Original Article

Self-reported high salt intake in adults: data from the National Health Survey, Brazil, 2013

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Abstract

Objective: *to describe self-reported high sodium consumption prevalence in adults and compare results in Brazilian capitals and the Federal District based on data from the 2013 National Health Survey (PNS) and from the 2013 Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel).* ***Methods:*** *this was a descriptive study using PNS and Vigitel data, estimating prevalence and confidence intervals (95%CI).* ***Results:*** *PNS data indicates that 14.2% (95%CI:13.6%-14.7%) of adults reported high sodium consumption. It was higher in men (16.1%;95%CI:15.3-16.9), people aged 18-29 (17.7%;95%CI:16.2-19.2), those with higher education (17.3%;95%CI:15.6-19.0), living in urban areas (14.8%;95%CI:13.6-14.7), and in Southern Brazil (18.2%;95%CI:16.8-19.7). When comparing capitals, there was no statistical difference between PNS and Vigitel, although statistical difference was found in Rio Branco and Aracaju.* ***Conclusion:*** *similar rates of high prevalence were found in both studies, reinforcing Vigitel's important monitoring role.*

Key words: *Sodium Chloride, Dietary; Life Style; Feeding Behavior; Risk Factors; Epidemiology, Descriptive.*

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Introduction

Sodium is found in nature, in the salt added to the preparation of food, in the salt shaker at the table and in processed foods,[1] being widely available. There is evidence of the association of high sodium intake with the development of several chronic diseases such as arterial hypertension,[2] cardiovascular diseases,[3,4] stroke, left ventricular hypertrophy, kidney diseases[5] and stomach cancer[6], among others. This is an important risk factor to be monitored.

The daily salt intake per person was excessive in most countries, ranging between 9 and 12g.[7] In Brazil, the 2008-2009 Household Budget Survey pointed a population average daily sodium intake of 4,700mg, equivalent to 12 g/day of salt.[8,9] This value far exceeds the World Health Organization (WHO) recommendation of a maximum daily salt intake of 5g for adults (2,000mg of sodium)[10].

> *The decrease in salt intake has been identified as one of the most cost-effective interventions to reduce the burden of chronic non-communicable diseases (NCDs)*

The decrease in salt intake has been identified as one of the most cost-effective interventions to reduce the burden of non-communicable diseases (NCDs), with the potential to save millions of lives each year, once its intake is related to NCDs. [11-14] Initiatives on salt reduction have also been developed since 2004, as part of the WHO Global Strategy on Diet, Physical Activity and Health.[15,16] The importance of salt reduction in the population was approved at the United Nations High Level Meeting on NCDs, which occurred in 2011, and was included in the WHO Global Action Plan for the Prevention and Control of NCDs, which has set a target of 30% reduction in salt intake between 2013 and 2020.[11,17] Strategic Action Plan to Tackle Non-communicable Diseases (NCDs) in Brazil 2011-2022, published in 2011, also defined as one of its goals the reduction in the average salt intake.[12]

Direct information on the sodium intake remains scarce in the country. A study conducted in Vitória, Espírito Santo State, using urine samples, estimated a daily salt intake of 12.6g (standard deviation: 5.8g) per individual. Of this volume, 52.3% derive from the addition of salt to the food.[18]

The monitoring of indicators related to food consumption takes into consideration the markers of healthy and unhealthy consumption patterns. The indicator "self-perception of high salt intake" belongs to the markers of unhealthy food.[19] In 2013, the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel) included the indicator "self-perception of high salt intake". Of those surveyed by Vigitel, 16% considered their salt intake high or very high.[19]

The knowledge of prevalence of risk factors and their distribution in the population is essential to guide the NCDs prevention actions and health promotion in a more cost-effective way.[20] Evaluating the self-reported sodium intake may help in raising awareness of population regarding of the need to change this habit. In 2013, the National Health Survey (PNS) in its module 'Lifestyle', inquired the population about the self-perception of salt intake.[21]

The objectives of this study were to describe the prevalence of self-reported high sodium intake in adults and compare data of Brazilian capitals and the Federal District, collected by the National Health Survey, PNS, and the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey, Vigitel, both conducted in 2013.

Methods

This cross-sectional study used data from the PNS and the Vigitel System. The PNS is a household survey carried out by the Brazilian Institute of Geography and Statistics (IBGE) in a partnership with the Ministry of Health.[21] Its sampling, by clusters, took place in three stages: (i) census sectors (primary units), (ii) households (secondary units) and (iii) an 18 year-old or older adult resident (tertiary unit) selected by simple random sample, to respond to the specific questionnaire. Sample weights were set for the Primary Sampling Units (PSU), for households and all their residents, in addition to the weight for the selected resident.[21,22]

Data collection occurred in 2013 and extended to 64,348 households, with 60,202 interviews conducted with adults (18 or older). The non-response rate in the study was of 8.1%. The IBGE was responsible for the fieldwork, as well as for the availability of its professionals involved in the research, such as information gathering agents, who were previously trained, supervisors and coordinators.[21]

To record the data collected, PDA (personal digital assistance), handheld computers, were used in the

interviews scheduled according to the availability and convenience of the respondents. Two or more visits to each household were planned. Further details on the sampling process are available in the publication of the PNS results.[21]

The first publication of the PNS module focused on aspects related to the perception of health status, lifestyles and chronic diseases, including information on the consumption of salt.[21]

Vigitel is a telephone survey conducted with the adult population (≥18 years) who live in the Brazilian capitals and the Federal District. The sampling process of that research is probabilistic, based on the records of landlines from the studied places. The sample consists of 5,000 telephone lines divided into 200 sub-samples for each city, in order to identify the eligible lines (residential and active). After that, an individual is randomly selected to be interviewed in each household.[19]

The estimates of Vigitel are weighted by the raking adjustments of post-stratification, using the estimates of age, sex and education level of the population projected for the year of the survey. The objective of Vigitel weighting is to equalize the distribution of the interviewed population with the distribution of the estimated population. For more information, we recommend the annual publication of the Vigitel results.[19]

In the analysis of this study, we used the indicator of high salt intake, which consists of the ratio (%) of individuals aged 18 or more who reported high or too high salt intake, over the total number of individuals interviewed. The PNS question analyzed was: *"Considering the freshly prepared food and industrialized food, do you think your salt intake is a) very high, b) high, c) appropriate, d) low e) very low* ?».[21] The question of Vigitel to compose this indicator *was: "Summing the freshly prepared food plus the processed food, do you think your salt intake is a) very high, b) high, c) appropriate, d) low e) very low?."*[19]

Prevalence and their 95% confidence interval were presented according to:

a) sex (male, female);
b) age (18-29; 30-59; 60-64; and 65 -74 years old);
c) education level
   - No schooling and incomplete primary school;
   - Complete primary school and incomplete secondary school;
   - Complete secondary school and incomplete tertiary school; and
   - Complete tertiary school;
d) ethnicity/skin color (white, black, brown);
e) area of residence (urban, rural); and
f) Brazilian regions (North, Northeast, Southeast, South, Central-West).In the comparison between the two surveys, significant differences were identifyed based on the abscence of overlaping in the comparisson of 95%CI. In order to perform the analysis of the data, the software Stata version 11.0 was used, in the survey module, which considers effects of the complex sample.

The PNS was approved by the National Commission for Ethics in Research, under technical report n. 328,159, June 26, 2013; and Vigitel survey, approved under technical report n. 355,590, June 26, 2013.

Results

In Brazil, the prevalence of adults who referred high salt intake was 14.2% (95%CI 13.6% to 14.7%) and 15.0% (95%CI 14.2% to 15.8) for the total of the capitals. This prevalence was higher among males (16.1%; 95%CI 15.3% to 16.9%). We observed a reduction in prevalence of this indicator as age increased: frequency of 17.7% (95%CI 16.2% to 19.2%) for individuals aged 18 to 29 years, and 7.9% (95%CI 6,9% to 8.9%) for those between 65 and 74 years old (Table 1).

Concerning education level, higher prevalence was verified, as the years of study increased, with frequency of 17.3% (95%CI 15.6% to 19.0%) among adults with complete tertiary school and 10.5% (95%CI 9.8% to 11.2%) among individuals with no schooling and incomplete primary school. For ethnicity/skin color, adults who declare themselves white had a prevalence of 15.4% (95%CI 14.6% to 16.2%) of self-reported high salt intake. The high salt intake was more prevalent in urban areas (14.8%; 95%CI 13.6 to 14.7) and in the South (18.2%; 95%CI 16.8% to 19.7%) and Central-West (15.8%; 95%CI 14.5% to 17.1%). The lowest percentage of self-reported high consumption was found in the Northeast (10.7%; 95%CI 0.0% to 11.5 %) (Table 1).

When stratifying by States, the highest prevalences were observed in the states of Santa Catarina (19.8%; 95%CI 16.8 to 22.8), Rio Grande do Sul (19.4%; 95%CI 16.9 -21.8) and Amapá (19.0%; 95%CI 15.2 to 22.9); the lowest prevalences, on the other hand, were observed in the states of Paraíba (9.9%; 95%CI 8.0 to 11.9), Maranhão (9.8%; 95%CI 7.4 to 12.2) and Piauí (9.2%;

Table 1 - Prevalence (%) of self-reported high salt intake among adults (n = 60,202) according to sociodemographic characteristics. - National Health Survey. Brazil, 2013

Characteristics	High salt intake		
	%	95%CI[a]	
		Lowest	Highest
Sex			
Male	16.1	15.3	16.9
Female	12.5	11.8	13.2
Age (years)			
18-29	17.7	16.2	19.2
30-59	17.3	16.4	18.2
60-64	12.9	12.1	13.8
65-74	7.9	6.9	8.9
Education Level			
No schooling and incomplete primary school	10.5	9.8	11.2
Complete primary school and incomplete secondary school	15.8	14.4	17.2
Complete secondary school and incomplete tertiary school	16.6	15.6	17.6
Complete tertiary school	17.3	15.6	19.0
Ethnicity/skin color			
White	15.4	14.6	16.2
Black	13.6	11.9	15.4
Brown	12.8	12.1	13.5
Brazil	14.2	13.6	14.7
Urban	14.8	14.2	15.4
Rural	10.5	9.5	11.5
Country regions			
North	14.6	13.2	16.0
Northeast	10.7	10.0	11.5
Southeast	14.6	13.5	15.6
South	18.2	16.8	19.7
Central-west	15.8	14.5	17.1

a) 95%CI[a] : confidence interval of 95%

95%CI 7.4 to 11.0) (Figure 1). There was no convergence of states and capitals which stood out with the highest and lowest percentages for this indicator (Figure 1 and Table 2).

For the Brazilian capitals and the Federal District, the individuals who most reported high salt intake were those resident in Goiânia (21.5%; 95%CI 17.2 to 25.9), Macapá (20.7%; 95%CI 15.4 to 26.1) and Cuiabá (19.8%; 95%CI 15.2 to 24.4), the lowest prevalence were observed in Manaus (12.2%; 95%CI 8.9 -15.4), Rio Branco (10.5%; 95%CI 8.2% to 12.7%) and Aracaju (9.4%; 95%CI 6.3% to 12.6%). For the total of the capitals, the prevalence estimated by PNS was 15.0% (95%CI 14.2% to 15.8%), and by Vigitel, 16.0% (95%CI 15.3% to 16.6%). When comparing the prevalence of PNS and Vigitel, it was found that, although specific prevalences are not identical, only for Rio Branco and Aracaju the difference between the results of the two surveys was statistically significant (Table 2).

Discussion

According to the National Health Survey data, about one in six adult Brazilians consider their salt intake high. The prevalence of this condition was higher among men, compared to women, showing an inverse relation with age group and a direct one with the individuals' education level. The perception of high consumption is also higher among individuals with white skin in urban areas, and residents of the South and Central-West. Similarity between the results of the PNS and the Vigitel system was also found for all capitals except for Rio Branco and Aracaju.[19]

The results of this study cannot be seen as an approximation of the actual salt intake by the adult population of the country, since the correlation between the level perceived and the actual salt intake remains unexplored. Although the PNS has among its objectives the direct identification of the Brazilian population salt intake, through the analysis

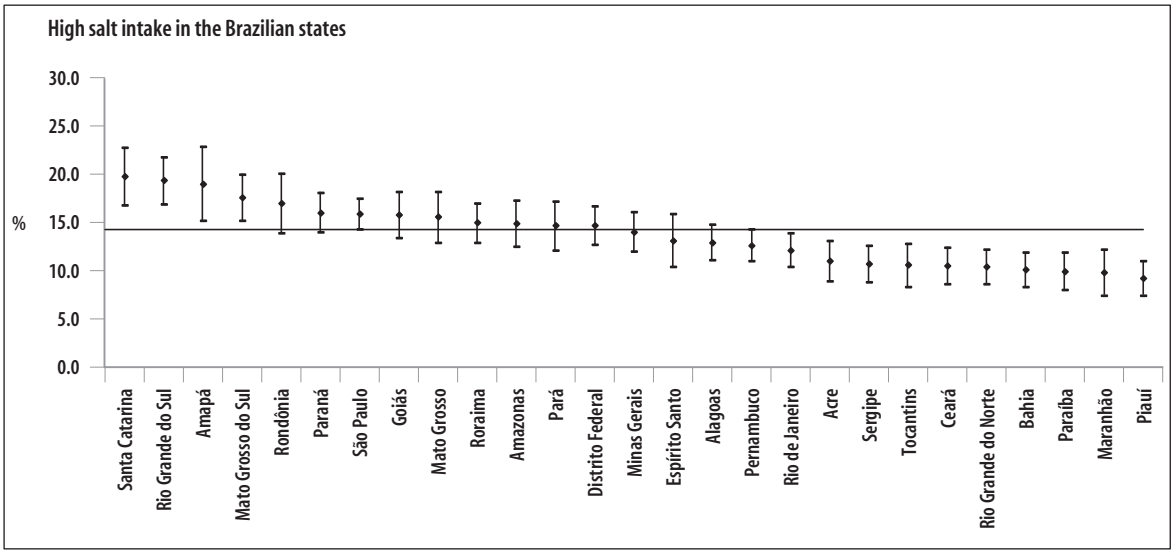

Figure 1 – Prevalence (%) of self-reported high salt intake among adults (n = 60,202), according to Brazilian States. - National Health Survey. Brazil, 2013

Table 2 - Prevalence (%) of self-reported high salt intake among adults living in the Brazilian capitals and the Federal District (n = 52,929), according to the National Health Survey (PNS) and Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel). Brazil, 2013

State capitals	PNS		Vigitel	
	Prevalence	95%CI[a]	Prevalence	95%CI[a]
Goiânia	21.5	(17.2-25.9)	17.7	(15.5-19.9)
Macapá	20.7	(15.4-26.1)	17.3	(15.0-19.7)
Cuiabá	19.8	(15.2-24.4)	17.1	(14.8-19.3)
Campo Grande	19.2	(16.2-22.2)	17.8	(15.3-20.3)
Florianópolis	18.6	(15.2-22.0)	17.9	(15.6-20.2)
Porto Alegre	17.7	(14.5-20.9)	19.0	(16.5-21.5)
Curitiba	17.6	(15.1-20.2)	18.2	(15.8-20.5)
São Paulo	16.1	(14.1-18.0)	15.8	(13.9-17.8)
Porto Velho	15.4	(10.5-20.2)	15.9	(13.4-18.4)
Natal	15.3	(12.4-18.1)	15.5	(13.2-17.7)
Maceió	15.2	(12.4-18.0)	15.3	(12.9-17.6)
Teresina	15.2	(12.7-17.8)	14.1	(11.6-16.5)
Palmas	15.0	(12.1-17.8)	16.0	(13.6-18.4)
Brasília	14.7	(12.7-16.7)	15.8	(13.6-17.9)
Boa Vista	14.4	(11.9-16.8)	16.5	(13.9-19.1)
Salvador	14.3	(11.3-17.4)	15.2	(13.1-17.2)
Belém	14.1	(10.7-17.4)	15.3	(13.1-17.4)
Recife	13.9	(10.7-17.2)	14.7	(12.6-16.8)
João Pessoa	13.7	(10.7-16.7)	14.8	(12.6-17.1)
Fortaleza	13.2	(10.0-16.4)	16.4	(14.3-18.4)
Rio de Janeiro	13.1	(10.3-16.0)	14.8	(12.7-16.8)
Vitória	13.1	(9.5-16.8)	16.4	(14.2-18.6)
Belo Horizonte	13.0	(10.8-15.3)	16.2	(14.1-18.2)
São Luís	12.8	(10.3-15.4)	17.3	(15.0-19.7)
Manaus	12.2	(8.9-15.4)	16.7	(14.3-19.1)
Rio Branco	10.5	(8.2-12.7)	18.0	(15.1-20.8)
Aracaju	9.4	(6.3-12.6)	15.4	(13.0-17.9)
Brazil	**15.0**	**(14.2-15.8)**	**16.0**	**(15.3-16.6)**

a) 95%CI[a] : confidence interval of 95%

of the urinary sodium, these data remained unavailable until the time of the conclusion of this study. However, the results presented here are a good way to assess the ability of the Brazilian population to identify their real salt intake and the dangers to health when intake is high.

Data from the Household Budget Survey (POF) conducted by IBGE in 2008-2009, with a sample of 21,003 individuals aged between 20 and 59, indicated, by the analysis of two non-consecutive days of food records, inadequate and excessive sodium intake by 89.3% of men and 70% of women in the country.[23] If the high salt intake was identified only by 16.1% of men and 12.5% of women participating in the PNS, it is possible to say that people's ability to recognize their sodium intake, or even intake adequate levels, remains far from ideal.

Some limitations should be taken into account during the assessment of this study results. In both surveys, PNS and Vigitel, the interviewees were asked to rate their salt intake, and this information was used as an approximation of their sodium intake.[19,21] As the sodium is present in the food as well as other substances (monosodium glutamate or sodium bicarbonate, for example) and its content in industrialized food is not always easy to perceive, self--assessment of individuals becomes complex, reducing the accuracy of the ultimate indicator and possibly resulting in their underestimation. Such matter constitutes the main limitation of this study. However, it is known that table salt accounts for the largest portion of the sodium consumed by the Brazilian population,[9,23,24] so that the big difference between the frequency of inappropriate intake and of individuals who recognize their high intake is due more to the ignorance of salt intake than to the inaccuracy in the measurement of this study.

Another potential limitation is related to the fact that the Vigitel sample is restricted to those with landline, which is a service with low coverage in the Northern and Northeastern regions. This is probably one of the reasons in the frequency differences found between PNS and Vigitel, for individuals referring high salt intake in Aracaju and Rio Branco. However, the use of a weighting adjustment reduces these biases, seeking to approach the population studied by Vigitel to that population estimated for each city studied in each year of the survey.[19]

In this study, there was great similarity of the parameters estimated by Vigitel and PNS for the self-perception of salt intake for Brazil and for 25 of the 27 capitals. This finding, in addition to the swiftness and low cost of the system based on telephone interviews (about one-fifth of the cost of an in-person home interview),[25] leads to the conclusion that the Vigitel system is suitable to maintain the surveillance of this indicator, especially during interval years of household surveys. We highlight that no test was used to assess the agreement among the results found. The results presented suggest greater perception of salt intake among individuals with higher education level. This trend is often observed in studies involving other topics related to eating and nutrition.[26] Since the inadequate sodium intake appears to be similarly distributed among the country regions and the different education levels, such information reinforces the need of specific actions among the population of lower income levels and instruction.

Individuals' behavior change is a complex process, full of nuances,[27] usually initiated by the recognition of the current behavior as something harmful or problematic.[26,27,28] Increasing the population's level of awareness about the potential dangers of excessive sodium intake is a key step towards reversing the current levels of inadequate intake of this element. The Ministry of Health performs measures aiming to reduce salt intake from processed food.[29] In this sense, a central strategy is the agreement between the government and the food industry on establishing voluntary, gradual and sustainable reduction of the maximum levels of sodium in processed foods.[29]

This study allowed to identifying the frequency of adults evaluating their own sodium intake as high and their distribution according to the sociodemographic characteristics of the population. The low level of knowledge of individuals about their sodium intake is alarming and demands strong action, such as aggressive media campaigns and other broad-reach nutrition education actions, especially among the population with low income and education levels in the whole country. The similarity in the estimates of prevalence found in the National Health Survey, PNS, and Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey, Vigitel, enables this last one to be used effectively in monitoring this indicator.

Authors' Contributions

Oliveira MM, Malta DC, Santos MAS and Claro RM participated in the study design, analysis and interpretation of data, writing, revision and final approval of the article.

Oliveira TP and Nilson EAF participated in the drafting, revision and final approval of the article.

Everyone is responsible for all aspects of the manuscript, including the guarantee of its accuracy and integrity.

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