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Tobacco smoking and level of education in Brazil, 2006

ABSTRACT

OBJECTIVE: To assess smoking prevalence and cumulative cigarette consumption and factors associated.

METHODS: Data from 54,369 respondents aged ≥18 years were analyzed. Data was collected through interviews using the *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) conducted in Brazilian state capitals and Federal District in 2006. Smoking prevalence rates were estimated stratified by level of education and gender in all cities studied and prevalence ratios, crude and adjusted for number of adults living in the same household and number of rooms per household, were also calculated. Lifetime cigarette consumption (pack-years) was analyzed by level of education and gender in all macroregions studied.

RESULTS: In Brazil, overall smoking prevalence was significantly higher among men and women with lower education (eight years of schooling = 24.2%; nine years and more = 15.5%). This difference tended to decrease with age and an inverse proportion was seen among the elderly. Reduced risk of smoking was found associated to higher education regardless of the number of adults living in the same household and the number of rooms per household. The prevalence of heavy smokers was higher among those with lower education, especially among women in the Northern region, except for the Southern region, where it was higher among men with higher education.

CONCLUSIONS: The study results confirmed higher smoking prevalence among those with lower education, especially among younger males. Further studies are needed to better understand the dynamics of tobacco epidemic for developing specific prevention actions targeting different age and social groups.

DESCRIPTORS: Smoking, epidemiology. Educational Status. Health Inequalities. Chronic Disease, prevention & control. Health Surveys. Brazil. Telephone interview.

INTRODUCTION

Smoking is the leading preventable risk factor for many chronic diseases and accounts for a large number of premature deaths worldwide.[19]

Recent research studies have estimated the attributable risk of active and passive smoking associated to several diseases[6] and evidenced that smoking cessation can benefit even the elderly.[2] It has also been demonstrated that reduction of daily tobacco consumption lowers the risk of developing cardiovascular conditions, respiratory symptoms, and cancer, particularly lung cancer.[18] Tobacco-related diseases are a leading cause of death among Brazilian population.[12]

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Since 1980s smoking control actions have been implemented in Brazil, coordinated by the Brazilian Ministry of Health and the *Instituto Nacional do Câncer* (National Cancer Institute), as part of a policy based on legal acts, education, and tobacco product regulations.[5]

The 1989 National Nutrition and Health Survey estimated a smoking prevalence of 33.1% (40.3% among men and 26.2% among women) in people aged 15 years and more.[12] From these data, the World Health Survey[17] found a 35% reduction in smoking prevalence (2.5% per year) in people aged 18 years and more between 1989 and 2003.[12]

The objective of the present study was to analyze smoking prevalence and cumulative cigarette consumption and factors associated.

METHODS

A cross-sectional study including data from the Telephone-Based Surveillance of Risk and Protective Factors for Chronic Diseases (VIGITEL) was conducted in 26 state capitals and Federal District in Brazil in 2006.[13] VIGITEL was based on probabilistic samples of people aged 18 years and more living in households with at least one fixed telephone line. Considering a minimum of 2,000 interviews per city, stratified systematic drawing of 5,000 telephone lines (25 replicates of 200 lines) per city was carried out. Adults (≥18 years old) living in households with an active fixed telephone line were invited to participate in the study. Upon agreement, an adult living in the household was drawn to be interviewed at a day and hour of their convenience. Replicates were used up to at least 2,000 interviews per city were reached.[13]

The total number of adult respondents was 54,369, ranging between 2,008 and 2,301 by city. Of all respondents, 21,294 were males and 33,075 were females.

VIGITEL questionnaire was developed based on protocols used in risk factor monitoring systems for chronic diseases.[11,16,18] There was collected information on demographic and socioeconomic characteristics (age, gender, marital status, ethnicity, level of education, number of adults living in the same household, and number of rooms per household); food intake and physical activity; self-reported weight and height; cigarette and alcohol use; self-perception of health status, and reporting of prior medical diagnosis of arterial hypertension, diabetes, and high cholesterol.

Smoking prevalence was analyzed using the proportion of daily and casual smokers per city and data was then aggregated by cities in each macroregion and by all cities. Level of education was divided into: eight years of schooling; and nine years or more. Crude and age-adjusted (18–24, 25–34, 35–44, 45–54, 55–64 and ≥65 years) smoking prevalence ratios (PR) associated to level of education and their related 95% confidence intervals were estimated per city, macroregion, and overall (all cities).

To assess the dynamics of association between smoking and level of education in young adults, adults, and elderly population, smoking PR associated to level of education and their related 95% CI were calculated by aggregating data of cities by macroregion and stratifying it into three age groups: 18–29, 30–59, and ≥60 years.

PRs adjusted for number of adults living in the same household and number of rooms per household were also estimated by grouped cities in a macroregion. The variable number of adults living in the same household was categorized into tertiles (up to two; three; and four and more) and number of rooms per household was categorized into quartiles (zero to three; four; five; and six).

For those respondents reporting smoking, lifetime cumulative cigarette consumption was estimated based on daily amount consumed and smoking duration using data grouped by macroregion. The number of daily packs was multiplied by years of smoking reported (difference between age at the time of interview and age of smoking initiation). Smoking categories were defined as follows: light (up to 20 pack-years); moderate (20.1 to 40.0 pack-years); and heavy (more than 40.0 pack-years). This analysis was adjusted for age (18–24, 25–34, 35–44, 45–54, 55–64, and ≥65 years old) and stratified by level of education (up to eight years of schooling; and nine or more). All analyses were performed by gender and all estimates included weighting factors attributed to each respondent in VIGITEL.[13]

As it was a telephone survey, an oral consent from all respondents was obtained at the time of telephone contact. VIGITEL was approved by the *Comissão de Ética em Pesquisa em Seres Humanos* (Human Research Ethics Committee) of the Brazilian Ministry of Health.

RESULTS

Tables 1 and 2 shows smoking prevalences and PRs associated to level of education and their related 95% CI per city, all cities in a macroregion and overall among men and women. Respondents with lower education had higher smoking prevalence. Higher rates of smoking were seen among men in Porto Alegre (RS) and women in Florianópolis (SC). Lower smoking prevalences were found among men with higher education in Salvador (BA) and Palmas (TO) (Table 1), and women with higher education in Manaus (AM) and Aracaju (SE). Reduced risk of smoking was verified among both male and female respondents with nine

Table 1. Smoking prevalence[a] among men (≥18 years old) by level of education, and crude and age-adjusted prevalence ratios (PR)[b] by macroregions and capitals. Brazil, 2006. (N=54,369)

Region/Capital	Level of education (years)				Crude PR		Adjusted PR	
	0 to 8		9 or more					
	%	95% CI	%	95% CI	PR	95% CI	PR	95% CI
Brazil	24.2	23.2;25.3	15.7	15.1;16.3	0.65	0.57;0.74	0.64	0.56;0.73
Northern	26.0	24.0;28.0	15.1	14.0;16.2	0.58	0.49;0.70	0.56	0.46;0.70
Porto Velho	30.8	25.4;36.1	15.4	12.4;18.4	0.50	0.36;0.70	0.47	0.34;0.67
Rio Branco	29.6	24.4;34.8	14.7	11.7;17.7	0.50	0.35;0.70	0.47	0.34;0.67
Manaus	26.4	21.1;31.7	12.4	9.8;15.1	0.47	0.33;0.68	0.46	0.31;0.67
Boa Vista	26.2	20.7;31.7	18.1	14.9;21.3	0.69	0.49;0.98	0.66	0.45;0.96
Belém	21.3	16.2;26.4	17.3	14.1;20.4	0.81	0.57;1.15	0.77	0.54;1.11
Macapá	37.5	31.6;43.4	17.3	14.2;20.4	0.46	0.34;0.63	0.42	0.31;0.58
Palmas	22.4	16.5;28.3	12.5	10.0;15.0	0.56	0.36;0.87	0.55	0.35;0.88
Northeastern	20.1	18.4;21.8	14.0	13.0;15.0	0.70	0.59;0.82	0.68	0.58;0.80
São Luís	20.2	14.9;25.4	13.6	10.8;16.4	0.67	0.44;1.03	0.65	0.42;1.01
Teresina	28.4	23.1;33.8	16.5	13.2;19.7	0.58	0.40;0.84	0.55	0.38;0.80
Fortaleza	20.8	15.7;25.9	17.7	14.5;20.9	0.85	0.57;1.27	0.82	0.54;1.25
Natal	18.9	13.8;24.0	15.6	12.5;18.7	0.83	0.52;1.30	0.81	0.50;1.31
João Pessoa	27.5	21.7;33.3	13.0	10.2;15.8	0.47	0.32;0.69	0.46	0.31;0.67
Recife	23.1	17.5;28.7	14.5	11.4;17.5	0.63	0.43;0.92	0.61	0.42;0.89
Maceió	19.0	14.2;23.8	15.9	12.8;19.1	0.84	0.57;1.24	0.81	0.54;1.21
Aracaju	20.2	14.2;26.1	14.0	11.1;16.9	0.69	0.44;1.10	0.66	0.42;1.02
Salvador	14.1	9.8;18.4	10.1	7.6;12.7	0.72	0.45;1.15	0.73	0.45;1.18
Southeastern	24.7	21.9;27.4	16.9	15.3;18.4	0.68	0.54;0.87	0.68	0.52;0.88
Belo Horizonte	26.9	21.4;32.5	16.5	13.3;19.6	0.61	0.44;0.86	0.60	0.42;0.85
Vitória	23.5	17.4;29.5	15.3	12.3;18.2	0.65	0.42;1.02	0.60	0.38;0.94
Rio de Janeiro	17.4	12.4;22.4	14.7	11.7;17.8	0.85	0.57;1.25	0.85	0.58;1.25
São Paulo	28.0	22.7;33.2	18.4	15.0;21.8	0.66	0.47;0.92	0.65	0.44;0.96
Southern	33.0	29.2;36.8	16.4	14.6;18.1	0.50	0.39;0.63	0.47	0.37;0.61
Curitiba	30.0	24.2;35.8	15.4	12.4;18.5	0.51	0.37;0.72	0.51	0.36;0.73
Florianópolis	26.3	19.1;33.4	19.0	16.0;22.0	0.72	0.49;1.07	0.69	0.47;1.02
Porto Alegre	38.2	31.4;44.9	16.7	13.6;19.9	0.44	0.30;0.63	0.41	0.29;0.59
Central-western	24.4	21.5;27.3	13.5	12.1;14.9	0.55	0.42;0.72	0.55	0.41;0.72
Campo Grande	25.1	19.8;30.3	14.0	11.0;17.0	0.56	0.38;0.82	0.53	0.35;0.80
Cuiabá	31.3	25.2;37.4	15.1	12.3;18.0	0.48	0.33;0.71	0.43	0.29;0.65
Goiânia	18.7	14.2;23.3	12.6	9.6;15.5	0.67	0.45;0.99	0.68	0.47;0.99
Brasília	25.7	17.3;34.2	13.6	11.0;16.1	0.53	0.32;0.86	0.52	0.31;0.87

[a] Weighed percent for adjusting the sociodemographic distribution of VIGITEL sample to adult population distribution from 2000 Population Census.
[b] Reference category: level of education of up to eight years of schooling.

years or more of schooling. Age-adjusted PRs ranged between 0.30 and 0.88 and were statistically significant in most cities.

Tables 3 and 4 show smoking prevalences and PRs associated to level of education by age in the cities of each macroregion and overall in men and women, respectively. For younger respondents (18–29 years old), a protective effect of education was found among men in five macroregions and among women in the northern, northeastern, and central-western regions. For those aged 30–59, level of education was a protective factor and PRs remained almost the same after adjustment for number of adults living in the same household and number of rooms per household. Only among women in the southeastern region 95% CI of the adjusted PR

Table 2. Smoking prevalence[a] among women (≥18 years old) by level of education, and crude and age-adjusted prevalence ratios (PR)[b] by macroregions and capitals. Brazil, 2006. (N=54,369)

Region/Capital	Level of education (years)				Crude PR		Adjusted PR[a]	
	0 to 8		9 or more					
	%	95% CI	%	95% CI	PR	95% CI	PR	95% CI
Brazil	14.7	14.0;15.3	10.6	10.2;11.0	0.73	0.64;0.82	0.70	0.61;0.80
Northern	12.6	11.3;13.9	7.6	6.9;8.3	0.60	0.48;0.76	0.59	0.46;0.76
Porto Velho	17.6	13.8;21.5	8.0	6.1;9.8	0.45	0.29;0.71	0.44	0.26;0.74
Rio Branco	22.1	18.0;26.2	10.3	8.2;12.4	0.47	0.33;0.67	0.46	0.32;0.68
Manaus	11.2	8.2;14.3	5.8	4.1;7.5	0.52	0.30;0.88	0.48	0.27;0.84
Boa Vista	12.2	8.8;15.6	8.4	6.5;10.2	0.69	0.43;1.11	0.80	0.47;1.34
Belém	11.1	8.0;14.1	8.9	7.0;10.9	0.81	0.54;1.21	0.81	0.54;1.23
Macapá	12.6	9.1;16.0	5.8	4.2;7.4	0.46	0.29;0.75	0.45	0.26;0.77
Palmas	10.3	6.1;14.6	7.8	6.1;9.6	0.76	0.31;1.86	0.74	0.27;2.01
Northeastern	12.9	11.8;14.0	7.3	6.7;7.9	0.56	0.47;0.67	0.54	0.45;0.66
São Luís	9.9	6.8;13.1	6.4	4.8;8.0	0.64	0.37;1.10	0.60	0.34;1.08
Teresina	18.5	14.8;22.2	6.5	4.8;8.2	0.35	0.22;0.56	0.32	0.20;0.52
Fortaleza	17.4	13.8;21.0	8.1	6.2;10.0	0.47	0.31;0.70	0.44	0.28;0.69
Natal	13.0	9.8;16.2	6.9	5.2;8.7	0.53	0.35;0.82	0.51	0.32;0.81
João Pessoa	15.8	12.2;19.3	6.9	5.2;8.6	0.44	0.28;0.68	0.40	0.25;0.62
Recife	13.3	10.2;16.5	8.2	6.3;10.0	0.61	0.42;0.89	0.64	0.44;0.93
Maceió	10.9	8.0;13.8	9.9	7.8;12.0	0.91	0.52;1.58	0.86	0.49;1.52
Aracaju	10.3	7.4;13.1	5.6	4.0;7.1	0.54	0.34;0.87	0.48	0.30;0.78
Salvador	7.9	5.3;10.5	6.5	4.8;8.2	0.82	0.48;1.39	0.83	0.47;1.48
Southeastern	15.0	13.4;16.7	12.3	11.1;13.4	0.82	0.66;1.01	0.78	0.62;0.98
Belo Horizonte	13.3	10.1;16.5	9.5	7.5;11.5	0.72	0.48;1.06	0.68	0.44;1.07
Vitória	16.6	12.9;20.4	11.3	9.2;13.4	0.68	0.46;1.00	0.59	0.39;0.89
Rio de Janeiro	15.0	11.7;18.2	11.3	9.1;13.4	0.76	0.54;1.06	0.73	0.52;1.04
São Paulo	15.4	12.3;18.6	13.6	11.1;16.1	0.88	0.64;1.21	0.83	0.58;1.18
Southern	18.2	16.0;20.5	14.6	13.3;16.0	0.80	0.65;0.99	0.76	0.60;0.95
Curitiba	18.0	14.4;21.5	13.9	11.5;16.3	0.77	0.56;1.06	0.75	0.53;1.06
Florianópolis	19.8	15.4;24.3	12.7	10.5;14.9	0.64	0.45;0.92	0.58	0.39;0.86
Porto Alegre	18.1	14.2;22.1	15.9	13.6;18.3	0.88	0.63;1.23	0.81	0.56;1.15
Central-western	16.6	14.7;18.4	9.4	8.4;10.4	0.57	0.43;0.76	0.54	0.39;0.74
Campo Grande	10.6	7.8;13.3	9.1	7.0;11.2	0.86	0.56;1.33	0.88	0.55;1.40
Cuiabá	14.3	10.5;18.1	7.6	5.8;9.4	0.53	0.34;0.84	0.53	0.31;0.90
Goiânia	18.2	14.7;21.7	6.4	4.7;8.2	0.35	0.23;0.55	0.30	0.19;0.48
Brasília	18.4	13.3;23.5	11.5	9.6;13.5	0.63	0.39;1.01	0.61	0.37;1.02

[a] Weighed percent for adjusting the sociodemographic distribution of VIGITEL sample to adult population distribution from 2000 Population Census.
[b] Reference category: level of education of up to eight years of schooling.

was not significant. For the elderly (≥60 years old), crude and adjusted PRs were not significant, except in the northern region. This effect varied among women; a non-significant trend of increased risk of smoking was seen among those with higher education in the southern and central-western regions.

The Figure shows age-adjusted lifetime cumulative cigarette consumption (pack-years) among smokers by level of education, stratified by gender and aggregated by macroregions. Almost 60% of smokers in state capitals reported light smoking (up to 20 pack-years). The prevalence of moderate (20 to 40 pack-years) and heavy (more than 40 pack-years) smokers were higher among males and in the southeastern and southern regions as well. Overall, the proportion of smokers was higher among those with lower education. The

Table 3. Smoking prevalence[a] among men (≥18 years old) by level of education and crude and age-adjusted prevalence ratios[b,c] by macroregions. Brazil, 2006. (N=54,369)

Age group (years)	Region	Level of education (years)				Crude PR		Adjusted PR[c]	
		0 to 8		9 or more					
		%	95% CI	%	95% CI	PR	95% CI	PR	95% CI
18 to 29	Brazil	25.3	22.5;28.1	13.4	12.5;14.3	0.53	0.40;0.71	0.53	0.41;0.69
	Northern	30.7	25.6;35.8	15.9	14.1;17.6	0.52	0.39;0.69	0.53	0.40;0.70
	Northeastern	20.6	16.2;25.1	12.4	10.9;14.0	0.60	0.44;0.82	0.61	0.44;0.84
	Southeastern	25.3	16.9;33.8	12.9	10.3;15.4	0.51	0.26;0.99	0.54	0.31;0.94
	Southern	38.0	25.5;50.5	15.5	12.5;18.5	0.41	0.24;0.69	0.40	0.24;0.65
	central-western	24.1	16.0;32.2	13.6	11.2;16.1	0.57	0.34;0.96	0.52	0.30;0.89
30 to 59	Brazil	25.4	23.9;26.8	17.8	17.0;18.6	0.70	0.61;0.81	0.75	0.65;0.87
	Northern	24.2	21.6;26.8	15.0	13.5;16.5	0.62	0.50;0.77	0.63	0.50;0.78
	Northeastern	21.5	19.2;23.8	15.6	14.2;17.0	0.73	0.60;0.87	0.71	0.59;0.86
	Southeastern	25.9	22.3;29.6	20.1	17.9;22.4	0.78	0.61;0.99	0.88	0.69;1.13
	Southern	35.6	30.5;40.7	17.4	15.0;19.7	0.49	0.38;0.62	0.52	0.41;0.66
	Central-western	25.5	21.7;29.3	13.5	11.7;15.4	0.53	0.39;0.73	0.56	0.41;0.77
60 or more	Brazil	17.6	15.9;19.4	13.4	11.5;15.2	0.76	0.53;1.08	0.79	0.55;1.14
	Northern	17.1	13.6;20.7	6.0	2.5;9.4	0.35	0.17;0.73	0.39	0.19;0.83
	Northeastern	12.8	10.1;15.5	11.4	8.4;14.4	0.89	0.58;1.38	0.89	0.58;1.39
	Southeastern	19.3	14.6;23.9	14.3	10.0;18.6	0.74	0.43;1.28	0.79	0.45;1.37
	Southern	16.7	11.2;22.1	13.8	9.0;18.6	0.83	0.45;1.52	0.89	0.48;1.65
	Central-western	20.8	15.9;25.6	12.7	8.5;16.9	0.61	0.34;1.11	0.53	0.28;1.01

[a] Weighed percent for adjusting the sociodemographic distribution of VIGITEL sample to adult population distribution from 2000 Population Census.
[b] Reference category: level of education of up to eight years of schooling.
[c] Adjusted for tertiles of number of adults living in the same household (up to 2; 3; 4 or more) and quartiles of number of rooms per household (0 to 3; 4; 5; 6 or more).

difference in the proportion of heavy smokers according to level of education was higher among women, notably in the northern region. However, an inverse trend was found among men in the southern region where heavy smoking was associated to higher education.

DISCUSSION

The present study showed major differences in smoking prevalence in state capitals in Brazil.

Higher smoking prevalence was found among respondents with lower education, especially in younger people (18–29 years of age). Two Brazilian population-based surveys conducted between 2002 and 2005[17,a] reported a proportion of smokers lower than 23% in those aged 18 years and more. The prevalence of smokers was higher among respondents with lower education in both studies. Smoking prevalence in Brazil has in fact decreased, especially among younger people with better socioeconomic conditions.[12] It suggests that smoking control policies have been effective to prevent smoking initiation among young people but they are likely to have a more direct effect on people of higher socioeconomic strata.

When data was aggregated by cities, the effect of reduced risk with increasing education in younger females was of lower magnitude than that seen in their male counterpart. But as this result was not consistently seen across regions, an effect modification of these variables is likely to have occurred. Further studies are needed to better explore potential interactions between socioeconomic and cultural background and purchase power/promotion of consumption in addition to level of education. It could be that the variable "years of schooling" (which includes the last year of school attended to estimate the number of years a person attended school) was able to better distinguish respondents with fewer years of schooling. For those with many years of education, their income is not generally affected by additional years of

[a] Ministério da Saúde. Instituto Nacional de Câncer. Secretaria de Vigilância à Saúde. Inquérito Domiciliar sobre Comportamentos de Risco e Morbidade Referia de Doenças e Agravos Não-Transmissíveis, 2002-2005. Rio de Janeiro: INCA; Disponível em http://www.inca.gov.br/vigilancia/fatores_de_risco.html

Table 4. Smoking prevalence[a] among women (≥18 years old) by level of education and crude and age-adjusted prevalence ratios,[b,c] by macroregions. Brazil, 2006. (N=54,369)

Age group (years)	Region	Level of education (years)				Crude PR		Adjusted PR[c]	
		0 to 8		9 or more					
		%	95% CI	%	95% CI	PR	95% CI	PR	95% CI
18 to 29	Brazil	13.0	10.9;15.0	8.7	8.1;9.4	0.67	0.50;0.92	0.70	0.51;0.95
	Northern	10.2	6.8;13.7	5.5	4.5;6.5	0.54	0.31;0.92	0.54	0.30;0.97
	Northeastern	13.8	10.5;17.2	5.0	4.2;5.9	0.36	0.24;0.55	0.35	0.23;0.52
	Southeastern	12.1	6.7;17.5	10.8	8.8;12.8	0.89	0.48;1.64	1.00	0.54;1.84
	Southern	11.2	3.8;18.6	12.8	10.3;15.2	1.14	0.50;2.61	1.19	0.54;2.63
	Central-western	17.5	10.6;24.3	7.9	6.3;9.6	0.45	0.23;0.90	0.41	0.21;0.80
30 to 59	Brazil	17.9	16.9;18.9	12.5	11.9;13.0	0.70	0.60;0.80	0.71	0.62;0.83
	Northern	15.3	13.4;17.2	9.9	8.9;10.9	0.64	0.50;0.83	0.68	0.52;0.89
	Northeastern	14.3	12.8;15.9	9.3	8.4;10.2	0.65	0.54;0.78	0.66	0.55;0.81
	Southeastern	18.9	16.3;21.4	14.0	12.5;15.6	0.74	0.58;0.95	0.76	0.59;0.99
	Southern	24.4	20.9;28.0	16.1	14.3;17.9	0.66	0.53;0.83	0.65	0.51;0.81
	Central-western	18.8	16.1;21.5	10.9	9.5;12.2	0.58	0.43;0.77	0.61	0.45;0.83
60 or more	Brazil	8.2	7.3;9.0	8.0	6.8;9.2	0.98	0.68;1.40	1.06	0.73;1.55
	Northern	8.2	6.3;10.1	4.8	1.9;7.6	0.58	0.23;1.48	0.74	0.30;1.81
	Northeastern	7.4	6.0;8.8	5.4	3.7;7.0	0.73	0.47;1.13	0.77	0.49;1.22
	Southeastern	8.4	6.4;10.4	8.0	5.4;10.6	0.95	0.53;1.71	1.03	0.53;1.98
	Southern	9.4	6.8;12.0	13.9	10.1;17.8	1.49	0.93;2.38	1.41	0.87;2.30
	Central-western	7.2	5.1;9.4	8.2	5.1;11.2	1.13	0.59;2.18	1.28	0.64;2.54

[a] Weighed percent for adjusting the sociodemographic distribution of VIGITEL sample to adult population distribution from 2000 Population Census.
[b] Reference category: level of education of up to eight years of schooling.
[c] Adjusted for tertiles of number of adults living in the same household (up to 2; 3; 4 or more) and quartiles of number of rooms per household (0 to 3; 4; 5; 6 or more).

schooling. The finding of higher smoking prevalences among women over 60 with higher education may reflect a trend of past decades, a time when smoking was a symbol of freedom.

A limitation of the study was the use of PRs to assess the association between smoking and level of education. The adjustment for the number of people living in the same household and number of rooms per household did not provide more accurate estimates, which were similar before and after adjustment. These two variables may not be adequate indicators of socioeconomic condition to capture the anticipated effect with adjustment; or either these variables and level of education are colinear. The variable number of people per room in the household was intended to be an additional socioeconomic indicator.

The interpretation of results of the analysis of lifetime cumulative cigarette consumption restricted to current smokers should take into account that this compound variable may not accurately reflect actual burden of smoking. Information on daily amounts consumed and age of smoking initiation were cross-sectionally collected regardless of consumption changes over time. The age-adjustment revealed higher proportion of smokers with lower education, except for men in the southern region. The South is the leading tobacco producer region in Brazil, which may have influenced smoking behavior of respondents. Qualitative studies can provide further input on social and cultural aspects associated to smoking.

An American cohort study, started in 1982, corroborated Doll & Peto observations[1] made in the 1970s that duration of tobacco consumption (in years) is more important for predicting lung cancer than daily amount of cigarettes smoked.[3] These studies were carried out in countries where burden of smoking, especially in the 1950s and 1960s, was likely well above that seen in Brazil during that same time period. However, there is no population-based data available in Brazil on smoking prevalence and lifetime cigarette consumption to compare with that of other developed countries. In Brazil, a significant reduction in the mean number of cigarettes smoked on a daily basis has been seen among men in general and among women with nine years or more of education.[12]

In the present study, most smokers of state capitals (except for the southern region) showed light burden of smoking. This finding may suggest that, although these

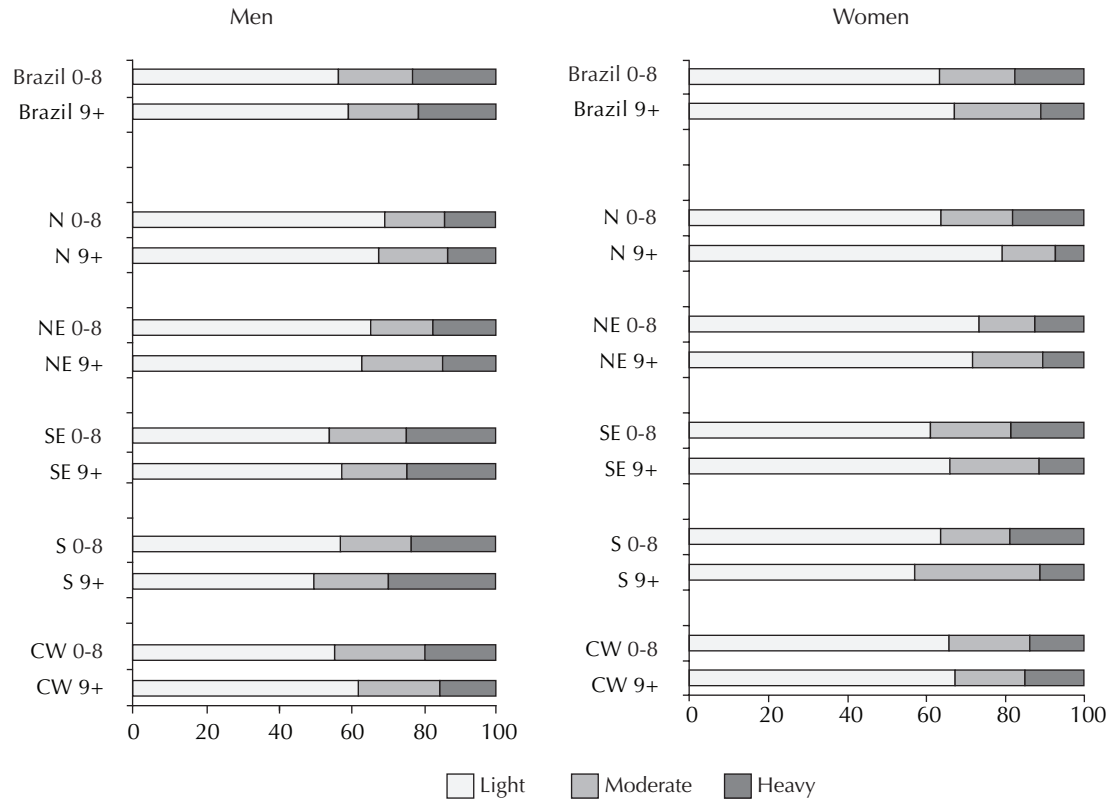

Figure. Age-adjusted lifetime cigarette consumptiona among smokers according to level of educationb in state capitals of macroregions and Federal District. Brazil, 2006.
N: Northern; S: Southern; NE: Northeastern; SE: Southeastern; CW: Central-western region
[a] Weighed to adjust sociodemographic distribution of VIGITEL sample to adult population distribution from 2000 Population Census and adjusted for age (18–24, 25–34, 35–44, 45–44, 55–64 and 65 or more years).
[b] 0–8 and 9 or more years.

smokers are not able to quit smoking, their daily cigarette consumption decreased. It supports an approach for intensifying actions for smoking cessation within the Brazilian National Health System (SUS). Health managers should prioritize access to effective treatment for tobacco dependents seeking care services at all levels.

Different smoking rates between men and women in some cities and by age reinforce the fact that smoking epidemics in Brazil have distinctive dynamics, reflected by different rates of tobacco-related diseases. Malta et al[9] analyzed mortality trend due tracheal, bronchial, and lung cancer in Brazil as a whole and in Brazilian states between 1980 and 2003. They found reduced mortality among men younger than 59 and increased mortality among women older than 30. In a study conducted in the state of Rio Grande do Sul including adolescents of a cohort followed up from birth, smoking was inversely associated to parental education among males, and family income among females.[10]

The association between smoking prevalence and lower education or socioeconomic condition and increased smoking prevalence among women have been consistently demonstrated in countries with varying degrees of development. In Russia,[14] a trend analysis based on data from surveys conducted between 1992 and 2003 showed that smoking prevalence had a two-fold increase (6.9% to 14.8%) among women and a slight increase (57.4% to 62.6%) among men. For both men and women, this increase was significantly higher among those with lower education, especially among women. Mean age of smoking initiation was significantly lower among women.[14]

A population-based survey carried out in Mumbai,[4] India, found that the odds ratio of tobacco use of any kind among illiterate compared to respondents with college education was 7.4 in men and 20.3 in women after adjustment for age and occupation.[4]

An Egyptian study reported an association between smoking prevalence, (married) marital status, and (low) level of education among men. Among women, however, a direct association was seen between higher (college) education and smoking (OR=15.3). Those

who never smoked were more familiar about health effects of tobacco and had better risk perception of tobacco use.[20]

An US study[7] reported that, between 1992 and 2002, a more pronounced reduction in smoking prevalence was seen among women of low socioeconomic condition compared to those of high condition. The authors concluded that poor women responded better to media messages and increased cigarette taxes.

Thus, it is crucial to better understand conditioning and interfering factors of healthy habits and to what extent smoking control actions are effective in men and women of different social conditions and level of education.[8] In addition to taking into account the different history of smoking among women, tobacco industry strategies targeting individuals of different ages and socioeconomic conditions should also be considered.

It is vital to understand the entire process involving individual and social behaviors associated to tobacco experimentation and dependence to support effective policies and interventions that can promote increased awareness in more vulnerable groups with limited access to health services. Differences of gender and level of education should be taken into consideration, as well as social and cultural aspects of each Brazilian region.

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