









Epidemiology of breast cancer in a tertiary oncology hospital in the countryside of Minas Gerais

Luiz Carlos Navarro de Oliveira¹ , Sebastião Maurício de Oliveira Castro^{2,3} ,
Carla Simone Moreira de Freitas⁴ , Rita de Cássia de Jesus Duarte Silva² , Flávio Ferraz Vieira² ,
Rodrigo Bastos Tostes⁵ , Bruno Licy Gomes de Mello⁶ , René Aloisio da Costa Vieira^{1,7,8*} 

ABSTRACT

Objective: In Brazil, the characteristics of breast cancer patients who arrive at cancer treatment services are influenced by conditions related to the tumor, to the diagnostic system and navigation in the phase prior to care, with regional differences being little known as well as their seasonal variation. **Methods:** This is a retrospective study of epidemiological data of patients with breast cancer treated at the Hospital do Câncer de Muriaé (HCM), an exclusively oncology hospital (CACON II), with primarily public care, a reference for cancer treatment in the east of Zona da Mata region, Minas Gerais. Clinical and care-related characteristics were evaluated from 2010 to 2021. **Results:** During this period, 4,573 new patients were treated. The care was primarily public (80.5%) and most patients were undiagnosed (45.7%) or untreated (71.8%) at the first visit. The patients were between 40 and 69 years old (70.2%) and a significant portion were between 70 and 74 years old (7.4%). The rate of early stage (clinical stage – CS 0 + I) represented only 33.9 and 25.8% of all patients and those treated exclusively in the hospital, respectively. There was no change in clinical stage and age group over the years. **Conclusion:** When evaluating epidemiological data, the characteristics of the service and the pre-institutional diagnostic care network should be analyzed, facts that influence the results. Throughout the period, there was no great variation in relation to age group and staging. In this region, the early stage of breast cancer has unsatisfactory rates, and the 70 to 74 age group should be considered in mammographic screening. Epidemiological studies are essential to improve health strategies.

KEYWORDS: breast neoplasms; epidemiology; trends.

INTRODUCTION

Breast cancer is the main type of neoplasm in women in the world^{1,2}. In developed countries, there is a high incidence and relative mortality, which is contrary to what occurs in developing countries, where it is possible to observe a lower incidence, but a higher mortality, which is influenced by the stage of diagnosis and treatment^{2,3}.

Breast cancer screening is associated with a decrease in mortality⁴, due to the increase in the number of patients in the early stage, which reflects better survival⁵. In addition, the increase in the Human Development Index (HDI) has repercussions on the increase in patients with the initial clinical stage⁶.

The early stage is sensitive to technology, thus requiring mammography, biopsy, and diagnostic flow. In Europe, mammography screening is a reality, and mammography is performed on a large scale in asymptomatic patients. Based on this concept, EUSOMA (European Society of Breast Cancer Specialists) created quality criteria for screening in Breast Units⁷, but for places where mammographic screening is not a reality, mainly in developing countries, such as Brazil, services are focused on the demand for treatment, with few organized experiences^{8,9}. To assess the quality of patients who arrive at the services, indirect indicators can be used, with the clinical stage being easily assessed in Brazil⁶.

¹Hospital de Câncer de Muriaé, Mastology Division, Department of Oncological Surgery – Muriaé (MG), Brazil.

²Hospital do Câncer de Muriaé, Hospital Cancer Registry – Muriaé (MG), Brazil.

³Hospital do Câncer de Muriaé, Head and Neck Division, Department of Oncological Surgery – Muriaé (MG), Brazil.

⁴Hospital do Câncer de Muriaé, Department of Clinical Oncology – Muriaé (MG), Brazil.

⁵Hospital do Câncer de Muriaé, Department of Radiotherapy – Muriaé (MG), Brazil.

⁶Hospital do Câncer de Muriaé, Infectious Diseases Division, Department of Medical Clinics – Muriaé (MG), Brazil.

⁷Universidade Estadual Paulista, Faculdade de Medicina de Botucatu, Graduate Program in Obstetrics and Gynecology – Botucatu (SP), Brazil.

⁸Fundação Pio XII, Hospital do Câncer de Barretos, Graduate Program in Oncology – Barreto (SP), Brazil.

*Corresponding author: reneacv@gmail.com

Conflict of interests: nothing to declare.

Received on: 09/30/2023. Accepted on: 04/09/2024.

With a better understanding of breast cancer, it can be evaluated through molecular subtypes, a fact that influences treatment and is associated with age, diagnosis, ethnicity/skin color, and ancestry^{10,11}.

Hospital Cancer Registries are valuable sources for the evaluation of regional characteristics, age at diagnosis, clinical stage at diagnosis, treatment, and actuarial survival. In breast cancer, these data reflect on the quality of the healthcare service prior to the hospital unit. Unfortunately, few services have their data published¹²⁻¹⁴; these data allow to assess the quality of the public healthcare service prior to hospital admission.

The Hospital do Câncer de Muriaé (Muriaé Cancer Hospital – HCM) is an oncology hospital that preferably serves patients from the public health system, being a High Reference Center in Oncology (*Centro de Alta Complexidade em Oncologia* [Oncology Center of High Complexity] – CACON II),¹⁵ located in Zona da Mata, in the countryside of Minas Gerais. It started its hospital activities in 2002 and the Hospital Cancer Registry (*Registro Hospitalar de Câncer* – RHC) only in 2010. There are no reports of epidemiological evaluation of breast cancer in this region, justifying an epidemiological study on this disease.

METHODS

This is an observational, retrospective study of data from the HCM's RHC from 2010 to 2021. The hospital is a public institution managed by the Fundação Cristiano Varela (Cristiano Varela Foundation), with primarily public care (85%), covering about 200 cities, with an estimated population of 3.1 million inhabitants. There is no other hospital or tertiary service in Oncology in this region of Minas Gerais.

The RHC data are public and can be accessed on the hospital's website ([https://www.fcv.org.br/site/Hospital/Registro Hospitalar de Câncer](https://www.fcv.org.br/site/Hospital/RegistroHospitalar%20de%20Cancer)), a fact that disregards the need for evaluation by a Research Ethics Committee, due to Resolution No. 466/2012. In addition, institutionally, the RHC authorized the analysis of the data. As the data change over time, the last evaluation, carried out on May 22, 2023, was used as a reference.

The authors sought to evaluate data exclusively related to breast cancer, in view of epidemiological characteristics and temporal variations related to clinical stage and age. In the evaluation of the clinical stage, the patients were classified as early stage (clinical stage – CS 0 and I), advanced stage (CS II and III), and metastatic stage (CS IV). The age group was divided into: under 40 years, 40–74 years, and over 74 years.

Figures were created by IBM SPSS for Mac version 22.0 (Figure 1) and Excel for Mac version 16 (Figure 2 and 3). Decimal numbers were automatic separated automatic in comma and not point.

RESULTS

We observed an increasing rise in the number of patients, potentially associated with the increase in the number of referenced cities. The care was primarily public (80.5%), patients from cities in Minas Gerais (94.3%); most patients were undiagnosed (45.7%) or untreated (71.8%) at the first visit, had a low level of education (62.8% up to elementary school), and were married (55.2%) (Table 1).

The patients were generally brown (47.7%), aged 40–69 years (70.2%) (Figure 1), and native of Minas Gerais (81.1%). Attention should be given to the 70–74 years age group because there are controversies regarding screening, representing 7.4% of tumors (Table 2).

The main histological type identified was invasive ductal carcinoma (80.1%), followed by invasive lobular carcinoma (7.9%). Carcinoma *in situ* was present in 6.0% of the patients; only 33.9% had an early clinical stage (CS 0 + I). When evaluating only the cases initially treated at the hospital, 5.4% of the patients had CS 0, and 25.8% had an early stage (Table 2).

In addition, we evaluated the main characteristics of the patients treated by the Brazilian Unified Health System (SUS) in relation to the private system (Table 3): most of the patients without a diagnosis were from the SUS (47.2%), while in the private system, most patients already had a previous diagnosis ($p < 0.001$). The clinical stage was also influenced by the type of care: patients with early stage (0 + I) came mainly from the private system (31.1% *versus* 26.2%; $p < 0.001$). The patient's age was not influenced by the care system.

With the temporal evaluation, we observed, over the years, the maintenance of the age group at diagnosis and the clinical stage, and a small increase in the number of patients with clinical stage IV in the years of the new coronavirus (Covid-19) pandemic (Figures 2 and 3).

DISCUSSION

The literature is limited with regard to epidemiological data on breast cancer-related RHC. There are experiences of cancer hospitals¹², oncology units^{14,16}, Specialty Reference Centers^{17,18}, and the Regional League¹⁹. When evaluating epidemiological data related to breast cancer, derived from hospitals or reference services, the regional characteristics, the referral flow, the existence of other services in the region, and the characteristics of the accreditation of the oncology unit should be analyzed, a fact that may impact the presented results. The HCM serves a region referenced in the east of Zona da Mata where there is no other Oncology unit, public or private, constituting itself as a regional reference for cancer treatment. It is established as a CACON II Hospital¹⁵, as it contains all types of treatment related to cancer care, from diagnosis to palliative care, with a high rate of resolution.

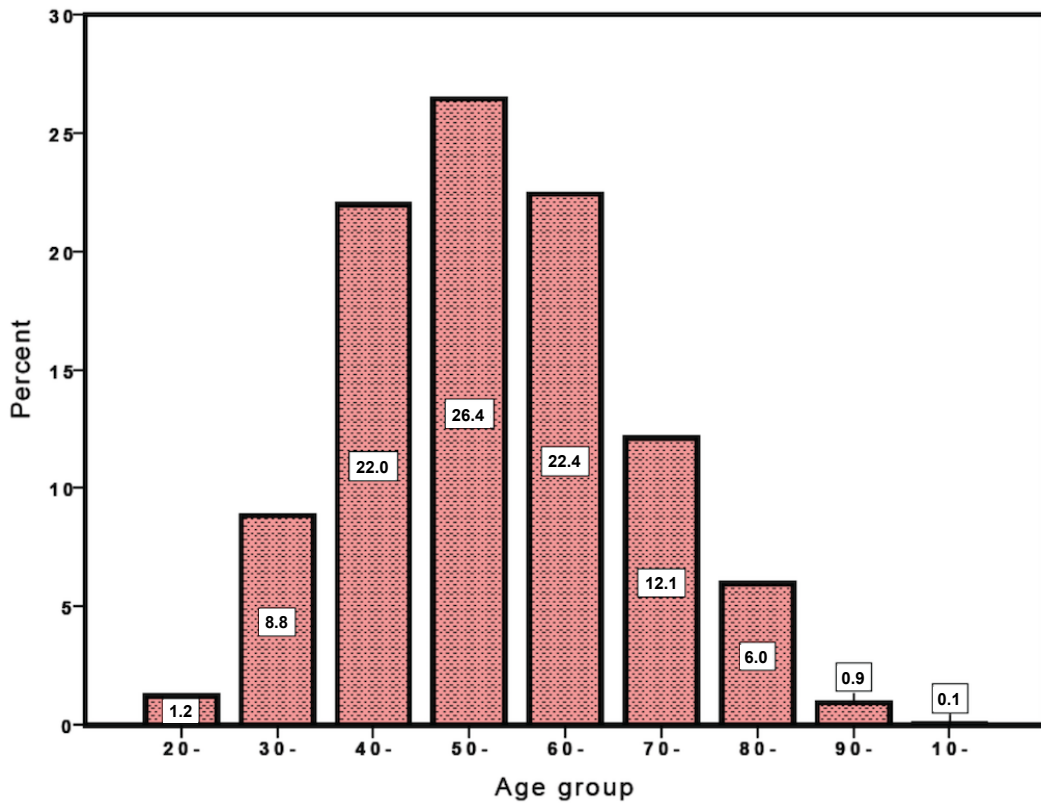
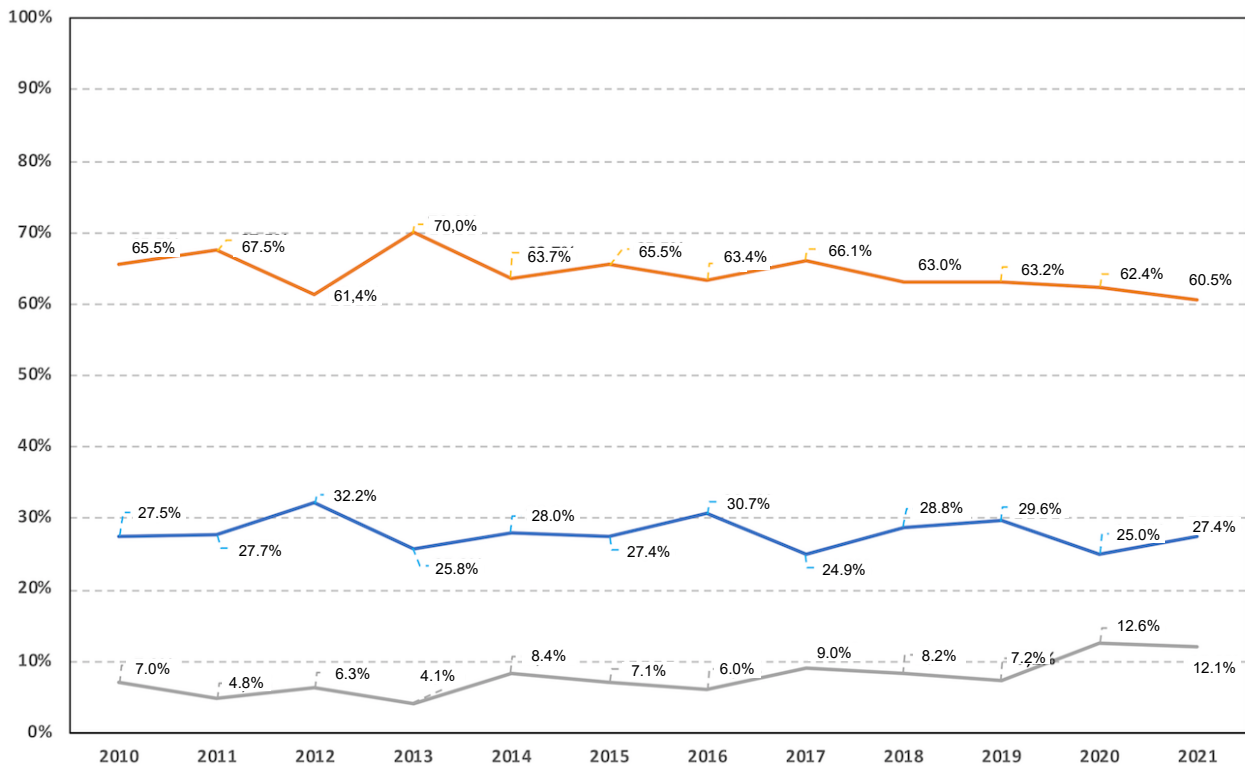


Figure 1. Age distribution.



CS: clinical stage; Early: CS 0 and I; Advanced: CS II and III; Metastatic: CS IV.

Figure 2. Time curve from the clinical stage (%) to diagnosis.

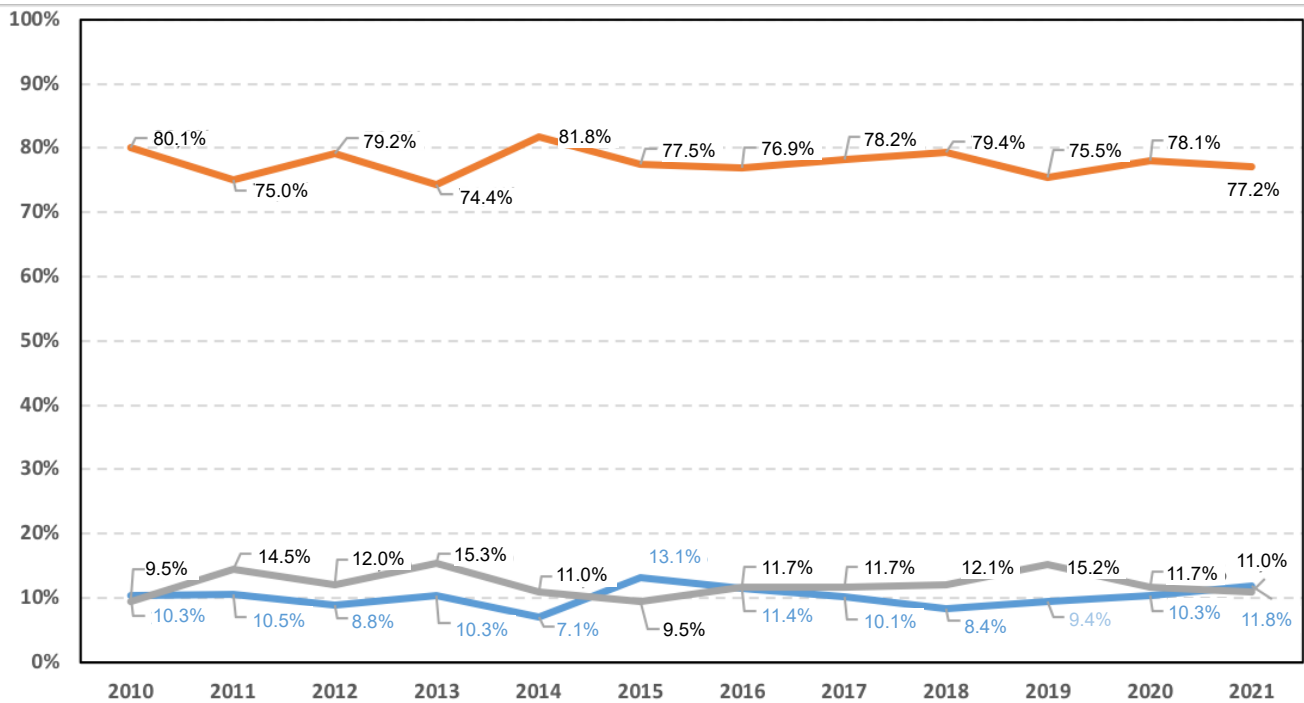


Figure 3. Time curve of the distribution of the age group at diagnosis

We observed an increasing rise in the number of patients, a fact that reflects the efficiency and organization of the cancer treatment network. Historically, the hospital served patients from other nearby states, a fact that has changed over time — currently, care is exclusive to patients from the state of Minas Gerais. As for breast cancer, since 2010 there has been an increase in the annual rate, which ranged from 259 women in the first triennium to 492 women in the last triennium. The HCM is a public hospital, privately managed, preferably serving SUS patients (80.5%), and private care is limited (13.1%).

With regard to breast cancer, the main access for patients is through the Mastology Division and Clinical Oncology sectors. Initially, Mastology was served together with Oncological Surgery, a fact that was modified due to the growth and the need for a team dedicated to this specialty. The inclusion of patients in the Mastology Division occurs due to the high suspicion lesions or confirmation of neoplastic disease, and patients with BI-RADS 4 and 5 lesions or confirmed breast neoplasms are evaluated. Due to limitations in the regional health system, many suspected cases are diagnosed at the hospital level. The structuring and resolution of the regional healthcare system have an impact on the type of referred patient, and there is also a high rate of patients who need complementary diagnostic evaluation and diagnostic breast biopsy. When assessing breast cancer, 45.7% of the patients were diagnosed at the institution, 26.1% arrived with a diagnosis and without treatment, and 27.4% had already undergone some type of oncological treatment.

Assessing patients' age characteristics is essential to understand potential changes related to risk factors as well as screening strategies. The Brazilian Ministry of Health suggests that screening should

be carried out in the age group of 50 to 69 years, which would benefit 49.2% of patients. The Brazilian Society of Mastology (*Sociedade Brasileira de Mastologia* – SBM), in turn, suggests starting it at 40 years of age, which would benefit 70.2% of patients. The age group of 70–74 years represents about 7.4% of patients. When evaluating the Brazilian population pyramid, there is a gradual decrease in the number of patients according to age group, and a significant number of patients in the age group of 70–74 years was observed, a fact that should be taken into account, especially in relation to those with high life expectancy, as suggested by the SBM.

Comparing the age groups, we observed no changes in the analyzed period, nor any differences in age group and clinical stage in patients from the public or private systems. Another factor that can influence the age group is the hospital characteristic. Private hospitals, which depend on health insurance plans, may have a younger population with higher income, which is associated with the availability of resources to maintain the health insurance — this fact must be better evaluated. The rate of patients under 50 years of age was 40% in a private hospital in the city of São Paulo¹² and 31.2% in the study's hospital.

The quality and care in staging is reflected in the quality of the RHC data. In this sample, 8% of data were ignored, and levels lower than 10% were acceptable. Another important finding is the rate of patients with stage IV, which is usually less than 10% — higher rates reflect serious limitations in the healthcare system. As it is an oncology hospital, 7.4% of the patients were diagnosed at this stage, a result influenced by the characteristics of the service, similar to that observed in oncology hospitals^{12,13} and oncology units^{14,16} (5.3% to

Table 1. General information on breast cancer patients treated at the Hospital do Câncer do Muriaé (MG).

Variable	Category	Number	%
Year of diagnosis	2010 to 2012	777	17.0
	2013 to 2015	1,023	22.4
	2016 to 2018	1,295	28.3
	2019 to 2021	1,478	32.3
Location	Minas Gerais	4,315	94.3
	Rio de Janeiro	246	5.4
	Espírito Santo	12	0.3
Type of service	Brazilian Unified Health System	3,682	80.5
	Health insurance	576	12.6
	Private	70	1.5
	Other	245	5.4
Clinic – admission*	Mastology	1,772	38.7
	Clinical oncology	1,578	34.5
	Radiotherapy	487	10.6
	Surgical oncology	480	10.5
	Other	14	0.4
Place of origin – birthplace	Southeast – Minas Gerais	3,708	81.1
	Southeast – other states	777	17.0
	Northeast	59	1.3
	South	18	0.4
	North	7	0.2
	Midwest	4	0.1
Level of education	Absent	345	7.5
	Some elementary school	2,031	44.4
	Elementary school	499	10.9
	High school	901	19.7
	College degree	606	13.3
	No information	191	4.2
Marital status	Single	1,017	22.2
	Married	2,524	55.2
	Common-law marriage	25	0.5
	Divorced	436	9.5
	Widow(er)	571	12.5
Total	–	4,573	100.0

*Patients initially treated at another institution were excluded from this study.

8.0%), and lower than that observed in regional outpatient reference centers^{17,18}. In a national study whose authors evaluated only invasive tumors, the national rate was 9.3%²⁰. At the HCM, during the Covid-19 pandemic, there was an increase in the number of patients with stage IV, reaching 12.1%, a fact potentially influenced by serious limitations in patient navigation at the care level prior to hospitalization²¹.

Another factor associated with the quality of services is the rate of patients with early stages (CS 0 + I): 25.8%. Stage zero corresponds to carcinoma *in situ*, usually diagnosed by mammographic screening, evidencing the impact of this test as a diagnostic tool for breast cancer. In a place with organized screening, in a small city of the State of São Paulo, Brazil, three phases were observed: prior to screening (CS 0 + I = 13%); in the

Table 2. Data related to presentation at hospital admission.

Variable	Category	Number	%
Sex	Women	4,551	99.5
	Men	22	0.5
Ethnicity/skin color	Brown	2,183	47.7
	White	1,841	40.3
	Black	526	11.5
	Asian	4	0.1
	Ignored	19	0.4
Age group (years)	<40	466	10.2
	40–49	962	21.0
	50–59	1,227	26.8
	60–69	1,023	22.4
	70–74	339	7.4
	≥75	556	12.2
Diagnosis	ND, NT	2,091	45.7
	WD, WT	1,192	26.1
	WD, WT	1,254	27.4
	Other	36	0.8
Histological type	IDC	3,662	80.1
	ILC	359	7.9
	DCIS	213	4.7
	Other	339	7.3
CS–TNM*	CS 0	251	6.0
	CS I	921	27.9
	CS II	1,625	38.6
	CS III	1,066	25.3
	CS IV	343	8.2
CS–TNM†	CS 0	168	5.4
	CS I	639	20.4
	CS II	1,245	39.7
	CS III	854	27.2
	CS IV	231	7.4

ND: no diagnosis; NT: no treatment; WD: with diagnosis; WT: with treatment; IDC: invasive ductal carcinoma; ILC: invasive lobular carcinoma; DCIS: ductal carcinoma in situ; CS: clinical stage. *Ignored data were excluded (n=367; 8%); †Ignored data and data on patients with previous treatment were excluded.

first two years of mammographic screening (43.3%); and after consolidation of screening (60%), in which asymptomatic patients had better rates of early stage (84.3% *versus* 31.9%)^{22,23}. At an oncology hospital in Curitiba (state of Paraná, Brazil)¹³, from 2000 to 2009, this rate was 14.3%, but the rate of incomplete data was 16.9% and the study did not present numerical data, making it difficult to evaluate absolute data. In a private oncology hospital in the state of São Paulo¹², this rate was 46.7%. If the numbers were evaluated by the HDI, we would have, in descending order: Curitiba/State of Paraná (HDI = 0.823) > São Paulo/State of São Paulo (HDI = 0.805)

> Barretos/State of São Paulo (HDI = 0.798) > Muriaé/State of Minas Gerais (HDI = 0.734). It is observed that the HDI is important, but it is also relevant how it actually reaches the SUS population, through health initiatives. Different results are observed depending on the presence and structure of the screening program, location, type of population served, and hospital characteristics. By comparing the numbers, we can observe the need to improve the regional public health system, the importance of organized mammography screening, and the need for improvements in the navigation of patients in the diagnosis of breast cancer in the SUS.

Table 3. Patient characteristics in relation to patient type*.

		SUS (%)	Private (%)	Total (%)	p-value
Type of Diagnosis	ND–NT	1,335 (79.0)	355 (21.0)	1,690 (42.9)	<0.001
	WD–WT	745 (71.5)	300 (28.5)	1,052 (26.7)	
	WD–WT	728 (61.1)	445 (37.9)	1,173 (29.8)	
	Other	11 (44.4)	14 (56.0)	25 (0.6)	
Age group (years)	<40	270 (68.0)	127 (32.0)	397 (10.1)	0.419
	40–49	603 (72.1)	233 (27.9)	836 (21.2)	
	50–59	758 (71.6)	300 (28.4)	1,058 (26.9)	
	60–69	644 (73.7)	230 (26.3)	874 (22.2)	
	70–74	215 (72.4)	82 (27.6)	297 (7.5)	
	≥75	336 (70.3)	142 (29.7)	478 (12.1)	
Clinical stage	CS 0	158 (74.5)	54 (25.5)	212 (5.8)	0.001
	CS I	532 (67.1)	261 (32.9)	793 (21.8)	
	CS II	1,013 (72.4)	386 (27.6)	1,399 (38.4)	
	CS III	717 (76.4)	221 (23.6)	938 (25.7)	
	CS IV	213 (70.3)	90 (29.7)	303 (8.3)	
Total		2,633 (72.2)	1,012 (27.8)	3,645 (100)	

SUS: Brazilian Unified Health System; ND: no diagnosis; NT: no treatment; WD: with diagnosis; WT: with treatment. *Patients whose origin is ignored were excluded from this study.

Authors of the Amazona III Study²⁴ evaluated patients with stages I to IV, coming from public and private services. When comparing the public and private systems, differences were observed in stages I, II, and IV: there was a higher rate of patients with stage I in the private service (40.6% *versus* 18.5%), and the diagnosis in this sector was mainly made by screening (53.0% *versus* 23.1%); there were no differences in relation to age group.

HCM has mixed characteristics, with partial private care. Patients from the private system generally arrived at the hospital with a confirmed diagnosis and/or previous treatment, with a higher rate of early clinical stage (31.1% *versus* 26.2%, compared to rates of patients treated by the SUS). This fact corroborates previous studies whose authors compared the public and private systems, but these numbers are lower than the rate of 46.7% observed in a private cancer hospital in São Paulo, which makes us ponder that other local cultural factors and adherence to mammography may influence the observed results. Another analyzed factor was age, which was not influenced by the preferred type of care at the hospital unit, in which there is a high rate of patients with health insurance from the Civil Servants of Minas Gerais.

Recently, there have been experiments showing associated numbers of hospital records²⁵, represented by newsletters; however, such data, usually raw, need to be better analyzed and contextualized. Likewise, the results should be compared over

time in order to assess seasonal changes, such as the COVID-19 pandemic, or those associated with the structuring of the health system.

Thus, the main characteristics of our service were presented, with the limitations of the use of raw data, the lack of evaluation of molecular subtypes and survival, which can be presented in future studies.

CONCLUSIONS

When observing patients treated in the Zona da Mata, in the countryside of Minas Gerais, in a tertiary oncology hospital, there are also limitations associated with diagnosis in the public service; the hospital still provides secondary care, due to the high number of cases still diagnosed at the institutional level.

AUTHORS' CONTRIBUTION

LCNO: Data curation, Formal Analysis, Visualization, Writing – original draft, Writing – review & editing. SMOC: Data curation, Visualization, Writing – original draft, Writing – review & editing. CSMF: Data curation, Visualization, Writing – original draft, Writing – review & editing. RCJDS: Data curation, Visualization, Writing – original draft, Writing – review & editing. FFV: Formal analysis, Visualization, Writing – original draft, Writing – review & editing.

RBT: Data curation, Visualization, Writing – original draft, Writing – review & editing. BLGM: Visualization, Writing – original draft, Writing – review & editing. RACV: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing.

REFERENCES

- Allemani C, Matsuda T, Di Carlo V, Harewood R, Matz M, Nikšić M, et al. Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries. *Lancet*. 2018;391(10125):1023-75. [https://doi.org/10.1016/S0140-6736\(17\)33326-3](https://doi.org/10.1016/S0140-6736(17)33326-3)
- Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2021;71(3):209-49. <https://doi.org/10.3322/caac.21660>
- Berry DA, Cronin KA, Plevritis SK, Fryback DG, Clarke L, Zelen M, et al. Effect of screening and adjuvant therapy on mortality from breast cancer. *N Engl J Med*. 2005;353(17):1784-92. <https://doi.org/10.1056/NEJMoa050518>
- Gøtzsche PC, Jørgensen KJ. Screening for breast cancer with mammography. *Cochrane Database Syst Rev*. 2013;2013(6):CD001877. <https://doi.org/10.1002/14651858.CD001877.pub5>
- Vieira RA, Uemura G, Zucca-Matthes G, Costa AM, Micheli RA, Oliveira CZ. Evaluating breast cancer health system between countries: the use of USA/SEER and Brazilian women as a cohort sample. *Breast J*. 2015;21(3):322-3. <https://doi.org/10.1111/tbj.12410>
- da Costa Vieira RA, Biller G, Uemura G, Ruiz CA, Curado MP. Breast cancer screening in developing countries. *Clinics (Sao Paulo)*. 2017;72(4):244-53. [https://doi.org/10.6061/clinics/2017\(04\)09](https://doi.org/10.6061/clinics/2017(04)09)
- Perry N, Broeders M, de Wolf C, Tornberg S, Holland R, von Karsa L. European guidelines for quality assurance in breast cancer screening and diagnosis. Fourth edition--summary document. *Ann Oncol*. 2008;19(4):614-22. <https://doi.org/10.1093/annonc/mdm481>
- Vieira RAC, Formenton A, Bertolini SR. Breast cancer screening in Brazil. Barriers related to the health system. *Rev Assoc Med Bras (1992)*. 2017;63(5):466-74. <https://doi.org/10.1590/1806-9282.63.05.466>
- Tsunoda AT, Nunes JS, Watanabe APHU, Santos-Junior LA, Maudad EC, Brentani RR. Controle de qualidade em rastreamento mamográfico no Brasil: experiência do Hospital de Câncer de Barretos. *Rev Bras Mastologia*. 2013;23(1):12-8.
- Carvalho FM, Bacchi LM, Pincerato KM, Van de Rijn M, Bacchi CE. Geographic differences in the distribution of molecular subtypes of breast cancer in Brazil. *BMC Women's Health*. 2014;14:102. <https://doi.org/10.1186/1472-6874-14-102>
- da Costa Vieira RA, Sant'Anna D, Laus AC, Bacchi CE, Silva RJC, Oliveira-Junior I, et al. Genetic Ancestry of 1127 Brazilian Breast Cancer Patients and its correlation with molecular subtype and Geographic Region. *Clin Breast Cancer*. 2023;23(5):527-37. <https://doi.org/10.1016/j.clbc.2023.04.001>
- Makdissi FB, Leite FPM, Peres SV, Silva DRM, Oliveira MM, Lopez RVM, et al. Breast cancer survival in a Brazilian Cancer Center: a cohort study of 5,095 patients. *Mastology*. 2019;29(1):37-46. <https://doi.org/10.29289/2594539420190000437>
- Medeiros JM, Linhares JC, Hatschbach SBB, Hubie DP, Rahman AS, Orlandi D, et al. Perfil epidemiológico e estudo de sobrevida dos pacientes com câncer de mama atendidos no Hospital Erasto Gaertner em Curitiba, PR. *Rev Bras Mastologia*. 2016;26(3):107-12. <https://doi.org/10.5327/Z201600030005RBM>
- Laila HJEA, Zenkner JRG, Araujo MC, Becker JDL, Pereira AD. Characterization of prognostic factors of breast cancer among women with this condition attended by the Brazilian Unified Health System in the municipality of Bagé, Rio Grande do Sul, Brazil. *Mastology*. 2019;2(29):64-70. <https://doi.org/10.29289/2594539420190000438>
- Brasil. Ministério da Saúde. Gabinete do Ministro. Portaria no 3.535 de 2 de setembro de 1998. Estabelece critérios para cadastramento de centros de atendimento em oncologia. Brasília: Ministério da Saúde; 1998 [cited on 2023 Sept 30]. Available from: https://bvsmms.saude.gov.br/bvs/saudelegis/gm/1998/prt3535_02_09_1998_revog.html
- Nunes BAP, Siqueira SL, Pereira SM, Pacheco TJ, Pessanha TO, Mendonça SB. Perfil epidemiológico dos pacientes diagnosticados com câncer de mama em Campos dos Goytacazes (RJ), Brazil. *Rev Bras Mastologia*. 2012;22(4):117-23.
- Haddad CF, Reias CM, Paiva ACO, Pereira AO, Leal PH, Reis SMC, et al. Evaluation of clinical, pathological and epidemiological profile of patients with breast cancer in the microregion of Lavras – MG. *Mastology*. 2023;33:e20220037. <https://doi.org/10.29289/2594539420220037>
- Haddad CF. Características clínico-patológicas e estadiamento ao diagnóstico de pacientes com câncer de mama em um centro de saúde do interior de Minas Gerais. *Rev Bras Mastologia*. 2014;24(4):103-8. <https://doi.org/10.5327/Z201400040003RBM>
- Barboza RS, Ferreira JKR, Faustino RS, Silveira Junior LS. Breast cancer in Rio Grande do Norte, a retrospective study: epidemiological, clinical and therapeutic profile. *Mastology*. 2017;27(2):109-16. <https://doi.org/10.5327/Z2594539420170000174>

20. Renna-Junior NL, Silva GA. Late-stage diagnosis of breast cancer in Brazil: analysis of data from Hospital-Based Cancer Registries (2000–2012). *Rev Bras Ginecol Obstet*. 2018;40(3):127-36. <https://doi.org/10.1055/s-0038-1624580>
21. Rocha AFBM, Freitas-Junior R, Ferreira GLR, Rodrigues DCN, Rahal RMS. COVID-19 and breast cancer in Brazil. *Int J Pub Health*. 2023;68:160585. <https://doi.org/10.3389/ijph.2023.1605485>
22. Oliveira-Junior I, Mauad EC, Fonseca BO, Watanabe AHU, Vieira RAC. Late results of regional breast cancer screening program performed in the interior of São Paulo State, Brazil. *Mastology*. 2018;28(Suppl 1):7. <https://doi.org/10.29289/259453942018V28S1009>
23. Mattos JSC, Caleffi M, Vieira RAC. Rastreamento mamográfico no Brasil: resultados preliminares. *Rev Bras Mastologia*. 2013;23(1):22-7.
24. Rosa DD, Bines J, Werutsky G, Barrios CH, Cronemberger E, Queiroz GS, et al. The impact of sociodemographic factors and health insurance coverage in the diagnosis and clinicopathological characteristics of breast cancer in Brazil: AMAZONA III study (GBECAM 0115). *Breast Cancer Res Treat*. 2020;183(3):749-57. <https://doi.org/10.1007/s10549-020-05831-y>
25. Registro Hospitalar do Câncer do Hospital de Câncer de Barretos. Infographics [Internet]. 2022 [cited on 2023 Sept 30]. Available from: https://infogram.com/rhc_hcb

