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Noncommunicable diseases, risk factors, and protective factors in adults with and without health Insurance

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Abstract *This study describes the coverage of health insurance and compares the occurrence of risk factors (RF) and protective factors of noncommunicable diseases in the population with and without health insurancesin Brazilianstate capitals. Data from the telephone survey Vigitel was analyzed. The Poisson regression model was used to estimate the prevalence ratio (PR), comparing RF among those who did or did not have a health insurance. Plan coverage was 49.1%, and the highest prevalences were in Goiania, Vitória, Florianópolis, and Belo Horizonte. Adults over 55 years of age and with higher education were more likely to have an insurance. The population with health insurance hada higher prevalence of protective factors, such as fruit and vegetable consumption (PR = 1.3 95% CI 1.2-1.3), physical activity in their free time (PR = 1.2 (95% CI: 1.2-1.3), mammographies (RP = 1.2 IC95% 1.1-1.3) and pap smears (PR = 1.1 IC95% 1.2-1.3), and lower prevalence of RFs such as smoking (RP = 0.7, 95% CI 0.6-0.8), poor health (RP = 0.8 CI95% 0.6-0.9), obesity (RP = 0.8 IC95% 0.7-0.9), consumption of meat with fat (RP = 0.9 IC95% 0.8-0.9) and whole milk (RP = 0.9 IC95% 0,8-0.9). Regardless of educational level, the population that has health insurancesgenerally has better indicators, such as healthier habits and greater coverage of preventive exams.*

Key words *Health insurance, Chronic diseases, Hypertension, Healthy eating, Physical activity*

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Introduction

Cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases are the most common noncommunicable diseases (NCDs), which are responsible for 70% of deaths in the world[1,2]. These diseases lead to premature deaths, loss of quality of life, and have negative economic impact in families, individuals, and society[1,2]. Increasing NCD numbers reflect the negative effects of fast urbanization and globalization, which induce the people of most countries to sedentary lifestyles, high-calorie diets with extremely processed foods, in addition to the use of tobacco and alcohol[1,2]. Generally, NCDs affect low-income populations, since they are more exposed to the risk factors and have worse access to health services[1-4].

Studies point out inequalities in the distribution of the morbidity and mortality of NCDs and their risk factors, resulting from socioeconomic factors such as education, employment, income, gender, race[1,3], educational level, and having health insurances[4-6]. Literature also describes a positive relation between the access to health services, educational levels, and the income of the population[7-9]. Data from the National Health Survey (PNS) pointed out that the highest the educational level of the head of the family, the higher their chance of having a health insurance. These proportions increased, considering that 61.7% of the population with complete higher education has a health insurance, while, among those with a lower educational level (from 0 to 8 years education), 14.1% also reported having it, regardless of the type of insurance.[10,11] The same research pointed out that the population with the highest educational level and health insurances had better access to health services[6], both public and private, and better access to preventive exams for cancer, such as the mammography[12], in addition to a lower frequency of NCDs and less disabilities generated by these diseases[6].

American studies with data from the Behavior Risk Factor Surveillance System (BRFSS) show that populations with health insurance tend to have more access to preventive exams, a higher prevalence of protective factors, and a lower prevalence of risk factors[13,14]. These studies state that there is a relation between these outcomes and higher educational levels and social conditions of their participants[13,14]. In Brazil, there are still few studies comparing the population with health insurance to the population without[15]. Surveys carried out in Belo Horizonte pointed out that there are differences between these populations, always associating higher prevalences of risk factors with populations under no health insurance coverage[8].

In 2006, the National System of Telephone Surveys on Noncommunicable Diseases (Vigitel) started to monitor the NCDs and their risk factors, and in 2008, the variable health insurance was included in the survey. There are few national studies that compare the different populations, with and without an insurance. Considering the constant change in the coverage of Brazilian health insurances[10], and the increase in the population under the coverage of such insurances, as indicated by the 2013 National Health Survey[11], it is important for this type of study to point out inequalities in health and give support to overcoming them.

This article aimed to analyze the coverage of health insurances in Brazil and compare the occurrence of NCDs, their risk factors and protective factors, reported morbidities, and the access to preventive exams in the population with and without health insurances in all Brazilian capitals.

Methods

This cross-sectional study used data from the 2015 Vigitel survey for the adult population (≥ 18 years old) living in the capital cities of the 26 Brazilian states and in the Federal District. The Vigitel used probabilistic samples from landlines in the city, which were made available by the main telephonic companies in the country. 5,000 landlines were randomly chosen from each capital and separated in replicas (or sub-samples) of 200 lines each, to identify active residential lines, which would then be considered eligible for the research. For each line selected, one of the adults who lived in the household was randomly selected to be interviewed[16,17].

The ranking method[18,19] was used to calculate the post-stratification weights, based on external sources of data from the Brazilian population. In the construction of the post-stratification weights, the study used data from the Brazilian Institute of Geography and Statistics (IBGE) for age, sex, and educational level of the population, considering the estimates of the IBGE for the current year of the research[17]. The ranking method uses the distribution of absolute frequencies of age groups (18 to 24; 25 to 34; 35 to 44; 45 to 54; 65 or more), sex (male, female), and educational level (0 to 7; 8 to 10; 11 to 13; 14 years

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or more)of the population, weighted by sampling weights. The weights were calculated using the SAS software, with the macro asRakinge.sas, made available by Izrael et al.[19].

The VIGITEL questionnaire is 94 questions long, and these are divided in the following modules: demographic and socioeconomic characteristics of the individuals; eating and physical activity standards; reported height and weight; consumption of cigarettes and alcoholic beverages; self-evaluation of one's own health situation; reported morbidities; and preventive exams.

In this study, the coverage of those who report having health insurance in the Brazilian capitals was analyzed, as were the Prevalence Ratio of the ownership of plans according to sex and age group, in the population who had the plan. The prevalences, with their respective CI95%, were compared to the variables related to smoking (smokers, ex-smokers, passive smokers at home, passive smokers at work); and to body weight (excessive body weight - body mass index ≥ 25 kg/m2; obesity - body mass index ≥ 30 kg/m2). The absent values of excessive weight and obesity were attributed according to the methodology employed by the Vigitel and previously described[17]. The other prevalences calculated were related to the consumption of meats with excessive fat (red meats with visible fats or chicken with skin); consumption of whole milk; regular consumption of sodas or artificial juices (five or more days a week); consumption of sweets (five or more days a week); physical inactivity (people who did not practice any physical activity in their free time in the last three months, make no intense physical efforts in their work, who do not go to work on foot or bicycle, and are not responsible for the heavy cleaning of their houses); PA< 150 minutes in the domains "free time", "work", and "movement"; the habit of watching TV; alcohol abuse (four or more doses for women and five or more for men) in a same occasion in the last 30 days (one dose of alcohol was considered to be one dose of a distilled alcoholic beverage, one can of beer, or one glass of wine); driving under the influence; bad health state self-assessment; and reported morbidities (previous medical diagnostic of arterial hypertension and diabetes).

Protective factors presented were: consumption of the recommended amount (five or more daily portions, in five or more days of the week) of fruits and vegetables; regular consumption of beans (five or more days a week); recommended practice of physical activities in one's free time (at least 150 minutes a week of light to moderate physical activity, or at least 75 minutes a week of vigorous physical activity, regardless of the number of days a week in which the physical activity is practiced; carrying out exams for the early detection of cancer in women (mammographies for women from 50 to 69 years old, in the last two years, and pap smear exams for women from 25 to 59 years old, in the last three years).

These indicators were calculated having, as their denominator, the number of adults interviewed, with the exception of those which referred to people of a specific age or sex. The calculation of the prevalences was weighted to adjust the sociodemographic distribution of the Vigitel sample to the distribution of the adult population in the city, according to the methodological aspects already described[17]. The PR was calculated as adjusted according to age, sex, and educational level, between those who had health insurance and those who did not, according to Poisson's model[20].

Also, the risk factors were compared between the population who had an insurance and those who did not, according to the prevalence and the PR adjusted by age and sex, and stratified according to the educational level (from 0 to 8, from 9 to 11, and 12 years of educational level).

The Vigitel Survey was approved by the Ethics Committee for Research with Human Beings from the Ministry of Health. The signing of the Free and Informed Consent Form, in this survey, was replaced by a verbal consent given by the interviewee during the phone call.

Results

The percentage of people with health insurances in the capitals, considered as a group, was 49.1%, varying from 30.4% in Rio Branco to 64.4% in Goiânia (Table 1).

Considering the population from 18 to 24 years old as a reference, the age group from 25 to 34 years old had a lower PR for having an insurance. The highest PRs were in the age groups from 55 to 64 (PR= 1.1 CI95% 1.05-1.2) and of 65-year-olds or older people (PR = 1.4 CI95% 1.3- 1.5). The highest the educational level, the highest the chance of having health insurance - 9 to 11 years (PR = 1.7 CI95% 1.6-1.8) and 12 to 20 years (PR = 2.8 CI95% 2.6-2.9) (Table 2).

The distribution of risk factors and protection factors for noncommunicable diseases among people with and without health insurance, in the capitals, considered as a group, as well as the es-

Table 1. Size of the sample and coverage of health insurance per capital. Brazil, Vigitel, 2015.

City	Has an insurance		Sample	Has an insurance		
	No	Yes	Total	%(*)		CI (95%)
Aracaju	788	1.211	1.999	52.11	49.25	54.98
Belém	1.005	993	1.998	43.27	40.60	45.95
Belo Horizonte	701	1.303	2.004	60.73	58.06	63.39
Boa Vista	1.084	932	2.016	31.54	28.49	34.59
Campo Grande	1.097	904	2.001	43.29	40.55	46.03
Cuiába	561	1.440	2.001	57.67	53.74	61.59
Curitiba	918	1.079	1.997	53.77	51.16	56.39
Florianópolis	550	1.445	1.995	61.76	58.51	65.01
Fortaleza	1.037	953	1.990	43.03	40.31	45.76
Goiânia	378	1.618	1.996	64.59	60.18	69.01
João Pessoa	1.017	974	1.991	34.79	32.11	37.48
Macapá	923	1.070	1.993	41.10	37.71	44.50
Maceió	1.136	860	1.996	38.93	36.12	41.73
Manaus	1.061	939	2.000	38.41	35.01	41.81
Natal	962	1.052	2.014	42.80	39.90	45.71
Palmas	722	1.272	1.994	49.93	46.62	53.25
Porto Alegre	953	1.051	2.004	50.81	47.77	53.86
Porto Velho	827	1.172	1.999	41.97	38.61	45.34
Recife	1.124	879	2.003	38.83	36.23	41.42
Rio Branco	1.110	891	2.001	30.39	27.44	33.35
Rio de Janeiro	631	1.373	2.004	53.91	50.51	57.30
Salvador	975	1.019	1.994	46.66	43.72	49.59
São Luís	1.191	805	1.996	35.19	32.36	38.03
São Paulo	923	1.075	1.998	48.01	45.37	50.65
Teresina	828	1.164	1.992	47.95	44.94	50.96
Vitória	554	1.438	1.992	64.29	61.16	67.42
Distrito Federal	366	1.637	2.003	59.85	55.50	64.20
Total	23.422	30.549	53.971	49.12	48.18	50.06

Note: (*) Weighted percentage to adjust the sociodemographic distribution of the Vigitel sample to the distribution of the adult population in the city, as projected according to each year of the research.

Table 2. Prevalence ratio of having or not health insurance in Brazilian capitals, according to age and educational level. Brazil, Vigitel, 2015.

Variable	PR	CI (95%)	
Age group			
18 to 24	1.00		
25 to 34	0.93	0.88	0.99
35 a 44	0.97	0.91	1.03
45 a 54	1.07	1.00	1.14
55 to 64	1.12	1.05	1.20
65 or more	1.42	1.34	1.52
Years of formal education			
0 to 8	1.00		
9 to 11	1.71	1.60	1.84
12 to 20	2.76	2.59	2.95

timated PRs, are presented in Table 3. In general, higher prevalences of protective factors and lower prevalences of risk factors were found in the population which had health insurances.

The population with insurances had the lowest prevalence of smoking – 7.7% (CI 95% 6.9- 8.5), ex-smoking, heavy smoking (20 or more cigarettes a day) and passive smokers both at home and at work. More than half the population with insurance had excessive weight – 51.6% (CI95% 50.3-52.8), but its prevalence was still higher in the population with no insurance – 56.2% (CI95% 54.8-57.6). The same was true for obesity, whose prevalence for those with insurance was – 16.5% (CI95% 15.6-17.4), but for those without was – 21.3% (CI95% 20.1-22,5).

Table 3. Risk factors and protective factors for noncommunicable diseases among people who have and who do not have health insurances in the Brazilian capitals. Brazil, Vigitel, 2015.

Variable	Has health insurance						PRad*	CI 95%	
	Yes			No					
	Prev	CI 95%		Prev	CI 95%				
Smoker	7.7	6.9	8.5	13.0	11.9	14.0	0.7	0.6	0.8
Ex-smoker	18.9	18.0	19.8	22.6	51.4	23.7	0.6	0.5	0.9
20 or more cigarettes	2.1	1.6	2.5	4.1	3.4	4.8	0.9	0.8	0.98
Passive smokers at home	7.9	7.2	8.7	10.2	9.3	11.2	0.8	0.7	0.9
Passive smokers at work	6.7	5.9	7.4	9.3	8.4	10.2	0.8	0.7	0.9
Excess Weight	51.6	50.3	52.8	56.2	54.8	57.5	1.0	0.9	1.0
Obesity	16.5	15.6	17.4	21.3	20.1	22.5	0.8	0.7	0.9
FV Regular	44.7	43.4	45.9	30.9	29.6	32.1	1.3	1.2	1.4
FV recommended	30.9	29.8	32.1	19.8	18.7	20.9	1.3	1.2	1.4
Meats with fat	28.3	27.1	29.5	33.9	32.5	35.3	0.9	0.8	0.9
Whole milk	46.7	45.4	47.9	56.1	54.7	57.5	0.9	0.8	0.9
Soda (5x or more/No)	17.7	16.7	18.8	20.2	18.9	51.4	0.9	0.8	1.0
Sweets (5x or more/No)	22.8	21.7	23.9	17.4	16.3	18.5	1.2	1.1	1.3
Beans (5x or more/No)	60.6	59.4	61.8	68.8	67.5	70.0	0.9	0.9	1.0
PA at leisure	43.9	42.6	45.1	31.7	30.4	33.0	1.2	1.2	1.3
No PA	16.0	15.1	16.9	15.9	14.9	17.0	1.1	1.0	1.2
PA >= 150min/no 3 domains	55.3	54.0	56.5	49.9	48.5	51.3	1.1	1.0	1.1
PA < 150min/no 3 domains	44.7	43.5	46.0	50.1	48.7	51.5	0.9	0.9	1.0
Watching TV - 3hrs/day	20.9	19.9	21.9	24.2	22.9	25.4	0.9	0.8	1.0
Alcohol abuse	17.1	16.1	18.0	17.3	16.2	18.5	0.9	0.8	1.0
Driving under the influence	6.6	6.0	7.2	4.5	3.9	5.1	1.1	0.9	1.3
Bad health evaluation	3.5	3.0	4.1	6.0	5.3	6.7	0.8	0.6	0.9
Mammography in the last two years	87.1	85.1	89.0	70.3	67.8	72.9	1.2	1.1	1.2
Pap smear in the last three years	86.0	84.6	87.4	76.5	74.8	78.2	1.1	1.1	1.2
Hypertension	22.5	21.5	23.5	27.2	26.0	28.4	0.9	0.8	0.96
Diabetes	6.7	6.1	7.3	8.1	7.3	8.8	0.9	0.8	1.1

* Prevalence ratio adjusted by age, sex, and educational level.

Regarding food intake, the population with health insurance had more frequent indicators of healthy diets, such as the recommended amounts of fruits and vegetables – 30.9% (CI 95% 29.8-32.1). They also had less frequent unhealthy indicators, such as lower consumption of fat meats – 28.3 (CI 95% 27.1-29.5), whole milk – 46.7% (CI 95% 45.4-47.9), and sodas – 17.7 (CI95% 16.7-18.8). The exceptions were a higher consumption of sweets and a lower consumption of beans by the population with health insurances.

Practicing physical activities as leisure was more common among the population with insurance – 43.9% (CI 95% 42.6-45.1); physical inactivity did not show any differences between the populations; watching TV and the number of hours watching TV were lower among people with insurance.

Alcohol abuse was 17.1% (CI 95% 16.1-18.0) and driving under the influence was more common in the population with insurance. The self-report of the state of health was worse with less frequency among the population with insurance 3.53 (CI95% 2.98-4.1) when compared to the one without 6.0% (CI95% 5.3-6.7); that was also true for the prevalence of self-reported morbidities (hypertension and diabetes) among those who have health insurance.

The preventive cancer exams for women, mammography and pap smear, were more common in the population with insurance: 87.0 (CI95% 85.1-89); the results for those with no insurance were 86.0 (CI95% 84-87.4) (Table 3).

After adjusting for age, sex, and educational levels, having health insurance was associated to a lower prevalence of smoking (PR 0.70, CI95% 0.6-

0.8), of being an ex-smoker (PR = 0.6 CI95% 0.5-0.9), of smoking 20 cigarettes or more a day (PR = 0.9 CI95% 0.8-0.98), and of being a passive smoker both at home and at work (PR = 0.8 CI95% 0.7-0.9 and 0.8 CI95% 0.7-0.9 respectively).

After the same adjustments, having a health insurance was also associated to lower levels of obesity (PR = 0.8 CI95% 0.7-0.9), to a higher consumption of fruits and vegetables both with regards to regular consumption (PR = 1.3 CI 95% 1.2-1.4) and to the recommended amounts (PR = 1.3 CI 95% 1.2-1.4). It was also associated with a lower consumption of meats with fats (PR = 0.9 CI 95% 0.8-0.9) and of whole milk (PR = 0.9 CI 95% 0.8-0.9). There were no significant differences in the association of the variables with the consumption of soda five times or more a week; however, the users of insurance consumed more sweets (PR 1.2 CI 95% 1.1-1.3) and less beans in five or more days a week (PR = 0.9 CI 95% 0.8-1.0). Participants with insurance considered their own health state bad with less frequency (PR = 0.8 CI 95% 0.6-0.9) and their PR was lower for arterial hypertension, despite being within the CI of 95%. A higher number of people with health insurances practiced physical activities in their free time (RP = 1.2 CI95% 1.2-1.3), while the other indicators of PA are in the limit of the CI of 95%. There were no differences in the variables regarding the abuse of alcohol and driving under the influence among the populations with and without insurance. Preventive exams, such as the mammography in women from 50 to 69 years of age in the last two years, and the pap smear in women from 25 to 69 years old in the last three years, were more common among women who had insurances (PR = 1.2 CI 95% 1.1-1.2) and (PR = 1.1 CI 95% 1.1-1.2), respectively (Table 3).

Table 4 shows the PR of risk factors and of protective factors for noncommunicable diseases in the population with and without health insurances, according to three categories of educational level (0 to 8 years, 9 to 11 years, and 12 to 20 years of formal education), as adjusted by sex and age. In general, the indicators were better among people who have health insurance. In all categories of educational level the regular and the recommended consumption of fruits and vegetables was higher; there was a lower consumption of milk with fat; a higher PR for the practice of physical activity; and a higher coverage of mammography. In the group with a lower educational level (0 to 8 years), those with insurance had a higher PR with regard to drinking whole milk and being obese. In the group from 9 to 11 years of formal education, the PR was lower for being a passive smoker at work, for watching TV 3 or more hours a day, for having a bad health evaluation, and for hypertension. Among people with from 9 to 11 years or 12 years or more formal education, those who had insurance had lower PR of being smokers. In the group of people with 12 years old or more, there was a lower PR in the consumption of meats with fat and of consuming beans, and a higher PR of driving under the influence.

Discussion

The study showed that nearly half the population in the capitals has health insurance, with better coverage in the Southeast, South, and Midwest capitals. Goiânia and Vitória were the states with coverage above 64%. Having health insurance was more common in populations with a higher educational level, and among those who are 55 or older. In general, the population who has health insurances shows higher prevalences of protective factors, such as healthy diets (more consumption of fruits and vegetables), practicing physical activities in their free time, being under the coverage of preventive exams, such as mammographies and pap smears, in addition to having a lower prevalence of risk factors such as smoking, physical inactivity, bad health evaluation, arterial hypertension, obesity, alcohol abuse, excessive consumption of fat meats, whole milk, and sodas, despite having a lower consumption of beans and a higher consumption of sweets. When stratified according to educational level, these characteristics, in general, tend not to change, and the population who has health insurances, regardless of their educational level, has better indicators.

The lower coverage of health insurance of the capitals in the Northeast and North of the country is in accordance to estimates from the ANS and the PNS[10,11,21]. In general, better coverage is frequent in urban areas, in the capitals, in the most populous cities, and in regions with more wealth inequality and economic activity[7,10,11,21]. The coverage found here is higher than PNS data, according to which the coverage in capitals is 40%, while it is 27% in the general population[7]. The PNS also pointed out that the population with insurance had grown with regards to the PNAD 2008[7,10]. Data from the Vigitel 2015 was consistent with regards to the growth of health insurances, whose coverage in 2011 was 47.4%[15].

Table 4. Distribution of risk factors and protective factors for noncommunicable diseases in the population who have and who do not have health insurance, according to the categories of educational level, in the group of 26 capitals and in the Federal District. Brazil. Vigitel. 2015.

Variable	Years of formal education														
	0 to 8					9 to 11					12 +				
	Health insurance					Health insurance					Health insurance				
	Yes	No	PRad*	CI95%		Yes	No	PRad*	CI95%		Yes	No	PRad*	CI95%	
Smoking															
Smoker	11.4	15.7	0.8	0.6	1.0	6.8	10.9	0.6	0.5	0.8	6.6	9.2	0.7	0.5	0.9
Ex-smoker	27.9	29.7	0.8	0.5	1.4	16.4	17.0	0.6	0.4	0.9	16.5	13.5	0.6	0.4	1.0
20 or more cigarettes	4.1	5.6	0.9	0.8	1.0	1.8	3.0	0.9	0.8	1.0	1.3	1.9	1.0	0.8	1.2
Passive smokers at home	6.6	9.4	0.7	0.6	1.0	8.8	10.9	0.8	0.7	1.0	7.9	10.9	0.8	0.6	1.1
Passive smokers at work	9.1	10.2	1.0	0.7	1.3	7.0	9.3	0.8	0.6	0.9	5.2	5.9	1.0	0.7	1.3
Reg. fruits and vegetables	40.3	29.8	1.3	1.1	1.4	39.6	28.7	1.3	1.2	1.4	51.3	41.5	1.1	1.1	1.3
Recom. fruits and vegetables	25.2	17.9	1.3	1.1	1.6	27.6	19.3	1.4	1.3	1.5	36.7	28.0	1.2	1.1	1.4
Meats with excessive fat	27.2	33.3	0.9	0.8	1.0	31.2	35.1	0.9	0.8	1.0	26.2	32.6	0.86	0.8	0.9
Whole milk	46.4	53.7	0.9	0.8	0.9	53.0	60.0	0.9	0.8	0.9	41.3	52.9	0.8	0.8	0.9
Soda (5x or more/ No)	15.6	17.1	1.0	0.8	1.2	21.0	23.9	0.9	0.8	1.0	16.0	19.8	0.9	0.7	1.0
Sweets (5x or more/No)	15.3	12.8	1.3	1.0	1.6	22.4	20.8	1.1	1.0	1.3	27.0	23.6	1.2	1.0	1.3
Beans (5x or more/ No)	65.4	70.7	0.9	0.9	1.0	66.3	68.4	1.0	0.9	1.0	53.4	62.8	0.9	0.8	0.9
Sufficient PA at leisure	31.7	22.8	1.5	1.3	1.7	43.5	37.1	1.2	1.1	1.3	50.4	47.3	1.1	1.0	1.2
No PA	22.7	19.4	1.0	0.9	1.2	14.4	13.5	1.0	0.9	1.2	14.0	10.9	1.2	1.0	1.5
PA >= 150min/no PA in 3 domains	43.9	44.2	1.1	1.0	1.2	57.4	54.0	1.1	1.1	1.2	59.2	58.4	1.1	1.0	1.1
PA < 150min/no PA in 3 domains	56.1	55.8	0.9	0.9	1.0	42.6	46.0	0.9	0.9	1.0	40.8	41.6	0.9	0.9	1.0
Regularly watches TV - 3hrs/day	23.1	23.6	1.0	0.8	1.1	22.9	26.5	0.9	0.8	0.9	18.1	19.1	0.9	0.8	1.1
Alcohol abuse	9.8	14.7	0.8	0.6	1.0	16.8	19.4	0.9	0.8	1.0	21.0	20.7	1.1	0.9	1.3
Driving under the influence	2.9	3.1	1.1	0.6	2.0	5.2	5.3	0.9	0.7	1.2	9.6	6.9	1.4	1.1	1.8
Excess Weight	59.6	62.7	1.0	0.9	1.0	52.6	51.3	1.0	0.9	1.0	46.6	47.4	0.9	0.9	1.0
Obesity	18.8	25.7	0.7	0.6	0.9	17.5	18.1	0.9	0.8	1.1	14.5	15.0	0.9	0.7	1.1
Bad health evaluation	6.8	8.0	0.8	0.6	1.2	3.0	4.4	0.7	0.5	0.9	2.3	3.5	0.7	0.5	1.1
Mammography in the last two years	80.5	68.3	1.2	1.1	1.3	88.5	75.0	1.2	1.1	1.3	92.0	74.2	1.2	1.1	1.4
Pap smear 3 years	83.9	75.6	1.1	1.0	1.2	86.4	75.9	1.1	1.1	1.2	86.6	81.2	1.0	1.0	1.1
Hypertension	43.1	38.6	1.0	0.9	1.1	18.5	17.9	0.87	0.8	0.9	15.4	14.0	0.8	0.7	1.0
Diabetes	15.2	12.8	1.0	0.8	1.2	4.9	4.1	0.9	0.7	1.1	3.9	3.2	0.9	0.6	1.2

* Prevalence ratio adjusted by age and sex.

Other studies also point out the association between educational levels and having a health insurance[8,11,13,22], as was also found here. The PNS also shows that owning an insurance is associated to educational level, income, and better health indexes[5,6].

The increase in the coverage of insurances after 55 years of age is coherent with the findings of other studies[7,10,11] and with data from the System of Information on Beneficiaries (SIB) from the ANS[23], which has been justified by the need of elders to use health services, for which they have more demands[21,22].

The indicators of smoking were less prevalent among people who have health insurance. In general, people with higher educational levels, income, and better socioeconomic conditions have more information on the negative effects of smoking and lower prevalences[15,23]. It stands out that, in this study, the differences remained, even when there was an adjustment according to educational level.

The WHO recommends a daily intake of 400 g/day of fruits and vegetables to prevent cardiovascular diseases, as well as a reduction in the consumption of fats, sugars, and salt[1,24]. As opposed to the indicators of fruit and vegetable intake, the consumption of fats and soda was lower in the population with health insurance, which can be explained by the higher purchasing power of this population to acquire healthy foods such as fruits and vegetables, in addition to their better knowledge about unhealthy foods[8,25]. The exception in the population with insurance was the higher consumption of sweets; also, the people with insurance and high educational levels had a lower prevalence in the intake of beans, which was also found in the PNS[24,25]. It is possible that people with more income diversified their diet enough so that they diminished the intake of beans, which is a loss, due to the beneficial effects it has, as it carries fibers and nutrients, leading to more satiety and preventing obesity[26].

Also, the population with insurance practiced more physical activities at time of leisure and in other domains, being less sedentary and spending less time watching TV. These positive indicators of physical activity have been explained in populations with higher educational levels and income due to their better access to spaces where to practice physical activities, and to better knowledge with regards to the benefits of PA. Therefore, it is important to invest in public policies that improve public spaces for the practice of physical activities, as to diminish this inequality[26].

Bad health self-assessments has been used in literature as important health indicators and predictors of mortality, especially among elders, and are used internationally[27]. In general, younger people, with a better educational level, higher income, and health insurance have better access to goods and services and tend to evaluate better their state of health, which is in accordance to the results found here in the population with insurance[27]. When they stratified by educational level, in general, the population with insurance had a better health evaluation, especially among those with an average educational level, from 9 to 11 years of formal education.

The exams recommended for the prevention of breast and cervical cancer are, respectively, the mammography, every two years in women from 50 to 69 years old[28], and the pap smear, every three years in women from 25 to 64 years old[28,29]. The prevalences of these two exams were very high in both populations, but even higher in the population with insurance.

The goal set by the Plan for Confronting Chronic Diseases for 2022 is to reach 75% with regards to the mammography[30]. This goal has been reached among women with insurances, but not among those without. With regard to the Papanicolaou test (pap smear) the goal of the Plan for Confronting NCDs, to reach an average coverage of 85% in 2022 was already achieved by the population with insurance and almost reached (84.7%) by the population receiving care in the Single Health System (SUS)[30], showing how important the Primary Health Care services are in Brazil, since the SUS broadly offers this exams for the population[9]. It also stands out that the differences between the population with and without health insurances persist when stratified according to educational level.

In the United States, women with health insurances had better coverage of mammography and pap smears, which could be explained by the fact that this population has a greater access to diagnostic and preventive services[13,14].

Excessive weight and obesity are associated to cardiovascular diseases, diabetes, colon cancer, rectal cancer, breast cancer, cirrhosis, among other diseases[1,2], being a serious worldwide problem to be dealt with, considering its continuous growth in most countries[31]. As such, it is the objective of the National plan[30] and of the NCD Global Plan to prevent its grownth[32]. Despite being a widespread problem, the population with health insurances was less likely to have excessive weight and obesity.

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A study on arterial hypertension (AH) and its associated factors, which analyzed data from the Vigitel, suggested that, after a multivariate analysis and an adjustment according to all variables in the model, having a health insurance was no longer a protective factor for AH, suggesting that the educational level is the most impactful variable for "reducing hypertension"[33]. This study showed that having insurance is a protective factor for AH when adjusted by sex, age, and educational level. However, when adjusted according to the three educational levels, having an insurance was only protective for people with 9 to 11 years of formal education. Additionally, the prevalence of AH in the population with insurance and low educational levels was three times higher than in the population with insurance and high educational levels, confirming the importance of the educational levels as a protective factor for AH.

Having health insurance was more common in the population with a higher educational level, and among those who had 12 years formal education or more. International studies, such as the Alameda County Study, published in 2005 by Maty et al.[34], also pointed at an association between the educational level and diabetes, after adjusting for the variables "income" and "occupation". This suggests that the educational level, seen as a socioeconomic proxy, is more associated to the access of practices of health promotion, such as healthy diets, physical activities, access to medication, and health services[35].

Alcohol abuse prevalences was not different for the groups with and without insurance but was more prevalent in populations with higher educational levels, which is in accordance to other Vigitel studies[17]. When stratified according to educational levels, driving under the influence was more frequent for people with health insurance and higher educational levels, which can be justified by the likelihood of them owning a car and being related to a better socioeconomic status.

The study points out that there are health inequalities, and that the population with access to health insurances has better health indicators, reflecting higher educational levels, better access to health services, and practices of health promotion. Therefore, investing in the improvement of educational practices and public policies of health promotion is essential to diminish these inequalities.

Some of the limits of this study are the use of telephone interviews, which may diminish the participation of people with no landlines. There was an attempt to diminish this bias using post-stratification weights. The fact that the information was self-reported also can lead to information bias, although the national and international experience points that variables such as arterial hypertension and the assessment of the health state can achieve good estimates using this methodology, in addition to advantages it has, such as the fast acquisition of information, sensitivity, and low cost[18]. Additionally, since this study was cross-sectional, it was not possible to establish cause-effect temporal relations. Therefore, it cannot be stated that the access to health insurances leads to lower exposure to risk, or whether individuals who are more worried about their own health are the ones who seek health insurance.

Conclusion

The study showed differences in the risk factors and in the protective factors both among adults who had and who had not private health insurances. The first presented with healthier habits, such as consuming fruits and vegetables, practicing physical activities, and having a lower prevalence of smoking and alcohol abuse. The prevalence in the use of preventive exams was also significantly higher in those who have insurances, when compared to those who depend exclusively on the SUS, even when results were stratified according to the educational level. The self-reported morbidities were not different for those with health insurances. Monitoring the risk factors for NCDs is important to support public policies of prevention.

Collaborations

Malta DC took part in the conception and design of the study, as well as in data collection, data analysis and interpretation, and in the elaboration of the first draft of the article. Bernal RTI took part in the conception and design of the study, as well as in data collection, statistical analysis and interpretation of data, and in the critical review of the article. Neto VE, Curci KA, Lisbôa.RM, Cachapuz RF, Freitas MIF, and KSC Coelho took part in the analysis and interpretation of the data, and in the critical review of the work. All authors approved the final version to be published, agreeing to be responsible for all aspects of the work, meaning that, if necessary, all guarantee that any issues related to the precision or integrity of any part of this work will be adequately investigated and resolved.

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