

Spatio-Temporal Distribution of Oral Cancer Mortality in Minas Gerais, Brazil, 2006 - 2013

Distribuição espaço-temporal da mortalidade por câncer de boca em Minas Gerais, Brasil, 2006-2013

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Abstract

In Brazil, there is a regional variation in and mortality by cancer of the mouth. Differences in the distribution of the rate of this type of mortality are attributed to the consumption of cigarettes and alcohol, socioeconomic conditions, diet or genetic characteristics. **Aim:** To analyze the spatial distribution of oral cancer mortality rate of Minas Gerais regions between 2006 and 2013. **Methodology:** This is an ecological study that used the data made available by the System of Information on Mortality (SIM) using parameters of 10th revision of the International Classification of Diseases and Related Health Problems (ICD-10 -WHO). The geographic pattern was built through thematic maps of the distributions of rates mortality, as the macro-regions of health and year. **Results:** In the period studied 2263 deaths occurred for cancer of the mouth in Minas Gerais, being, 1751(77.38%) men and 512 (22.62%) women. The deaths of oral cancer occurred in all macro-regions of the state and that the geographic distribution of these deaths occurred in a heterogeneous way. **Conclusion:** Were found differences of oral cancer mortality rate distribution among Minas Gerais regions.

Keywords: Mortality, Mouth Neoplasms, Spatial Analysis, Health Information Systems

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Recebido em: 29/08/2016

Revisado em: 26/09/2016

Aceito em: 29/09/2016

Publicado em: 07/12/2016

Resumo

No Brasil, há uma variação regional na mortalidade por câncer de boca. As diferenças na distribuição da taxa desse tipo de mortalidade são atribuídos ao consumo de cigarros e álcool, condições socioeconômicas, dieta ou características genéticas. **Objetivo:** Analisar a distribuição espacial das taxas de mortalidade por câncer de boca nas regiões de Minas Gerais entre 2006 e 2013. **Metodologia:** Este é um estudo ecológico que utilizou os dados disponibilizados pelo Sistema de Informações sobre Mortalidade (SIM) e baseada na Classificação Internacional de Doenças e Problemas Relacionados à Saúde (CID -10 - OMS). O padrão geográfico foi construído através de mapas temáticos das distribuições de taxas de mortalidade, como as macro-regiões de saúde e ano. **Resultados:** No período estudado 2263 mortes ocorreram por câncer de boca em Minas Gerais, sendo 1751 (77.38%) homens e 512 (22.62%) mulheres. Os óbitos por câncer de boca ocorreram em todas as macrorregiões do Estado e a distribuição geográfica destas mortes ocorreram de forma heterogênea. **Conclusão:** Foram encontradas diferenças na distribuição da taxa de mortalidade por câncer bucal entre regiões de Minas Gerais.

Palavras-chave: Mortalidade, Neoplasias Buciais, Análise Espacial, Sistemas de Informação em Saúde

Introduction

Epidemiological studies show an increase and variation from oral cancer mortality as, sex, race and geographical location¹⁻³.

Regional differences in the distribution of mortality are attributed to the consumption of cigarettes and alcohol, socioeconomic conditions, type of diet or directly related to genetic characteristics³⁻⁵. In Brazil, there is a variation in the rate of incidence and mortality between the regions, being the Southeast and South regions those that present in the highest rates^{5,6}. The Minas Gerais state is located in the Southeast region of Brazil. Account with 853 municipalities and population of 19.597.330 people (10% of the country population). The Human Development Index Medium (IDHM) is 0.731 and the Gini index of 0.46. The urbanization represents 85.3% and the economically active population is of 9.94 million. Has a tropical climate, with average annual temperatures exceeding 18°C⁷. The hypothesis to be studied is that there is a space-temporal pattern in the distribution of mortality from cancer of the mouth between Minas Gerais state regions.

The aim of this study is analyze the distribution of oral cancer mortality rate of Minas Gerais regions between 2006 and 2013.

Methodology

This is an ecological epidemiology retrospective study. For situation analysis of oral cancer mortality in Minas Gerais was used data by Mortality Information System (SIM)⁹. First the data collection was standardized by of individuals' residences. To see the consistency of information was chosen data access for two sites: Minas Gerais State Health Department (SES/MG) contain data until 2013 and

Tabnet/DataSUS whose available data until December 2012^{10,11}. The data from 2014, 2015 and 2016 were not analyzed because they can be reviewed by SIM^{10,11}. The state is subdivided into thirteen health regions in accordance with the state Master Plan in: Center, South Center, Jequitinhonha, East, South East, North-West, North, West, Southeast, South, North Triangle and South Triangle⁸. (Figure 1).

The anatomic location of the lesions origin was based on Chapter 2 of ICD-10, neoplasms (Tabulating List ICD-BR-10) for the 2010 year¹². For this study were selected categories: C00 = Lip; C01 = Base of the tongue; C02 = other parts of the mouth and not specified of tongue parts; C03 = Gum; C04 = Mouth floor; C05 = Palate; C06 = other parts and not specified mouth parts¹². The validity and use of extracted data extracted from SIM, in studies regarding the oral cancer mortality rates were carried out in previous studies^{13,14}.

From the death frequency by oral cancer in the period from 2006 to 2013 were calculated crude rates weighted by age and gender. This oral cancer mortality analysis was based on previous epidemiological studies that investigated the space-time evolution of this type of death in Sao Paulo city and between the Brazilian regions^{15,16}.

In order to describe the geographic pattern of occurrence of oral cancer mortality were constructed thematic maps based on the distributions of mortality rates as health regions and year. The legends of the maps were standardized in five extracts to facilitate visualization and best understanding of the results. For the construction of maps was used a cartographic basis provided by IBGE and specific computational program^{17,18}.

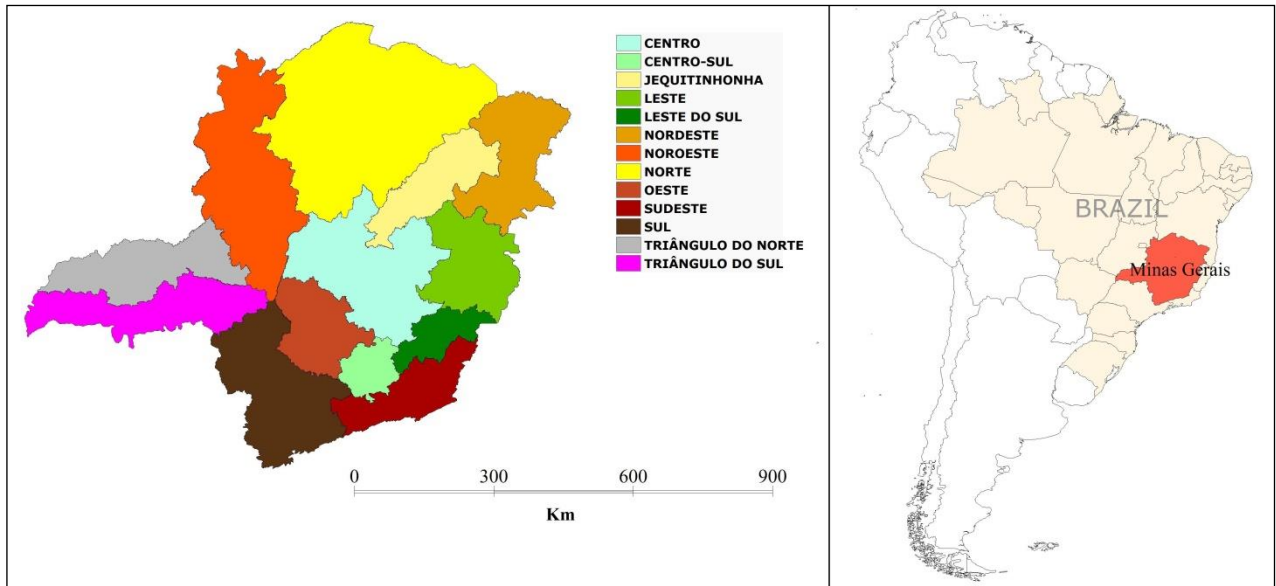


FIGURE 1- Geographical location and health regions of health of Minas Gerais state, Brazil.

Results and Discussion

Between 2006 and 2013 occurred 2.263 deaths for oral cancer in Minas Gerais, being, 1751(77,38%) men and 512 (22.62%) women. For this study were excluded two male deaths from due to lack of information. The male deaths were 3.42 greater than the female deaths. The largest number of oral cancer deaths in men was showed in other studies and may be related to men lifestyle^{15, 16, 19, 20,21}.

Previous space-time previous studies have observed a decreasing tendency or stationary for the oral cancer mortality rates^{20,21}. However, a previous study performed in Brazil demonstrated growth trend of mortality rate more accentuated in men than in

women¹⁶. It seems to be a growing trend of oral cancer mortality rate in Minas Gerais, mainly for the man in the period studied. (Table 1).

The rates average according to gender also occurred in a heterogeneous manner between the state health regions.(Table 1). The highest rates averages occurred in the range of 2010 to 2013, being the heaths regions southeast, Southern Region, and the center that presented the largest averages. The male gender followed the same pattern of crude rate. However, for the female gender there was a decrease in the average of the rates for the macro regions South Center, Jequitinhonha and Northeast between the periods I and II for the female gender. (Table 1).

TABLE 1- Average rate by health region state and gender, Minas Gerais, Brazil, 2006-2013.

Region	Period					
	Cycle I (2006 – 2009)			Cycle II (2010 – 2013)		
	Rate	Female	Male	Rate	Female	Male
Sul	1.03	0.41	1.59	1.26	0.67	1.88
Centro Sul	1.48	0.81	2.17	2.04	0.73	3.42
Centro	1.56	0.64	2.52	1.81	0.75	2.98
Jequitinhonha	0.65	0.52	0.79	0.98	0.26	1.73
Oeste	1.06	0.38	1.75	1.59	0.98	2.24
Leste	0.98	0.47	1.5	1.37	0.79	1.99
Sudeste	1.86	0.71	3.04	2.29	1.2	3.47
Norte	0.64	0.15	1.12	1.41	0.56	2.29
Noroeste	0.73	0	1.42	1.08	0.46	1.72

Leste do Sul	1.34	0.52	2.16	1.21	0.82	1.65
Nordeste	0.86	0.61	1.09	1.32	0.42	2.28
Triângulo do Sul	1.25	0.52	2	1.56	0.7	2.46
Triângulo do Norte	1.19	0.62	1.77	1.28	0.66	1.94
Total	1.25	0.52	1.99	1.58	0.74	2.49

The frequency or weighted rate by age are measures used in studies on the mortality rates for cancer of the mouth^{2,15,19-22}. However, there is a great variation in the type of weighting done as the age used. This different age classification of range hinders the comparison between studies and commits the mortality analysis for this cancer type of weighting process. In this study, we observed a

tendency of emergence of cases from thirty years and a constant growth curve as the aging of the population. Further study on age standardized rates showed that the increase of mortality from cancer was due to the aging of the population and cement shall not strictly to the increase of incidence of the oral cancer or mortality of this cancer type²³. (Figure 2).

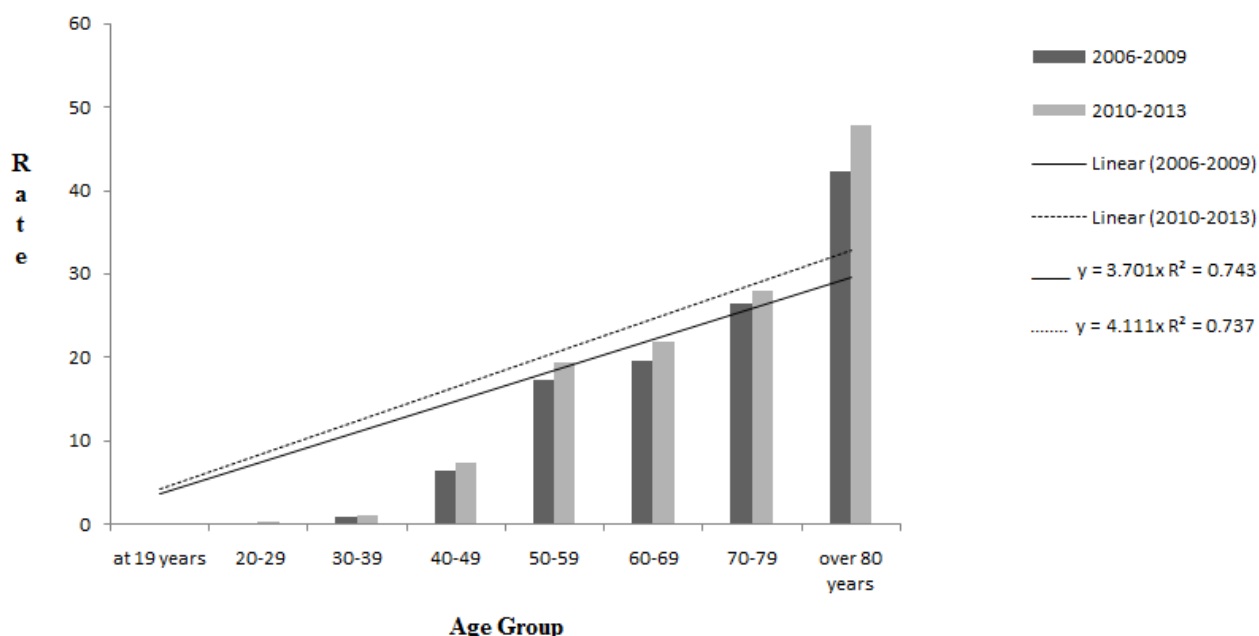


FIGURE 2-Mortality rate evolution weighted by age range, Minas Gerais, Brazil, 2006-2013.

In the period, the most frequent category, whose origin of the lesion can be detected was the base of the tongue (C01) with 461 (20.38%) death prevalence. The lowest prevalence was the lip (C00) with 27 (1.20%) of deaths. The category analysis allowed to identify high prevalences whose origin of the lesion were not identified (C02 and C06) and

represent 1441 (63,91%) of deaths. Further study also showed higher prevalence in unspecific mouths parts²⁰. Other studies have identified higher prevalence for the tongue anatomical region^{15,21,22}. This fact constitutes a limitation of the study and the own yes because it hampers the anatomical knowledge of the region and of the possible injury etiology. (Table 2).

TABLE 2- Deaths frequency by oral cancer mortality of ICD-10 category, Minas Gerais, Brazil, 2006-2013.

Region	Anatomic Region						Total
	Lip	Tongue base	Gum	Mouth floor	Palate	NE*	
Sul	2 (7.40)	35 (7.61)	3 (10.34)	15 (13.40)	14 (7.48)	173 (11.97)	242 (10.70)
Centro Sul	0	19 (4.12)	2 (6.90)	2 (1.78)	3 (1.60)	77 (5.32)	103 (4.55)
Centro	7 (25.93)	231 (50.10)	4 (13.80)	45 (40.17)	72 (38.50)	484 (33.51)	843 (37.28)

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Jequitinhonha	1 (3.71)	9 (1.95)	0	1 (0.90)	1 (0.53)	13 (0.91)	25 (1.10)
Oeste	1 (3.71)	15 (3.25)	3 (10.34)	2 (1.78)	11 (5.88)	96 (6.64)	128 (5.66)
Leste	2 (7.40)	10 (2.17)	2 (6.90)	7 (6.25)	9 (4.81)	108 (7.47)	138 (6.10)
Sudeste	1 (3.71)	59 (12.80)	4 (13.80)	20 (17.85)	34 (18.18)	145 (10.03)	263 (11.63)
Norte	3 (11.12)	18 (3.90)	2 (6.90)	2 (1.78)	11 (5.88)	96 (6.64)	132 (5.83)
Noroeste	2 (7.40)	8 (1.73)	0	1 (0.90)	4 (2.14)	33 (2.28)	48 (2.12)
Leste do Sul	0	6 (1.31)	1 (3.44)	2 (1.78)	6 (3.20)	54 (3.73)	69 (3.05)
Nordeste	1 (3.71)	17 (3.68)	2 (6.90)	2 (1.78)	8 (4.27)	42 (2.91)	72 (3.18)
Triângulo do Sul	2 (7.40)	18 (3.90)	3 (10.34)	7 (6.25)	9 (4.81)	40 (2.76)	79 (3.50)
Triângulo do Norte	5 (18.52)	16 (3.47)	3 (10.34)	6 (5.35)	5 (2.67)	84 (5.82)	119 (5.26)
Total	27 (100)	461 (100)	29 (100)	112 (100)	187 (100)	1445 (100)	2261 (100)

(*) unidentified anatomical regions (NE) = C02 e C06

Deaths of oral cancer occurred in all regions of the state and the geographic distribution were heterogeneous. (Figure 3).

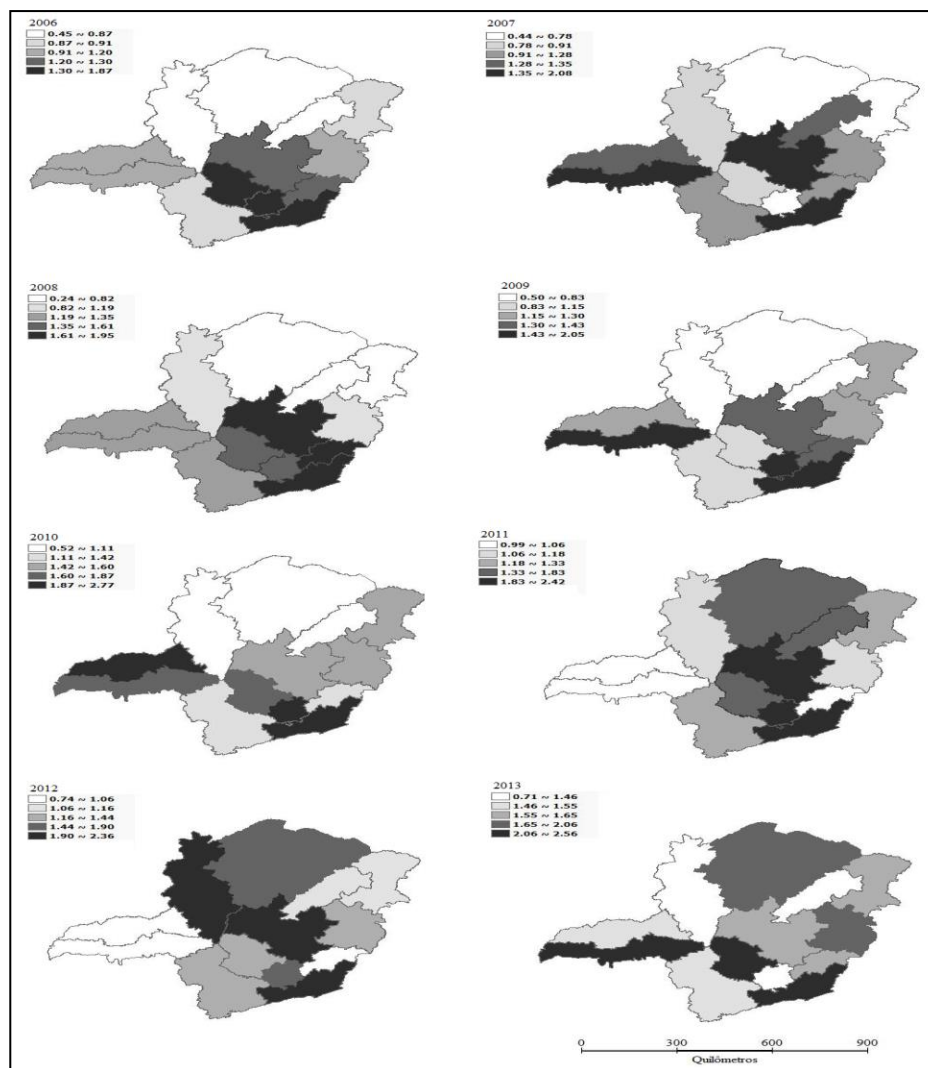


FIGURE 3- Spatio-temporal distribution of mortality rate for oral cancer, Minas Gerais, 2006-2013.

The regions with the highest rates of mortality by oral cancer were those that present the best social indicators and larger population contingents. Previous study assumes that the problem is not related to population size or level of development, since, without distinction between the 13 health regions, happened advanced cases of the disease on arrival the high complexity, soon, with unfavorable prognosis at the beginning of treatment⁶. However, to evaluate the rate of oral cancer in Aracaju one study demonstrated a higher frequency of deaths by oral cancer in neighborhoods with low or very low condition of life²⁴. Another study conducted in Brazilian capitals correlated positively socioeconomic indicators with oral cancer mortality³. The socially disadvantaged groups are exposed to a greater number of risk factors, have worse nutritional conditions of oral health and less access to the dental care, consequently, minors possibilities of early diagnosis of cancerous lesions³.

The migration phenomena of poorer regions to other with better living conditions of labor supply and specialized service can explain a greater occurrence of deaths in regions with better socioeconomic indicators^{2,4,25}. The migratory phenomena should be considered a particular way that affect the studies of morbidity and mortality because can occur underreporting or super-notification of the records of deaths per region²⁵. This is a hypothesis raised by this study and that deserves investigation in other models of study. The fact adopt as methodological criterion the place of residence has allowed us to identify which health region of the individual belongs.

Conclusion

Were found differences in oral cancer mortality distribution between Minas Gerais regions. The oral cancer mortality that occurred in Minas Gerais population is subject to preventive, early diagnosis and its occurrence may show failures in the health care process. Therefore, there is potential for the control of mortality from this câncer type. Thus, oral cancer mortality data in the Minas Gerais state show the importance that problem as a public health problem.

Acknowledgements

To INPE to provide by free form the computational program TerraView ® which allowed the construction of thematic maps and the National Council of Technological and Scientific Development (CNPQ) through research funding.

Conflict of interests

The authors declare no conflict of interest.

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