

## Perspectives of oral cancer's epidemiological panorama in Brazil

### *Perspectivas do panorama epidemiológico do câncer de boca no Brasil*

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**ABSTRACT:** *Introduction:* Mouth cancer mainly affects the aerodigestive tracts, the tongue, the floor of the mouth and the lower lip. There is a considerable increase in this condition, making it an important factor in public health. In view of the above, what would be the current epidemiological panorama of oral cancer in Brazil? *Objective:* To present the perspectives of the epidemiological panorama of oral cancer in Brazil. *Method:* Descriptive and retrospective cross-sectional study, with a quantitative approach, in which data were collected from the Brazilian Health Informatics Department (DATASUS) and analyzed using articles available at Medline (via Pubmed), SciELO and INCA publications. *Results:* 264,829 cases were reported, of which 72.08% were male, with a predilection for the age group of 50 to 59 years (28.99%) and Caucasian (43.09%). Regarding the deaths, there were 30,563 cases (11.54%), being 77.75% male, 57.07% from 50 to 59 years old and 41.00% Caucasian. Mouth cancer has a high incidence in the Brazilian population, being of multifactorial etiology. In relation to sex, it is attributed to greater exposure to detectable risk factors. Investment in prevention, especially in reducing the consumption of alcohol, tobacco and mitigating the transmission of Human Papilloma Virus (HPV) by oral route, is directly related to combating this neoplasia. *Conclusion:* It is observed that the perspectives are considered promising, as new conditions are created to combat the studied health problem and public policy actions are developed in the country.

**Keywords:** Mouth neoplasms; Public health policy; Preventive health services.

**RESUMO:** *Introdução:* O câncer de boca acomete principalmente as vias aerodigestivas, a língua, o assoalho da boca e lábio inferior. Nota-se aumento considerável desse agravo, tornando-o fator importante na saúde pública. Diante do exposto, qual seria o atual panorama epidemiológico do câncer de boca no Brasil? *Objetivo:* Apresentar as perspectivas do panorama epidemiológico do câncer de boca no Brasil. *Método:* Estudo transversal descritivo e retrospectivo, de abordagem quantitativa, cujos dados foram coletados ao Departamento de Informática do Sistema Único de Saúde (DATASUS) e analisados sob auxílio de artigos publicados nas bases Pubmed, Scielo e publicações do INCA. *Resultados:* Foram notificados 264.829 casos, sendo 72,08% do gênero masculino, com predileção pela faixa-etária de “50 a 59 anos” (28,99%) e cor/raça branca (43,09%). No tocante aos óbitos, observou-se 30.563 casos (11,54%), com 77,75% do gênero masculino, sendo 57,07% da faixa-etária de 50-59 anos e na cor/raça caucasiana (41,00%). O câncer de boca possui alta incidência na população brasileira, sendo de etiologia multifatorial. Em relação ao sexo, isso é atribuído a maior exposição aos fatores de risco detectáveis. O investimento em prevenção, sobretudo na redução do consumo do álcool, tabaco e na mitigação da transmissão do Papiloma Vírus Humano (HPV) por via oral, relaciona-se diretamente com o combate a essa neoplasia. *Conclusão:* Observa-se que as perspectivas são consideradas promissoras, à medida que são criadas novas condições de combate ao agravo de saúde estudado e partir das ações de políticas públicas que se desenvolvem no país.

**Palavras-chave:** Câncer de boca; Políticas públicas de saúde; Serviços preventivos de saúde.

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## INTRODUCTION

The number of cancer cases has considerably increased around the world, especially since the last century, when great lifestyle changes occurred due to technological developments. The main causes of death and illnesses around the world are non-transmissible diseases and conditions, in which, in 2018, the main were cardiovascular diseases and cancer cases with, respectively, 48% and 21%. Such conditions caused greater impacts in low and medium development countries, as they cause premature deaths<sup>1</sup>.

Cancer is a chronic degenerative disease that includes disordered cell growth that invade tissues and organs and can spread to other regions of the body. Due to its high aggressiveness and mortality, it represents, today, one of the most important public health problems worldwide. Mouth cancer affects the aero digestive pathways, the tongue, floor of the mouth and lower lip, which are the most affected regions of the oral cavity<sup>2</sup>.

Mouth cancer is the sixth most common cancer on the planet, also presenting a high prevalence in Brazil. It is also one of the most aggressive cancers affecting head and neck, being oral squamous cell carcinoma (SCC) being the most common of oral cancers. The *Instituto Nacional de Câncer* (INCA) estimated that, in 2014, 15,290 new cases of the disease occurred in Brazil. In its Northeast Region, the estimated number is 3,020 new cases<sup>3</sup>. When it comes to gender, men are the most affected, in a 3:1 ratio. Individuals over 40 and under 70 years old are the most affected<sup>4</sup>.

In addition, workers exposed to the sun, users of tobacco, alcohol, or both, comprise mouth cancer's most affected patients. As the disease has multifactorial etiology, it is mainly related to lifestyle habits, such as smoking and alcohol consumption, as well as economic income, since low-income population groups tend to have poor oral health conditions and nutritional deficiencies, with greater risk factors. Some studies have shown protective factors such as having a diet rich in fruits, vegetables, and vegetable oils, in addition to the practice of regular physical exercise<sup>5,6</sup>.

One of the emerging risk factors is HPV virus infection, as new studies have shown that when a histological type of cancer in the oral cavity is associated with HPV, it has better overall survival and disease-free survival in 3 and 5 years than those negative to HPV<sup>7</sup>.

Its clinical picture is variable, thus an early diagnosis is crucial, as well as attention to oral lesions that do not heal, red or whitish spots, nodules in the region, hoarseness, difficulty in chewing, swallowing or speaking, for more than 2 or 3 weeks. Thus, it is important to evaluate patients who have important risk factors, so it is possible to enhance the prevention of oral cancer<sup>5</sup>.

The aggressiveness present in most cases is directly

related to a late diagnosis when oral lesions reach advanced stages. It leads to a low survival rate after treatment, and the patient's low quality of life, generally presenting a misshapen aesthetic and permanent loss of speech and swallowing. The detection of oral cancer can be performed through visual and tactile inspection, and its diagnosis confirmed by histopathological examination, in which the individual himself can detect the disease through self-examination of the oral cavity<sup>8</sup>.

Cytopathology is a method based on the possibility of analyzing the cells collected from the lesions and interpreting the colored smear obtained from the collected material under light field microscopy<sup>9</sup>. An additional exam widely used due to its easy accessibility and wide acceptance by patients, is the smear of the oral lesion area, in which the smear is used in the cytopathological exam<sup>5</sup>.

The treatment includes surgery and chemotherapy, from which the patient must be followed up with the participation of a multiprofessional team (speech therapist, nutritionist, physiotherapist, dentist, psychologist, plastic surgeon), as in the postoperative period many local and regional recurrences occur, thus the follow up should be conducted closely and include special attention<sup>5,10</sup>.

The patients who suffered from this disease and survived can return to work and fully resume their lives, when they have socio-economic and emotional support, and carry out positive social interactions, with occupational rehabilitation<sup>10</sup>.

Studies have shown that the incidence of oral cancer has been increasing, revealing the urgent need to broadly assess the prospects for this chronic disease. Based on the assumption that there is a staggered increase in oral cancer cases, an update to this topic is necessary, thus expanding oral cancer panorama in Brazil.

In this context, the aim of this work is to provide a better understanding of oral cancer epidemiology in Brazil, to additionally outline preventive measures that can positively modify its epidemiological indicators and enable an early diagnosis so that a better prognosis is achieved. In addition, to create mechanisms to optimize the different treatment modalities, so that the mortality rate of individuals with the diagnosis decreases from the perspectives.

## MATERIALS E METHODS

This is a cross-sectional, descriptive and retrospective study, with a quantitative approach, in which data were collected from DATASUS (*Departamento de Informática do Sistema Único de Saúde*), the Brazilian Health Informatics Department. The main competence of this platform is the provision of SUS information technology, characterized as an elementary tool in the

process of operationalizing health indicators.

To locate the necessary data, the “*Sistema de Informação Hospitalar*” (SIH) was used, which main purpose is to catalog all the care provided by SUS-financed hospital admissions. From this processing, reports are generated so that managers can make the health facility payments.

In the research, the icon “*Morbidade Hospitalar do SUS*” was accessed by place of hospitalization, covering all regions of the country. The term from the CID-10 list of morbidities “malignant neoplasm of the lip, oral cavity and pharynx” was used, in portuguese: “*Neoplasia Maligna do Lábio Cavidade Oral e Faringe*”. The variables used were: number of hospitalizations, sex, race, age group, number of deaths and lethality, always examining the period from January 2009 to December 2018. The results were extracted in a CSV file (Comma Separated Values) and transferred to Microsoft Excel® 2011, for the construction of an electronic spreadsheet, which was responsible for converting the numerical data to percentage values.

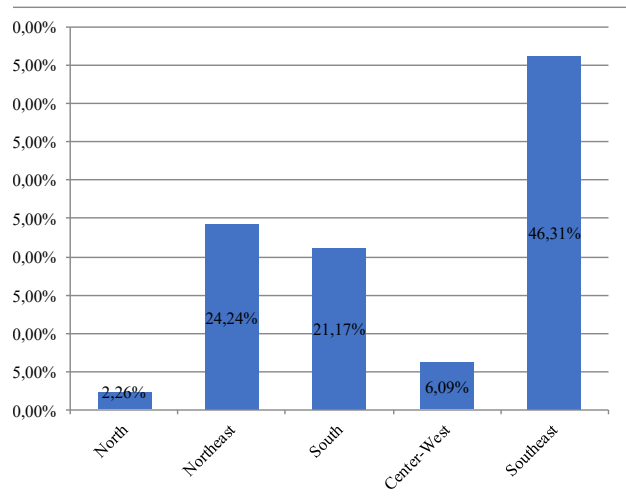
It is noteworthy that the term “*Neoplasia Maligna do Lábio Cavidade Oral e Faringe*” (malignant neoplasm of the lip, oral cavity and pharynx) includes: Malignant neoplasm of the lip, Malignant neoplasm of the base of the tongue, Malignant neoplasm of other and unspecified parts of the tongue, Malignant neoplasm of the gum, Malignant neoplasm of the floor of the mouth, Malignant neoplasm of the palate, Malignant neoplasm of other and unspecified parts of the mouth, Malignant neoplasm of the parotid gland, Malignant neoplasm of other and unspecified major salivary glands, Malignant neoplasm of the tonsil, Malignant neoplasm of the oropharynx, Neoplasm malignant nasopharynx and malignant neoplasm of other locations, and ill-defined locations, of the lip, oral cavity and pharynx<sup>11</sup>.

To carry out the data discussion, a literature review was performed by accessing Medline (via Pubmed) and SciELO databases, in addition to the INCA publications. The descriptors used were “cancer”, “mouth”, “mouth cancer” and “Brazil”. After selecting the articles, reading, analysis and discussion were carried out with the information obtained in the research.

## RESULTS

During the evaluated period, the total number of hospitalizations was 264,829, with an expressive highlight for Brazil Southeast region, with approximately 46.31% of registered cases. The smallest proportion was present in the North region, with approximately 2.26%. Meanwhile, the Northeast region accounted for about 24.24%, the South with 21.17% and the Center-West with 6.09% (Graph 1).

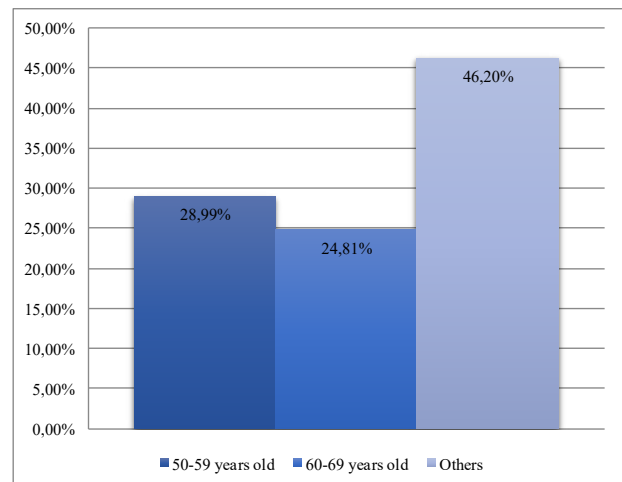
**Graph 1** – Percentage of hospitalizations by Brazilian region



Source: DATASUS (2020), adapted by the authors.

Another important factor is the prevalence of cases regarding sex, given that the 72.08% of the affected individuals are men. Regarding the age group, there is an expressive prevalence of individuals with 50-59 and 60-69 years old, with, respectively, about 28.99% and 24.81% of cases (Graph 2).

**Graph 2** – Percentage of hospitalizations according to age group



Source: DATASUS (2020), adapted by the authors.

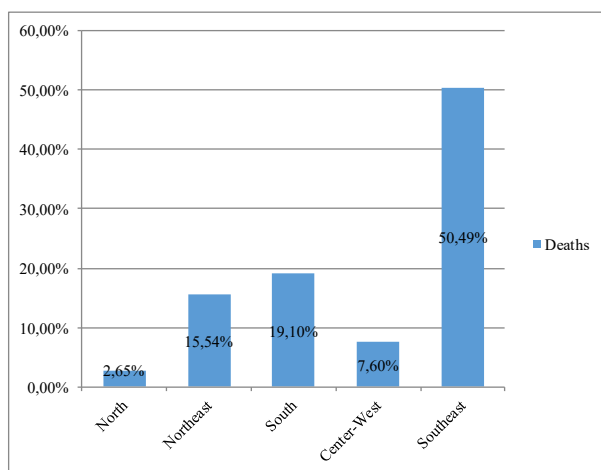
In the 50-59 and 60-69 age ranges, the male percentage is even more expressive, comprising about 78.09% of the cases. As well, the percentage of disease occurrence in the Southeast region is also higher, of about 50.00%, in which the higher contribution comes from to the city of São Paulo, accounting for 26.49% of the cases in this age interval. There is also, in terms of incidence, an expressive portion regarding the race, being more prevalent

in white, with about 43.09% of cases.

Regarding the number of deaths, a total of 30,563 cases were documented, accounting for 11.54% of total hospitalizations. Within such aspect, the most significant proportions are also found for the male gender and for the Caucasian race with, respectively, about 77.76% and 41.00% of deaths.

The deaths dominant age group was also from 50-69 years old, accounting for approximately 53.80% of events. It was also found an expressive number of records in the Southeast region and in the city of São Paulo, responsible, respectively, for approximately 50.49% and 23.72% of deaths. Again, the number of deaths in the North region was the least expressive, with about 2.65%, while the Center-West, South and Northeast presented about 7.6%, 19.1% and 15.54% of deaths, respectively (Graph 3).

**Graph 3** – Percentage of deaths by Brazilian region



Source: DATASUS (2020), adapted by the authors.

The mortality rate was found to be, on average, of 11.54% of the number of hospitalizations for the entire country. In this context, the North region is highlighted with a 13.54% mortality rate, that is, above the national average. The mortality rate, for Brazil, is more expressive in the 50-69 years old age group, with 12.24%, in which the negative highlight is still for the North region, with 14.99%. Regarding to gender, the mortality rate for males and females are, respectively, about 12.14% and 10.00% in Brazil. For both cases, the North region also presents the higher mortality rates among Brazilian regions, with 14.33% and 11.78% for males and females, respectively.

However, regarding race, the highest mortality rate is present in black, with a total of 13.60%, still maintaining the prominence of the North region when compared to the others, with 19.13%. The white race, highlighted in previous studied aspects, presented a mortality rate of 10.98%, in which, among Brazilian regions, the Southeast

presented the higher rate, of about 12.19%.

## DISCUSSION

According to the collected data, the epidemiological reality points mostly to patients over 40 years old, male, and belonging to low socioeconomic and educational strata. Mouth cancer has a high incidence in the Brazilian population with a multifactorial etiology. In relation to sex, this is attributed to greater exposure to smoking and alcohol consumption among men when compared to women<sup>1</sup>.

Regarding the high prevalence among men from 50 to 69 years old, a reflection of this generation is observed, in which men represent most individuals exposed to risk habits throughout life, especially smoking and alcohol consumption. In such cases, attention should be paid to the most vulnerable part of the population and screening for early diagnosis, resulting in adequate treatment and consequent cure for the patient<sup>1</sup>.

Individuals who smoke are 4 times more likely to develop oral cancer<sup>1</sup>. There are more than 60 carcinogens in smoke, mainly tar, benzopyrenes and aromatic amines. The high temperature at the cigarette tip causes an increase in mucosal aggression. The risk of oral cancer development for industrialized cigarette smokers, for pipe smokers, and for straw cigarette users are, respectively, of 6.3, 13.9 and 7.0 times higher than that of non-smokers. Regarding the patient who stopped using tobacco, the risk of oral cancer development becomes the same as that of a non-smoker only after 10 years of stopping the habit. The risk does not depend exclusively on the type of smoke, but also on the number of cigarettes used. Thus, the appearance and development of oral cancer is directly proportional to the amount consumed<sup>12</sup>.

As for smoking, the indicators show that since 1989, when studies on tobacco use began in Brazil, the percentage, and the absolute number of individuals over 18 years old who smoke has been decreasing with each survey. Such decrease is attributed to campaigns against this addiction that participates in the development of several diseases, including mouth cancer, as already exposed. In the North and Northeast regions, the decrease in tobacco use were more expressive, while South and Southeast regions are the Brazilian regions with the highest prevalence of tobacco use. In addition, the Southeast region highlights as the more prevalent in terms of cases, hospitalizations, and deaths due to mouth cancer<sup>1,13</sup>.

Alcohol intake is a major risk factor for the development of oral cancer. A case-control study conducted in Brazil reveals that consumption of distilled alcoholic drinks (*cachaça*, vodka, whiskey, cognac) was associated with mouth cancer, as these drinks increase the risk of developing this neoplasm by almost 6 times at a probability ratio of 5.87 (OR = 5.87) and a 95% confidence interval (95% CI, 3.65–9.44). Such risk increase is related to the



higher alcohol content of these drinks<sup>3</sup>. It is believed that it can act by increasing the cellular permeability of the mucosa to carcinogenic agents, causing injuries due to ethanol metabolites (aldehydes) and indirectly by nutritional deficiencies secondary to its chronic consumption, as for liver cirrhosis<sup>12</sup>.

The carcinogenic action of alcohol is mainly attributed to one of its metabolites, acetaldehyde, which has the capacity to cause mutations in the cell DNA of cells to which it comes into contact. The consumption of alcoholic beverages increases the risk of mouth cancer about 9 times and, when associated with smoking, it becomes 35 times higher. Alcohol and tobacco consumption are related to more than 80% of cases, being considered synergistic agents in the increased risk<sup>14,15</sup>.

Other factor discussed in the present study is the association of oral cancer with sun exposure, whether for professional reasons or lifestyle. This cancer has a slow evolution, is easily detectable and, when early diagnosed, reaches about 100% cure with little or no sequel<sup>16</sup>. Solar radiation can produce lesions of significant biological importance in the long term. Repeated and excessive exposure to the sun's rays (ultraviolet rays), for periods greater than 15 or 30 years, causes changes in the lips capable of progressing to carcinoma. Hence, chronic exposure represents a considerable risk factor, especially for light-colored people, with little melanin pigmentation, which have the highest risk of developing oral cancer<sup>17</sup>.

Individuals with less education are more likely to develop oral SCC, as they have greater contact with tobacco and alcohol, has poor oral health conditions and nutritional deficiencies<sup>17</sup>.

Studies report that the male population has a high incidence in salivary gland cancer that is presented as an association with viral infection<sup>18,19</sup>. The study by Fu and collaborators indicates that men have a high propensity to develop cancer in the salivary glands, as men are earlier exposed to risk factors by beginning sexual life earlier, and because they have more sexual partners during life<sup>18</sup>. Such aspects make men more likely to have early contact with the HPV virus, which considerably contributes to the development of oral cancer, which can be transmitted during oral sex<sup>18</sup>. In the study by Stock and collaborators, men reported higher levels of desire for oral sex<sup>19</sup>. Among the participants who reported involvement in oral sex, there was an average of eight sexual partners, while less than 5% reported always using condoms during oral sex<sup>19</sup>.

As previously mentioned, HPV infection is a major risk factor for the development of oral cancer, not only in men, but also in women. To date, more than 150 HPV subtypes have been identified, of which more than 40 types of HPV are generally sexually transmitted and infect the anogenital region and the oral cavity. The increased incidence of mouth and oropharynx SCC, especially in younger patients, can be attributed to infections by HPV<sup>20</sup>.

HPV-related mouth cancer is a particular form related to risk factors as sexual behavior, the growing number of sexual partners during life, younger age at sexual debut and oral sex itself<sup>18</sup>.

Although HPV-16 has been identified in most tumors of the oral cavity and oropharynx containing HPV DNA, we have identified a small number of other types of HPV. These included one of each of the HPV-18, HPV-33, HPV-35, HPV-45 and HPV-59 types, all types of oncogenic or high-risk HPV<sup>21</sup>. In view of the data, the importance of HPV vaccination is notorious. In Brazil, the government offers free vaccination for human papillomavirus 6, 11, 16 and 18 (recombinant) – thus called quadrivalent HPV vaccine, which is available to the female population from 9 to 14 years of age (14 years, 11 months, and 29 days) and for the male population of 11 to 14 years of age (14 years, 11 months, and 29 days) with a vaccination schedule of 2 (two) doses (0 and 6 months). The vaccination strategy for boys also contributes for reducing the virus transmission to women and thus, further reducing the incidence of HPV-related disease in the female population. As well, it is offered for people living with HIV and transplanted people aged 9 to 26 years<sup>12</sup>.

A study carried out in the United States of America by Chaturvedi and collaborators showed that the prevalence of vaccinal-type oral HPV decreased by 37% between 2009-2010 and 2015-2016 in a sample of unvaccinated American men aged between 18 and 59 years old, suggesting protection of the herd against oral HPV infections. Therefore, it appears that vaccination is an effective method for the prevention of oral cancer<sup>22</sup>.

The research by Ablanedo-Terrazas et al.<sup>23</sup> is consistent with others that describe an association of tonsillectomy with persistent oral HPV infection. This can be explained by the fact that tonsillar tissue is an important site of induction and immune surveillance in the upper aerodigestive tract.

## CONCLUSIONS

Seeking to identify the prospects for oral cancer in Brazil is a way of knowing the disease epidemiology in the country. In this context, knowing the percentages of the main causes among the population, and carrying out screening actions, a better prevention and health promotion can be achieved based on these data, to prevent early development of oral cancer. The importance of these actions is reinforced by studies that accumulate evidence pointing that oral cancer is still lately diagnosed and, consequently, the need for mutilating treatment is commonly observed. Oral cancer early diagnosis makes the levels of cure significantly relevant.

Thus, knowledge about the age group, gender, and social class most affected by oral cancer enables health measures with a closer look at the prevention and early

diagnosis of this pathology. Based on the collected data, the individuals most affected by oral cancer, in Brazil, as men, from 50-69 years old, and belonging to low socioeconomic and educational strata.

The basic health units and family health strategy professionals have direct contact with the population of low socioeconomic status, which comprise the individuals with higher incidence and prevalence of oral cancer due to the risk factors to which they are exposed, including poor oral health, smoking, drinking and sun exposure. If such professionals know about such risk factors, they might act through education in oral health and hygiene, raising awareness for risky habits and also recognize individuals with suspected injuries, referring them to secondary or

tertiary care units for investigation. Simple measures like these can increase early diagnosis, decrease exposure to risk factors and, consequently, decrease the incidence.

Despite this performance of primary care, there are areas that still do not have effective health coverage, which can result in underestimated data on the prevalence of the disease.

The prospects for oral cancer in Brazil can be considered promising, since there is an active search for the main risk factors related to this type of carcinoma. As well, there is an active search by health professionals to make an early diagnosis and the concern of the population for taking health care and prevent diseases like this.

**Authors contribution:** Santos JIO - Participated in data collection, systematization, and analysis, as well as in text writing. Ferreira JS - text writing. Munhoz IGA - text writing. Lemos DLP - text writing. Tenorio DPQ - systematization, and data analysis. Almeida LORF - Participated in data collection, systematization, and analysis. Fernandes MCB - text writing. Vieira LLM - text writing. Melo MEF - text writing. Almeida MSG - text writing. Panjwani CMBRG - systematization and data analysis, as well as in the final text correction.

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