

Monitoring of Risk and Protective factors for Chronic Non Communicable Diseases by telephone survey in Brazilian State Capitals, 2008

Resultados do monitoramento dos Fatores de risco e Proteção para Doenças Crônicas Não Transmissíveis nas capitais brasileiras por inquérito telefônico, 2008

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Abstract

Objective: To estimate the prevalence of protective and risk factors for the most important chronic non communicable diseases in all Brazilian capitals, including the Federal District. **Methods:** Data used were collected in 2008 through VIGITEL, an ongoing population-based telephone survey surveillance system implemented in all Brazilian State capitals since 2006. In 2008, over 54,000 interviews were completed over the phone with a random sample of individuals living in all 27 capitals. **Results:** The analyses showed differences in the prevalence of determinants of chronic diseases by demographic characteristics such as gender, age and schooling. Men were more likely to be current smokers, overweight, and consumers of soft drinks, fatty meat and alcohol. They were also more likely to be more active in leisure. Women reported being more likely to eat healthy, but also were more likely to have a physician diagnosis of high blood pressure, dyslipidemia, osteoporosis and overall poor health status. In general, the prevalence of risk factors studied increased with decreasing levels of schooling. **Discussion:** The VIGITEL system was implemented to monitor changes in the prevalence of determinants of chronic diseases over time to inform public health workers and decision makers to adjust existing programs and policies according to the changing profile of consumers. The ultimate goal is to improve the health of the Brazilian population.

Keywords: Prevalence. Risk factors. Chronic diseases. Telephone survey. Population-based study.

Resumo

Objetivo: Analisar os fatores de risco e proteção para Doenças Crônicas Não Transmissíveis - DCNT nas capitais do Brasil. **Metodologia:** Foram analisadas informações provenientes do sistema de vigilância de fatores de risco e proteção para DCNT por inquérito telefônico – VIGITEL, em 2008. A amostra foi composta por 54 mil entrevistas sendo as frequências apresentadas para o conjunto das capitais por sexo, faixa etária e escolaridade. **Resultados:** O estudo mostrou diferenças na prevalência de fatores de risco e proteção de DCNT entre sexos, idade e escolaridade. Os homens apresentaram maiores frequências de fatores de risco como fumo, excesso de peso, consumo de refrigerantes, carnes com excesso de gordura e bebidas alcoólicas. Os homens praticam mais atividade física no lazer. As mulheres se alimentam melhor e referem mais diagnóstico médico de doenças, como hipertensão arterial, dislipidemia e osteoporose, além de estado de saúde ruim. Em geral, os fatores de risco são mais frequentes na população de menor escolaridade. **Discussão:** Estas informações devem redirecionar a implementação das políticas públicas com foco em um modo de viver mais saudável e escolhas individuais mais adequadas por parte da população adulta brasileira.

Palavras-chave: Fatores de risco. Doença crônica. Levantamento epidemiológico. Entrevista por telefone. Prevenção e controle.

Introduction

Chronic non-communicable diseases (CNCD) are a serious public health problem worldwide, affecting low-, average- and high-income countries. World Health Organization (WHO) estimates point out that CNCD are responsible for nearly 60% of the deaths occurring in the world annually¹. In Brazil, approximately 64% of the deaths and the majority of hospitalizations are due to CNCD².

Among the risk factors for chronic diseases, behavioral factors should be emphasized, such as smoking, alcohol and drug use, high-sugar and high-fat food intake, and physical inactivity. Behavioral risk factors are potentially modifiable and conditioned by socioeconomic, cultural and environmental factors^{1,2,3}. There is evidence that health promotion and disease prevention strategies reduce the morbi-mortality from these diseases, causing CNCD risk factor monitoring to be an important measure in the definition of effective disease control actions¹.

Aiming to implement CNCD surveillance in Brazil, the Ministry of Health developed the *Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico* (VIGITEL – Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases), enabling the continuous and fast monitoring of CNCD risk factors in 27 Brazilian capitals⁴. The use of information generated by the Brazilian information systems has been encouraged and recommended to identify the epidemiological profile of chronic diseases in this country and to develop indicators for management and monitoring of the main CNCD risk factors, thus supporting the implementation of health promotion policies⁵.

The present study aimed to describe the distribution of the main CNCD risk and protective factors in adults living in the Brazilian capitals and Federal District, according to sex, age groups and level of education, in 2008.

Methods

A telephone survey on chronic non-communicable disease protective and risk factors (VIGITEL) was conducted in a representative sample of the adult population (≥ 18 years) living in the 26 Brazilian state capitals and Federal District who had a landline telephone.

Probabilistic samples of the population aged 18 years or more living in households with at least one telephone landline were obtained in two stages: 1) systematic random selection of 5,000 landlines in each city, followed by a new random selection and organization of 25 sub-samples of 200 landlines; and 2) random selection of one adult resident from each household to be interviewed. The VIGITEL system establishes a minimum sample size of 2,000 telephone interviews in each of the 27 Brazilian capitals to estimate the frequency of any risk factors in the adult population, with a 95% confidence interval and 2% sampling error.

Estimates of risk and protective factors were weighted, considering the differences in socio-demographic composition between the VIGITEL sample and the total adult population of each city, according to the 2000 Census distribution. The final weight attributed to each individual results from the multiplication of the following factors: the inverse of the number of telephone landlines in the resident's household, the number of adults living in the household and the post-stratification weight, which aims to level out the socio-demographic composition of the adult population of the city, according to data on sex, age group and level of education. A fourth weighting factor is used for the estimates of the group of 27 capitals, resulting from the ratio between the proportion of adults of a given city and the proportion of adults of all 27 cities. More details on the sampling design and methodological procedures can be found in other publications^{4,6}.

The present study assessed the frequencies of risk and protective factors in the group of Brazilian capitals and Federal

District, according to the percentage of individuals who reported on the questions that comprised the indicator. Among the risk factors, the following variables were considered: *smokers* (individuals who smoked, regardless of the frequency and intensity of smoking habit); *consumers of 20 or more cigarettes* (individuals who smoked 20 or more cigarettes per day); *ex-smokers* (individuals who had smoked at a certain time in their lives); *overweight* (body mass index equal to or higher than 25 kg/m²); *obesity* (body mass index equal to or higher than 30 kg/m²); *intake of sodas* (intake of sodas or artificial juice with sugar five or more days per week) and *intake of fatty meats* (intake of red meat with visible fat or chicken with the skin); *physical inactivity* (individuals who did not practice any physical activities in their free time in the previous three months, did not make any intense physical efforts at work, did not go to work on foot or by bicycle, and were not responsible for the "heavy cleaning" of their homes); *alcohol abuse* (individuals who, in the previous 30 days, consumed more than four drinks (females) or five drinks (males) of alcoholic beverages on a single day); *poor self-rated health status* (individuals who rated their own health status as poor); *report of medical diagnosis of arterial hypertension* (individuals who reported a medical diagnosis of arterial hypertension), *diabetes* (individuals who reported a medical diagnosis of diabetes), *dyslipidemia* (individuals who reported a medical diagnosis of dyslipidemia) and *osteoporosis* (individuals who reported a medical diagnosis of osteoporosis). The protective factors assessed were as follows: *regular intake of fruits and vegetables* (intake of these foods on five days of the week or more) and *recommended intake of fruits and vegetables* (intake of five or more daily servings of these foods on five days of the week or more); *sufficiently active during leisure time* (individuals who performed light to moderate physical activities for at least 30 minutes per day on five or more days of the week or vigorous physical activities

for at least 20 minutes per day on three or more days of the week).

The STATA software, version 9⁷, was used for data processing and statistical analyses, using commands that estimate 95% confidence intervals.

The results were shown in percentages and their respective confidence intervals (95% CI), according to sex, level of education and age groups, and the Prevalence Ratios (PR) were calculated and adjusted for age. The VIGITEL survey was approved by the *Comissão Nacional de Ética em Pesquisa em Seres Humanos* (CONEP – National Human Research Ethics Committee). The informed consent form was replaced by a verbal consent obtained during telephone contact with participants.

Results

The VIGITEL survey conducted 54,353 complete interviews, of which 21,435 were with men and 32,918 with women. Table 1 shows the frequency of CNCD risk and protective factors in the group of cities studied and according to sex. Except for obesity, physical inactivity and report of medical diagnosis of diabetes, all indicators showed significant differences between sexes.

There was a higher frequency of males who were smokers; consumers of more than 20 cigarettes per day; ex-smokers; overweight individuals; consumers of sodas and fatty meats; and individuals with alcohol abuse; in addition to those who were sufficiently active during leisure time. Among women, there was a higher frequency of intake of fruits and vegetables on five or more days of the week (regular intake) and five daily servings on five or more days of the week (recommended intake); poor self-rated health status; and report of medical diagnosis of diseases, such as arterial hypertension, dyslipidemia and osteoporosis (Table 1).

Tables 2 and 3 show the distribution of risk and protective factors for chronic diseases per age group, in men and women respectively. Among men, the percentage of

smokers was lower in the 65-year-and-more age group and overweight increases with age, reaching 62.3% between 45 and 54 years and steadily decreasing in the following age groups. With the increase in age, there was a higher frequency of ex-smokers, individuals with a regular and recommended intake of fruits and vegetables, physical inactivity, report of medical diagnosis of diseases and poor self-rated health status from the age of 25 years. Intake of sodas showed a reduction with age, sufficient physical activity during leisure time showed a reduction until the age of 54 years and an increase from 55 years, whereas intake of fatty meats and alcoholic beverages showed a reduction from the age of 35 years (Table 2).

Among women, the percentage of ex-smokers increased with age until the 45-to-54-year age group and the frequencies of overweight and obesity increased until the age of 64 years. Physical inactivity was higher in the extreme age groups (18-to-24-year and 55-year-and-more age groups). Regular and recommended intake of fruits and vegetables and report of medical diagnosis of diseases increased with age. Intake of sodas, fatty meats and alcoholic beverages showed a reduction after the age of 45 years and the percentage of women who rated their health status as poor increased from the age of 45 years, reaching 11.2% of those aged 65 years and more (Table 3).

The Prevalence Ratios (PR) of risk and protective factors for CNCD in men by level of education are shown in Table 4. Men with a level of education equal to or lower than eight years of school (zero to eight years) had higher PR in the following indicators: smoking, consumption of 20 or more cigarettes, ex-smokers, intake of sodas and fatty meats, poor self-rated health status and report of medical diagnosis of diabetes and osteoporosis. Among men with 12 years of education or more, higher PR were found in the following variables: overweight, obesity, regular and recommended intake of fruits and vegetables, sufficient physical activity during leisure time and report of medical diagnosis of dyslipidemia.

Table 1 – Prevalence (%)¹ of risk and protective factors for non communicable chronic diseases in adults (≥ 18 years of age) in Brazilian State Capitals and Federal District, by gender. VIGITEL, Brazil, 2008.

Tabela 1 – Prevalência (%)¹ de fatores de risco e proteção para doenças crônicas não transmissíveis em adultos (≥ 18 anos) nas capitais de estados e Distrito Federal, segundo sexo. VIGITEL, Brasil, 2008.

Variables	Total	Sex	
		Male	Female
		n = 54.353	n = 21.435
	% (95%CI)	% (95%CI)	% (95%CI)
Smoking habit			
Smokers (*)	16.1 (15.0 - 17.3)	20.5 (18.3 - 22.7)	12.4 (11.5 - 13.3)
Consumers of 20 or more cigarettes (*)	4.9 (4.4 - 5.4)	6.5 (5.7 - 7.3)	3.6 (3.0 - 4.1)
Ex-smokers (*)	21.6 (20.8 - 22.4)	25.3 (24.0 - 26.7)	18.4 (17.5 - 19.3)
Nutritional status			
Overweight (*)	44.2 (43.1 - 45.3)	48.6 (46.8 - 50.4)	40.0 (38.7 - 41.4)
Obesity	13.1 (12.5 - 13.8)	13.1 (12.0 - 14.2)	13.1 (12.3 - 13.9)
Food intake			
Regular intake of fruits and vegetables (*)	31.7 (30.8 - 32.7)	26.0 (24.6 - 27.4)	36.6 (35.4 - 37.9)
Recommended intake of fruits and vegetables (*)	19.2 (18.4 - 19.9)	15.4 (14.3 - 16.4)	22.4 (21.4 - 23.4)
Sodas (*)	24.6 (23.4 - 25.8)	28.5 (26.5 - 30.4)	21.2 (19.8 - 22.6)
Fatty meats (*)	33.4 (32.2 - 34.5)	44.1 (42.2 - 46.0)	24.2 (22.9 - 25.5)
Physical activity			
Sufficiently active during leisure time (*)	15.0 (14.3 - 15.7)	18.5 (17.3 - 19.7)	12.0 (11.3 - 12.7)
Inactive	17.4 (16.5 - 18.2)	17.2 (15.9 - 18.4)	17.6 (16.4 - 18.8)
Alcohol abuse (*)			
	17.6 (16.8 - 18.4)	26.6 (25.1 - 28.1)	9.8 (9.1 - 10.6)
Poor self-rated health status (*)			
	4.5 (4.1 - 4.9)	3.0 (2.4 - 3.5)	5.9 (5.3 - 6.5)
Report of medical diagnosis of diseases			
Arterial hypertension (*)	23.9 (23.0 - 24.7)	21.0 (19.7 - 22.3)	26.3 (25.2 - 27.4)
Diabetes	5.5 (5.1 - 5.9)	5.0 (4.4 - 5.5)	5.9 (5.4 - 6.4)
Dyslipidemia (*)	16.8 (16.1 - 17.4)	14.0 (13.1 - 15.0)	19.2 (18.3 - 20.1)
Osteoporosis (*)	4.3 (4.0 - 4.6)	1.4 (1.1 - 1.7)	6.8 (6.3 - 7.3)

¹ Percentual ponderado para ajustar a distribuição sociodemográfica da amostra VIGITEL à distribuição da população adulta da cidade no Censo Demográfico de 2000.

¹Weighted proportion according to the 2000 Census sociodemographic distribution of the adult population in each given State capital.

FONTE: Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (VIGITEL), Ministério da Saúde.

SOURCE: Surveillance System of Protective and risk factors for chronic diseases by telephone survey (VIGITEL), Ministry of Health, Brazil

(*) diferença significativa entre os sexos (*) [significant difference between genders]

Women with a level of education equal to or lower than eight years of school (zero to eight years) had higher PR in the following indicators: smokers, consumption of 20 or more cigarettes per day, ex-smokers, overweight, obesity, intake of fatty meats and sodas, poor self-rated health status and report of medical diagnosis of arterial hypertension, diabetes and osteoporosis. Women with 12 years of school or more had higher PR for regular and recommended intake of fruits and vegetables, sufficient physical activity during leisure time and physical inactivity (Table 5).

Discussion

The present study showed differences in the prevalence of risk and protective factors for CNCD according to sex, age and level of education in the group of Brazilian capitals. Men had the highest frequencies of risk factors such as smoking, overweight, and intake of sodas, fatty meats and alcoholic beverages. In addition, they practiced more physical activities during leisure time. Women had a healthier diet and more frequently reported medical diagnosis of diseases such as arterial hypertension, dyslipidemia and osteoporosis, apart from

Table 2 – Prevalence (%)¹ of risk and protective factors for non communicable chronic diseases in adult men (≥ 18 years of age) in Brazilian State Capitals and Federal District, by age group. VIGITEL, Brazil, 2008.

Tabela 2 – Prevalência (%)¹ de fatores de risco e proteção para doenças crônicas não transmissíveis em homens nas capitais de estados e Distrito Federal, segundo faixa etária. VIGITEL, Brasil, 2008.

Variables	Age group					
	18 to 24 % (95% CI)	25 to 34 % (95% CI)	35 to 44 % (95% CI)	45 to 54 % (95% CI)	55 to 64 % (95% CI)	65 and more % (95% CI)
Smoking habit						
Smokers (*)	24.2 (16.1-32.3)	20.3 (17.0-23.5)	18.8 (16.5-21.0)	21.9 (19.1-24.8)	19.7 (16.3-23.2)	13.4 (10.2-16.6)
Consumers of 20 or more cigarettes (*)	3.9 (1.9-5.8)	5.6 (3.8-7.4)	6.7 (5.3-8.1)	9.1 (7.1-11.0)	10.6 (7.9-13.3)	7.3 (4.6-10.0)
Ex-smokers (*)	10.8 (8.4-13.2)	17.9 (15.3-20.5)	22.7 (20.4-25.1)	38.4 (35.2-41.6)	47.2 (43.1-51.4)	53.8 (49.4-58.2)
Nutritional status						
Overweight (*)	25.1 (21.1-29.1)	47.9 (44.4-51.4)	57.5 (54.7-60.3)	62.3 (59.2-65.5)	60.3 (56.2-64.4)	51.6 (47.2-56.1)
Obesity	5.5 (3.7-7.2)	12.7 (10.1-15.2)	16.0 (13.9-18.1)	18.5 (15.7-21.2)	18.2 (15.0-21.4)	11.7 (8.7-14.7)
Food intake						
Regular intake of fruits and vegetables (*)	20.3 (16.8-23.8)	23.9 (20.9-26.9)	24.9 (22.6-27.2)	30.6 (27.8-33.5)	32.3 (28.4-36.1)	38.0 (33.8-42.2)
Recommended intake of fruits and vegetables (*)	12.1 (9.8-14.3)	13.9 (11.7-16.1)	15.4 (13.5-17.3)	18.1 (15.6-20.5)	17.0 (14.1-19.9)	23.7 (19.9-27.6)
Sodas (*)	40.1 (33.8-46.5)	34.5 (31.1-37.9)	25.8 (23.2-28.3)	20.5 (17.8-23.2)	15.6 (12.6-18.6)	9.2 (6.9-11.5)
Fatty meats (*)	47.9 (41.9-53.9)	49.8 (46.3-53.3)	46.1 (43.3-48.9)	37.4 (34.2-40.6)	35.6 (31.6-39.6)	28.8 (24.9-32.7)
Physical activity						
Sufficiently active during leisure time (*)	27.9 (24.0-31.9)	18.3 (15.7-20.9)	12.8 (11.1-14.4)	12.5 (10.7-14.2)	18.0 (14.7-21.3)	19.3 (15.9-22.8)
Inactive	10.6 (7.6-13.6)	14.3 (11.7-16.8)	17.4 (15.3-19.6)	18.8 (16.1-21.6)	23.4 (19.9-26.9)	36.7 (32.4-41.0)
Alcohol abuse (*)						
Poor self-rated health status (*)	27.0 (22.7-31.2)	33.3 (30.0-36.6)	29.1 (26.7-31.6)	25.2 (22.5-27.9)	17.8 (14.5-21.0)	6.7 (4.9-8.6)
Report of medical diagnosis of diseases						
Arterial hypertension (*)	2.4 (1.0-3.8)	2.1 (1.2-3.0)	2.8 (1.7-3.8)	3.6 (2.4-4.7)	4.4 (3.3-5.6)	5.3 (3.3-7.3)
Diabetes						
Dyslipidemia (*)	6.0 (3.4-8.7)	10.7 (8.2-13.1)	18.9 (16.7-21.0)	35.4 (32.2-38.7)	47.4 (43.2-51.5)	52.1 (47.8-56.5)
Osteoporosis (*)	0.9 (0.3-1.4)	0.9 (0.4-1.3)	3.5 (2.4-4.6)	7.6 (5.8-9.4)	15.2 (12.1-18.2)	20.1 (16.4-23.8)
Dislipidemia	2.7 (2.0-3.5)	6.6 (5.1-8.0)	17.8 (15.7-20.0)	25.8 (22.9-28.6)	29.0 (25.2-32.8)	23.8 (20.2-27.5)
Osteoporose	0.1 (0.0-0.3)	0.3 (0.1-0.6)	1.4 (0.5-2.2)	1.8 (1.1-2.5)	2.6 (1.6-3.6)	7.2 (4.8-9.6)

¹ Percentual ponderado para ajustar a distribuição sociodemográfica da amostra VIGITEL à distribuição da população adulta da cidade no Censo Demográfico de 2000.

² Weighted proportion according to the 2000 Census sociodemographic distribution of the adult population in each given State capital.

Fonte: Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (VIGITEL), Ministério da Saúde.

SOURCE: Surveillance System of Protective and risk factors for chronic diseases by telephone survey (VIGITEL), Ministry of Health, Brazil.

(*) diferença significativa entre todas as faixas etárias

(*) [significant difference among all age groups]

poor self-rated health status. In general, risk factors were more frequent in the population with a lower level of education.

In 2008, there was an influence from socio-demographic factors (age and level of education) and differences by sex in the majority of risk and protective factors assessed.

Brazil does not have sufficiently long and comparable historical series to assess the trends and to monitor risk and protective factors for CNCD. Nevertheless,

some previous studies may provide useful parameters for this monitoring, despite the methodological differences among these studies. In the case of smoking, the *Pesquisa Nacional de Saúde e Nutrição* (PNSN – National Health and Nutrition Survey) conducted in 1989 showed a prevalence of 33.1% and the Global Health Survey conducted in 2003 in Brazil with a national sample showed a reduction to 22.4%¹⁰. Data from the 2008 VIGITEL survey showed a

Table 3 - Prevalence (%)¹ of risk and protective factors for non communicable chronic diseases in adult women (≥ 18 years of age) in Brazilian State Capitals and Federal District, by age group. VIGITEL, Brazil, 2008.

Tabela 3 – Prevalência (%)¹ de fatores de risco e proteção para doenças crônicas não transmissíveis em mulheres nas capitais de estados e Distrito Federal, segundo faixa etária. VIGITEL, Brasil, 2008.

Variables	Age group					
	18 to 24 % (95% CI)	25 to 34 % (95% CI)	35 to 44 % (95% CI)	45 to 54 % (95% CI)	55 to 64 % (95% CI)	65 and more % (95% CI)
Smoking habit						
Smokers (*)	9.3 (6.6-12.0)	11.4 (9.5-13.3)	14.3 (12.6-16.0)	17.8 (15.7-19.8)	15.1 (12.7-17.4)	6.4 (4.9-7.8)
Consumers of 20 or more cigarettes (*)	2.9 (0.8-4.9)	2.7 (1.8-3.6)	3.8 (2.8-4.8)	5.9 (4.6-7.2)	4.9 (3.2-6.5)	1.8 (1.0-2.7)
Ex-smokers (*)	11.0 (8.4-13.5)	12.1 (10.3-14.0)	18.3 (16.5-20.1)	29.9 (27.6-32.2)	27.8 (25.1-30.5)	24.3 (21.9-26.6)
Nutritional status						
Overweight (*)	23.1 (18.9-27.2)	33.5 (30.9-36.1)	42.7 (40.3-45.2)	50.3 (47.6-53.0)	58.3 (54.9-61.6)	55.8 (52.7-59.0)
Obesity	4.1 (2.8-5.3)	10.4 (8.7-12.1)	13.7 (12.0-15.4)	17.9 (15.9-19.9)	23.9 (20.8-26.9)	21.6 (18.8-24.3)
Food intake						
Regular intake of fruits and vegetables (*)	24.6 (21.2-28.0)	32.9 (30.4-35.5)	37.6 (35.3-39.8)	42.6 (40.1-45.1)	47.2 (44.0-50.3)	50.8 (48.0-53.6)
Recommended intake of fruits and vegetables (*)	15.4 (12.7-18.0)	20.8 (18.5-23.1)	23.1 (21.1-25.1)	26.1 (23.9-28.3)	28.5 (25.7-31.3)	28.8 (26.1-31.5)
Sodas (*)	33.0 (28.2-37.7)	27.3 (24.7-30.0)	17.7 (15.8-19.6)	14.0 (12.1-15.8)	12.8 (10.3-15.3)	7.2 (5.7-8.7)
Fatty meats (*)	29.9 (25.4-34.4)	29.4 (26.9-31.9)	23.4 (21.5-25.4)	21.0 (18.8-23.1)	17.5 (15.1-20.0)	11.3 (9.6-13.0)
Physical activity						
Sufficiently active during leisure time (*)	9.9 (8.2-11.6)	11.6 (10.1-13.1)	13.7 (12.2-15.2)	13.2 (11.5-14.8)	13.0 (11.0-15.1)	11.1 (9.2-13.1)
Inactive	21.7 (17.3-26.2)	12.7 (11.0-14.5)	11.2 (9.9-12.5)	13.8 (12.1-15.6)	20.4 (17.6-23.1)	37.9 (35.2-40.7)
Alcohol abuse (*)						
Poor self-rated health status (*)	14.0 (11.3-16.8)	11.9 (10.3-13.6)	10.9 (9.5-12.3)	7.8 (6.4-9.2)	4.3 (3.3-5.4)	1.5 (0.9-2.1)
Report of medical diagnosis of diseases						
Arterial hypertension (*)	4.2 (2.5-6.0)	4.2 (3.0-5.4)	4.6 (3.4-5.8)	7.9 (6.4-9.4)	8.1 (6.3-9.9)	11.2 (9.4-12.9)
Diabetes						
Dyslipidemia (*)	6.9 (4.8-9.0)	11.6 (9.9-13.3)	23.1 (20.9-25.3)	38.4 (35.8-40.9)	55.7 (52.6-58.8)	66.6 (64.1-69.2)
Osteoporosis (*)	0.3 (0.1-0.5)	0.9 (0.5-1.3)	3.3 (2.4-4.3)	9.7 (7.9-11.5)	15.7 (13.3-18.1)	21.5 (19.1-23.8)
Dislipidemia (*)	5.8 (3.7-8.0)	8.9 (7.5-10.2)	16.3 (14.7-18.0)	29.0 (26.7-31.2)	40.3 (37.2-43.3)	45.4 (42.6-48.2)
Osteoporose	0.5 (0.2-0.8)	0.7 (0.2-1.1)	1.8 (1.1-2.5)	8.8 (7.3-10.3)	17.8 (15.6-20.1)	32.9 (30.2-35.6)

¹ Percentual ponderado para ajustar a distribuição sociodemográfica da amostra VIGITEL à distribuição da população adulta da cidade no Censo Demográfico de 2000.

¹Weighted proportion according to the 2000 Census sociodemographic distribution of the adult population in each given State capital.

FONTE: Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (VIGITEL), Ministério da Saúde.

Source: Surveillance System of Protective and risk factors for chronic diseases by telephone survey (VIGITEL), Ministry of Health, Brazil.

(*) diferença significativa entre todas as faixas etárias (*) [significant differences among all age groups]

lower prevalence of 16.1% in the Brazilian capitals. Although the data shown here are not fully comparable to previous surveys, a significant reduction in the prevalence of smoking can be inferred during this period⁴. Another piece of evidence that supports these data is the increase in the number of ex-smokers, especially in the older age groups, showing the growing number of individuals who stopped smoking after the age of 45 years¹¹. This reduction may have

resulted from greater tobacco use control, including restrictions of consumption in public places, prohibition of television advertising and wider dissemination of the harms in the media¹².

The smoking burden, expressed by the number of years as a smoker, and the number of cigarettes smoked per day are important factors to predict lung cancer^{13,14}. The prevalence of heavy smokers (individuals who smoke 20 or more cigarettes per day) is

Table 4 - Prevalence¹ of risk and protective factors for non communicable chronic diseases in adult men (≥ 18 years of age) in Brazilian State Capitals and Federal District, by schooling. VIGITEL, Brazil, 2008.

Tabela 4 - Prevalência (%)¹ de fatores de risco e proteção para doenças crônicas não transmissíveis em homens nas capitais de estados e Distrito Federal, segundo anos de estudo. VIGITEL, Brasil, 2008.

Variables	Level of education (in years)					
	0 to 8		9 to 11		12 or more	
	% (95%CI)	PR	% (95%CI)	PR	%	PR
Smoking habit						
Smokers (*)	26.6 (22.8 - 30.3)	2.1	14.1 (12.6 - 15.5)	1.0	12.6 (10.9 - 14.4)	1
Consumers of 20 or more cigarettes (*)	8.7 (7.3 - 10.2)	2.0	3.6 (2.9 - 4.3)	0.9(*)	4.4 (3.4 - 5.4)	1
Ex-smokers (*)	29.2 (26.8 - 31.5)	1.2	19.9 (18.5 - 21.3)	1.1(*)	22.6 (20.6 - 24.7)	1
Nutritional status						
Overweight (*)	45.9 (42.9 - 48.9)	0.8	47.8 (45.8 - 49.8)	0.9	58.2 (55.7 - 60.7)	1
Obesity	13.4 (11.6 - 15.2)	0.9	12.0 (10.8 - 13.3)	0.9	14.2 (12.4 - 15.9)	1
Food intake						
Regular intake of fruits and vegetables (*)	21.6 (19.4 - 23.9)	0.5	25.6 (23.9 - 27.3)	0.7	40.4 (37.9 - 42.9)	1
Recommended intake of fruits and vegetables (*)	12.1 (10.5 - 13.6)	0.5	16.2 (14.8 - 17.7)	0.7	24.4 (22.1 - 26.6)	1
Sodas (*)	28.7 (25.3 - 32.1)	1.3	31.5 (29.5 - 33.4)	1.2	22.7 (20.5 - 25.0)	1
Fatty meats (*)	47.9 (44.7 - 51.0)	1.4	42.5 (40.5 - 44.5)	1.1	35.0 (32.6 - 37.5)	1
Physical activity						
Sufficiently active during leisure time (*)	14.9 (13.0 - 16.7)	0.6	21.7 (20.1 - 23.2)	0.8	24.3 (22.2 - 26.5)	1
Inactive	18.8 (16.7 - 21.0)	1.0(*)	13.8 (12.4 - 15.2)	0.9	17.5 (15.6 - 19.5)	1
Alcohol abuse (*)						
	25.6 (23.1 - 28.1)	1.0(*)	28.6 (26.8 - 30.4)	1.0	26.4 (24.4 - 28.5)	1
Poor self-rated health status (*)						
	3.8 (2.9 - 4.7)	2.4	2.2 (1.5 - 2.8)	1.5(*)	1.6 (1.0 - 2.1)	1
Report of medical diagnosis of diseases						
Arterial hypertension (*)	23.5 (21.2 - 25.8)	1.0(*)	16.1 (14.8 - 17.4)	1.0(*)	21.4 (19.3 - 23.6)	1
Diabetes	6.3 (5.3 - 7.3)	1.5	3.2 (2.6 - 3.8)	1.2	3.8 (2.9 - 4.7)	1
Dyslipidemia (*)	12.8 (11.3 - 14.3)	0.6	11.7 (10.6 - 12.8)	0.7	21.8 (19.6 - 23.9)	1
Osteoporosis (*)	2.0 (1.4 - 2.5)	1.7	0.6 (0.4 - 0.8)	0.9(*)	1.0 (0.6 - 1.4)	1

¹ Percentual ponderado para ajustar a distribuição sociodemográfica da amostra VIGITEL à distribuição da população adulta da cidade no Censo Demográfico de 2000 / ¹Weighted proportion according to the 2000 Census sociodemographic distribution of the adult population in each given State capital.

² Nota: RP ajustada por idade / ² Note: prevalence ratio adjusted by age

FONTE: Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (VIGITEL), Ministério da Saúde.

SOURCE: Surveillance System of Protective and risk factors for chronic diseases by telephone survey (VIGITEL), Ministry of Health, Brazil.

(*) estimativa da RP não significativa ao nível de significância de 5% (*) prevalence ratio estimate non significant at 5%

(**) não há associação entre o indicador e a escolaridade (***) there is no association between the factor and schooling

two times higher among men than women. This fact is in agreement with the higher incidence of and mortality from lung cancer observed in males^{15,16}, although studies of mortality trends show the reduction in lung cancer rates among males aged 60 years or less. This can be explained by the increase in the number of male ex-smokers, resulting in a reduction in the mortality trends of lung cancer in males in recent years¹². In terms of nutrition, there has been an increase in the prevalence of overweight and obesity in recent decades. The following surveys have monitored this in Brazil: the *Estudo Nacional de Despesas Familiares* (ENDEF – National Study on Household Spending)

conducted in 1975, the PNSN conducted in 1989, and the *Pesquisa de Orçamentos Familiares* (POF – Household Budget Survey) conducted in 2003. Overweight increased, respectively, from 18.6% (1975) to 29.5% (1989) and subsequently to 41.0% (2003) in men, while it rose from 28.6% to 40.7% and finally decreased to 39.2% (2003) in women. According to these same surveys, obesity in men increased from 2.2% to 5.1% and subsequently to 8.8%; in women, this prevalence rose from 7.8% to 12.8% and finally decreased to 12.7% in the same period¹⁷. The VIGITEL survey data shown here (2008) emphasize these findings and reveal that, compared to previous surveys,

Table 5 – Prevalence (%)¹ of risk and protective factors for non communicable chronic diseases in adult women (≥ 18 years of age) in Brazilian State Capitals and Federal District, by schooling. VIGITEL, Brazil, 2008.

Tabela 5 - Prevalência (%)¹ de fatores de risco e proteção para doenças crônicas não transmissíveis em mulheres nas capitais de estados e Distrito Federal, segundo anos de estudo. VIGITEL, Brasil, 2008.

Variables	Level of education (in years)					
	0 to 8		9 to 11		12 or more	
	% (95%CI)	PR	% (95%CI)	PR	%	PR
Smoking habit						
Smokers (*)	14.6 (13.0 - 16.1)	1.4	9.5 (8.5 - 10.6)	0.9(*)	10.5 (9.1 - 11.9)	1
Consumers of 20 or more cigarettes (*)	4.7 (3.6 - 5.7)	1.7	2.1 (1.6 - 2.5)	0.8(*)	2.7 (2.1 - 3.4)	1
Ex-smokers (*)	21.7 (20.1 - 23.3)	1.3	14.7 (13.6 - 15.8)	1.1(*)	14.7 (13.3 - 16.2)	1
Nutritional status						
Overweight (*)	47.9 (45.4 - 50.5)	1.4	33.2 (31.6 - 34.8)	1.1	31.0 (29.0 - 32.9)	1
Obesity	17.4 (15.9 - 18.9)	1.7	9.3 (8.3 - 10.2)	1.2(*)	8.6 (7.4 - 9.8)	1
Food intake						
Regular intake of fruits and vegetables (*)	33.4 (31.4 - 35.4)	0.6	35.0 (33.4 - 36.6)	0.7	50.3 (48.3 - 52.4)	1
Recommended intake of fruits and vegetables (*)	19.4 (17.8 - 21.1)	0.5	22.2 (20.7 - 23.6)	0.7	32.6 (30.7 - 34.5)	1
Sodas (*)	22.3 (19.9 - 24.7)	1.8	23.0 (21.4 - 24.5)	1.4	14.3 (12.8 - 15.8)	1
Fatty meats (*)	25.6 (23.4 - 27.8)	1.6	25.0 (23.5 - 26.5)	1.3	17.9 (16.3 - 19.4)	1
Physical activity						
Sufficiently active during leisure time (*)	9.5 (8.5 - 10.6)	0.6	14.6 (13.4 - 15.8)	0.9(*)	15.2 (13.8 - 16.6)	1
Inactive	17.1 (15.1 - 19.1)	0.7	16.1 (14.8 - 17.4)	0.8	22.0 (20.3 - 23.6)	1
Alcohol abuse (*)						
	8.4 (7.1 - 9.6)	0.8(*)	11.5 (10.3 - 12.6)	0.9(*)	11.6 (10.2 - 12.9)	1
Poor self-rated health status (*)						
	8.5 (7.3 - 9.6)	3.4	3.4 (2.8 - 3.9)	1.6	2.2 (1.7 - 2.8)	1
Report of medical diagnosis of diseases						
Arterial hypertension (*)	36.1 (34.2 - 38.1)	1.9	15.9 (14.8 - 17.0)	1.3	14.0 (12.7 - 15.4)	1
Diabetes	8.7 (7.8 - 9.6)	2.1	3.0 (2.5 - 3.4)	1.4	2.6 (2.0 - 3.1)	1
Dyslipidemia (*)	23.0 (21.5 - 24.6)	1.0(*)	13.9 (12.9 - 14.9)	0.9(*)	16.5 (15.1 - 17.9)	1
Osteoporosis (*)	9.8 (8.9 - 10.7)	1.5	3.3 (2.8 - 3.7)	1.2(*)	3.4 (2.7 - 4.0)	1

¹ Percentual ponderado para ajustar a distribuição sociodemográfica da amostra VIGITEL à distribuição da população adulta da cidade no Censo Demográfico de 2000 / ¹Weighted proportion according to the 2000 Census sociodemographic distribution of the adult population in each given State capital.

² Nota: RP ajustada por idade / ² Note: prevalence ratio adjusted by age

FONTE: Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (VIGITEL), Ministério da Saúde. SOURCE: Surveillance System of Protective and risk factors for chronic diseases by telephone survey (VIGITEL), Ministry of Health, Brazil.

(*) estimativa da RP não significativa ao nível de significância de 5% (*) prevalence ratio estimate non significant at 5%

(**) não há associação entre o indicador e a escolaridade (**) there is no association between the factor and schooling

there has been an increase in prevalence in men, although these data are not fully comparable, as they refer to capitals and are self-reported.

Obesity and overweight are important risk factors for CNCD, especially diabetes and cardiovascular diseases, showing the importance of investing in healthy eating and physical activity promotion programs. Likewise, the VIGITEL survey monitoring shows that these habits are not widely adopted by the Brazilian adult population. Physically inactive individuals total 17.4% and those active during leisure time total 15%. Healthy eating is also a problem, as only one third of the adult population

consumed fruits and vegetables regularly and only one fifth met the WHO recommended levels. These data corroborate the POF data (2003), which shows that the mean intake of fruits and vegetables is approximately 140 g, whereas the WHO Global Strategy on Diet, Physical Activity and Health recommendations are nearly 400 g of fruits and vegetables^{1,17}.

The influence of obesity on chronic diseases has been well established and a high BMI poses the risk of diabetes, systemic arterial hypertension and dyslipidemia¹⁸. A study conducted with the American population showed that the BMI was associated with a greater chance of rating one's own

health as poor or fair¹⁹.

An inverse relationship between level of education and nutritional outcomes in the female population was observed in studies conducted in Brazil in recent decades²⁰. The opposite was found among males, with a lower prevalence of overweight in the groups with a lower level of education²¹.

Arterial hypertension is shown to be more frequent in men aged 50 years or less²², although having a higher frequency in women in the present study, probably because the information was self-reported and dependent on access to diagnosis. Likewise, the higher frequency of diagnosis of diabetes, dyslipidemia and osteoporosis in females can partly be due to their seeking health services more frequently, resulting in a higher proportion of medical diagnoses²³.

The findings of this study confirmed the increase in the frequency of arterial hypertension, diabetes and dyslipidemia with age, which is in agreement with the increase in the risk of CNCND in elderly populations due to the accumulation of risk factors^{1,24}. In addition, there was higher frequency of diagnosis of arterial hypertension in individuals with a lower level of education, as observed in other studies²⁵.

Data from the 2008 VIGITEL survey corroborate previous studies which have shown that osteoporosis primarily affects women after menopause and those with a lower level of education^{26,27}.

High alcohol use is described as a risk factor for hypertension, cirrhosis, cerebrovascular accident, and pharynx, larynx, esophagus and liver cancer. This high level of consumption among males is consistent with other studies in Brazil and worldwide^{27,29}. Alcohol abuse has increased in Brazil, compared with data from the 2006 VIGITEL survey⁴.

With regard to the intake of fruits and vegetables, the present study showed that men and younger individuals had a lower intake, similarly to what has been observed in the World Health Survey³⁰. The greater intake of fruits and vegetables in populations with a higher level of education can

also be explained by the greater access to information used to adopt healthy habits³¹.

Greater intake of fruits and vegetables has been found among elderly individuals living in 14 different geographical areas in Africa, America, Europe and Asia³². This positive association between age and intake of fruits and vegetables can be explained by previously acquired eating habits, including a healthier diet, and by following the recommendations received in health services, which occur more frequently among the elderly population with a higher prevalence of chronic diseases³¹.

Previous studies show that men are more active in the leisure time, work and transportation domains, while women are more active in the household domain^{5,33}. These findings have been reported in several studies in Brazil³⁴, Spain³⁵, Australia and other countries³⁶. The literature is consistent with regard to lower levels of education being associated with higher levels of physical inactivity during leisure time³³.

One of the limitations of this study is the fact that the sample was restricted to individuals who had a fixed telephone line, with lower coverage in the North and Northeast regions. However, the use of post-stratification weights reduces bias, as it seeks to bring the study sample closer to the reality of the population of the Brazilian capitals, according to the 2000 Demographic Census. Nonetheless, it is estimated that recent changes in the distribution of levels of education and age groups have occurred in the country with the increase in the elderly population, which could alter the future VIGITEL estimates from the updating of census data. Another limitation refers to the use of self-reported morbidity, dependent on the access to medical diagnosis and on the individual's awareness of their own health status. However, the literature shows that self-reported hypertension is a satisfactory indicator of prevalence estimates, with the advantage of being inexpensive and fast to obtain information^{22,23}.

Modern life exposes individuals and societies to innumerable behavioral risk

factors (smoking, diet, physical inactivity, alcohol and drug use) and, concomitantly, reduces the action of protective factors such as: the increased access to fresh foods with a higher nutritional quality, the existence of social support networks and safe public spaces, and safe and appropriate public spaces for physical activity⁸.

The data monitored by the VIGITEL

survey are important to support public policies on health promotion and useful for the follow-up of risk and protective factors for chronic non-communicable diseases in adults living in the Brazilian capitals. As a result, these data are a relevant epidemiological tool to support health promotion and CNCD prevention policies.

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