



Incidence of cancer in the regions of Brazil and their associations with Health Policies

Incidência de câncer nas regiões brasileiras e suas associações às Políticas de Saúde

Karina Mary de Paiva¹, Eduarda Besen¹, Emanuelle Moreira², Vanessa Corrêa³, Deivid Silveira⁴, Raissa Pozzi², Patricia Haas¹

¹ Department of Speech Therapy, Postgraduate Program in Speech Therapy (PPGFON) of the Universidade Federal de Santa Catarina, Florianópolis SC Brazil.

² Undergraduate Course in Speech Therapy of the Universidade Federal de Santa Catarina, Florianópolis SC Brazil.

³ Postgraduate Course in Physiotherapy (PPGFisio) of the Universidade Federal de Santa Catarina, Florianópolis SC Brazil.

⁴ Undergraduate in the Course of Medicine of the Universidade Federal de Santa Catarina, Florianópolis SC Brazil.

*Corresponding author: Karina Mary de Paiva - E-mail: kmvianna@gmail.br

ABSTRACT

The incidence of cancer throughout Brazil expresses the sanitary condition in which the country finds itself, which requires a health system capable of positively interfering with such situations. The incidence rates of lung, tracheal, bronchus, esophagus, stomach, colon, rectum, anus, prostate, lip, and oral cavity cancer, malignant skin melanoma, and other malignant skin neoplasias were analyzed, verifying the tendencies in the Regions of Brazil and their relationship with existing public policies in this period. This cross-sectional retrospective study was conducted with data obtained from DATASUS and the National Cancer Institute (INCA). Different incidence patterns of the main types of cancer were observed between the Regions of Brazil, with higher rates of prostate, breast, skin, colon, rectum, and anus cancer, which continuously increased in the period analyzed. Lung, bronchus, and tracheal cancer tended to stabilize, while stomach cancer decreased among males in the Southeast Region. Hence, limitations are recognized in the cancer control process, although there are successes as well – which agrees with the good results in the implemented health policies, especially those related to primary health care actions.

Keywords: Neoplasms. Incidence. Public health. Brazil.

RESUMO

A incidência de câncer em todo o Brasil expressa o quadro sanitário no qual se encontra o país, o que requer um sistema de saúde capaz de interferir positivamente em tais situações. Foram analisadas as taxas de incidência de câncer de pulmão, traqueia, brônquios, esôfago, estômago, cólon, reto, ânus, próstata, lábio, cavidade oral, melanoma maligno da pele e outras neoplasias malignas de pele verificando a tendência nas regiões brasileiras, e a relação com as políticas públicas existentes neste período. Estudo transversal retrospectivo com dados obtidos no DATASUS e do Instituto Nacional do Câncer (INCA). Observa-se diferentes padrões de incidência dos principais tipos de cânceres entre as regiões brasileiras, com as maiores taxas para o câncer de próstata, de mama, de pele e cólon, reto e ânus, que permaneceram em ascensão no período analisado. O câncer de pulmão, brônquio e traqueia tem apresentado tendência de estabilidade e no de estômago, houve redução para o sexo masculino na região sudeste. Assim, são reconhecidos limites no processo de controle do câncer, mas também êxitos, o que condiz com bons resultados das políticas de saúde implementadas, em especial, as relacionadas às ações da atenção básica.

Palavras-chave: Neoplasias. Incidência. Saúde Pública. Brasil.

Received in December 03, 2019

Accepted on October 11, 2020

INTRODUCTION

Cancer is one of the major causes of death worldwide, with estimates increasing for the upcoming years, which reveals the magnitude of the problem. More than 8.8 million people in the world die every year from this disease¹. In Brazil, the estimate is that in 2018 alone the incidence of cancer will be of an additional 600 thousand new cases².

The National Cancer Care Policy is grounded on issues related to the incidence of cancer and its mortality rate in both the national and universal contexts. However, it is utterly important to consider the differences between the Regions of Brazil when planning actions focused on oncologic care, considering their decentralization to ensure effectiveness³.

The Brazilian health system is organized for health intervention, promotion, prevention, and recovery in three different types of care. It must analyze and meet all the citizens' health needs, from the most primary to the high-complexity ones⁴. In this perspective, the Brazilian National Cancer Institute (INCA) was created in 1990 to plan and support the Brazilian national health policy by fighting cancer. It is responsible for offering oncologic care, prevention, and early detection, producing informational material, and promoting events. It also has the purpose of broadly disseminating information on prevention and early detection through television stations, printed media, and the Internet⁵.

A survey conducted by INCA² with various types of cancer in the Regions of Brazil from 2002 to 2013 shows that the average incidence of cancer has been increasing more evidently in the three states of the South Region. Such factor was explained not only by these areas' population growth but also by a social change, namely, the decreased birth and mortality rates, with a noticeable increase in life expectancy, evidenced in the aging population. Hence, the incidence of chronic-degenerative

diseases, particularly the cardiovascular ones and cancer, tended to increase².

Cancer is a disease that involves not only the patient but also their whole social and family context. Preventing it is related to one's lifestyle and quality of life, which can also define their health condition⁶. Thus, it is essential to improve the patients' quality of life, with interventions to minimize pain, such as physical, psychological, social, and spiritual symptoms⁷.

According to data from the World Health Organization⁷, 8.8 million people (most of whom live in low-income countries) die every year due to cancer. Therefore, an unsolved state of social vulnerability can lead to various cancer predisposing factors. In such a situation, one way to tackle and correct the said problem in the country is through primary health care. Public health has undergone countless changes throughout history, especially in how it deals with the increase in this aggravation, being committed to creating prevention programs and campaigns.

Therefore, it is essential to conduct studies to identify how this disease behaves, thus helping to adequately handle it. In this regard, this study analyzed the incidence rates of lung, tracheal, bronchus, esophagus, stomach, colon, rectum, anus, prostate, lip, and oral cavity cancer, malignant skin melanoma, and other malignant skin neoplasias, verifying their tendency in the Regions of Brazil and their relationship with the existing public policies in this period.

METHODOLOGY

This is a cross-sectional, retrospective, descriptive study on the incidence patterns of the main types of cancer by sex and geographical Region of Brazil from 2002 to 2013. The data was collected between November 2017 and March 2018 with a survey of the information expressed by the health

indicators in DATASUS (the information technology department of the Brazilian public health care system) and INCA.

For this study, the incidence rates of the main types of cancer were calculated, namely: lung, tracheal, and bronchus; esophagus; stomach; colon, rectum, and anus; prostate; lip and oral cavity; female breast; uterus; and skin melanoma. The information was organized by sex (female and male) and geographical region of Brazil (North, Northeast, South, Southeast, and Central-West). Also, the incidence patterns in these Regions and their variations throughout the years were verified.

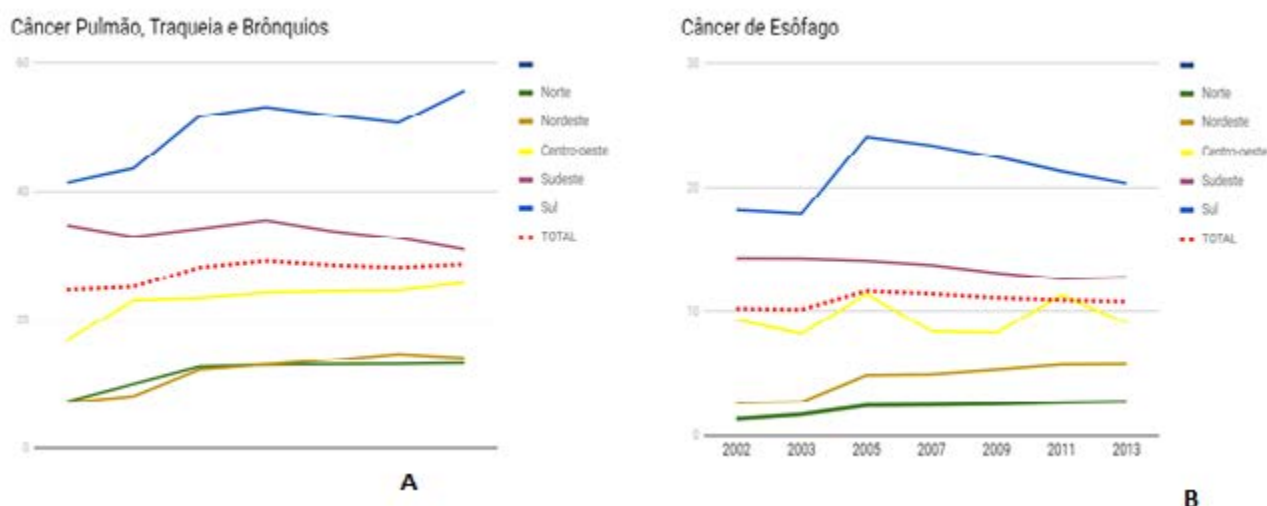
For the second part of the study, the policies and actions developed nationwide were previously listed regarding the main types of cancer (lung, tracheal, and bronchus; esophagus; stomach; colon, rectum, and anus; prostate; lip and oral cavity; female breast; uterus, and skin melanoma), to analyze their association with the existing public policies and contexts in this period. This survey was conducted by two researchers for future analysis. The information was entered in Excel[®] to be independently evaluated by the revisors, giving priority to data that agreed with actions developed in primary health care aiming to prevent and diagnose the main types of cancer.

RESULTS

Based on the data collected in this study, it was observed that in Brazil airways, lung, tracheal, and bronchus cancers⁹ increased through the years when 2002 (24.6%) is compared with 2013 (28.7%). The highest rates were observed in the South Region for both sexes, followed by the Southeast and Central-West. The North and Northeast had the lowest rates. When the sexes were compared, the incidence of airways, lung, tracheal, and bronchus cancers was greater among men in all the years and Regions. In this research, the South Region was the only one

whose rates were higher than the national average, in all the years (Chart 1A).

The incidence of esophagus cancer¹⁰ is greater in the South (21.1%) and Southeast Regions (13.5%), with higher values than the national average (10.9%), especially for males. In the Northeast, a stabilized rate is noticed from 2002 to 2005 (14.0%), followed by a decline in the rates beginning in 2005/2007 (12%). On the other hand, the South behaved differently, with an upward trend from 2002 to 2007 and the highest incidence peak in 2005 (24.0%). A tendency of decline was observed in the last years, reaching 20.3% in 2013; however, it remained as the Region with the highest incidence of this type of cancer. It should be pointed out that the Regions with the lowest incidences grew during the period analyzed – in the final representation (2013) it was twice as much as that of the first period (2002): North (2.7%/1.3%) and Northeast (5.7%/2.6%) (Figure 1B). Regarding the sex, the overall values among males remained higher than that of women.



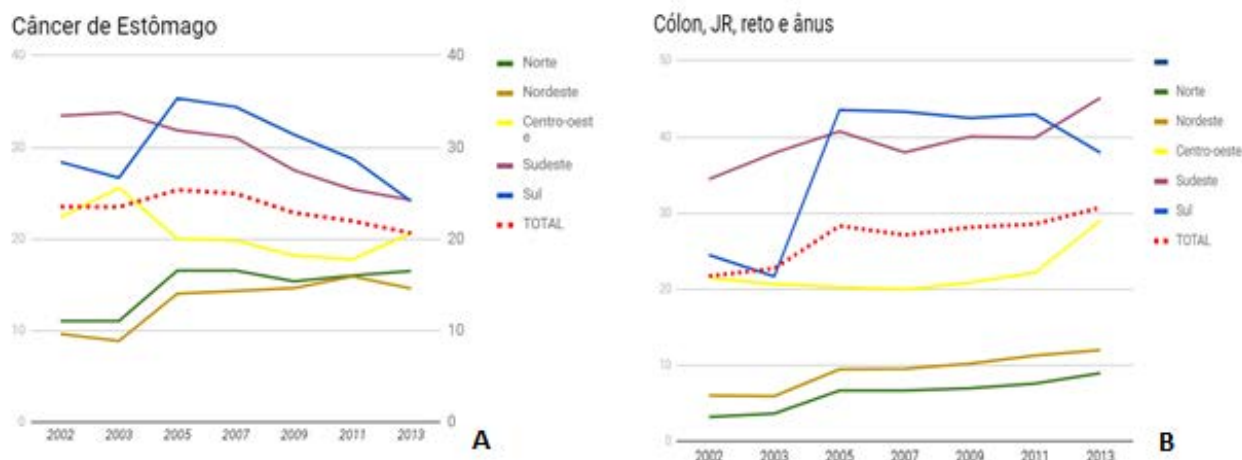
Notes: A - The incidence of lung, trachea and bronchial cancer in the Brazilian regions, 2002-2013; B incidence of esophageal cancer in Brazilian regions, 2002-2013.

Figure 1. The incidence of cancer, 2002-2013.

Source: Data represented from indices from DATASUS and the National Cancer Institute (INCA).

The stomach cancer rates increased between 2002 (23.5%) and 2005 (25.3%), the highest peak in this collection, then followed by a decrease. Of the Regions, its incidence is higher in the South of the country (29.9%), followed by the Southeast (29.6%)

and Central-West (20.6%). The South and Southeast Regions were above the national average (23.2%) throughout the period approached in the research (Figure 2A). Higher values were observed for males than for females.



Notes: A - The incidence of stomach cancer in Brazilian regions, 2002-2013; B - The incidence of colon, rectum and anus cancer in Brazilian regions, 2002-2013.

Figure 2. The incidence of cancer, 2002-2013.

Source: Data represented from DATASUS and National Cancer Institute (INCA) indexes

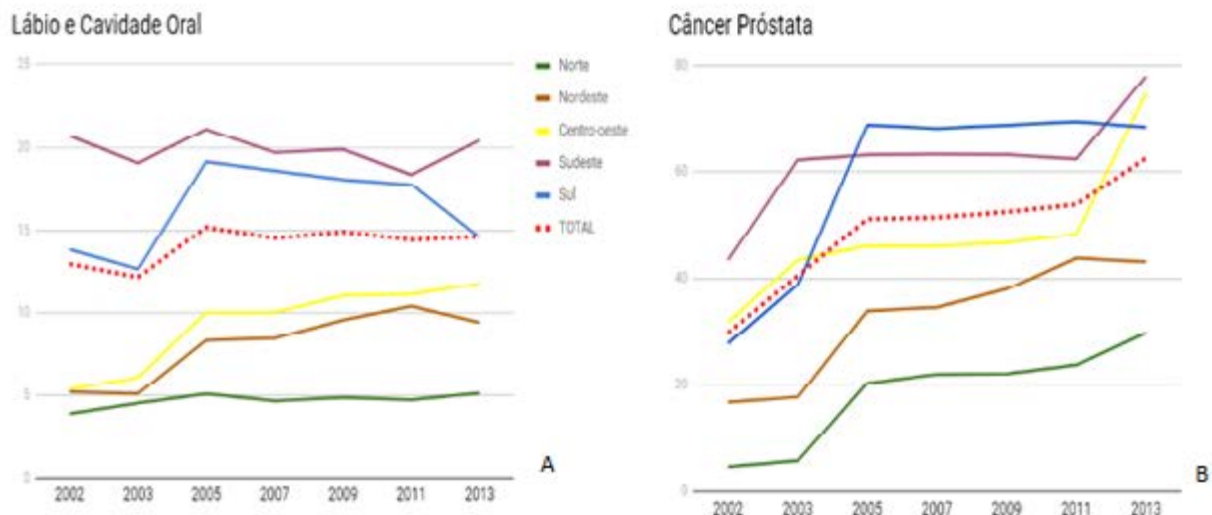
In the data analysis of cancers in the final sections of the gastrointestinal tract (colon, rectum, and anus), their importance is notorious, as in the final data they are only below breast cancer in women,

prostate¹¹ in men, and “other skin neoplasias”¹² in both. Its representation had an increasing incidence in the whole analysis (21.7%/30.7%), in both sexes and all the Regions, emphasizing the quick leap in the

South Region, practically doubling its representation from 2003 (21.6%) to 2005 (43.5%). In less exuberant representativity numbers, an increase was observed in the rates in the North (3.1%/8.9%) and Northeast Regions (6.0%/12.0%) (Figure 2B). In this group, the females have slightly higher numbers than males.

The group with lip and oral cavity cancer presents a plateau graph, which increased from 2002 (12.9%) to 2005 (15.1%), slightly decreased in 2007 (14.5%), and remained considerably stable until 2013. The South (19.9%) and Southeast Regions (13.4%) had rates above the national average (14.1%) (Figure 3A). Regarding sex, higher rates were observed for males.

Among males, prostate cancer increased throughout the analyzed period, ending it with twice as much as it started (62.5%/29.8%). The change in the collected data from 2003 (40.5%) to 2005 (51.1%) and from 2011 (53.8%) to 2013 (62.5%) is worth noting, as it revealed sudden increases. The South (58.5%) and Southeast Regions (62.2%) had values above the national average (48.8%). Despite the North Region presenting the lowest values in the whole analysis, there was a significant increase between 2002 (4.7%) and 2013 (29.7%) (Figure 3B).



Notes: A - The incidence of cancer of the lip and oral cavity, 2002-2013; B - The incidence of prostate cancer in Brazilian regions, 2002-2013.

Figure 3. The incidence of cancer, 2002-2013.

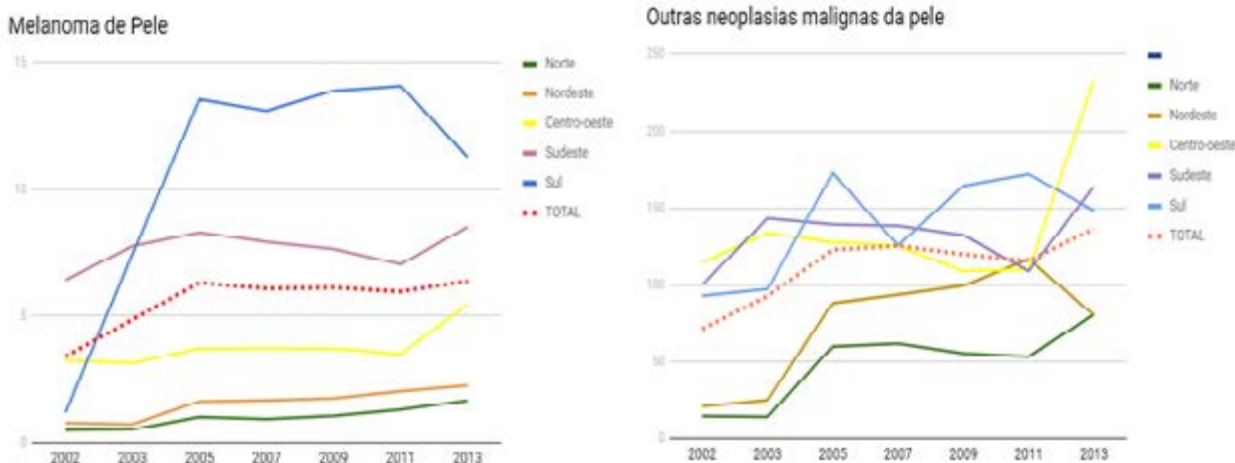
Source: Data represented from indices from DATASUS and the National Cancer Institute (INCA).

Concerning skin melanoma, in 2002 it was more representative in the Southeast (6.4%) and Central-West Regions (3.2%). However, beginning in 2003, the South started having an important increase in numbers, reaching an average of 10.6% in the period analyzed. Along with the Southeast (7.6%), it had higher rates than the national average (5.6%) (Figure 4A). Also, the rates were higher among males.

Other malignant skin neoplasias were the main causes of cancer in the present study, with the highest values in both sexes. Their most representative Regions in 2002 were the Central-West (114.4%), Southeast (100%), and South (92.8%). After 2003, a progressive increase stands out in the Southeast and South Regions, to which the highest rates belong from then on, along with the Central-West. It was verified

that all these Regions – South (139.0%), Central-West (136.1%), and Southeast (132.1%) – had mean values above the national average, which was at 112% in the period analyzed (Figure 4B). This group of cancers

changed the pattern regarding the sex during the period analyzed, as the males had higher rates in some initial data, and the females predominated in the final ones.



Notes: A - The incidence of skin melanoma in Brazilian regions, 2002-2013; B - The incidence of other malignant skin neoplasms in Brazilian regions, 2002-2013.

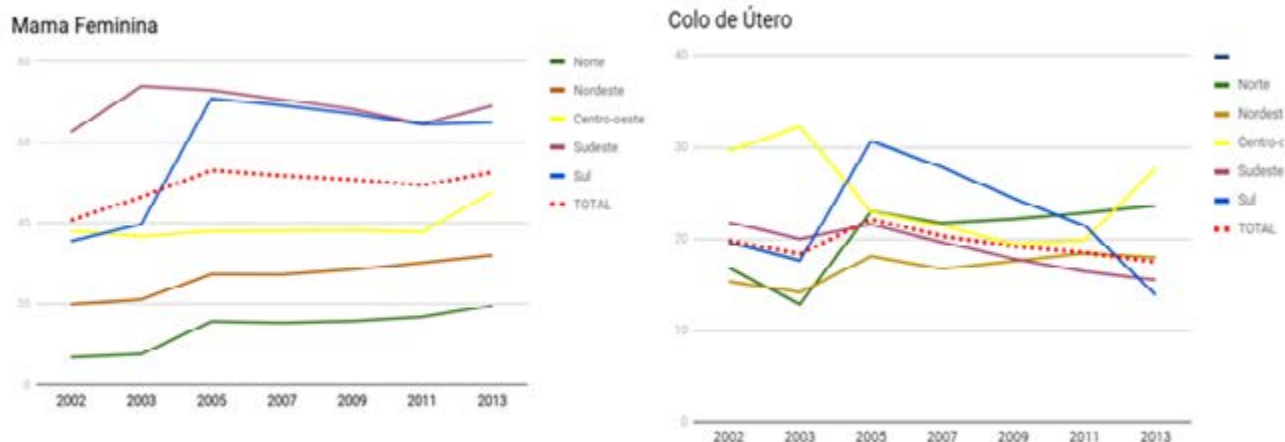
Figure 4. The incidence of neoplasms, 2002-2013.

Source: Data represented from DATASUS and National Cancer Institute (INCA) indexes

Regarding specific cancer per sex, female breast cancer¹³ had an increase between 2002 (40.6%) and 2005 (52.9%) followed by a drop until 2011 (49.3%) and another increase in 2013 (52.5%). The Southeast Region had the highest mean rate (68.7%) of the Regions of Brazil, above the national average (49.2%) in the whole period analyzed, followed by the South Region (58.7%) (Figure 5A).

Cervical cancer¹⁴ increased between 2002 (19.8%) and 2007 (20.3%), followed by a decrease

until the last data of 2013 (17.5%). The Central-West Region had the highest rates in 2002 (29.5%) and 2003 (32.3%), followed by a drop which continued until 2011 (9.9%) and a sharp increase in 2013 (27.7%) – which placed it as the Region of Brazil with the highest mean rate (24.7%), followed by the South (22.2%) and North Regions (20.4%) (Figure 5B).



Notes: A - The incidence of female breast cancer in Brazilian regions, 2002-2013; B - The incidence of cervical cancer in Brazilian regions, 2002-2013

Figure 5. The incidence of female cancers, 2002-2013.

Source: Data represented from indices from DATASUS and the National Cancer Institute (INCA)

DISCUSSION

Given the data collected in this study, it was observed that the lung, tracheal, and bronchus cancers increased the mean rates in the Regions of Brazil in the period in question. However, after 2009 the total number of cases stabilized. This scenario suggests that these data reflect the decrease in tobacco consumption in the last years. Due to initiatives such as the National Tobacco Use Control Program, smokers were given the necessary support to control the situation with medications, adhesives, and group therapies. It all took place through primary health care, resulting in controlled cases of tumors and early detection. The public health policies in Brazil, which are an example to other nations, helped reduce tobacco consumption. Strong public health policies in Brazil led to a subsequent reduction in tobacco consumption, which can be an example to other low- and middle-income countries¹⁵.

Esophagus cancer increased in all the Regions of Brazil in both sexes, except for the Southeast, which reduced its incidence among males. According to INCA¹⁰, 10,790 new cases of esophagus cancer are estimated in 2018. The main risk factors for esophagus cancer include tobacco use⁹, alcoholism,

and human papillomavirus (HPV) infection. The work of community health agents is utterly important in this context, actively going after people for their adherence to proposed actions, besides following up cases with suspicion to reach an early diagnosis.

Regarding stomach cancer, the North and Northeast Regions had an increased number of cases, while the Central-West, South, and Southeast either decreased or maintained the number of cases in both sexes. Aspects related to feeding and overweight are highlighted as risk factors. Hence, it is worth mentioning the presence of nutritionists at the Extended Family Health Care Center (NASF) and healthy-eating groups in primary health care¹⁶.

There was an increase in the incidence of colon, rectum, and anus cancers in all the Regions, especially in the South and Southeast, in both sexes. The National Oncologic Care Policy (PNAO) has promoted the implementation of population screening programs to ensure an early diagnosis through the dissemination of the warning signs both to the population and the health professionals³. The relationship between this cancer and the sexually transmitted infections (STI) – whose fast tests (screening) are available in primary health care – is also highlighted, as well as the HPV oncogenic infection and issues related to eating habits¹⁷.

The incidence of breast cancer has been increasing in all the Regions of the country. Although the rates tended to decrease between 2007 and 2011, it increased again in the last year of the analysis. It is suggested that the demographic transition that has been leading to population aging, along with decreased fertility rates, may be related to such an increase¹⁸. Currently, a great mobilization is observed in national campaigns aiming to raise awareness in the population regarding the importance of an early diagnosis, encouraging self-examination and clinical mammography. The plan of strategic actions to tackle the non-communicable chronic diseases (NCCD) in Brazil provides practical measures, including early diagnosis, encouraging early mammography.

In 2012, cervical cancer was the fourth most common type of cancer in women worldwide, of which cases 85% occurred in low- and middle-income countries¹⁹. According to INCA¹⁴, this is one of the types of cancer with the highest incidence in the female Brazilian population. In the last period analyzed, there was an increase in the North and Northeast Regions, while the rate decreased in the South, Central-West, and Southeast, despite the variation. Population screening may contribute to a decrease in cervical cancer mortality rates, as observed in high-income countries since the beginning of the 20th century²⁰. Nonetheless, in middle- and low-income countries the results are less expressive due to the limited access to health care – e.g., the low coverage of screening programs and delays in performing diagnostic and therapeutic procedures²¹.

Prostate cancer has been increasing through the years in all the Regions. The research shows substantial growth in the incidence rates between 2003 and 2005 in most of the Regions. A great encouragement toward the prevention of this cancer is also observed, including annual campaigns named Blue November, which promote men's health with health care actions¹¹.

Lip and oral cavity cancers had their incidence increased in both sexes, in most of the Regions of

Brazil, except for the Southeast – which registered a reduction in the incidence rate. The stabilization of the observed rate results from long-term changes and indicates improvements in the early detection of oral cancer and less exposure to risk factors²². According to INCA⁹, the main risk factors for this type of cancer are tobacco and alcohol use, potentialized when they are simultaneous. The increasing mortality rates suggest the long path to be taken to reduce these habits for the sake of the general population's health²³. The PNAO highlights that the tobacco use control program is an essential strategy, combined with the awareness campaigns and actions in primary health care, besides the screening performed with a clinical visual inspection of the oral cavity by a professional dental surgeon to early diagnose these cancers²⁴.

Given the information presented and described in this study, an increase in the cases of skin melanoma was observed in all the Regions, especially in the South of Brazil. In this type of cancer, early detection is essential. The initiatives and campaigns of the Ministry of Health are recurrent, particularly in summertime, when there is greater exposure to the sunrays. Other types of malignant skin cancers were also pointed out, whose results showed an even greater increase in all the Regions and both sexes¹².

The epidemiologic context of increasing incidence of cancers in the Regions of Brazil and their relationship with the sexes is an excellent tool in health planning and administration, besides having the role of helping in the health care strategies aimed at the population, especially in primary health care.

CONCLUSION

Despite the increase in the incidence of the different types of cancer in the Regions of Brazil, attention is called to the importance of the increased number of public policies aimed at health promotion and prevention actions focused on decreasing these rates, especially through early diagnosis. These

policies are a great advancement from the standpoint of health care in the context of the so-high prevalence of neoplasias in recent years.

This research is an important strategy to ensure that attention is given to the patients, reaffirming the impact of national campaigns intended for promoting the population's health and quality of life. Cancer control is a great challenge, as it involves the quality of life and individual habits – especially regarding the prostate, breast, skin, colon, rectum, and anus cancer, the most incident ones, which continued to increase in the last years of the period of this study. However, the relevance of policies aimed at controlling cancers is also notorious, highlighting the work done in primary health care, with health promotion and early detection. Promoting the quality of life while implementing control policies are strategies that have been achieving valuable results in all types of cancers, striving to detain increases and make the decreases happen.

REFERENCES

1. Fundação do Câncer. Investimentos em Oncologia. Brasil; 2018 [acesso em 2018 Jul 9]. Disponível em: <https://www.cancer.org.br/investimentos-em-oncologia/>.
2. Brasil. Ministério da Saúde. Secretária de Atenção à Saúde. Instituto Nacional de Câncer. A situação do câncer no Brasil. [internet] 2006 [acesso em 2018 Jul 9]. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/situacao_cancer_brasil.pdf.
3. Dutra VGP, Parreira VAG, Guimaraes RM. Evolução da mortalidade para o câncer colorretal no Brasil e regiões, por sexo, 1996-2015. *Arq. Gastroenterol.* 2018; 55 (1): 61-65.
4. Celuppi IC, Geremia DS, Ferreira J, Pereira AMMP, Souza JB. 30 anos de SUS: relação público-privada e os impasses para o direito universal à saúde. *Saúde em Debate.* 2019; 43 (121): 302-313.
5. Amorim VMSL, Barros MBA, César CLG, Carandina L, Goldbaum M. Fatores associados a não realização da mamografia e do exame clínico das mamas: um estudo de base populacional em Campinas, São Paulo, Brasil. *Cadernos de Saúde Pública.* 2008; 24(11): 2623-2632.
6. Santos AF, Guedes, MS, Tavares RC, Silva JMB, Neto WB, Santana JB et al. Vivências de mães com crianças internadas com diagnóstico de câncer. *Sistema de Informação Científica Redalyc Rede de Revistas Científicas da América Latina e do Caribe, Espanha e Portugal.* 2017; (34): 1-15.
7. World Health Organization. Early cancer diagnosis saves lives, cuts treatment costs. 2017 [acesso em 2018 Mai 25]. Disponível em: <http://www.who.int/en/news-room/detail/03-02-2017-early-cancer-diagnosis-saves-lives-cuts-treatment-costs>.
8. Teixeira LA, Fonseca CO. Brasil. Ministério da Saúde. De doença desconhecida a problema de saúde pública: o INCA e o controle do câncer no Brasil. 2007. p:1-174.
9. Brasil. Ministério da Saúde. Instituto Nacional de Câncer. Dados e números da prevalência do tabagismo. [internet] 2019 [acesso em 2019 Set 3]. Disponível em: <https://www.inca.gov.br/observatorio-da-politica-nacional-de-controle-do-tabaco/dados-e-numeros-prevalencia-tabagismo>.
10. Brasil. Ministério da Saúde. Instituto Nacional de Câncer. Tipos de câncer. Esôfago. [internet] 2019 [acesso em 2018 Mai 9]. Disponível em: <http://www2.inca.gov.br/wps/wcm/connect/tiposdecancer/site/home/esofago>.
11. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas e Estratégicas. Política Nacional de Atenção Integral à Saúde do Homem : princípios e diretrizes / Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Ações Programáticas e Estratégicas – Brasília : Ministério da Saúde, 2009. 92 p. : il. – (Série B. Textos Básicos de Saúde).
12. Brasil. Ministério da Saúde. Instituto Nacional de Câncer. Tipos de câncer. Pele Melanoma. [internet] 2019 [acesso em 2018 Mai 9]. Disponível em: http://www2.inca.gov.br/wps/wcm/connect/tiposdecancer/site/home/pele_melanoma.

13. Brasil. Ministério da Saúde. Instituto Nacional de Câncer. Tipos de câncer. Mama. [internet] 2019 [acesso em 2018 Mai 9]. Disponível em: <http://www.inca.gov.br/wps/wcm/connect/tiposdecancer/site/home/mama>
14. Brasil. Ministério da Saúde. Instituto Nacional de Câncer. Tipos de câncer. Colo de Útero. [internet] 2019 [acesso em 2018 Mai 9]. Disponível em: http://www2.inca.gov.br/wps/wcm/connect/tiposdecancer/site/home/colo_uterio
15. Araujo LH, Baldotto C, Castro G Jr, Katz A, Ferreira CG, Mathias C, et al. Lung cancer in Brazil. *J. bras. pneumol.* 2018; 44 (1): 55-64.
16. Azevedo E Silva G, de Moura L, Curado MP, Gomes FDAS, Otero U, Rezende LF, et al. The fraction of cancer attributable to ways of life, infections, occupation, and environmental agents in Brazil in 2020. *PLoS One.* 2016;11(2): 1-13.
17. Silva GA, Rezende LFM, Gomes FS, Souza PRB Jr, Szwarcwald CL, Neto JE. Modos de vida entre pessoas que tiveram câncer no Brasil em 2013. *Ciênc. saúde coletiva.* 2016; 21 (2): 379-388.
18. Couto MSA, Guerra MR, Firme VAC, Bustamante-Teixeira MT. Comportamento da mortalidade por câncer de mama nos municípios brasileiros e fatores associados. *Revista Panamericana de Salud Pública.* 2017; 41(168): 1-10.
19. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *International Journal Of Cancer.* 2014;136(5): 359-386.
20. International Agency for Research on Cancer World Health Organization. IARC Handbooks of Cancer Prevention. Cervix Cancer Screening. 2005; 10.
21. Nascimento MI, Silva GA. Efeito do tempo de espera para radioterapia na sobrevida geral em cinco anos de mulheres com câncer do colo do útero, 1995-2010. *Cadernos de Saúde Pública.* 2015; 31(11): 2437-2448.
22. Perea LME, Peres MA, Boing AF, Antunes JLF. Tendência de mortalidade por câncer de boca e faringe no Brasil no período 2002-2013. *Rev Saude Publica.* 2018; 52(10):1-10.
23. Biazevic MGH, Castellanos RA, Antunes JLF, Michel-Crosato E. Tendências de mortalidade por câncer de boca e orofaringe no Município de São Paulo, Brasil, 1980/2002. *Cad. Saúde Pública.* 2006; 22(10): 2105-2114.
24. Bomfim RA, Cascaes AM. Tendências dos benefícios previdenciários por câncer bucal e de orofaringe de 2006 a 2013 no Brasil. *Epidemiologia e Serviços de Saúde.* 2018; 27(1):1-9.