

## Self-reported oral health in the Brazilian adult population: results of the 2013 National Health Survey

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**Abstract** *Abstract Oral diseases are a relevant public health problem in Brazil, because of their prevalence and magnitude in the population. Population-based surveys are essential tools for the election of groups and demands priority attention, . The aim of this paper was to describe the self-reported oral health status of the population, according to sociodemographic factors. A descriptive study was conducted using the National Health Survey data of 2013. Indicators associated with oral hygiene practices and oral health conditions were analyzed. Men, elders, blacks and browns, individuals with no education and with incomplete elementary level, residents in rural areas and in the northeast had the lowest frequencies of the indicators of oral hygiene and health self-perception oral as good or very good. Total loss has affected about 16.0 million. Both total tooth loss as the loss of 13 or more teeth was more frequent among women, individuals aged 60 and older, poorly educated, residents in rural areas. It is concluded that the data from the National Health Research -PNS 2013 reinforce the need for policies and actions that minimize the inequalities in oral health, ensuring access to the most vulnerable population sub-groups according to their health needs.*

**Key words** *Oral health, Epidemiological survey, Self-report*

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## Introduction

Oral health issues are a significant public health problem due to their percentage prevalence and the scale of the population<sup>1</sup>. There have been few studies with nationwide scope on the condition of Brazilians' oral health. Highlights have been the epidemiological surveys on oral health in the Brazilian population made by the Health Ministry in 1986<sup>2</sup>, 1996<sup>3</sup> (with school children only), 2003<sup>4</sup> and 2010<sup>5</sup>.

Comparison between these epidemiological surveys<sup>2-4</sup> shows that the condition of adult Brazilians' oral health has improved<sup>6</sup>. In 1986 the 'CPOD' index (the sum of cases of permanent teeth with caries, extractions due to caries and restorations) was 22.5% in the adult population aged 35 to 44 and the P component (number of teeth extracted) contributed 66% of that total<sup>2</sup>. After two decades, this profile was practically unchanged: the average CPOD in adults was 20.1, with a contribution of 65.7% from the lost teeth (P) component<sup>3</sup>.

The data of the last epidemiological survey (2010)<sup>5</sup> show that incidence of caries in the adult population aged 35-44 is lower than in the 2003 survey<sup>4</sup>. And in relation to loss of teeth, the data of the National Oral Health Survey (SB Brazil 2010) showed 25% of adults having lost a tooth, with the average of lost teeth varying from 13.5 in 2002/2003 to 7.4 in 2010. However, more than half of elderly people had edentulism (total loss of teeth), both in 2010 and in 2002/2003<sup>7</sup>. As to the effect of collective measures, fluoridation of the public water supply has been one of the principal measures, and a very effective method of control of dental caries<sup>8</sup>.

Population-based studies are essential tools for identification of the groups and demands that should receive priority attention, and also for preparation of instruments for formation and health of public policies. With this in mind the Health Ministry made the 2013 National Health Survey (PNS 2013)<sup>9</sup>, in partnership with the Brazilian Geography and Statistics Institute (IBGE).

The 2013 PNS<sup>9</sup> employed self-assessment for responses by the Brazilian population to its questionnaire on health – an indicator that is in fact used both in Brazil<sup>10</sup> and internationally<sup>11</sup>. Self-assessment has an acceptable degree of validity<sup>12</sup> for ascertaining the number of teeth present and the need for prosthesis, as well as being an indicator used in epidemiological surveys due to its advantages in relation to clinical examination (the gold standard for diagnosis of oral

health situation), and also taking time, costing less and not requiring a specialized professional.

The objective of this article is to describe the self-referred oral health situation of the Brazilian population, according to social-demographic factors.

## Methods

A descriptive study was carried out using the data of the 2013 Brazilian National Health Survey<sup>9</sup>, a partnership between the Brazilian Geography and Statistics Institute (IBGE) and the Brazilian Health Ministry.

The PNS is a household-based survey, with a sampling process that takes place in three stages: primary sampling units were sectors or groups of sectors from the census; households were the secondary units; and the tertiary units comprised one selected resident aged 18 or over from the household. The primary sampling units of the PNS were obtained from the Master Sample, which is the sampling structure of the IBGE's Integrated Household Surveys System (SIPD).

The selection of the sub-sample of the primary sampling units was made by simple random sampling. On this basis, a fixed number of permanent private households in each primary unit was selected. This selection was made from the National File of Addresses for Statistical Purposes (CNEFE) in its most recent use. Within each household selected, one resident aged 18 or over was chosen by lot to answer the specific questionnaire.

The size of the sample was decided taking into account the level of precision desired for the estimates of some indicators of interest. The minimum size decided for the sample was 1,800 households in each unit of the Brazilian federation (the States, and the Federal District). Initially, 81,254 households were selected, and the interviews were carried out in 64,348 households. All the analyses of the PNS were weighted for the primary sampling units, for the households and all their residents and also for the resident selected. Details on the process of sampling and weighting are available in the report of the PNS<sup>9</sup>.

In the collection of data, first the personal responsible for the selected household, or the resident, was contacted. The individual who answered the household questionnaire and all the people resident at the household were identified, and also the adult resident who answered the individual interview. The interviews were sched-

uled for the dates and times that were best for the informants, in advance, with two or more visits per household. The PNS questionnaire was divided into modules, for characteristics of the household, of all the residents (schooling, income, work, disabled people, health plan coverage, use of the health services, health of children under the age of two, health of the elderly) and of the adult resident selected (styles of life, perception of state of health, accidents and incidents of violence, chronic illnesses, women's health, prenatal care, healthcare and medical care).

This study analyzed the following indicators relating to oral health:

#### *Oral health practices*

- a) Proportion of people aged 18 or over who brush their teeth at least twice a day;
- b) Proportion of people aged 18 or over who use toothbrush, toothpaste and dental floss to clean their teeth;
- c) Proportion of people aged 18 or over who change their toothbrush for a new one at least once every three months.

#### *Oral health conditions*

- d) Proportion of people aged 18 or over who consider their oral health to be good or very good;
- e) Proportion of people aged 18 or over who have an intense or very intense degree of difficulty in eating due to problems with teeth or dentures;
- f) Proportion of people aged 18 or over who have lost all their teeth;
- g) Proportion of people aged 18 or over who have lost 13 or more teeth;
- h) Proportion of people aged 18 or over who use some type of dental prosthesis.

Estimates were made of the proportions and their respective 95% confidence intervals ( $CI_{95\%}$ ), by gender (male, female); age group (18-29; 30-39; 40-59 and 60 or over); race/skin color (white, black, mixed-race); level of schooling (no schooling, or primary schooling incomplete; primary schooling incomplete; secondary schooling complete and higher education incomplete; and higher education complete); area of residence (urban, rural); and official geographic Region of Brazil (North, Northeast, Southeast, South, and Center-West). The data were analyzed using *Stata* software, version 11.0 in the *Survey* module for complex samples. The plan of the 2013 PNS was approved by the Brazilian National Research Ethics Committee of the Health Ministry.

## Results

### Oral hygiene practices

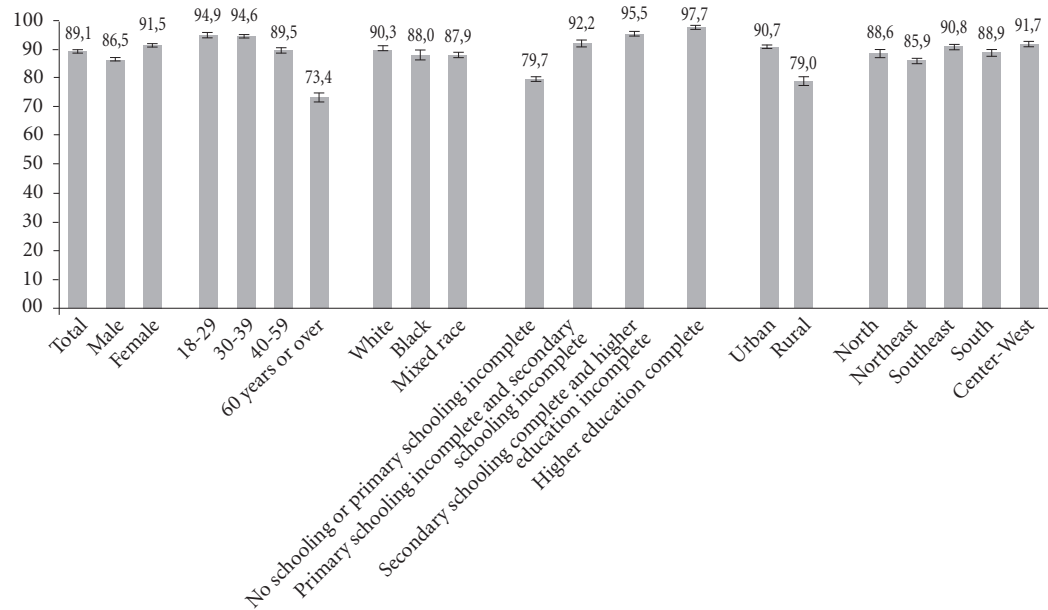
In Brazil, 89.1% of people aged 18 or over brushed their teeth at least twice a day ( $n = 60,202$ ). The habit was less frequent among men (86.5%), people aged 60 or over (73.4%), black people (88.0%) and mixed-race people (87.9%), those without schooling or with primary schooling incomplete (79.7%), those resident in rural areas (79.0%), and those resident in the Northeast Region (85.9%) (Figure 1).

In relation to the individuals who used a toothbrush, toothpaste and dental floss to clean their teeth ( $n = 58,905$ ), the lowest proportions were found among males (48.4%), those aged 60 or over (29.1%), those of African-Brazilian skin color (43.6%), those of mixed race (47.1%), those without schooling or with primary education incomplete (29.2%), those resident in rural areas (30.4%), and those resident in the Northeast (38.4%) (Figure 2).

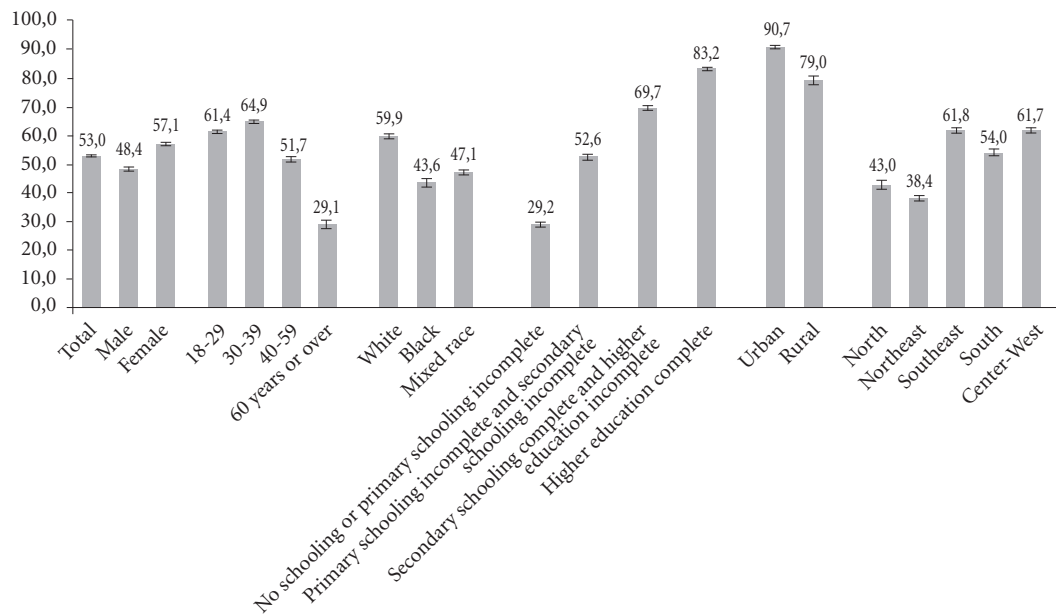
Of people aged 18 or over ( $n = 58,905$ ), 46.8% said they changed their toothbrush for a new one with at least three months of use, with the lowest frequencies observed among men (44.8%), the elderly (36.2%), those of African race origin (41.8%) and of mixed race (45.2%), those without schooling or without completed primary education (40.9%), those resident in rural areas (43.3%), and those resident in the Southeast (43.2%) and Center-West (43.5%) Regions (Figure 3).

### Oral health conditions

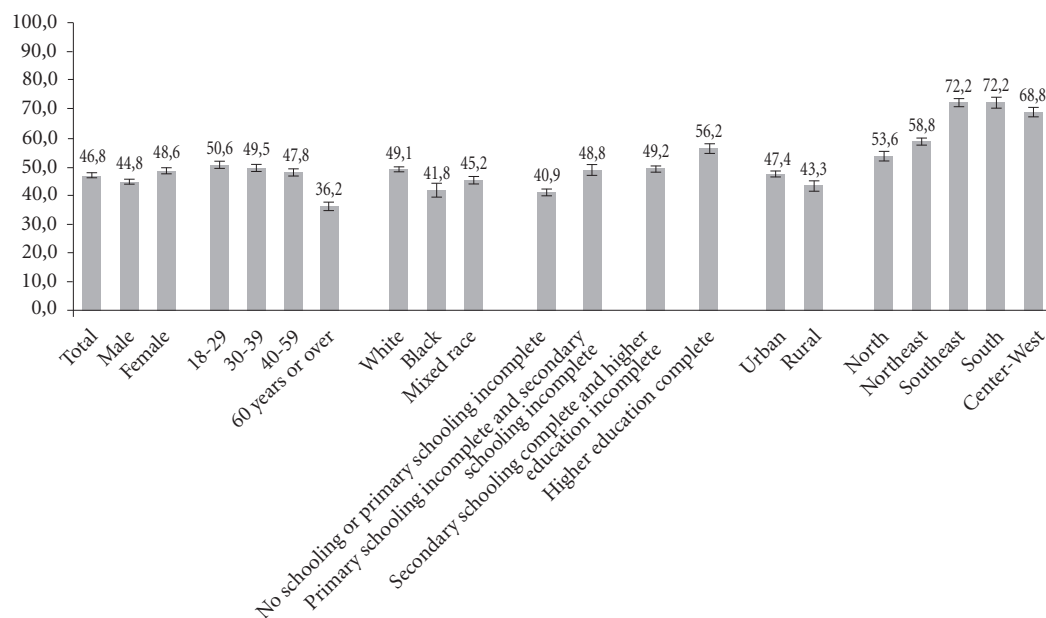
A total of 60,202 adults answered the questionnaire on self-perception of oral health. In 2013, 67.4% of those aged 18 or over identified their oral health as *good* or *very good*. However, those with the lowest percentages of this indicator were: Males (65.8%), adults in the 40-59 age group (63.5%) and aged 60 or over (62.3%), those of African-Brazilian origin (61.2%) and mixed race (62.5%), those without schooling or with primary schooling incomplete (57.5%), and those living in rural areas (56.6%). The estimates varied from 58.8%, in the Northeastern Region, to 72.2% in the South and Southeast Regions (Figure 4).



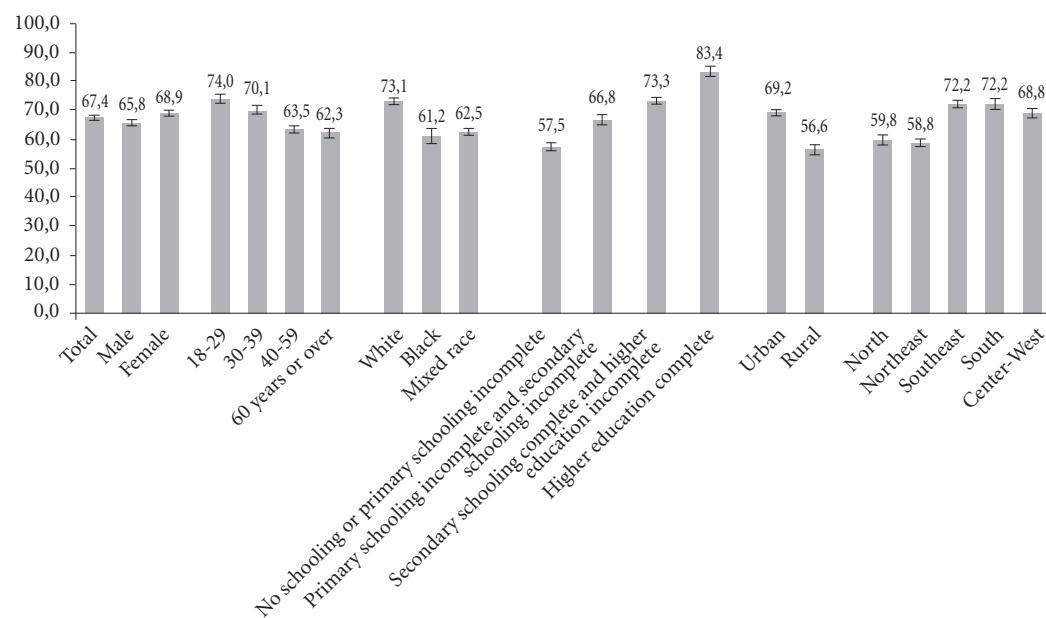
**Figure 1.** Distribution of people aged 18 or over who brush their teeth at least twice a day, according to selected variables, with indication of 95% confidence interval. Brazilian National Health Survey, 2013.



**Figure 2.** Distribution of people aged 18 or over who use a toothbrush, toothpaste and dental floss for cleaning teeth, by selected variables, with indication of 95% confidence interval. National Health Survey, 2013. Brazilian National Health Survey, 2013.



**Figure 3.** Distribution of people aged 18 or over who change their toothbrush for a new one at least every three months, by selected variables, with indication of 95% confidence interval. National Health Survey, 2013.



**Figure 4.** Distribution of people aged 18 or over who consider their oral health to be good or very good, by selected variables, with indication of 95% confidence interval. National Health Survey, 2013.

In Brazil, 60,202 people aged 18 or more answered questions about the difficulty of feeding themselves due to problems with teeth or false teeth. Of these, 1.4% of the males and 1.7% of the females had an intense or very intense degree of difficulty in feeding themselves due to problems with teeth or false teeth. This difficulty was more frequent in people aged 40-59 (1.9%), and 60 or over (3.3%), and also in those without schooling or with incomplete primary education (3.2%). People of black skin color, residents in rural areas and residents in the Northeast had the highest percentages reporting intense or very intense

difficulty in feeding themselves due to problems with teeth or false teeth: 2.2%, 2.3% and 2.3%, respectively (Table 1).

60,202 adults answered the questionnaire on loss of teeth. The survey estimated that 11.0% of people aged 18 or over had lost all their teeth, the highest proportion being in women (13.3%), people aged 60 or more (41.5%), people with education or with incomplete primary education (22.8%), and people living in rural areas (15.0%) and in the North Region (7.7%). There was no statistically significant difference for the *skin color* variable (Table 1).

**Table 1.** Proportion of indicators of condition of oral health in adults aged 18 or over, by selected variables, with indication of 95% confidence interval. National Health Survey, 2013.

Variables	Report intense or very intense eating difficulty due to tooth or denture problems % (CI95%)	Loss of all teeth % (CI95%)	Loss of 13 or more teeth % (CI95%)	Loss of 13 or more teeth and intense or very intense difficulty in eating % (CI95%)	Use of some type of dental prosthesis % (CI95%)
Total	1.5 (1.4-1.7)	11.0 (10.6-11.4)	23.0 (22.5-23.6)	4.5 (3.9-5.1)	33.3 (32.7-34.0)
Gender					
Male	1.4 (1.1-1.6)	8.4 (7.8-8.9)	19.3 (18.5-20.1)	4.5 (3.5-5.4)	28.3 (27.4-29.2)
Female	1.7 (1.4-1.9)	13.3 (12.8-13.9)	26.3 (25.6-27.0)	4.5 (3.7-5.4)	37.9 (37.0-38.7)
Age group (years)					
18 to 29	0.5 (0.3-0.7)	0 (0.0-0.1)	0.2 (0.1-0.3)	1.8 (0.0-3.8)	3.2 (2.7-3.7)
30 to 39	0.8 (0.5-1.0)	0.6 (0.4-0.8)	3.9 (3.4-4.4)	5.4 (1.6-9.3)	17.0 (15.9-18.2)
40 to 59	1.9 (1.6-2.2)	9.8 (9.1-10.6)	29.0 (27.8-30.3)	4.5 (3.5-5.4)	48.0 (46.7-49.3)
60 and over	3.3 (2.8-3.8)	41.5 (39.8-43.2)	67.4 (65.9-69.0)	4.5 (3.7-5.3)	68.6 (67.0-70.2)
Level of schooling					
No schooling, or primary incomplete	3.2 (2.8-3.6)	22.8 (21.9-23.7)	44.2 (43.2-45.3)	5.3 (4.6-6.1)	47.8 (46.6-49.1)
Primary complete, secondary incomplete	0.8 (0.5-1.0)	6.5 (5.5-7.5)	15.3 (13.9-16.6)	2.4 (1.3-3.5)	28.4 (26.7-30.2)
Secondary complete, higher education incomplete	0.4 (0.3-0.6)	2.6 (2.2-2.1)	7.9 (7.3-8.6)	2.1 (1.1-3.0)	21.2 (20.3-22.2)
Higher education complete	0.2 (0.1-0.3)	2.1 (1.5-2.6)	6.6 (5.7-7.5)	1.6 (0.4-2.8)	26.2 (24.2-28.3)
Race/skin color					
White	1.3 (1.1-1.5)	11.6 (10.9-12.3)	23.1 (22.2-24.0)	4.0 (3.1-4.8)	36.4 (35.4-37.4)
Black	2.2 (1.6-2.9)	11.0 (9.3-12.7)	23.1 (21.0-25.3)	5.7 (3.6-7.7)	30.5 (28.2-32.9)
Mixed-race	1.7 (1.4-1.9)	10.4 (9.8-11.0)	23.1 (22.2-24.0)	4.9 (4.0-5.8)	30.5 (29.6-31.5)
Region of residence					
North	1.1 (0.8-1.4)	7.7 (7.0-8.5)	20.6 (19.4-21.8)	3.3 (2.1-4.5)	28.6 (27.3-29.9)
Northeast	2.3 (1.9-2.6)	10.7 (10.1-11.3)	25.4 (24.5-26.2)	5.9 (4.8-7.1)	30.9 (29.6-32.1)
Southeast	1.2 (1.0-1.5)	11.9 (11.1-12.7)	21.6 (20.6-22.5)	3.9 (2.8-5.0)	33.8 (32.7-35.0)
South	1.3 (1.0-1.7)	10.8 (9.9-11.8)	25.3 (23.7-26.8)	4.1 (2.7-5.4)	38.6 (37.1-40.1)
Center-West	1.6 (1.2-2.0)	10.6 (9.7-11.5)	21.2 (20.2-22.2)	4.4 (3.0-5.8)	33.6 (32.5-34.8)
Area of residence					
Urban					
Rural					

The loss of 13 or more teeth was reported by 23% of adults ( $\geq 18$  years), and was more frequent in women (26.3%), people aged 60 or over (67.4%), people without schooling or with incomplete primary education (44.2%), people living in rural areas (33.1%) and people living in the South (25.3%) or Northeast (25.4%) Regions. No statistically significant differences were observed for the variable *skin color* (Table 1).

Of the people who lost 13 or more teeth, 4.5% reported intense or very intense difficulty in feeding themselves, there being no difference for gender, skin color, place of residence (city/rural), or Region. The lowest percentage of report of intense or very intense difficulty in eating, among those who lost 13 or more teeth, was in the 18-29 age group (1.8%); the largest proportion was among those with no education or incomplete primary education (5.3%) (Table 1).

As to the use of some type of dental prosthesis (and = 44,921), 33.3% of adults ( $\geq 18$ ) reported this factor, the majority being: women (37.9%); people aged 60 or over (68.6%); those without education or with incomplete primary education (47.8%); those of white skin color (36.4%); and residents in the South (38.6%) and Southeast (33.8%) Regions. No statistically significant differences were found for location of residence (Table 1).

## Discussion

The data of the 2013 PNS showed that men, elderly people, black and mixed-race individuals, those without schooling or with incomplete primary education, and those living in rural areas or in the Northeast had the lowest frequencies of indicators of adequate oral hygiene and of self-perception of their oral health as good or very good. Reports of intense or very intense difficulty in eating due to problems with teeth or dentures increased with age and was also greatest among those with low schooling, those of black or mixed race, and those resident in rural areas and in the Northeast.

The literature shows a positive association between frequency of brushing of teeth and the feminine gender, young adults and those with a higher level of schooling<sup>10,11</sup>. A systematic review that aimed to identify an association between social, demographic, economic, psycho-social and behavioral factors and self-perception of condition of oral health showed that women have the highest correlation with the act of care, both per-

sonal and family, visit the health services more frequently and express the existence of morbidities more<sup>8,12-14</sup>.

In a survey on adults between age 20 and 59, living in a rural settlement, it was evident that self-assessment or oral health was more frequent in adults with low schooling and in those of black skin or mixed race<sup>15</sup>, similar to the data of the PNS. However, in that study, which was a local study, the highest prevalence of negative self-assessment was in younger people and women, in contrast to the PNS, which was a nationwide study. Advancing age had an influence on worsening self-perception of oral health, also corroborating the other studies. A study with the data of the 2010 SB Brasil (Brazil Oral Health [*Saúde Bucal*] Study) for the Southern region showed adults and elderly people with lower income having the worst self-assessment of oral health<sup>16</sup>.

Difficulty in eating also reflects the inequalities in oral health in Brazil. According to data of the SB Brasil survey, made in 2002 and 2003 in 250 Brazilian municipalities with adults of the 35-44 age group, the factors associated with self-perception of regular or bad mastication were: not receiving preventive information about oral health; having less than 23 teeth in the mouth; need for a partial or total prosthesis; self-perception of oral health as regular or bad/very bad; pain in teeth and gums; and a need for dental treatment. Adults living in the Northeast, those of mixed-race or African-Brazilian background, and those with the lowest level of schooling had the worst self-perception of mastication<sup>15</sup>.

In relation to loss of teeth, 16.0 million people had total loss. Both total loss of teeth and the loss of 13 or more teeth were more frequent in: women; respondents aged over 60; those with low schooling; and those resident in rural areas. The occurrence of dental loss in Brazil, according to the National Oral Health Survey (SB Brasil) of 2010, was greatest in: elderly people; women; people of lower income and schooling; and residents in the North and Northeast regions<sup>15</sup>.

The development of caries as an illness is the principal cause of loss of teeth, followed by gum disease. Use of tobacco is the largest risk factor for its development in adults<sup>17</sup>. In relation to the social determinants related to loss of teeth, the demographic and socio-economic characteristics have high significance for this condition among individuals: the number of teeth lost in adults is greater among the elderly, women, people with low socio-economic conditions and low schooling<sup>16</sup>. However, it can be noted that difficulty of

access to advance dental services for conservation treatment is shown to be one of the reasons why dental extraction is seen as the most viable alternative, principally among those with less purchasing power<sup>18</sup>.

Loss of teeth is a recognized and serious problem of public health, being a significant indicator for the population's oral health, with an extremely high influence in individuals' quality of life<sup>19</sup>. Its impact reduces functional capacity such as chewing and speech, as well as adverse conditions of a nutritional, aesthetic and psychological nature, with reduction of self-esteem and social integration<sup>20</sup>. Skin color, self-referred need for dental treatment, and low schooling are considered predictors both for negative self-evaluation of oral health<sup>13-15</sup> and also for loss of teeth; low schooling and low income are considered determining factors for tooth loss<sup>15</sup>.

Of those who have lost 13 or more teeth and have intense or very intense difficulty in eating, the lowest percentage was among the youngest and the greatest among those with low schooling. One of the elements that helps with chewing and consequently nutrition is the number of teeth in the mouth: a functional dentition has at least 21 natural teeth<sup>20</sup>. As a probable hypothesis for why younger people should have more difficulty in mastication, a lower level of resilience than the elderly have for dealing with challenges related to the function of the mouth (pains, discomfort, food restriction) is cited. Loss of teeth, a marker for inequalities in oral health, affects more individuals with lower schooling and income, because they have less access to dental services and to measures to promote health<sup>8,21,22</sup>.

The majority of individuals who reported use of some type of dental prosthesis was found in women, elderly people, people with low schooling, people with black skin or of mixed race, and those resident in the South and Southeast. The greater use of prostheses in women can be explained by the fact that they used dental services more than men<sup>21</sup>. Elderly people and those with low schooling reported use of prostheses more frequently, probably due to greater loss of teeth<sup>16</sup>. Also, individuals of white skin, and residents in the South and Southeast, used dental services more, according to data from the PNAD (National Household Sample Surveys) of 1998 and 2003<sup>23</sup>.

Another study that used data from epidemiological surveys carried out by the Health Ministry in the years 1986, 2003 and 2010 showed the experience of caries, expressed by the CPOD index

(total of permanent teeth with caries, teeth lost and teeth filled), and dental health, expressed by the OH-D index (total of healthy teeth plus filled teeth) relative to the number of functional teeth, compared to random samples of residents aged 35-44 in each Brazilian Region. There were reductions in the CPOD index and increase in the OH-D index in all the regions in the period from 1986 to 2010. The North Region, which had the worst level in 1986, showed the greatest gain in terms of functional teeth. The investigators concluded that there has been a transition to better oral health in Brazilian adults. It is plausible to propose that addition of fluoride to the water and to toothpaste, higher incorporation of preventive services, and improvement in human development indicators arising from public policies are related to this improvement<sup>24</sup>.

In view of these data it is really possible to affirm that the oral health conditions of Brazilian adults have improved, over the years. However, in relation to the oral health of elderly people, the situation has not changed, with a high prevalence of edentulism (total loss, of all the teeth), and teeth with caries<sup>25</sup>. The Epidemiological Oral Health Conditions Survey of the Brazilian Population, the SB Brasil Project (2002-03) found a critical situation of oral health for elderly people: 54.8% having completely lost all their teeth, an average CPOD (number of teeth with caries, lost or filled) of 27.93, and less than 10% with more than 20 teeth in the mouth<sup>4</sup>. These findings are strongly influenced by a cohort effect and a period effect. The greater part of Brazilian elderly people lived their infancy and youth unexposed to fluoridation in water (which was begun in Brazil in the 1950s), but fluoridation of toothpastes (begun at the end of the 1980s) shows itself to be the principal reason for the decline in dental caries and in a large proportion of the losses of teeth detected in this population group.

Periodic nation-wide epidemiological surveys are of great importance for planning, assessment and monitoring of health conditions and services. It is known that people's behavior is conditioned, among other aspects, by their perceptions and the importance that they attribute to them. Offering health services is not always synonymous with people seeking out these services. Thus, to know how each individual perceives his or her own health is an important step for understanding the pattern of demand for health services<sup>12-14,25</sup>.

According to data of the PNS, difficulties in eating were little reported in the population in



general, but were frequent among the elderly, and also among those with low schooling. A systematic review of the literature over the period 1986-2004 on the oral problems most prevalent among Brazilian elderly people revealed that the average values of the CPOD index were between 25 and 31, with a large percentage of individuals having no teeth at all, reflecting the inefficacy historically present in the public dental healthcare services, limited to series of extractions and urgency services based on the curativist model<sup>25</sup>.

As a limitation of this study, we highlight the non-realization of clinical examination to verify the oral health situation of the adults interviewed. However, it is necessary to note also that self-perception of oral health is less associated with clinical situations and more linked to subjective factors<sup>26</sup>. According to the literature<sup>27</sup>, self-perception about the number of teeth has high validity.

## Final considerations

In Brazil inequalities in oral health are an historic phenomenon, evidencing vulnerabilities in the rural area, in the North and Northeast Regions, and among those with less schooling<sup>8,13,20</sup>. The interventions in public health in the field of oral health principally affect groups with lower socio-economic conditions that preliminarily and intensely make use of the advantages of beneficial public health policies, such as fluoridation of the public water supply<sup>8</sup>. The data of the 2013 PNS underscore the need for policies and actions that minimize the inequalities in oral health, ensuring access to more vulnerable population sub-groups in accordance with their health needs.

## Collaborations

LS Nico worked on writing, revising and the final draft of the article. SSCA Andrade worked on the write-up, development of the figures and tables, revision and final draft. DC Malta worked on the conception and revision of the article. GA Pucca Junior worked on the revision of the article. MA Peres participated in writing and revising the article.

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