inform about maternal schooling. There was an increasing number of participants who claimed to be mulattos. The increasing schooling in the Brazilian population and the reference to being mulattos were also identified in Census 2010¹².

Among markers indicating a healthy diet, there was a reduction in the consumption of unhealthy foods, such as dainties and soft drinks. However, there was also a reduction related to healthy diets, such as the intake of beans and fruits. Dainties and sweetened drinks increase the risks of excessive weight and CNCDs^{2,13}. Dainties were consumed five days or more a week by half of the students in 2009, and there was a 16% reduction in 2012. With regard to the intake of soft drinks, there was a 5% reduction, even though this frequency is higher than number in Europe (25%) at the age of 15. Unlike European adolescents, Brazilian girls eat more dainties than boys².

The intake of fruits and vegetables, which is a protective factor against cardiovascular disease and type 2 diabetes¹³, is still low at this age group. These data are in accordance with other studies by WHO, such as the Health Behavior School-aged Children (HSBC), in Europe, which showed 36% of fruit intake at the age of 13, ranging from 50%, in Belgium, to 15%, in Greenland². Even though the intake of beans is high, it reduced in 2012, as pointed out among Brazilian adults^{14,15}. In 2012, the regional variation related to the intake of beans remains, being less consumed in the North region and more consumed in the Southeast region⁴. PeNSE 2009³ indicated these same differences, which can be understood by the cultural diversity in dietary habits between regions¹⁶.

Another important factor to reduce NCDs is the practice of physical activities. More than 80% of the adolescents aged 13 to 15 years old in the world do not achieve the recommendations concerning the practice of physical activities¹⁷. The low levels of physical activity among children and adolescents has been attributed to the declining number of physical education classes in schools, to the increment of time spent in front

of the TV, internet and videogames, and to the reduction of active leisure options due to growing urban violence¹⁷. The regular practice of physical activities among adolescents and teenagers has an impact on physical and bone development, besides increasing the chances that these people will become active adults¹⁸⁻²⁰.

In PeNSE 2012, only half of the students in both studies reported attending two or more physical education classes a week at school, and this percentage remained stable in both editions. Providing more physical education classes and improving school facilities are part of the NCD plan of action, and it is the object of a partnership involving the Ministry of Education and the Ministry of Health⁶. There is scientific evidence that promoting physical activities in the school environment is important to make students more active^{13,20,21}.

WHO recommends that children and adolescents should not spend more than two hours watching TV, since this practice is associated with the intake of high-calorie food and soft drinks, and also because it provides little energy consumption¹. The results of PeNSE pointed out that the proportion of students who spend two hours or more watching TV is very high, of about 80% in both editions. These data are higher than the ones presented in HBSC, which indicate about 64% of students aged 13 to 15 years old². There were changes concerning the questions about the practice of physical activity, so it was chosen not to present them in this study, once no comparisons would be possible. The indicators compared here involve similar questions in both editions.

Tobacco is one of the most important risk factors that trigger most chronic diseases^{13,22}. Preventing and delaying the initiation to the habit is essential to reduce the negative effects of the cigarette on the health of the population^{13,23}.

The act of trying cigarettes is a result of curiosity, encouragement from colleagues and example from parents and close adults, and smoking at this stage of life leads to higher chances of smoking as an adult²³. PeNSE showed an stabilization tendency for 2009 and 2012, of about 6%, presenting one of the lowest prevalence rates in Latin American countries²⁴, the United States¹⁰ and European countries^{2,24}. One positive factor was the average reduction of the presence of father or mother who smoked. These results show the importance of public policies that regulate and forbid tobacco advertisement in the country^{6,22}.

The use of alcohol among Brazilian adolescents is high, and about three times more disseminated than the use of tobacco. It represents an important risk factor for accidents, violence and NCD. This habit has also been described as a predisposing factor for depressive disorders, anxiety, fights at school, bullying, property damage and problems with the police², besides being a predictor of use during adulthood^{2,25}. However, alcohol consumption is socially acceptable and stimulated^{25,26}. Studies point out that the exposure of adolescents to alcohol advertisement encourages alcohol consumption at this age group²⁷.

Lifetime use of alcohol and the intake of drinks in the past 30 days remained stable in both editions. In the United States, the percentage of 14 to 17-year old students who tried one dose of alcohol was of 70.8%, in 2011, and the consumption of at least one dose in the past 30 days was of 30.8%, which is higher than Brazilian students¹⁰. In Brazil, for both indicators, girls consumed more, which has been explained by some authors by the fact

that girls reach puberty earlier. With age, these differences are overcome and boys drink more²⁸⁻³⁰. In Brazil, as well as in other countries, the use of illicit drugs among adolescents and teenagers has become a serious issue, since this habit is a predictor of psychosocial disorders and dependence during adulthood^{2,31}. Frequencies around 9% point out to the need for prevention measures, such as the Drug and Crack Prevention Program, released in 2012. HBSC² indicated that, among 15 year-old students, 17% had used marijuana at some point in life, and 8% had used it in the past 30 days. Even though the frequency of tobacco and drug indicators are higher in public schools, in other studies of PeNSE, after the adjustment by age, this effect disappeared, once students in public schools are older than those in private schools^{23,29}.

Self-perception and satisfaction with body image are important factors for adolescents with regard to self-acceptance. If this perception is not in accordance with the body that is idealized by the adolescent, this fact can generate inadequate attitudes that damage their growth and development. PeNSE 2009 showed disassociation between measured body weight and body image, with low concordance calculated by the Kappa index between both variables³².

The perception of body image remained stable in the period. About one fifth of the interviewed adolescents thought they were fat or very fat, with discrete reduction of adolescents who considered being normal. A high level of dissatisfaction with body image is a predictive factor of depressive situations, psychosomatic disorders and dietary disorders³³. Girls are more critical about their self-image, whose perception is not in accordance with nutritional status³⁴. The level of satisfaction with self-image is closely related to losing or gaining body weight, so it is common to find that weight gain generates more dissatisfaction, especially among girls³⁵.

Data in this study are useful to determine the proper strategies of health prevention and promotion, thus orienting policies for Brazilian adolescents. The approach in schools has the advantage of being easy to access by this population and the benefits resulting from the study, thus enabling the integrated planning of health and educational sectors together with the target audience.

Among the limitations of the study, we can mention making the school population as a proxy of the adolescent population, and the used methodology excludes adolescents who are out of school. This problem is minimized in Brazil due to the broad coverage of the educational system. Adolescents add up to 35 million, and most of them is enrolled in school: 97% and 82% for the age groups of 10 to 14 years old, and 15 to 17 years old, respectively, thus facilitating health control in the school environment^{4,12}.

In 2012, adjustments were made in the questionnaire aiming at its improvement and to provide more comparability with other international studies^{2,8}. PeNSE investigates 9th graders, which allows a relative comparability with other global monitoring systems addressed to adolescents^{2,8,10}. Some of these systems collect information in three age groups (11, 13 and 15 years old)², and other systems include students aged 14 to 17 years old¹⁰. These different methodological strategies can limit comparisons, due to the different age distributions.

Besides, the temporal tendency represented here refers to changes in the population throughout time, and not in the individuals, because cross-sectional studies use a new representative sample of the population in each survey.

CONCLUSION

Nowadays, the NCDs represent the highest disease load in the country, and health promotion actions at early stages of life are very important so that healthy habits from childhood and adolescence can be maintained throughout life. PeNSE constituted an important instrument to subsidize administrators with information, thus sustaining the surveillance system for students in the country. It has been the base to implement programs addressed to the health of students, such as the Program Health in School.

REFERENCES

1. UNICEF. The State of the World's Children 2011. Adolescence: An Age of Opportunity. New York: United Nations Children's Fund; 2011.
2. Organização Mundial de Saúde. Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey. Copenhagen: WHO Regional Office for Europe; 2012 (Health Policy for Children and Adolescents, No. 6).
3. Brasil. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar - PENSE 2009. Rio de Janeiro: IBGE; 2009.
4. Brasil. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar - PENSE 2012. Rio de Janeiro: IBGE; 2013.
5. Malta DC, Sardinha LMV, Mendes I, Barreto SM, Giatti L, Castro IRR et al. Prevalência de fatores de risco e proteção de doenças crônicas não transmissíveis em adolescentes: resultados da Pesquisa Nacional de Saúde do Escolar (PeNSE), Brasil, 2009. *Ciênc Saúde Coletiva* 2010; 15(2): 3009-19.
6. Brasil. Ministério da Saúde. Plano de ações estratégicas para o enfrentamento das doenças crônicas não transmissíveis (DCNT) no Brasil 2011-2022. Brasília: Ministério da Saúde; 2011.
7. Organização Mundial de Saúde. Health topics: Chronic diseases. Geneva: WHO; 2013.
8. Organização Mundial de Saúde. Global Student Health Survey (GSHS). Background information on GSHS purpose, methods, and country participation. 2013.
9. Sawyer SM, Afifi RA, Bearinger LH, Blakemore SJ, Dick B, Ezech AC, et al. Adolescence: a foundation for future health. *Lancet* 2012; 379: 1630-40.
10. EUA. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance (YRBSS). Morbidity and Mortality Weekly Report. Atlanta: CDC; 2012.
11. SAS Enterprise Guide [computer program]. Cary (NC): SAS Institute Inc., 2013. Disponível em: http://www.sas.com/images/email/c5677/sas_para_estatistica.html
12. Brasil. Instituto Brasileiro de Geografia e Estatística. Censo 2010. Rio de Janeiro: IBGE; 2010.
13. Organização Mundial de Saúde. Global status report on non communicable diseases 2010. Geneva: World Health Organization; 2011.
14. Brasil. Instituto Brasileiro de Geografia e Estatística. Pesquisa de orçamentos familiares 2008-2009: Análise da disponibilidade domiciliar de alimentos e do estado nutricional no Brasil. Rio de Janeiro: IBGE; 2010.
15. Velásquez-Meléndez G, Mendes LL, Pessoa MC, Sardina, LMV, Yokota RTC, Bernal RTI, et al. Tendências da frequência do consumo de feijão por meio de inquérito telefônico nas capitais brasileiras, 2006 a 2009. *Ciênc Saúde Coletiva* 2012; 17(12): 3363-70.
16. Brasil. Ministério da Saúde. Guia alimentar para a população brasileira: promovendo a alimentação saudável. Brasília: Ministério da Saúde; 2006.
17. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U. Global physical activity levels: surveillance progress, pitfalls and prospects. *Lancet* 2012; 380(9838): 247-57.

18. Gonçalves H, Hallal PC, Tales CA, Cora LPA, Menezes AMB. Fatores socioculturais e nível de atividade física no início da adolescência. *Rev Panam Salud Pública* 2007; 22(4): 246-53.
 19. Hallal PC, Knuth AG, Cruz DKA, Mendes MI, Malta DC. Prática de atividade física em adolescentes brasileiros. *Ciênc Saúde Coletiva* 2010; 15(2): 3035-42.
 20. Organização Mundial de Saúde. Global strategy on diet physical activity and health. Fifty-seventh World Health Assembly. Geneva: WHO; 2004.
 21. Hoehner CM, Soares J, Parra Perez D, Ribeiro IC, Joshu CE, Pratt M, et al. Physical activity interventions in Latin America: a systematic review. *Am J Prev Med* 2008; 34(3): 224-33.
 22. Malta DC, Iser BPM, Sá NNB, Yokota RTC, Moura L, Claro RM, et al. Tendências temporais no consumo de tabaco nas capitais brasileiras, segundo dados do VIGITEL, 2006 a 2011. *Cad Saúde Pública* 2013; 29(4): 812-22.
 23. Barreto SM, Giatti L, Casado L, Moura L, Crespo C, Malta DC. Exposição ao tabagismo entre escolares no Brasil. *Ciênc Saúde Coletiva* 2010; 15(2): 3027-34.
 24. The Global Youth Tobacco Survey Collaborative Group. Tobacco use among youth: a cross country comparison. Special report. *Tob Control* 2002; 11: 252-70.
 25. Strauch ES, Pinheiro RT, Silva, RA, Horta BL. Uso de álcool por adolescentes: estudo de base populacional. *Rev Saúde Pública* 2009; 43(4): 647-55.
 26. Malta DC, Mascarenhas MDM, Porto DL, Duarte EA, Sardinha LM, Barreto SM, et al. Prevalência do consumo de álcool e drogas entre adolescentes: análise dos dados da Pesquisa Nacional de Saúde Escolar. *Rev Bras Epidemiol* 2011; 14(1): 136-46.
 27. Vendrame A, Pinsky I, Faria R, Silva R. Apreciação de propagandas de cerveja por adolescentes: relações com a exposição prévia às mesmas e o consumo de álcool. *Cad Saúde Pública* 2009; 25(2): 359-65.
 28. Schulte MT, Ramo D, Brown SA. Gender Differences in Factors Influencing Alcohol Use and Drinking Progression Among Adolescents. *Clin Psychol Rev* 2009; 29(6): 535-47.
 29. Malta DC, Mascarenhas MDM, Lopes D, Bareto SM, Morais Neto OL. Exposição ao álcool entre escolares e fatores associados. *Rev Saúde Pública* 2014; 48(1): 52-62.
 30. 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(1): 166-77.
 31. Brasil. Ministério da Saúde. Cidades com mais de 200 mil habitantes poderão aderir a programa de combate ao crack [Internet]. Disponível em: <http://www.brasil.gov.br/saude/2013/02/cidades-com-mais-de-200-mil-habitantes-poderao-aderir-a-programa-de-combate-ao-crack> (Acessado em 10 de janeiro de 2014).
 32. Castro IRR, Levy RB, Cardoso LO, Passos MD, Sardinha LMV, Tavares LF, et al. Imagem corporal, estado nutricional e comportamento com relação ao peso entre adolescentes brasileiros. *Ciênc Saúde Coletiva* 2010; 15(2): 3099-108.
 33. Organização Mundial de Saúde. Inequalities young people's health: key findings from the Health Behaviour in School-aged Children (HBSC) 2005/2006 survey fact sheet. Copenhagen: WHO; 2008.
 34. Branco LM, Hilário MOE, Cintra IP. Percepção e satisfação corporal em adolescentes e a relação com seu estado nutricional. *Rev Psiq Clín* 2006; 33(6): 292-6.
 35. Conti MA, Frutuoso MFP, Gambardella AMD. Excesso de peso e insatisfação corporal em adolescentes. *Rev Nutr* 2005; 18(4): 491-7.
- Received on: 11/07/2013
Final version presented on: 04/25/2014
Accepted on: 04/29/2014