Epidemiological Profile and Trends of Breast Cancer in the Municipalities of Belém and Ananindeua, Pará State, Amazon

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

ABSTRACT

Introduction: Breast cancer is a public health problem, characterized by an uncontrolled growth of malignant cells in breast tissue and the most common type of cancer among women, representing one of the main causes of death in the world.

Objective: To carry out an epidemiological profile and trend of breast cancer in the municipalities of Belém and Ananindeua, state of Pará, Amazonia.

Methods: This is an ecological, time-series, retrospective, descriptive, quantitative and analytical study, where data were collected from the Population-Based Cancer Registry/State Department of Public Health of the State of Pará in partnership with the Ophir Loyola Hospital (RCBP/SESPA/HOL).

Results: The sociodemographic profile, the variable married (marital status) had the highest number of cases and percentage in 1712 (37%), followed by data without information 1214 (26%), followed by the single variable with 1079 (23%). In addition, the brown race was in first place with 1627 (35%) total cases, in schooling the data without information had the highest quantity in 1638 (35%), followed by high school (Old High School) in 1172 (25%). In tumor morphology, infiltrating ductal carcinoma was significant in 3309 (71%), followed by carcinoma without other specifications (NOS) with 284 (6%), in third place malignant neoplasm in 245 (5%). Regarding topography, in the total number of cases, breast was in first place with 2779 (60%), then the upper outer quadrant of the breast in 727 (16%), in third place invasive lesion of the breast 515 (11%), while in the two municipalities Belém had higher cases 3872, compared to Ananindeua 787.

Conclusion: The data presented, as well as the epidemiological indicators of breast cancer, such as the trend of the disease, the coefficients of determination, correlation and mortality, were significant, thus elucidating a public health problem, since the epidemiological panorama in the cities of Belém and Ananindeua is increasing.

1. INTRODUCTION

Breast cancer (CA) begins from the rapid and uncontrolled division of cells affected by cell mutation. Through this disordered multiplication, tumors are formed that can move to other tissues [1]. The increased risk of breast cancer has several factors such as endocrine/reproductive history, hereditary/ genetic factors, environmental/behavioral factors, and age, and does not have a single cause [2].

Worldwide, in 2020, the estimated number of new cases of breast cancer was approximately 2.3 million, representing about 24.5% of all types of neoplasms diagnosed in women [3]. In Brazil, excluding non-melanoma skin tumors, breast cancer has the highest incidence in all regions, with an estimated 73,610 new cases for each year of the 2023-2025 triennium, which represents 41.89/100,000 women and is the leading cause of cancer death in women, representing 16.1% of all cancer deaths [4].

In the North region of the country, in the 2023 estimate, the number of new cases is 2,410/100 thousand women, with an adjusted rate of 27.3, and the State of Pará leads with an incidence of 1020/100 thousand women with an adjusted rate of 23.88. The mortality rate in the northern region in 2021 is 8.59 deaths/100 thousand women, and in 2023 the adjusted mortality rate in the State of Pará is 8.40/100 thousand women. In Belém, the incidence in 2023 was 380/100 thousand women, with an adjusted rate of 42.41, and mortality between 2000-2021 is 2288 deaths [4].

Breast cancer also affects males, being a rare event, affecting about 1% of all cases. In these cases, the diagnosis is later, compared to the female gender. Mammography and ultrasonography are some of the tests that can identify the disease, and the treatment in both

sexes is similar and depends on the type of tumor [1]. Mammography is recommended every 2 years for women aged between 50 and 69 years, as a form of screening for early identification of the disease [5].

In addition to examinations, macroscopic evaluation of the breasts is necessary to identify characteristics of the disease such as: hardened, fixed and usually painless nodule, the main manifestation of the pathology being present in more than 90% of cases, changes in the nipple, nodules in the armpits or neck, spontaneous discharge of fluid from the nipples, reddened, retracted or orange-peel-like breast skin [5].

Thus, this study aims to carry out the epidemiological profile and trend of breast cancer in the municipalities of Belém and Ananindeua, state of Pará, Amazonia.

2. MATERIALS AND METHODS

2.1 Type of Study

This is a retrospective, descriptive and analytical-quantitative ecological time series study, where data were collected from 1996 to 2017, available at the Population-Based Cancer Registry (RCBP) in Belém/Pará/Brazil.

2.2 Place of Study

The study was carried out in the municipalities of Belém and Ananindeua, the two municipalities belong to the northern region of the country, state of Pará, the municipality of Belém has a territorial area of 1,059,466 km² and a resident population of about 1,303,403 people, Ananindeua has an area of 190,581km² and a resident population of about 478,778 people [6].

2.3 Study Population

The study population consisted of all cases reported between 1996 and 2017 in the Population-Based Cancer Registry (RCBP/ Belém/Pará/Brazil) referring to breast cancer cases in the age group of 25 to 59 years.

2.4 Tabulation and Variables

To organize the raw data, perform the correlation calculation of variables and later interpret the information, Excel version 2016 was used, the data were tabulated in order to avoid errors and redundancies in the study. The variables studied were women aged between 25 and 59 years, race, education, marital status, morphology, and tumor topography.

2.5 Inclusion and Exclusion Criteria

As an inclusion criterion, cancer data such as topography, morphology, and number of casps on the temporal trend from 1996 to 2017 were included, duly recorded in the RCBP. In the exclusion, missing cases and cases with incompleteness were removed from the trend of this study.

2.6 Ethics Committee

Due to the nature of the study with retrospective and secondary data available at the RCBP, belonging to the State Department of Public Health, there was no research and manipulation with human beings, in addition, the study is supported by item III of resolution 510/2016 [7].

3. RESULTS

Regarding the sociodemographic profile, the temporal trend from 1996 to 2017 showed that the variable marital status, married were the most affected, a total of notification in 1712 and a percentage of 37%, later the cases considered as without information represented 1214 (26%), single in 1079 (23%), the other variables had a notification below 250 cases and a percentage of 5%. As for race, the cases without information were in first place in 2240 (48%), followed by the brown race in 1627 (35%), later whites with 648 (14%), black 112 (2%), yellow 28 (1%) and indigenous 4 (0%). Schooling was significantly represented, especially among the notifications without information in 1638 (35%), followed by high school (former high school) with 1172 (25%), elementary I in 594 (13%), elementary school II in 592 (13%), complete higher education 570 (12%), no schooling 67 (1%) and incomplete higher education in 26 (1%), (Table 1).

In the analysis of the total number of cases per year, the temporal trend from 1996 to 2017 was increasing, only 2000 had a decrease in 95 cases, and the other years represented an increase (Fig. 1).

Table 1. Sociodemographic profile of women reported with breast cancer in the municipalities of Belém and Ananindeua, Pará State

MARITAL STATUS		%
MARRIED	1712	37%
NO INFORMATION	1214	26%
LEGALLY SEPARATED	245	5%
SINGLE	1079	23%
CONSENSUAL UNION	229	5%
WIDOWER	180	4%
TOTAL	**4659**	**100%**
RACE		
YELLOW	28	1%
WHITE	648	14%
INDIGENOUS	4	0%
BROWN	1627	35%
BLACK	112	2%
NO INFORMATION	2240	48%
TOTAL	**4659**	**100%**
SCHOOLING		
ELEMENTARY I (1ST TO 4TH GRADE)	594	13%
ELEMENTARY II (5TH TO 8TH GRADE)	592	13%
MIDDLE SCHOOL (FORMER HIGH SCHOOL)	1172	25%
NO SCHOOLING	67	1%
NO INFORMATION	1638	35%
COMPLETE HIGHER EDUCATION	570	12%
INCOMPLETE HIGHER EDUCATION	26	1%
TOTAL	**4659**	**100%**

Source: Anjos, et al. Data from the Population-Based Cancer Registry (RCBP) of Belém/Pará/Brazil, from 1996 to 2017
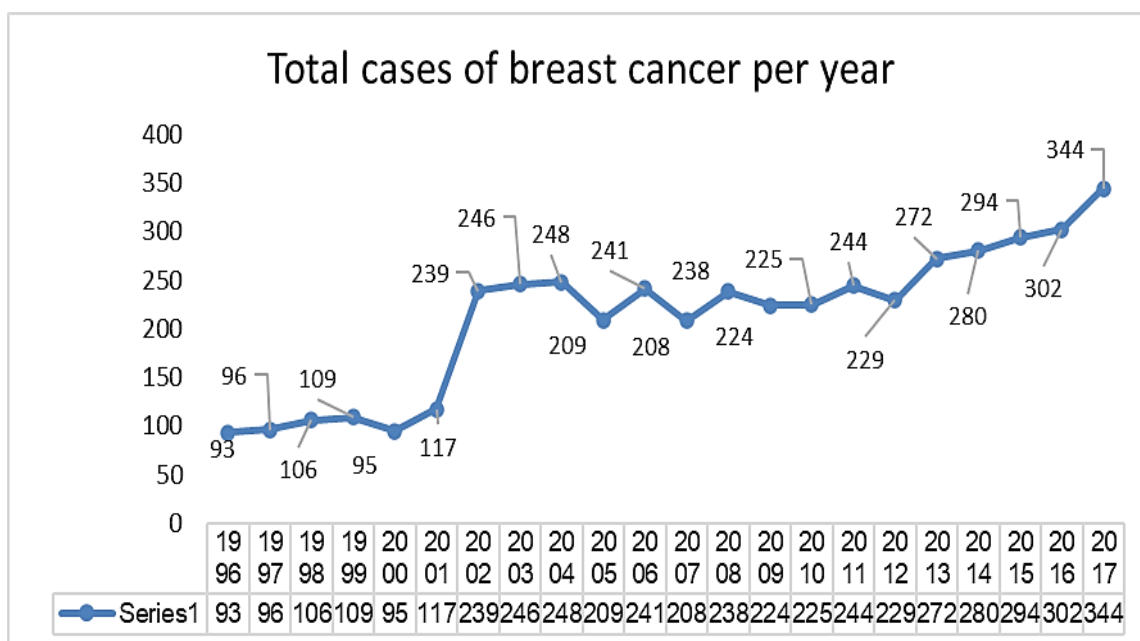**% (Percentage)*

Fig. 1. Breast cancer cases from 1996 to 2017
Source: Anjos et al. 2024

Subsequently, the most recurrent topography in the study was the breast, Not Otherwise Specified (SOE), BREAST, OOE in 2779 (60% of cases), subsequently upper outer quadrant of the breast in 727 (16%), subsequent invasive lesion of the breast in 515 (11%), upper inner quadrant of the breast in 189 (4%), lower inner quadrant of the breast representing 103 (2%), central portion of the breast in 99 (2%), external inferior quadrant of the breast with 78 (2%) and axillary prolongation of the breast 54 (1) (Table 2).

The morphology of the tumor was an important finding in the study, where infiltrating ductal carcinoma was the most recurrent in 3309 (71%), later carcinoma, SO (without other specifications) with 284 (6%), malignant neoplasm in 245 (5%), malignant neoplasm representing 183 (4%), lobular carcinoma, NOS with 177 (4%), the other morphologies had a notification below 60 cases

and a percentage ranging from 0 to 1% (Table 3).

In the temporal trend, the coefficient of determination (R2) presented 0.7955, i.e., approaching 1 and showing that the variability of the data can be explained by the model used, where values close to 1 indicate that the independent variable (Year) has a direct relationship with the dependent variable (Cancer cases), while the correlation coefficient indicates that the variables are related to each other. that is, as the temporal trend progresses, cancer cases grow along the trend (Fig. 2).

Regarding the total number of cases by age group, there was an increase in cases between 41 and 53 years of age and a reduction in the age group of 54 to 59 years, with significant notifications occurring in the age groups of 46, 48, 50, 51 and 53 (Fig. 3).

Table 2. Description of breast cancer cases according to topography in the municipalities of Belém and Ananindeua, Pará State

Topography	Total Cases	fx
INVASIVE BREAST INJURY	515	11%
MAMA, SOE	2779	60%
NIPPLE AND AREOLA	115	2%
CENTRAL PORTION OF THE BREAST	99	2%
AXILLARY BREAST EXTENSION	54	1%
LOWER OUTER QUADRANT OF THE BREAST	78	2%
INNER LOWER QUADRANT OF THE BREAST	103	2%
UPPER OUTER QUADRANT OF THE BREAST	727	16%
UPPER INNER QUADRANT OF THE BREAST	189	4%
TOTAL	4659	100%

Source: Anjos, et al. Data from the Population-Based Cancer Registry (RCBP) of Belém/Pará/Brazil, from 1996 to 2017
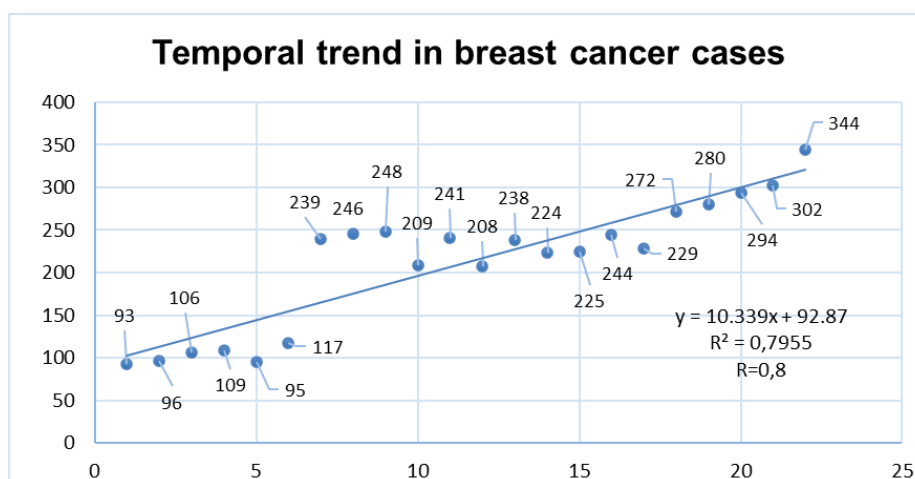**fx= Proporção*

Fig. 2. Temporal trend of breast cancer cases
Source: Anjos et al., 2024

Table 3. Description of breast cancer cases according to morphology in the municipalities of Belém and Ananindeua, Pará State

TUMOR MORPHOLOGY	Total Cases	fx
CLEAR CELL ADENOCARCINOMA, SOE	1	0%
SQUIRROUS ADENOCARCINOMA	28	1%
MUCINOUS ADENOCARCINOMA	56	1%
INVADING INTRADUCTAL PAPILLARY ADENOCARCINOMA	13	0%
TUBULAR ADENOCARCINOMA	15	0%
ADENOCARCINOMA, SOE	34	1%
INFILTRATING DUCTAL CARCINOMA MIXED WITH OTHER TYPES OF CARCINOMAS	7	0%
INFILTRATING LOBULAR CARCINOMA MIXED WITH OTHER TYPES OF CARCINOMAS	3	0%
ADENOSQUAMOUS CARCINOMA	1	0%
ADENOID CYSTIC CARCINOMA	2	0%
ANAPLASIC CARCINOMA, SOE	1	0%
CRIBYLFORM CARCINOMA	6	0%
CRIBYLFORM CARCINOMA, SOE	10	0%
ACINOUS CELL CARCINOMA	9	0%
SQUAMOUS CELL CARCINOMA, SOE	6	0%
SMALL CELL CARCINOMA, SOE	1	0%
INFILTRATING DUCTAL CARCINOMA	3309	71%
INFILTRATING AND LOBULAR DUCTAL CARCINOMA	23	0%
KERATINIZED SQUAMOUS CELL CARCINOMA, SOE	2	0%
SCUMMOCELL CARCINOMA, SOE	8	0%
FUSOCELLULAR CARCINOMA, SOE	1	0%
UNDIFFERENTIATED CARCINOMA, SOE	3	0%
INFLAMMATORY CARCINOMA	2	0%
LOBULAR CARCINOMA, SOE	177	4%
ATYPICAL MEDULLARY CARCINOMA	8	0%
MEDULLARY CARCINOMA WITH LYMPHOID STROMA	31	1%
MEDULLARY CARCINOMA, SOE	39	1%
METAPLASIC CARCINOMA, SOE	3	0%
PAPILLARY CARCINOMA, SOE	39	1%
SOLID CARCINOMA, SOE	2	0%
CARCINOMA, SOE	284	6%
CARCINOSARCOMA, SOE	3	0%
CYSTADENOCARCINOMA, SOE	1	0%
CYSTADENOCARCINOMA, SOE	1	0%
COMEDOCARCINOMA, SOE	46	1%
PAGET'S DISEASE AND INFILTRATING DUCTAL CARCINOMA OF THE BREAST	2	0%
PAGET'S DISEASE AND INTRADUCTAL CARCINOMA OF THE BREAST	8	0%
PAGET'S DISEASE MAMMARY	4	0%
PAGET'S BREAST DISEASE	3	0%
MALIGNANT HEMANGIOPERICYTOMA	1	0%
HEMANGIOSARCOMA	1	0%
MIXOID LIPOSSARCOMA	3	0%
LIPOSARCOMA, SOE	1	0%
MALIGNANT NEOPLASM	245	5%
MALIGNANT NEOPLASM	183	4%
NEUROFIBROSARCOMA	1	0%
FUSOCELLULAR SARCOMA	2	0%
SARCOMA, SOE	3	0%
MALIGNANT FILODES TUMOR	25	1%
MALIGNANT GIANT CELL TUMOR	2	0%
TOTAL	4659	100%

Source: Angels, et al. Data from the Population-Based Cancer Registry (RCBP) of Belém/Pará/Brazil, from 1996 to 2017
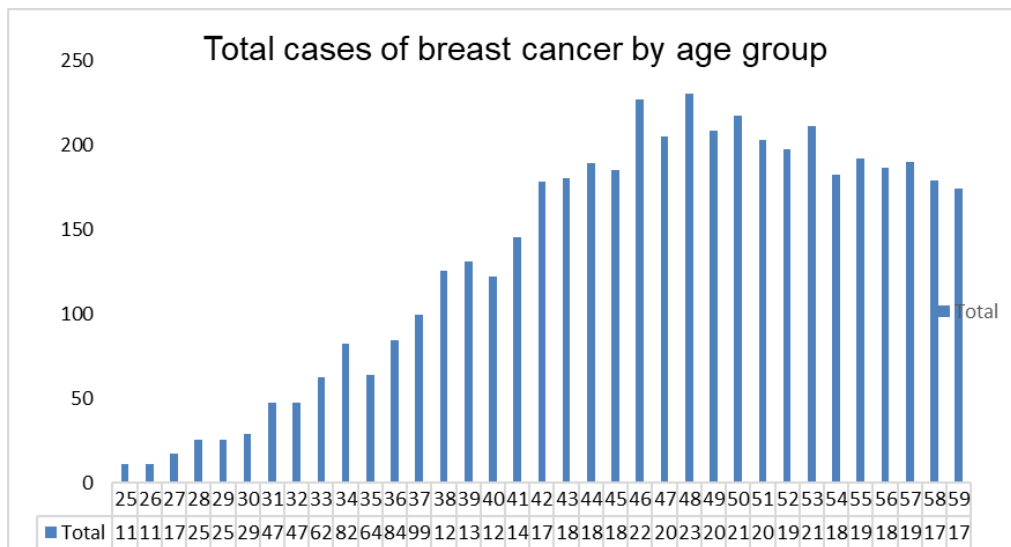**SOE= No other specs*

Fig. 3. Cancer cases by age group
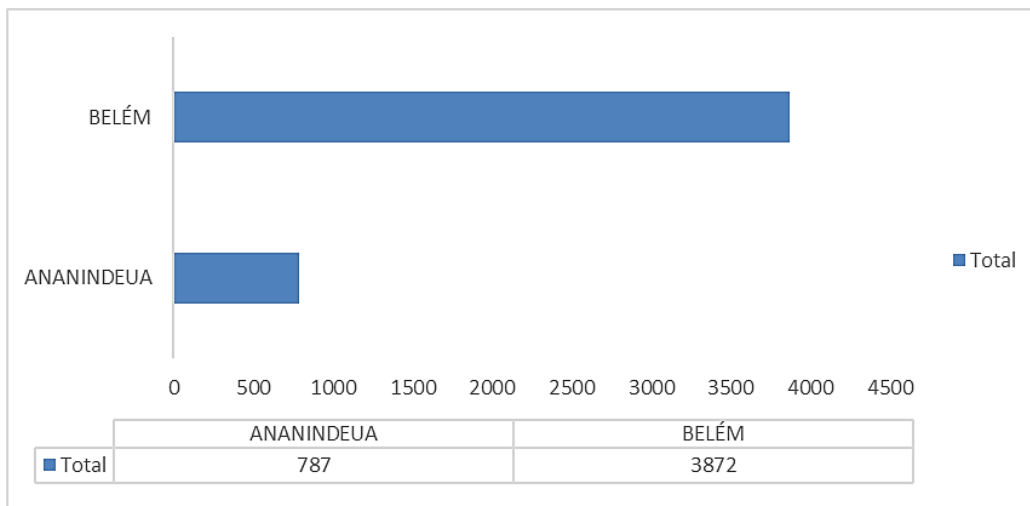*Source: Anjos et al., 2024*

Fig. 4. Total number of cases in the municipalities of Belém and Ananindeua
Source: *Anjos et al., 2024*

In the study, the municipality of Belém presented the highest notifications due to this temporal and epidemiological trend, with 3872 cases, referring to the second largest municipality in the state of Pará, Ananindeua, with 787 notifications (Fig. 4).

4. DISCUSSION

After analyzing the data, there was an increase in cases from 41 years of age, with a predominance of women aged between 46 and 53 years. Thus, it is compatible with the study by Mascarenhas, Liber and Pereira, in which the average age of cases in Pará was around 50 years, since 80% of diagnoses occur in this age group, and this progressive increase from 40 years onwards is linked to screening mammography, performed as a routine [8].

Regarding marital status, in the study, married people were most affected with 1712 notifications (37%), followed by cases considered as having no information with 1214 (26%), single people with 1079 (23%) and the other variables with results lower than 5%. This result corroborates a study conducted with women who underwent surgery for breast cancer in Rio de Janeiro, where it was found that 43.4% were married and/or in a stable union. Marital status is not considered a factor of vulnerability to cancer

disease, but having a partner is related to better optimism, social support, and quality of life for women [9].

Regarding the race variable, in the present study, the majority of cases considered as lacking information totaled 2240 (48%), followed by brown race with 1627 (35%), whites with 648 (14%), black with 112 (2%), and other variables smaller than 1%. The causes responsible for the development of breast CA are still undetermined, but several factors may be involved, such as genetic ones, so the inclusion of the race variable is important for the delineation of the disease [10].

The data of this study differ from the study by Oliveira et al, which traces the profile of women with breast CA treated with chemotherapy in Minas Gerais (MG), in which the white race had a predominance (69.74%), followed by the brown race (20.51%), this may be related to the region in which the research was developed, and it is expected that in MG the majority of women consider themselves White, while in the North/Northeast region they are considered brown [11].

Regarding the schooling variable, those with no information are also the majority with 1638 (35%), followed by high school with 1172 (25%), elementary school I and II with respectively 594 (13%) and 592 (13%), adding up to 26% and other variables smaller than 12%. This data corroborates the study by Santos et al, which analyzed the profile of women with breast WC in Paraná, in which the majority 27.4% had schooling up to high school [12].

Among the most important social determinants are socioeconomic factors, such as unemployment, poverty, income inequality, and lack of education [8]. The data of the present study are reinforced by the study by Cavalcante, Batista and Assis, carried out in Paraíba, in which 22.3% of the women had incomplete elementary education, and it can be inferred that women with a lower level of education and low purchasing power may be more vulnerable to illness [10].

A few years ago, oncologists stated that topographic identification alone was not enough to develop a treatment plan and/or research on cancer. Incidence and survival rates vary according to the histological type of the tumor. Thus, the World Health Organization (WHO) decided to adapt a version of the International

Classification of Diseases (ICD) to the International Classification of Diseases for Oncology (ICD-O), enabling the coding of tumor topography and morphology [13].

A finding that draws attention in the study concerns the topography of the tumor, which, as in the study by Pessoa et al, most cases correspond to the mammary gland, without other specifications (NOS), which demonstrates a failure in the reliable recording of information and the need for greater interest in the description of cases [14].

Infiltrating ductal carcinoma is the most common histological type, comprising between 80 and 90% of all cases [15]. As well as this study, other studies corroborate the MS, which evidences the presence of invasive ductal carcinoma in one of the breasts in more than 80% of cases [16,17-18].

According to data from the Brazilian Institute of Geography and Statistics (IBGE), Belém and Ananindeua have a total of about 1,782,181 inhabitants, being the two most populous municipalities in the state [6]. Both are part of Metropolitan Region I, according to the regional health division, established for the purpose of planning health actions, reducing geographical barriers through the decentralization of services, thus facilitating the population's access to health services [19].

Although there is a division of health regions, the search for more specialized health services is done in the capital or nearby municipalities, such as Ananindeua. It is known that in the North region the number of mammography machines is 1 for every 100,000 inhabitants, so early diagnosis is unfeasible in the most remote regions, causing displacement to the municipalities of the metropolitan region of Belém. In addition, the lack of professionals in the interior results in the inoperativeness of the services, resulting in the delay of care and referral to the central municipalities, where the specialty centers that can provide care and diagnosis are concentrated [20].

Users who cannot get care at their home start to live temporarily in large centers due to the time they wait to diagnose or treat, if necessary, time related to the long waiting list due to the high demands that specialized centers have. Thus, it is possible to point out the erroneous notification associated with the place of residence as a possible failure in the records of cancer cases,

since the users end up informing the place of temporary residence instead of the place of origin [20].

Also related to the high rates of breast cancer cases in Belém and Ananindeua, access to care and diagnostic services that are concentrated in large centers facilitates the tracking and identification of cases, contributing to the notification and feeding of information systems. Studies by Godoy indicate that Belém and Ananindeua have the highest concentration of health services in the state, being the first and second municipalities, respectively, that have the most primary care services up to high complexity, both public and private [21]

5. CONCLUSION

In the study, the municipality of Belém had the highest notifications as well as the highest trend of cases, compared to Ananindeua. Through this study, it was possible to understand the importance of knowledge about breast cancer, which variables are most affected and which types of lesions are more frequent in these municipalities.

Another point was the descriptions of the determinants and conditioning factors in health that are directly linked to the biopsychosocial factors of the clients, another important factor is the continuous and permanent education in health, in addition to consultations and prevention in health are essential pillars for health promotion, prevention and quality, as well as early treatment. Thus, the study sought to carry out a survey of the public health situation in the municipalities of Belém and Ananindeua, but also to show the epidemiological indicators of cancer.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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