



## Epidemiological Profile of the Main Amazonian Population: A Literature Review

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### ABSTRACT

The Amazon region presents alarming risk factors for the development of cancer. The main focus of this study was to evaluate the epidemiological profile of the main types of cancer in the Amazon region between 2013 and 2020, being a bibliographic review in the databases pubmed, lilacs, scielo and google scholar, with the descriptors "neoplasms", "cancer", "Amazon", "cancer" and "Amazonia", including studies in English and Portuguese, with 34 articles. It was verified that the incidence of cervical, breast, skin, prostate, gastric and lymphoproliferative neoplasms is very high among the Amazonian population, emphasizing the importance of knowledge of these results by the health services, to assist in the implementation of more strategic actions of attention to populations at risk in the Amazon region in Brazil.

**Keywords:** Cancer symptoms; Amazonian ecosystem; Incidence; Neoplasms

### INTRODUCTION

Cancer is one of the most serious health problems, affecting millions of people worldwide. Among the countries with the highest number of cases is Brazil, which, between 2012 and 2013, registered more than half a million patients with neoplasms, with emphasis on non-melanoma skin, breast and digestive tract cancer. The Amazon region it also presents alarming risk factors for the development of cancer, both physical, such as high exposure to solar radiation, and sociocultural, such as the consumption of aggressive foods, triggering liver and bile duct neoplasms. Even with major national initiatives for the prevention of various types of cancer in recent decades, it is seen that, especially in the north of the country, there is still a high prevalence of more accessible prevention neoplasms, such as breast cancer, due

to factors related to the lack education and access to quality public health.

#### Aim

The aim of this study is to review the literature on the epidemiological profile of the main types of cancer in the Amazonian population between the years 2013 and 2020.

### LITERATURE REVIEW

This aspect reveals a significant similarity to the national scenario, given that, excluding non-melanoma skin cancer, malignant breast neoplasms correspond to 28% of new cases identified an every year. The lack of access to education also increases the risk of cancer due to cultural causes, such as the excessive consumption of foods rich in salts and carbohydrates, especially cassava flour, and fish and meat

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preserved in salt. This risk factor is enhanced by the lack of hygiene in food handling, accentuating contamination by *H. pylori* and, added to the lack of access to preventive policies, increases the incidence of cancer of the gastrointestinal tract in the northern region, such as stomach cancer, being the second most prevalent in the Amazon [1-7].

The Amazon population also has, together with the Northeast region, the highest levels of exposure to ultraviolet rays, which leverages the chances of occurrence of non-melanoma skin cancer. In addition, the growing elderly population in the region contributes to the increased presence of this disease, as they have a deficient immune system, making cell repair difficult after contact with solar radiation [8].

There are, in addition to the types already mentioned, other forms of cancers with marked prevalence in the Amazonian space, such as cervical cancer, which also has its most visible spread in the northern region due to socioeconomic problems. However, among other factors, assessment of the level of involvement of this population by cancer is not yet fully understood, hindering a better treatment of the affected population. In view of this, the objective of this work is to define an epidemiological profile of the main types of cancer in the Amazonian population between 2013 and 2020, aiming to analyze the data present in the literature.

It is a bibliographic review, therefore, of an exploratory and descriptive character. The search for articles was carried out in the following databases: Pubmed, lilacs, scielo and google scholar, with the help of the descriptors "neoplasms", "cancer", "amazon", "cancer" and "amazonia". Studies in English and Portuguese published between 2013 and 2020 were included and the research was conducted in May of 2022. Type of cancer, gender and age group were the variables analyzed in this study. Incidence per 100.000 people was also included. Furthermore, studies unrelated to epidemiological aspects and those conducted outside the Brazilian legal amazon were excluded.

## RESULTS

3,030 articles published between 2013 and 2020 were obtained, 135 of which were found in the pubmed database, 102 in the LILACS database, 13 articles in the scielo electronic library and 2,780 in google scholar. Of these articles, 34 articles were chosen, considering their correspondence with the objective of this research (Table 1).

**Table 1:** Data regarding the average incidence of the analyzed types of cancer.

Type of cancer	Incidence per 100.000 people		
	Male	Female	Both
Cervical	-	25.62	-
Breast	-	19.21	-
Prostate	29.41	-	-
Gastric	-	-	12.35
Leukemia	4.17	3.29	-
Hodgkin's lymphoma	1.52	0.95	-
Non-Hodgkin's lymphoma	6.31	5.07	-
Skin	23.74	27.71	-

Regarding the incidence per 100 thousand people, the highest among women was the skin cancer (27.71 per 100 thousand women), and the lowest involved the hodgkin's lymphoma (0.95 per 100 thousand women). In view of the male group,

most were affected with prostatic cancer (29.41 per 100 thousand men). However, similar to what happened to women, the prevalence of the hodgkin's lymphoma was the smallest (1.52 per 100 thousand men) (Table 2).

**Table 2:** Data regarding the average age of patients per type of cancer.

Type of cancer	Average age per gender		
	Male	Female	Both
Cervical	-	34.5	-
Breast	-	50	-

Prostate	75.5	-	-
Gastric	59.7	50.3	-
Leukemia	-	-	10
Hodgkin's lymphoma	-	-	23.8
Non-HODGKIN'S lymphoma	-	-	49.4
Skin	-	-	33

According to the average age of diagnosis, it was found that, among men, the prostatic cancer had the highest mean age (75.5 years), while leukemia represented the lowest for both genders (10 years). Based on the women's group, the gastric and breast cancers were the ones with highest mean age of diagnosis (50.3 years and 50 years, respectively).

## DISCUSSION

### Cervical Cancer

It was the most frequent type of cancer as a theme among the articles (35.13%) 12-25. In fact, without considering non-melanoma skin tumors, cervical cancer is the first most incident in the North region (25.62 new cases predicted for every 100 thousand inhabitants in the years 2020 and 2021). Regarding the profile of the women affected in the North region, the majority were relatively young (between 30 years-39 years old), non-white or brown, low educational level, low income, early onset of sexual life, multiparty, among others.

One of the interesting aspects is that most articles related the occurrence of cervical cancer to infection by Human Papilloma Virus (HPV), mainly the oncogenic types HPV16 and HPV18, so that the prevalence of infection in Amazonian populations varied between 7% to 39.7% 15.23. Such prevalence was higher among indigenous women, especially those belonging to isolated tribes in the Amazon, which indicates the appearance and persistence of the virus in such peoples, regardless of contact with other societies. Consequently, in addition to the higher prevalence of HPV, there was also a high incidence of pre-malignant and invasive lesions. Given this, the genetic profile and some cultural habits related to the sexual and reproductive behavior of indigenous societies favor this reality, such as the early onset of sexual activity, multiple partners and high fertility rate. In addition, difficulties in accessing health services and low screening coverage contribute to the high incidence of cervical cancer among the indigenous Amazonian population.

### Breast Cancer

According to the INCA, breast cancer is the second most incident tumor (19.21/100 thousand), without considering non-melanoma skin cancer, second only to cervical cancer. Accordingly, it was the second most frequent type among the articles found, being the main theme of 5 articles (13.15%).

However, the study by Santos E, et al., showed breast cancer as the first most prevalent, which may be because the study population consists of elderly people undergoing chemotherapy treatment, since, as previously mentioned, cervical cancer is more frequent in relatively young patients.

Regarding the epidemiological profile, most of the affected population were women, mixed race, had a mean age at diagnosis between 49 years and 51 years old, menarche at 13 years old and menopause at 47 years old, had low education and were overweight 27-28. In addition, there was a high incidence of cancer in women who have children, with an average age of 21 years old in the first pregnancy, who were breastfed for more than 6 months, which is a controversy, since these characteristics are indicated as protective factors for breast cancer.

Some studies have evaluated the epidemiological profile of young patients with breast cancer, resulting in the predominance of the age group between 35 years and 40 years and a higher prevalence of mortality between 36 years and 40 years. Finally, other studies carried out with indigenous women concluded that the prevalence and mortality rate due to breast cancer in these women are significantly lower than in white women.

### Prostate Cancer

Prostate cancer is the most prevalent among men in all regions of the country, without considering non-melanoma skin cancer, with a rate of 29.41 new cases per 100 thousand in the Northern region. Thus, in a study conducted at hospital public of Palmas (TO), prostate cancer was the most common type among men, as well as in other studies, with a mortality rate of 13.48%. Regarding the profile of the affected men, it was verified the age between 71 years-80 years, white and brown, married, with low education and income of up to two minimum wages, in addition to sedentary lifestyle. However, it is important to highlight the scarcity of articles on the epidemiology of prostate cancer in the Amazon region, published in the analyzed period. A relevant aspect to be observed is the high incidence of prostate cancer in rural workers in the Amazon. In this regard, a literature review conducted by Silva et al. observed that there is a positive association between agricultural occupation and the use of pesticides with prostate cancer. Another interesting issue raised by some articles was the low incidence of prostate cancer among indigenous men. In this sense, a study carried

out with indigenous in the state of Para, showed only 1 case of prostate cancer in a series of 47 indigenous patients diagnosed with cancer, which represents a prevalence of 2.63%. For some authors, this is due to the specific diet, lifestyle and genetic profile presented by the indigenous groups. However, other authors believe that the low incidence reflects the underreporting of such cases due to the barriers imposed by cultural beliefs and the difficulties in accessing health services.

### Gastric Cancer

In the North region, without considering non-melanoma skin tumors, stomach cancer in men is the second most frequent (12.35/100 thousand) and the fifth among women (5.34/100 thousand). The prevalence of gastric cancer in the studies analyzed ranged from 3.57% to 71.5% possibly due to differences in the target population of each study. Regarding the epidemiological profile, the most affected gender is male (63.6 to 71.19%), brown, average age between 58.2 years and 61.2 years for men and 50.3 years for women, married and low schooling. In a study conducted by Silva et al. 77% of patients said they did not consume alcoholic beverages and 63.6% said they were not smokers. In the study by Carvalho, 67.5% of patients regularly consumed alcohol at some point in their lives and 72.5% used tobacco.

### Lymphoproliferative Diseases

The main types of lymphoproliferative diseases are leukemias and lymphomas. Without considering non-melanoma skin tumors, leukemia in men is the fifth most common neoplasm (4.17 new cases per 100 thousand inhabitants) and, among women, it is in the sixth position (with 3.29 new cases for each 100 thousand inhabitants). The four main types of leukemia are Acute Lymphoid Leukemia (ALL), Acute Myeloid Leukemia (AML), Chronic Lymphocytic Leukemia (LLC) and Chronic Myeloid Leukemia (CML).

Regarding the epidemiological profile of patients affected by leukemia, a higher prevalence was observed in male pediatric patients, with a predominant age range between 8 years and 12 years. According to a study by Hanna, et al., the most frequent type was acute lymphoid leukemia (27.9%). Nevertheless, another study carried out with adults, found a prevalence of 17, 9% of ALL and 14% LLC in patients with mean ages of 33.8 and 65 years respectively. Regarding lymphomas, the most frequent type was Non-Hodgkin's Lymphoma (NHL). Regarding NHL, was predominant in adult patients, with a mean age of 49.4 years, male and with a history of occupational exposure to herbicides and pesticides as rural workers. On the other hand, it is also important to describe the epidemiological profile found of the patients affected by Hodgkin's Lymphoma (LH), which was male, with an average age of 23.8 years, being more expressive in the age group for children and adolescents.

### Skin Cancer

Skin cancer can be classified in two ways, as melanoma and non-melanoma, with the non-melanoma type being the most

incident (27.71/100 thousand) in women and the second most incident (23.74/100 thousand) among men in the North region, melanoma has a low incidence and high lethality. In this context, skin cancer had a high frequency among the studies analyzed, occupying the third position with a prevalence between 9.74% and 12.60%. A study by Dantas, et al., investigated the profile of patients hospitalized with malignant skin neoplastic in the Northern region from 2000 to 2014, in which a greater number of hospitalizations was observed in cases of melanoma than non-melanoma (69.7% vs 30.3%), probably due to the significantly higher lethality of the first. In addition, there was a predominance of males, who are more affected due to occupational exposures and less skin care.

## CONCLUSION

Thus, the main types of cancer found in the Brazilian Amazon region were the cervix, breast, prostate, stomach, lymph proliferative diseases, such as leukemia and lymphoma, and skin cancer. In addition, this study described the epidemiological profile of each of these types of cancer prevalent in the region. Based on the above, it is emphasized the importance of knowledge of such results on the part of health services and society in general, so that they contribute to the creation and implementation of prevention and screening strategic for at-risk populations in the Amazon region in Brazil.

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