

Cancer Mortality in the North Region of Brazil in the Historical Series 2010-2017

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Abstract— Brazil is among the countries with the highest cancer mortality in the world. More than 200 thousand cancer deaths were estimated in 2015 in the country, which corresponds to approximately 20% of the total deaths. **OBJECTIVE:** To identify cancer mortality in the Northern Region of Brazil in the Historical Series 2010 - 2017. **MATERIALS AND METHODS:** Descriptive analytical study, retrospective type and quantitative approach, carried out in January 2020 with secondary data information, Results of the Computerization System of the Hospital Cancer Registry (SisRHC) from Brazil in the period from 2010 to 2017. **RESULTS:** In the 2010-2017 historical series, 9,304 deaths were recorded, with the highest number of cases in the state of Amazonas, which presented a total of 4,264 deaths (6%). As for socio-demographic data, there was a predominance of patients with male gender (51%), aged 60 to 69 years (25%), mixed race (73%), married (41%) and with incomplete primary education (41 %). **FINAL CONSIDERATIONS:** There were noticeable variations in some

states between diagnosed cases and mortality rate, which may be linked to the conjuncture of the organization of health care networks, care coverage, social determinants of health.

Keywords—*Mortality; Cancer; Brazil.*

I. INTRODUCTION

Cancer is characterized by disordered cell growth, with the potential to invade tissues and organs near and far. It is considered a public health problem and is related to risk factors such as smoking, physical inactivity, inadequate diet and harmful use of alcohol. Currently it is positioned as one of the main causes of mortality, affecting populations from all regions and countries in the world (INCA, 2017).

The World Health Organization (WHO) estimates that cancer is responsible for almost 1 in 6 deaths worldwide. More than 14 million people develop cancer each year and that number will increase to more than 21 million by 2030. Most people diagnosed with cancer live in low- and middle-income countries, where two cases of death from the disease occur. The WHO also estimates that about 8.8 million people die each year from malignant neoplasms worldwide (Siegel, Miller & Jemal, 2015; WHO, 2018).

In Brazil, it is estimated that more than 200 thousand cancer deaths occurred in 2015. A number that corresponds to approximately 20% of the total indexes, for the same year. This fact qualifies Brazil as one of the countries with the highest cancer mortality in the world, occupying the second place in the country in number of deaths, reaching a rate of 16,2% (Brasil, 2015).

Therefore, from the above, the North region has an increasing increase in cancer incidence and mortality, however, studies focusing on these data are scarce. Based on this, this study aimed to identify cancer mortality in the Northern Region of Brazil in the Historical Series 2010 - 2017.

II. METHOD

This study is configured as a retrospective, descriptive and analytical study, with a quantitative approach. The study was carried out in January 2020, with information, from secondary data, from the Computerized System of the Hospital Cancer Registry (SisRHC) referring to cancer mortality in the northern region of Brazil from 2010 to 2017. The data collected are available for the public on the website of the Integrador do Hospital do Câncer (RHC Integrator), at <https://irhc.inca.gov.br>. RHC is an INCA system that allows tabulation of data on patients with a

confirmed diagnosis of cancer, related to Hospital Cancer Registries (RHC) from all over Brazil.

Data from 9.304 cancer deaths were collected at the RHC in the 7 (seven) states (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima and Tocantins) that make up the northern region of Brazil, between the years 2010 to 2017. For this study, we included all cancer deaths from the entire northern region of Brazil.

For this study, the following Sociodemographic variables were used (federal state of process; total number of cases; total number of cases; sex; age group; race; education; marital status); Epidemiological characteristics (location of the tumor; basis of diagnosis; occurrence of more than 1 tumor and laterality) and associated factors (alcoholism, smoking and family history of cancer).

From the collected data, a descriptive analysis of the studied population was carried out, the data are arranged in the form of tables by means of statistics related to the median and standard deviation of the selected variables. Because the data used is open to the public and available for consultation through the INCA website (National Cancer Institute José Alencar Gomes da Silva), there was no need for approval by the Research Ethics Committee.

III. RESULTS

In the 2010-2017 historical series, 114.085 cancer cases were found in all states in the northern region, the largest number of cases in the state of Amazonas, with 67.851 cases, which corresponds to 59% of the total, followed by Pará, with 21.814 cases, corresponding to 19%, the State of Rondônia had 9.954 cases, which corresponds to 9% of the total, Tocantins had 8.697 cases, which corresponds to 8%, while the State of Acre had 2.595 cases, which corresponds to 2% of the total, followed by Amapá with 2.215 cases, corresponding to 2% and, finally, the State of Roraima with 949 cases, which corresponds to 1% of the total cases.

A total of 9.304 cases evolved to death, which corresponds to 8% of the total number of cases. As for the number of deaths, the State of Amazonas presented 4.264, which corresponds to 6% of the total, followed by Pará, with 2.316, which corresponds to 11%, the State of Tocantins comes next with 1.927 deaths, which corresponds to at 22%, Rondônia appears with 507 deaths, a fact that corresponds to 5%, followed by Acre with 135

deaths, corresponding to 5%, Amapá with 111, corresponding to 5% of the total and, finally, the State of Roraima with 44% cancer deaths, which corresponds to 5%

of the region's total. Table 1 shows the number of cancer deaths in the northern region, by state.

Table 1: Distribution of the number of deaths from cancer in the northern region of Brazil between the years 2010 to 2017.

	Total Cases by State	% Cases by State	Deaths by State	% Deaths	Deaths by sex n = 9.304			
STATE	n = 114 085	%	n = 9304	%	WEF	%	BUT	%
Acre	2.595	2%	135	5%	59	44%	76	56%
Amazon	67.861	59%	4.264	6%	2.193	51%	2071	49%
Amapá	2.215	2%	111	5%	57	51%	54	49%
Pará	21.814	19%	2.316	11%	1.144	49%	1172	51%
Rondônia	9.954	9%	507	5%	213	42%	294	58%
Roraima	949	1%	44	5%	26	59%	18	41%
Tocantins	8.697	8%	1.927	22%	847	44%	1079	56%

Source: integrator RHC, 2020.

In relation to mortality rates, Table 2 shows the observed declines in cancer mortality in the states of the Northern Region of the country between the years 2010 to 2017. The year 2010 shows as the highest cancer mortality rate in the northern region. The State of

Tocantins has the highest mortality rates among all the northern states. However, a decline in cancer mortality has also been observed over the years. The data are best expressed in table 2 below.

Table 2: Mortality rate (crude) due to cancer in the northern region of Brazil, according to the year of occurrence, in the history series 2010-2017.

Cancer mortality rate	Occurrence Year								
	2010	2011	2012	2013	2014	2015	2016	2017	Average
Acre	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.16
Amazon	1.18	1.16	1.13	1.11	1.10	1.08	1.06	1.04	1.10
Amapá	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.14
Pará	0.30	0.29	0.29	0.29	0.28	0.28	0.27	0.27	0.28
Rondônia	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.28
Roraima	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08
Tocantins	1.35	1.33	1.31	1.30	1.28	1.26	1.25	1.23	1.28

Source: integrator RHC, 2020.

As for sex, 51% of the patients who died were male, with a predominance of 25% in the 60 to 69 age group. As for race, the vast majority 73% of the brown race and 41% had only incomplete fundamental level. Regarding

marital status, it was observed that 41% of the patients who died were married. Table 3 expresses the characterization of the sociodemographic profile.

Table 3: Distribution of sociodemographic data of deaths from cancer in the northern region of Brazil between the years 2010 to 2017.

Variables	Total n = 9.304	
	Nº	%
Sex		
Feminine	4.539	49%
Male	4.764	51%
Age group		
00-09	199	2%
10-19	222	2%
20-59	4.064	44%
60-79	4.097	44%
80 or more	719	8%
Breed		
Ignored race / blank	698	8%
White	1.346	14%
Black	402	4%
Yellow	59	1%
Brown	6.771	73%
Indigenous	28	0%
Education		
Ignored / blank	1.428	15%
Illiterate	1.562	17%
Fund education incomplete	3.847	41%
Fund education complete	1.071	12%
Complete high school	1.097	12%
Some college teaching	76	1%
Complete Higher Education	223	2%
Marital status		
Unknown	944	10%
Not married	2.559	28%
Married	3.799	41%
Separate	432	5%
Stable union	447	5%
Widower	1.123	12%

Source: integrator RHC, 2020.

As for the epidemiological profile of the patients, it is noted that the largest number of cases of patients who died, 29% had neoplasms of the digestive organs, followed by 12% in the female genital organs. As for the

diagnosis, 84% were performed through primary histopathological examination, without metastasis in 90% of cases. For better visualization, the data are shown in table 4.

Table 4: Epidemiology of cancer deaths in the Northern Region of Brazil between the years 2010 to 2017.

Variables	Total n = 9.304	
	Nº	%
Location		
Lip and oral cavity	332	4%
Oropharynx, nasopharynx, larynx and nasopharynx	442	5%
Digestive organs	2.744	29%
Breathing apparatus (except larynx)	922	10%
Bones, joints, articular cartilage	114	1%
Hematopoietic system	819	9%
Skin	264	3%
And peripheral nerves SNA	5	0%
Retroperitoneum and peritoneum	44	0%
Connective tissue, subcutaneous and other soft tissue	125	1%
Breast	734	8%
Female genitals	1.082	12%
Male genital organs	548	6%
Urinary tract	258	3%
Eye, brain and other parts of CNS	225	2%
Thyroid and other glands	47	1%
Other ill-defined locations	37	0%
Lymph nodes	240	3%
Primary Location unknown	322	3%
Based Diagnostics		
Cytology	455	5%
Clinic	96	1%
Image for examination	377	4%
Histology of metastasis	363	4%
Histology of the primary tumor	7.778	84%
Tumor markers	61	1%
Clinical research	52	1%
No informations	122	1%
Occurrence of more than one tumor		
Yes	238	3%
No	8.370	90%
Doubtful	240	3%
No information	456	5%
Laterality		
Bilateral	177	2%

Right	1.051	11%
Left	888	10%
Not applicable	6.194	67%
No information	994	11%

Source: integrator RHC, 2020.

As for the factors associated with cancer, it was observed that 30% of the cases denied alcoholism, however 17% stated that they were ex-alcoholics. In relation to smoking, 20% denied smoking, however 24%

declared to be ex-smokers and 28% of the cases claimed to have a family history of cancer. The associated factors are expressed in table 5 below.

Table 5: Factors associated with cancer mortality in northern Brazil from 2010 to 2017.

Variables	Total n = 9.304	
	Nº	%
Alcoholism		
Not applicable	167	2%
Not rated	936	10%
Yes	1318	14%
No	2820	30%
Ex-consumer	1.568	17%
No informations	2492	27%
Smoking		
Not applicable	164	2%
Not rated	637	7%
Yes	1507	16%
No	2670	29%
Ex-consumer	2.235	24%
No informations	2088	22%
Cancer Family History		
Yes	2.218	24%
No	2624	28%
No information	4462	48%

Source: integrator RHC, 2020.

IV. DISCUSSION

In view of the results presented, the impact of cancer on public health is evident, both in terms of prevalence and the burden attributed to the high incidence, since the high demand for cases of the disease requires complex technological, political, economic and social assistance to support and repairing the damage associated with the pathology (Ferlay et al., 2019).

Thus, concomitant with the northern region, the emergence of the disease has occurred considerably in other regions of Brazil and worldwide. According to GLOBOCAN (Global cancer statistics), in 2018 the estimated cases of cancer and mortality worldwide were approximately 18% and 9% respectively (Bray, Ferlay, Soerjomataram, Siegel, Torre & Jemal, 2018).

Correlated with the prevalence and incidence index in Brazil in relation to other countries, the country has low

incidence rates in certain topographies, however, the factor of concern is the index and mortality rates. As higher statistics on pathology are presented in developed countries, this fact is accompanied by high health coverage, efficiency in early diagnosis and cure rates for diseases (Guerra et al., 2017).

In the present study, there was a prevalence of cancer of the digestive tract and female genital organs. This result confirms a difference in the profile of the prevalence of malignant neoplasms in the northern region in relation to that of the country. Thus, according to a mortality survey conducted in 2015, it showed that mortality from cervical cancer was higher in women in the north and northeast regions and a reduction in stomach cancer in all regions of Brazil, in addition to a increase in the number of colorectal cancer cases in men and women (Guerra et al., 2017).

The predominant cancer of female organs in Brazil is breast, colorectal and cervical, respectively, however, when the epidemiology of these pathologies in the northern region is analyzed, their inversion occurs, with a higher prevalence and cause of mortality, respectively, of malignant neoplasm of cervix, followed by breast cancer (Brasil, 2018). In addition, stomach cancer also has a high prevalence and cause of mortality in the northern region, because while in Brazil the topography of the stomach is between the 4th and 5th most prevalent, in this region its values increase to 2nd in the ranking (Brasil, 2018).

Cancer statistics are consequences of the interaction of multiple factors, including: the demographic-epidemiological transition, lifestyle, family and personal history, exposure to risk factors / agents, social inequalities, difficulty in accessing health services, promoting thus, deprivation of assistance aimed at health promotion and disease prevention and the consequent increase in the occurrence of the pathology (Silva, Bergmann, Siqueira, Casado & Zamboni, 2018).

The primary location of the tumor may reflect the social condition and social inequalities, according to research supported by Guerra et al (2017) and Cavalcante, Simão, Camargo, Faria, Moreira & Alvares (2014), the prevalence of gastrointestinal neoplasms and female genital organs, especially the cervix topography it presents high rates in groups with lower socioeconomic status.

In the present study, the patient's profile with variables such as low education, brown skin and male gender showed higher mortality. Such trends corroborate the findings of Ferlay et al (2019) and Silva et al (2018) and Moura (2016) who demonstrate the same mortality profile.

According to Moura, Santos, Neves, Schwarz & Gomes (2016), there are disparities in the demand for services

between genders. Demand is lower among men, and when there is a search for health institutions there is already seriousness and complications. In addition to this, it was also observed that generally among men there is a higher prevalence of lifestyle habits such as alcoholism and smoking compared to women. It is known that these factors are important in the genesis of cancer, thus contributing to the ratification of the mortality profile.

Regarding the level of education, there are some differences that the lower level of education influences the delay in diagnosis and the lower survival of cancer patients (Cavalcante, Simão, Camargo, Faria, Moreira & Alvares, 2014). In another study conducted on mortality in Brazil, higher mortality from cervical cancer was found in less developed regions, with low health care coverage and a lower level of education (Guerra et al., 2017).

However, according to a study by Cabral, Giatti, Casale & Cherchiglia (2019), it is emphasized that the level of education influences early diagnosis, treatment time and cancer survival, and women with schooling less than or equal to 8 years had the chance to start treatment between 60 to 91 days and 37 times more likely to start treatment compared to other profiles.

It is known that increasing age and the aging process point out the probability of the pathology occurring, especially when associated with lifestyle, because with aging changes in physiology, among them there is a delay in metabolism, a decrease in mitochondrial activity, increased fat deposition, which are proponent factors for the disease.

This accentuates when related to the unfavorable lifestyle habits adopted in the past. According to the results of a cohort study conducted by Li et al., (2020), it was observed that participants who never smoked, practiced physical activities, ingested little or no alcohol and had a balanced diet had a longer life expectancy. and greater quality of life free of chronic diseases.

In the study, there was a large discrepancy in the numbers of prevalence and mortality in some State, as there was a state with a lower prevalence of the disease, but mortality was high and superimposed on other units in the same region. This can also be configured with the performance of care coverage and the resolution of the proposed care in place, such as early diagnosis and fast and effective care (Barbosa, Souza, Bernal & Costa, 2016).

V. CONCLUSION

In the survey, the mortality profile was higher in males, with less education, brown skin color, married, older age

and with current habits or history of alcohol consumption and / or smoking. It was clearly noticed variations in some states between diagnosed cases and mortality rate. Some states had a lower proportion of diagnosed cases, however, mortality stood out, this fact may be linked to the conjuncture of the organization of health care networks, care coverage, social determinants of health.

In addition, there was a predominance of mortality from gastrointestinal cancer and female genital organs, a situation that differentiates the profile of cancer prevalence and mortality in the northern region from other regions of the country.

REFERENCES

- [1] Barbosa, I. R. Souza, D. L. B. Bernal, M. M. Costa, I. C. C. (2016). Regional inequalities in cervical cancer mortality in Brazil: trends and projections through to 2030. *Science and collective health*, 21(1), 253-262. <https://doi.org/10.1590/1413-81232015211.03662015>
- [2] Brazil. Ministry of Health. (2015). *Asis: Health Situation Analysis*. Retrieved from: http://bvsms.saude.gov.br/bvs/publicacoes/asis_analise_situacao_saude_volume_1.pdf
- [3] Brazil. Ministry of Health. National Cancer Institute. (2018). ABC of cancer: basic approaches to cancer control. José Alencar Gomes da Silva National Cancer Institute. Retrieved from: <https://www.inca.gov.br/sites/ufu.sti.inca.local/files//media/document/livro-abc-4-edicao.pdf>
- [4] Bray, F. Ferlay, J. Soerjomataram, I. Siegel, R.L. Torre, L.A. Jemal, A. (2018). Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer Journal Clinical*, 68(6), 394-424. Retrieved from: <https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/caac.21492>
- [5] Cabral, A. L. L. V. Giatti, L. Casale, C. Cherchiglia, M. L. (2019). Social vulnerability and breast cancer: differentials in the interval between diagnosis and treatment in women of different sociodemographic profiles. *Public health magazine*, 24(2), 613-622. <https://doi.org/10.1590/1413-81232018242.31672016>
- [6] Cavalcante, A. Simão, G. Camargo, I. Faria, L. Moreira, M. Alvares, W. (2014). Relationship between schooling and the number of deaths from cervical cancer. In: *6th health show*. Retrieved from: <http://periodicos.unievangelica.edu.br/index.php/educacaoemsaude/article/view/92411>
- [7] Ferlay, J. Colombet, M. Soerjomataram, I. Mathers, C. Parkin, D. M. Piñeros, M. Znaor, A. Bray, F. (2019). Estimating the global cancer incidence and mortality in 2018: GLOBOCAN sources and methods. *International Journal Cancer*, 144 (8), 941-53. Retrieved from: <https://onlinelibrary.wiley.com/doi/full/10.1002/ijc.31937>
- [8] Guerra, M. R. Bustamante-Teixeira, M.T. Corrêa, C.S.L. Abreu, D. M. X. Curado, M. P. Mooney, M. Naghavi, M. Teixeira, R. França, E.B. Malta, D.C. (2017). Magnitude and variation of the burden of cancer mortality in Brazil and Federation Units, 1990 and 2015. *Rev. Bras. Epidemiol*, 20(Suppl. 1), 102-115. <https://doi.org/10.1590/1980-5497201700050009>
- [9] José Alencar Gomes da Silva National Cancer Institute (Brazil). (2017). *ABC of cancer: basic approaches to cancer control*. Retrieved from: https://bvsms.saude.gov.br/bvs/publicacoes/inca/abc_do_cancer_2ed.pdf
- [10] Li, Y. Schoufour, J. Dong, D. W. Klodian, D. Pan, A. Liu, X. Mingyang, S. Gang, L. Hyun, J. S. Sun, Q. Al-Shaar, L. Molin, W. Rimm, E. B. Hertzmark, E. Stampfer, M. J. Willett, W. C. Franco, O. H. Hu, F. B. (2020). Healthy lifestyle and life expectancy free of cancer, cardiovascular disease, and type 2 diabetes: prospective cohort study. *The BMJ*, 368. <https://doi.org/10.1136/bmj.l6669>
- [11] Siegel, R. L. Miller, K. D. Jemal, A. (2015). Cancer statistics, 2015. *CA: a cancer journal for clinicians, Wiley Online Library*, 65(1), 5-29. Retrieved from: <https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/caac.21254>
- [12] World Health Organization [homepage on the internet]. (2017). *Early cancer diagnosis saves lives, cuts treatment costs*. Geneva: 2017. Retrieved from: <http://www.who.int/en/news-room/detail/03-02-2017-early-cancer-diagnosis-saves-lives-cuts-treatment-costs>
- [13] Moura, E. C. Santos, W. Neves, A. C. M. Schwarz, E. Gomes, R. (2016). Mortality in Brazil according to gender perspective, years 2000 and 2010. *Rev. Bras. Epidemiol*, 19(2), 326-338. 2016. Retrieved from: http://www.scielo.org/scielo.php?script=sci_arttext&pid=S1415-790X2016000200326&nrm=iso
- [14] Silva, M. J. S. Bergmann, A. Siqueira, A. S. E. Casado, L. Zamboni, M. M. (2018). The Influence of Social and Health Care Inequalities on Cancer Incidence and Mortality. *Brazilian journal of cancerology*, 64(4), 459-460. <https://doi.org/10.32635/2176-9745.RBC.2018v64n4.211>