

**FACTORS ASSOCIATED WITH THE PREVALENCE OF NEUROLOGICAL DISEASES:  
ANALYSIS OF THE 2015 HEALTH SURVEY OF SÃO PAULO**Reinaldo José Gianini<sup>1\*</sup>, José Augusto Camargo<sup>1</sup> and Anderson Porto<sup>2</sup><sup>1</sup>Professor M.D,Ph.D. Pontifícia Universidade Católica de São Paulo – Brazil.<sup>2</sup>Faculdade de Ciências Médicas e da Saúde - Pontifícia Universidade Católica de São Paulo – Brazil.**\*Corresponding Author: Reinaldo José Gianini**

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**ABSTRACT**

**Background:** Millions of dollars are spent on public services with the treatment of pathologies. The aim of this study was to describe the prevalence of epilepsy or seizures, migraine or hemicrania, and headache reported in the ISA Capital 2015 survey and to analyze the association with sociodemographic variables, use of health services and health spending. **Methods:** Using the ISA Capital 2015 questionnaire response database, 4.043 patients with pathologies were analyzed in the city of São Paulo. The data with sociodemographic variables of all subjects will be described. **Results:** There was a predominance of women, young and white people, Catholics, subjects in stable unions, subjects born in the municipality of São Paulo, subjects with an occupation, subjects with an income of 5-9 minimum wages (MW), subjects with elementary school level, SUS users, and subjects spending R\$ 100.00 or more on health according to the variables analyzed. **Conclusions:** The most sensitive factor for the determination of differences in its categories was 'age group', followed by 'sex', 'marital status', 'place of birth' and 'household income' which, in turn, were followed by 'religion', 'occupation' and 'educational level'.

**KEYWORDS:** Neurological diseases, Health Survey, Sociodemographic Variables.**1-INTRODUCTION**

Health surveys have been conducted in the city of São Paulo by research teams from public universities and the São Paulo State Department of Health. Such surveys are important to assess the health status of the population, enabling the detection of vulnerable groups and providing a panoramic view of their lifestyle and habits and of the prevalence of risk factors and acute or chronic morbidities, as well as of the use of health services. These surveys are therefore useful tools for public health planning.<sup>[1,2,3]</sup>

The ISA Capital 2015 survey was conducted in 2014 and 2015 in the city of São Paulo and involved a population residing in urban areas. Several cross-sectional studies were derived from the database of responses to the health surveys. Some morbidities have a high prevalence and are commonly found in daily medical practice, although epidemiological studies on these conditions in Brazil are scarce.

**Epilepsy or Seizures**

About 1 in 10 people will develop a seizure in their lifetime. An epileptic or convulsive seizure consists of abnormal and synchronous neuronal activity. To be defined as epilepsy, the patient must meet one of the following criteria: two or more unprovoked seizures at

an interval of more than 24 hours, an unprovoked seizure that is likely to recur within the next 10 years, or the presence of an epileptic syndrome. The clinical presentation varies according to the area of neuronal activation. The global prevalence of epilepsy ranges from 0.5% to 1.0%. In studies conducted in Brazil, the prevalence ranged from 5.4 to 16.5 per 1,000 inhabitants<sup>4</sup>. The importance of epilepsies classified as acquired must be highlighted, which were previously restricted to poor or developing countries and are currently observed throughout the world population.<sup>[5,6,7]</sup>

**Headaches**

Headache is one of the ten most common complaints in outpatient medical clinics and the chief complaint in general neurology.<sup>[8,9]</sup> Its clinical presentation varies widely and severe forms have great repercussions on the patient's quality of life, with personal, family, social and economic impacts - including treatment costs, productivity drops, and absenteeism.

There are different causes of headache and the so-called primary headaches such as tension-type headache and migraine are the most common<sup>1</sup>. Epidemiological studies help to define diagnostic criteria more accurately, to determine the natural history of headache, and to

estimate the socioeconomic impact, thus allowing efficient planning and allocation of resources.<sup>[8,10,11]</sup>

To describe the prevalence of epilepsy or seizures, migraine or hemicrania, and headache reported in the ISA Capital 2015 survey and to analyze the association with sociodemographic variables, use of health services and health spending.

## 2- MATERIAIS AND METHODS

Using the database of responses to the ISA Capital 2015 questionnaire (n = 4,043), a survey conducted in the city of São Paulo whose data were collected between September 2014 and December 2015, we evaluated the responses to the following items:

- i. C1 01b. What was the main health problem you had? (in the last two weeks)
- ii. C1 01h. What was the problem? (which caused you to be bedridden in the past two weeks)
- iii. C3 01a. Do you usually have migraine or headache?
- iv. C3 08a. Do you have any other health problem besides the ones we have already talked about? C3 08b. What problem?
- v. G1 04. What was the main disease that led you to seek the service? (compared to the last time you sought a health service)
- vi. G2 04. What was the main disease that led to hospitalization? (in the last 12 months)
- vii. J 01b - J 08b. What was the main health problem that led you to take this medication? (in case of a positive answer to item J 01. Have you used any medication in the last 15 days?)

The morbidities included in the present study were epilepsy or seizures, migraine or hemicrania, and headache, which were obtained from the answers to the questions mentioned above. The accordance between the recorded ICD code and the field containing the morbidity in writing was evaluated. Headaches accompanied by systemic symptoms, traumas or another acute morbidity were excluded from the analysis. If the written field disagreed with the recorded ICD, it was disregarded.

The sampling method described by Alves<sup>[2]</sup> was used. Data were analyzed using the STATA 16.0 software. The adjusted prevalence of the reported morbidities was calculated according to sex, age group, ethnicity, marital status, religion, place of birth, occupation, household income, educational level, use of the public health system (SUS), and health spending. The odds ratio (OR), Univariate Analysis (uni OR), Multivariate Analysis (multi OR), and the respective 95% confidence interval (95% CI) were adjusted for these independent variables. A significance level (alpha) of 0.05 was adopted to judge the associations.

## 3- RESULTS

Tables 1 to 3 show the distribution of subjects according to the variables analyzed, as well as the results of

association analysis. In general, there was a predominance of women, young and white people, Catholics, subjects in stable unions, subjects born in the municipality of São Paulo, subjects with an occupation, subjects with an income of 5-9 minimum wages (MW), subjects with elementary school level, SUS users, and subjects spending R\$ 100.00 or more on health.

### 3.1. Epilepsy or Seizures

Only 12 participants (0.3%) reported epilepsy or seizures, with a similar prevalence in both sexes. An association was observed between religion (Spiritist, Jewish or Buddhist) and epilepsy or seizures, with a multi OR of 8.05 (95% CI, 1.33-48.6, p = 0.02). Epilepsy or seizures were also associated with household income, with a multi OR of 0.06 (95% CI, 0.01-0.75, p < 0.05) for an income of 1 to 2 MW, multi OR of 0.13 (95% CI, 0.02-0.78, p < 0.05) for an income of 3 to 4 MW, and multi OR of 0.03 (95% CI, 0.003-0.24, p < 0.05) for an income of 5 to 9 MW. In summary, the prevalence of reported epilepsy or seizures is approximately 8 times higher among Spiritists, Jews or Buddhists, decreases with increasing household income, and is higher among SUS users.

### 3.2. Migraine or hemicrania

The prevalence of migraine or hemicrania was 3.6% among males and 13.7% among females. An association was observed between reported migraine or hemicrania and sex (p < 0.001), age group (p < 0.001), marital status (p < 0.001), occupation (p < 0.001), and health spending (p = 0.04). The prevalence of this morbidity was higher among participants spending R\$ 100.00 or more on health, but the result was not statistically significant (multi OR > 0.05 and 95% CI containing zero). Women more frequently reported migraine or hemicrania than men. The reported prevalence of migraine or hemicrania decreased with increasing age. Migraine or hemicrania was less frequently reported by subjects without a partner and those from other countries. The prevalence of migraine or hemicrania was lower among SUS users and higher among working individuals.

### 3.3. Headache

An association was observed between reported headache and sex (p < 0.001), age group (p < 0.001), marital status (p = 0.003), religion (p < 0.002), occupation (p < 0.001), household income (p = 0.004), and SUS use (p < 0.001).

The prevalence of headache was 22.9% among females and 17.8% among males. Women were more likely to exhibit morbidity, with a uni OR of 1.36 (95% CI, 1.16-1.61) and multi OR of 1.43 (95% CI, 1.16-1.76).

Regarding age group, the highest prevalence of reported headache was observed among young adults, with a decrease of prevalence in older age groups. The prevalence was 25.9% in the 15-29 year age group, 22.6% in the 30-44 year age group, 19.2% in the 46-59 year age group, and 13.2% in participants aged 60 years

or over. In the 46-59 year age group, the uni OR was 0.67 (95% CI, 0.51-0.87) and the multi OR was 0.68 (95% CI, 0.48-0.94), with  $p < 0.05$ , indicating a reduced likelihood of morbidity in this category. The same was observed for the  $\geq 60$  year group, with a uni OR of 0.41 (95% CI, 0.31-0.54) and multi OR of 0.40 (95% CI, 0.28-0.56), with  $p < 0.001$ .

The uni OR for widow status was 0.64 (95% CI, 0.46-0.89;  $p < 0.05$ ), indicating a possible protective factor. However, this variable may be age dependent and the multi OR was not statistically significant (95% CI containing zero and  $p > 0.05$ ).

With respect to religion, the “no religion” category had a multi OR of 0.65 (95% CI, 0.45-0.94), with  $p < 0.05$ , indicating a reduced likelihood of having cephalgia or headache. No statistically significant result was observed for the other religions.

There was an association between occupation and the presence of headache (chi-squared,  $p < 0.001$ ). The uni OR was 1.41 (95% CI, 1.18-1.70), with  $p < 0.001$ , but the multi OR was 1.22 (95% CI, 0.98-1.51), with  $p > 0.05$ . Thus, despite the observed association, there seems to be a confounding effect of another variable.

Chi-squared analysis showed an association between household income in MW and the presence of headache ( $p < 0.05$ ). However, analysis of the individual income categories revealed no statistically significant result.

An association was observed between SUS use and headache, with a uni OR of 1.37 (95% CI, 1.14-1.65,  $p = 0.001$ ) and multi OR of 1.39 (95% CI, 1.09-1.78,  $p < 0.05$ ). This result indicates a greater likelihood of having headache among participants who use SUS.

Taken together, the results show that females more frequently report headache than males. Headache decreases with increasing age. Subjects with an occupation more frequently report headache than those who do not. Users of SUS more frequently report headache than those who do not use SUS.

## 4-DISCUSSION

### 4.1. Epilepsy or Seizures

According to the Global Burden of Disease Study 2019 (GBD 2019), idiopathic epilepsy resulted in 13.1 million disability-adjusted life years (DALYs) lost. The prevalence considering both sexes was 0.32%, with a prevalence of 0.31% among females and 0.34% among males. The incidence rate for both sexes was 38.8 per 100,000 people, with an incidence of 35.8 per 100,000 women and 41.8 per 100,000 men.

About 1 out of 10 people will have seizures in their lifetime. The overall annual incidence, excluding febrile seizures, is about 39 per 100,000 people. This incidence is higher in males and shows a bimodal distribution – with peaks in the first year of life and after 75 years of

age. Regarding epilepsies, syndromes that are characterized by two or more seizures, the prevalence ranges from 5 to 7 per 1,000 people, with an annual incidence of 35 to 52 per 100,000 people. This incidence is also bimodal – 60 to 70 per 100,000 children under the age of 5 and 150 to 200 per 100,000 adults over 75 years of age. According to the literature, the incidence and prevalence of epilepsy are higher in developing countries like Brazil, with an average prevalence of 12.5 per 1,000 and annual incidence of 78 to 190 per 100,000 people,<sup>[12]</sup> In our study, we observed 12 participants with epilepsy or seizures, with a prevalence of 0.3% among males and of 0.3% among females. The similar proportion of males and females with epilepsy or seizures agrees with the epidemiological review of epilepsy conducted by Banerjee *et al*<sup>[13]</sup> as reported by Sella *et al*.<sup>[14]</sup>

Studies have shown a lower incidence and prevalence of epilepsy in low-income populations.<sup>[13,14]</sup> In our study, we did not observe such lower incidence and prevalence, probably because of the small number of participants with the morbidity. However, the likelihood of having epilepsy or seizures was lower the higher the household income in MW, as demonstrated by the multi OR that was much lower than 1 for all categories analyzed, with  $p < 0.05$ .

An association between religion (Spiritist, Jewish or Buddhist) and epilepsy or seizures, with a multi OR of 8.05 (95% CI, 1.33-48.6,  $p = 0.02$ ), has not been reported in other studies.<sup>[14,15]</sup> What is observed in the literature is a proportion of religions similar to that found in the general population.

### 4.2. Headaches and Migraine

According to the GBD (2019), headaches accounted for 46.6 million years lived with disability (YLD) in 2019 – the third leading level 3 cause in this category. The reported prevalence in both sexes was 32.7%, with a prevalence of 35.7% among females and of 29.8% among males. The incidence rate in both sexes was 10.1%, with an incidence of 10.6% in females and of 9.6% in males. Migraine accounted for 88.2% of all headaches, followed by tension-type headache (11.8%). Migraine was responsible for 42.1 million YLDs, or 4.8% of total YLDs, with a prevalence of 14.1%. The prevalence of migraine was also higher among females (17.9% versus 10.3% among males). The incidence rate was 1142.5 cases per 100,000 people, with an incidence of 1440.7 cases per 100,000 women and 853.3 cases per 100,000 men.

In the present study, the prevalence of headache was 22.9% among females and 17.8% among males. However, the global prevalence of 21% obtained in this study differs from the study by Okamura<sup>[16]</sup> who estimated a prevalence of 31.8% due to the inclusion of cases of headache associated with other acute signs and symptoms (secondary headaches). Association analysis also showed a greater likelihood of having the morbidity

in females, with a uni OR of 1.36 (95% CI, 1.16-1.61,  $p < 0.001$ ) and multi OR of 1.43 (95% CI, 1.16-1.76,  $p = 0.001$ ). This female predilection for headaches such as enxaqueca or migrânea has been reported in several studies conducted in Brazil.<sup>[17]</sup> and in other countries.<sup>[18]</sup> One explanation would be the action of estrogens.<sup>[16,19,20,21]</sup>

The highest prevalence of reported headache was observed among young adults, with the prevalence decreasing in older age groups, in agreement with the literature.<sup>[16,21]</sup> Regarding marital status, the incidence of headache seems to be lower among widowed subjects, indicating a possible protective factor. However, this

variable may be age dependent, with widowers being usually older.

With respect to religion, the category “no religion” had a multi OR of 0.65 (95% CI, 0.45-0.94), with  $p < 0.05$ , indicating a reduced likelihood of having headache. Interestingly, Tronvik *et al.*<sup>[22]</sup> observed that the presence of headache and migraine increases the odds of being a frequent religious attendee. One explanation is that religion would be a way of coping with pain.<sup>[23]</sup>

The greater odds of headache among participants who use SUS may be explained by the greater health needs of this group.

**Table 1: Analysis of associations between reported epilepsy or seizures and sociodemographic variables, use of health services, and health spending. ISA-SP-Capital 2015.**

Variable/Category	Unadjusted data			Adjusted data				
	Yes (%)	No (%)	p*	Prevalence (%)	Uni OR (95% CI)	P	Multi OR (95% CI)	P
<b>Sex</b>			0.66					
<b>Female</b>	6 (0.3)	2270 (99.7)		0.2				
<b>Male</b>	6 (0.3)	1761 (99.7)		0.3	1.21 (0.37-4.00)	0.75	2.43 (0.56-10.5)	0.23
<b>Age group (years)</b>			0.80					
<b>15 to 29</b>	3 (0.3)	1103 (99.7)		0.15				
<b>30 a 44</b>	3 (0.3)	886 (99.7)		0.32	2.08 (0.51-8.54)	0.31	1.43 (0.34-6.01)	0.62
<b>46 to 59</b>	1 (0.1)	717 (99.9)		0.13	0.83 (0.09-8.03)	0.87	0.60 (0.07-5.00)	0.64
<b>60 or over</b>	4 (0.4)	1015 (99.6)		0.12	2.06 (0.46-9.18)	0.34	1.35 (0.17-10.92)	0.78
<b>Skin color</b>			0.51					
<b>White</b>	8 (0.4)	1983 (99.6)		0.34				
<b>Black</b>	2 (0.5)	422 (99.5)		0.26	0.75 (0.19-2.97)	0.68	0.66 (0.17-2.49)	0.54
<b>Yellow</b>	0	85 (100.0)		0	-	-	-	-
<b>Brown</b>	2 (0.2)	1361 (99.8)		0.1	0.29 (0.06-1.42)	0.13	0.14 (0.02-1.21)	0.07
<b>Marital status</b>			0.48					
<b>Stable union</b>	4 (0.2)	1850 (99.8)		0.2				
<b>Single, separated, divorced</b>	6 (0.3)	1837 (99.7)		0.3	2.00 (0.54-7.40)	0.29	1.61 (0.59-4.42)	0.35
<b>Widowed</b>	2 (0.6)	332 (99.4)		0.5	3.08 (0.53-17.9)	0.21	-	-
<b>Religion</b>			0.13					
<b>Catholic</b>	8 (0.4)	1935 (99.6)		0.3				
<b>Evangelical or Protestant</b>	2 (0.2)	1198 (99.8)		0.1	0.37 (0.10-1.47)	0.16	0.57 (0.15-2.18)	0.41
<b>None</b>	0	590 (100)		0				
<b>Spiritist, Jewish or Buddhist</b>	2 (1.1)	185 (98.9)		0.11	3.59 (0.60-21.69)	0.16	8.05 (1.33-48.6)	<b>0.02</b>
<b>Umbanda or Candomblé</b>	0	39 (100)		0				
<b>Place of birth</b>			0.80					

São Paulo	7 (0.3)	2550 (99.7)		0.2				
Other state	5 (0.4)	1392 (99.6)		0.4	1.33 (0.70-7.23)	0.17	3.88 (0.76-19.8)	0.10
Other country	0	79 (100)		0				
Occupation			0.69					
No	2 (0.2)	925 (99.8)		0.1				
Yes	9 (0.3)	3047 (99.7)		0.2	1.70 (0.34-8.59)	0.52	-	-
Household income (MW**)			0.35					
< 1	2 (0.7)	279 (99.3)		1.2				
1 to 2	3 (0.4)	751 (99.6)		0.3	0.23 (0.04-1.48)	0.12	0.06 (0.01-0.75)	<b>0.03</b>
3 to 4	6 (0.4)	1359 (99.6)		0.3	0.27 (0.05-1.55)	0.14	0.13 (0.02-0.78)	<b>0.03</b>
5 to 9	1 (0.1)	969 (99.9)		0.03	0.28 (0.002-0.32)	<b>0.004</b>	0.03 (0.003-0.25)	<b>0.002</b>
> 9	0	308 (100)		0	-			
Educational level			0.30					
Illiterate	1 (0.9)	113 (99.1)		1.4				
Elementary school	6 (0.4)	1693 (99.6)		0.3	0.20 (0.02-1.83)	0.15	0.55 (0.11-2.54)	0.44
High school	5 (0.3)	1487 (99.7)		0.3	0.19 (0.02-1.83)	0.15	-	-
Higher education	0	724 (100)		0				
SUS user			0.46					
No	3 (0.2)	1419 (99.8)		0.09				
Yes	9 (0.3)	2603 (99.7)		0.3	3.58 (1.05-12.2)	<b>0.04</b>	2.51 (0.81-7.78)	0.11
Health spending***			0.45					
< 100	6 (0.4)	1731 (99.6)		0.4				
100 or more	4 (0.2)	1868 (99.8)		0.1	0.39 (0.08-2.02)	0.26	0.99 (0.20-4.84)	0.99

\*Chi-squared test or Fisher's exact test. \*\*MW: minimum wage. \*\*\*In Reais in the last month. OR: odds ratio; 95% CI: 95% confidence interval.

**Table 2: Analysis of associations between reported migraine or hemicrania and sociodemographic variables, use of health services, and health spending. ISA-SP-Capital 2015.**

Variable/Category	Unadjusted data			Adjusted data				
	Yes (%)	No (%)	p*	Prevalence (%)	Uni OR (95% CI)	P	Multi OR (95% CI)	P
Sex			<0.001					
Female	64 (3.6)	1703 (96.4)		0.04				
Male	312 (13.7)	1964 (86.3)		15.9	4.77 (3.49-6.50)	<b>&lt;0.001</b>	5.63 (3.91-8.11)	<b>&lt;0.001</b>
Age group (years)			<0.001					
15 to 29	101 (9.1)	1005 (90.9)		9.69				
30 a 44	151 (17.0)	738 (83.0)		15.61	1.72 (1.27-2.34)	<b>0.001</b>	1.53 (1.04-2.24)	<b>0.03</b>
46 to 59	68 (9.5)	650 (90.5)		9.47	0.98 (0.70-1.36)	0.88	0.76 (0.50-1.17)	0.22

<b>60 or over</b>	37 (3.6)	982 (96.4)		3.49	0.34 (0.23-0.50)	<b>&lt;0.001</b>	0.21 (0.12-0.38)	<b>&lt;0.001</b>
<b>Skin color</b>			0.51					
<b>White</b>	186 (9.3)	1805 (90.7)		10.2				
<b>Black</b>	36 (8.5)	388 (91.5)		9.1	0.88 (0.59-1.33)	0.56	0.95 (0.59-1.51)	0.82
<b>Yellow</b>	5 (5.9)	80 (94.1)		10.2	1.01 (0.32-3.20)	0.99	0.49 (0.08-2.78)	0.41
<b>Brown</b>	127 (10.1)	1226 (90.0)		11.2	1.11 (0.86-1.45)	0.41	1.14 (0.84-1.54)	0.39
<b>Marital status</b>			<0.001					
<b>Stable union</b>	213 (11.5)	1641 (88.5)		12.1				
<b>Single, separated, divorced</b>	145 (7.9)	1698 (92.1)		8.5	0.67 (0.53-0.85)	<b>0.001</b>	0.66 (0.48-0.90)	<b>0.008</b>
<b>Widowed</b>	17 (5.1)	317 (94.9)		6.4	0.49 (0.27-0.89)	<b>0.02</b>	0.50 (0.22-1.12)	0.09
<b>Religion</b>			0.53					
<b>Catholic</b>	177 (9.1)	1766 (90.9)		10.3				
<b>Evangelical or Protestant</b>	110 (9.2)	1090 (90.8)		9.9	0.95 (0.73-1.25)	0.73	0.83 (0.60-1.14)	0.25
<b>None</b>	56 (9.5)	534 (90.5)		9.9	0.96 (0.65-1.41)	0.83	0.96 (0.59-1.55)	0.86
<b>Spiritist, Jewish or Buddhist</b>	22 (11.8)	165 (88.2)		12.6	1.25 (0.73-2.17)	0.42	1.07 (0.53-2.15)	0.85
<b>Umbanda or Candomblé</b>	6 (15.4)	33 (84.6)		15.5	1.59 (0.63-4.03)	0.32	1.34 (0.40-4.43)	0.63
<b>Place of birth</b>			0.34					
<b>São Paulo</b>	234 (9.1)	2323 (90.8)		9.95				
<b>Other state</b>	137 (9.8)	1260 (90.2)		10.97	1.11 (0.90-1.38)	0.32	1.07 (0.83-1.37)	0.62
<b>Other country</b>	4 (5.1)	75 (94.9)		6.56	0.64 (0.20-2.05)	0.45	0.11 (0.01-0.94)	<b>0.04</b>
<b>Occupation</b>			<0.001					
<b>No</b>	58 (6.3)	869 (93.8)		7.66				
<b>Yes</b>	312 (10.2)	2744 (89.8)		10.82	1.46 (1.07-2.0)	<b>0.02</b>	1.14 (0.78-1.66)	0.49
<b>Household income (MW**)</b>			0.42					
<b>&lt; 1</b>	27 (9.6)	254 (90.4)		10.3				
<b>1 to 2</b>	56 (7.4)	698 (92.6)		8.5	0.81 (0.47-1.38)	0.43	0.74 (0.40-1.38)	<b>0.34</b>
<b>3 to 4</b>	134 (9.8)	1231 (90.2)		10.5	1.02 (0.64-1.64)	0.93	1.01 (0.58-1.78)	<b>0.96</b>
<b>5 to 9</b>	95 (9.8)	875 (90.2)		10.0	0.97 (0.57-1.63)	0.90	1.00 (0.52-1.91)	<b>0.99</b>
<b>&gt; 9</b>	29 (9.4)	279 (90.6)		11.8	1.16 (0.64-2.11)	0.62	1.16 (0.56-2.40)	0.69
<b>Educational level</b>			0.06					
<b>Illiterate</b>	6 (5.3)	108 (94.8)		8.78				
<b>Elementary school</b>	147 (8.7)	1552 (91.4)		9.37	1.07 (0.45-2.58)	0.87	0.78 (0.27-2.23)	0.65
<b>High school</b>	138	1354		9.55	1.09	0.83	0.51	0.19

	(9.3)	(90.8)			(0.47-2.55)		(0.18-1.40)	
<b>Higher education</b>	84 (11.6)	640 (88.4)		12.56	1.49 (0.62-3.60)	0.37	0.58 (0.19-1.70)	0.32
<b>SUS user</b>			0.06					
<b>No</b>	149 (10.5)	1273 (89.5)		11.8				
<b>Yes</b>	227 (8.7)	2385 (91.3)		9.2	0.75 (0.61-0.94)	<b>0.01</b>	0.81 (0.60-1.08)	0.15
<b>Health spending***</b>			0.04					
<b>&lt; 100</b>	144 (8.3)	1593 (91.7)		9.15				
<b>100 or more</b>	193 (10.3)	1679 (89.7)		11.3	1.27 (0.98-1.65)	0.07	1.30 (0.98-1.71)	0.07

\*Chi-squared test or Fisher's exact test. \*\*MW: minimum wage. \*\*\*In Reais in the last month. OR: odds ratio; 95% CI: 95% confidence interval.

**Table 3: Analysis of associations between reported headache and sociodemographic variables, use of health services, and health spending, ISA-SP-Capital 2015.**

Variable/Category	Unadjusted data			Adjusted data				
	Yes (%)	No (%)	p*	Prevalence (%)	Uni OR (95% CI)	p	Multi OR (95% CI)	p
<b>Sex</b>			<b>&lt;0.001</b>					
<b>Female</b>	314 (17.8)	1453 (82.2)		18.01				
<b>Male</b>	521 (22.9)	1755 (77.1)		23.09	1.36 (1.16-1.61)	<b>&lt;0.001</b>	1.43 (1.16-1.76)	<b>0.001</b>
<b>Age group (years)</b>			<b>&lt;0.001</b>					
<b>15 to 29</b>	286 (25.9)	820 (74.1)		25.54				
<b>30 a 44</b>	201 (22.6)	688 (77.4)		21.82	0.81 (0.66-1.00)	0.06	0.83 (0.63-1.09)	0.19
<b>46 to 59</b>	138 (19.2)	580 (80.8)		18.59	0.67 (0.51-0.87)	0.003	0.68 (0.48-0.94)	0.02
<b>60 or over</b>	135 (13.2)	884 (86.8)		12.3	0.41 (0.31-0.54)	<b>&lt;0.001</b>	0.40 (0.28-0.56)	<b>&lt;0.001</b>
<b>Skin color</b>			0.07					
<b>White</b>	378 (19.0)	1613 (81.0)		19.2				
<b>Black</b>	91 (21.5)	333 (78.5)		22.2	1.20 (0.87-1.66)	0.26	1.40 (0.71-1.51)	0.85
<b>Yellow</b>	15 (17.7)	70 (82.3)		19.1	1.00 (0.53-1.88)	0.99	1.35 (0.72-2.56)	0.35
<b>Brown</b>	308 (22.6)	1055 (77.4)		22.4	1.22 (0.99-1.50)	0.07	1.01 (0.77-1.32)	0.95
<b>Marital status</b>			0.003					
<b>Stable union</b>	365 (19.7)	1489 (80.3)		20.3				
<b>Single, separated, divorced</b>	417 (22.6)	1426 (77.4)		22.1	1.11 (0.91-1.34)	0.29	0.90 (0.70-1.15)	0.41
<b>Widowed</b>	51 (15.3)	283 (84.7)		14.1	0.64 (0.46-0.89)	0.008	0.72 (0.47-1.11)	0.14
<b>Religion</b>			0.002					
<b>Catholic</b>	388 (20.0)	1555 (80.0)		20.28				
<b>Evangelical or Protestant</b>	275 (22.9)	925 (77.1)		23.18	1.19 (0.97-1.44)	0.09	1.05 (0.81-1.36)	0.72
<b>None</b>	108 (18.3)	482 (81.7)		17.64	0.84 (0.63-1.13)	0.25	0.65 (0.45-0.94)	<b>0.02</b>

<b>Spiritist, Jewish or Buddhist</b>	26 (13.9)	161 (86.1)		14.54	0.67 (0.41-1.10)	0.11	0.73 (0.40-1.31)	0.29
<b>Umbanda or Candomblé</b>	14 (35.9)	25 (64.1)		33.55	1.98 (0.94-4.20)	0.07	1.77 (0.60-5.20)	0.30
<b>Place of birth</b>			0.27					
<b>São Paulo</b>	544 (21.3)	2013 (78.7)		20.88				
<b>Other state</b>	277 (19.8)	1120 (80.2)		20.62	0.98 (0.82-1.18)	0.86	0.94 (0.75-1.19)	0.62
<b>Other country</b>	12 (15.2)	67 (84.8)		17.57	0.81 (0.41-1.61)	0.54	0.78 (0.33-1.86)	0.58
<b>Occupation</b>			<0.001					
<b>No</b>	148 (16.0)	779 (84.0)		16.4				
<b>Yes</b>	672 (22.0)	2384 (78.0)		21.7	1.41 (1.18-1.70)	<0.001	1.22 (0.98-1.51)	0.07
<b>Household income (MW**)</b>			0.004					
<b>&lt; 1</b>	62 (22.1)	219 (77.9)		20.6				
<b>1 to 2</b>	181 (24.0)	573 (76.0)		23.7	1.19 (0.82-1.74)	0.35	1.22 (0.73-2.04)	0.45
<b>3 to 4</b>	293 (21.5)	1072 (78.5)		21.9	1.08 (0.75-1.56)	0.69	1.12 (0.70-1.81)	0.63
<b>5 to 9</b>	171 (17.6)	799 (82.4)		18.4	0.87 (0.60-1.26)	0.45	1.04 (0.64-1.69)	0.88
<b>&gt; 9</b>	50 (16.2)	258 (83.8)		14.9	0.67 (0.42-1.08)	0.10	0.89 (0.51-1.54)	0.67
<b>Educational level</b>			0.24					
<b>Illiterate</b>	23 (20.2)	91 (79.8)		20.24				
<b>Elementary school</b>	354 (20.8)	1345 (79.2)		21.467	1.08 (0.62-1.88)	0.79	0.90 (0.44-1.84)	0.77
<b>High school</b>	325 (21.9)	1166 (78.1)		22.5	1.14 (0.67-1.99)	0.62	0.76 (0.37-1.57)	0.46
<b>Higher education</b>	131 (18.1)	593 (81.9)		17.19	0.82 (0.48-1.40)	0.46	0.65 (0.32-1.30)	0.22
<b>SUS user</b>			<0.001					
<b>No</b>	259 (17.6)	1172 (82.4)		17.67				
<b>Yes</b>	584 (22.4)	2028 (77.6)		22.74	1.37 (1.14-1.65)	<b>0.001</b>	1.39 (1.09-1.78)	<b>0.009</b>
<b>Health spending***</b>			0.80					
<b>&lt; 100</b>	352 (20.3)	1385 (79.7)		20.35				
<b>100 or more</b>	373 (19.9)	1499 (80.1)		19.7	0.96 (0.79-1.17)	0.69	1.21 (0.96-1.53)	0.11

\*Chi-squared test or Fisher's exact test. \*\*MW: minimum wage. \*\*\*In Reais in the last month. OR: odds ratio; 95% CI: 95% confidence interval.

## CONCLUSION

The most sensitive factor (demographic variable) for the determination of differences in its categories was 'age group', followed by 'sex', 'marital status', 'place of birth' and 'household income' which, in turn, were followed by 'religion', 'occupation' and 'educational level'. Finally, 'skin color' and 'health spending' showed very low sensitivity for the determination of differences between categories regarding the three conditions studied

(epilepsy or seizures; migraine or hemicrania and headache).

## Ethics Approval and Consent to Participate

The Ethics Committee of the Faculty of Medical Sciences, PUC-SP, approved the study.



**Human and Animal Rights**

No animals were used in this research. All human research procedures were followed in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

**Consent for Publication**

Informed consent was obtained from all participants.

**Availability of Data and Materials**

Not applicable.

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