

# Breast Cancer Treatment and Determinants of Five-Year Survival in Two Referral Hospitals in Yaoundé, Cameroon

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## Abstract

**Background:** Breast cancer (BC) mortality and survival rates vary across the globe, with better survival values recorded in developed countries. In Cameroon, data on BC treatment outcome and its determinants are scant. **Objective:** Our aim was to evaluate the treatment and five-year survival of BC in two referral hospitals in Yaoundé. **Methodology:** We conducted a retrospective survival cohort study at two referral hospitals in Yaoundé. All files of patients managed for BC from 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2019 (5 years) at these hospitals were considered. Data on the socio-demographic and clinical characteristics, and the 5-year survival rate of BC cases was used to produce a Kaplan Meier survival curve. Cox regression enabled the identification of factors associated with BC survival, and calculation of hazard ratios to measure their impact, with significance level set at 5%. **Results:** We studied 503 cases with mean age  $48.4 \pm 10.4$  years, and range 16 - 78. Majority of cases were female (95.2%), had left breast disease (69.6%), and had invasive ductal carcinoma as histologic type (80.9%). Most cases (74.8%) were advanced at diagnosis (Stages III or IV) and the most common therapeutic modalities were chemotherapy alone (46.5%), and surgery combined with chemotherapy (44.7%). The 5-year survival rate was 51.9% and factors most strongly associated with poor survival included male gender (aHR: 7.07; 95% CI: 3.97 - 12.57;  $p < 0.001$ ), advanced cancer stage (aHR: 4.92; 95% CI: 3.14 - 7.71;  $p < 0.001$ ), and consultation delay  $\geq 6$  months

(aHR: 2.20; 95% CI: 1.66 - 2.90;  $p < 0.001$ ). Meanwhile, combining surgery and a second therapeutic modality, as well as university education was associated with better survival. **Conclusion:** This study highlights the high prevalence of advanced-stage disease, a modifiable factor, and its negative impact on BC survival in our setting. The findings underscore the need for strategies to enhance early detection, and timely combined treatment, as indicated, to improve BC outcomes.

## Keywords

Breast Cancer, Cancer Treatment, Survival, Treatment Outcome, Ductal Carcinoma

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## 1. Background

Breast cancer (BC) is a complex and multifactorial disease, characterized by the uncontrolled proliferation of malignant cells in the breast, which can invade nearby tissues and metastasize to distant parts of the body [1]. It is a major contributor to disease burden worldwide and the most common cause of cancer among women in both high-resource and low-resource settings. Its incidence, mortality and survival rates vary across the world [2]. In 2022, there were 2.3 million women diagnosed with breast cancer and 670,000 deaths recorded globally according to the World Health Organization (WHO) [3].

Although the exact cause is unknown, breast cancer is a multifactorial disease with diverse risk factors. The non-modifiable factors include advanced age, female gender, race, early puberty, late menopause, and certain mutations in key genes (BRCA1 and BRCA2), while modifiable factors include a high-fat diet, alcohol consumption, smoking, history of thoracic radiotherapy, first pregnancy after 30 years of age, nulliparity, not breastfeeding, and having fewer pregnancies. Its global incidence, mortality and survival rates are variable [4] [5]. In Cameroon, like with the global trend, the incidence of breast cancer is increasing, with about 4170 new cases and 2108 deaths in 2022. The reported overall 5-year survival rate varies from 30% to 62% [2]. WHO and other experts in the field recommend early diagnosis combined with timely and effective treatment as cost-effective measures for improving breast cancer outcomes in Africa [6].

Extensive studies on BC are indispensable to clearly demonstrate the prevalence of types and their distribution, treatment modalities in use, patient outcomes, and the determinants of the latter. This could help orientate policy and practice for the control of the disease. In our setting, data on these issues is scant. Our main objective was, therefore, to evaluate BC response to treatment in two referral hospitals in Yaoundé. More specifically, we intended to outline the distribution of histological types of BC, assess the five-year overall survival rate of patients managed for BC, and to identify determinants of favourable outcome.

## 2. Methodology

**Study design:** We carried out a retrospective survival cohort study at two referral hospitals; The Gynaeco-Obstetric and Paediatric Hospital (GOPHY), and the General Hospital (GHY) of Yaoundé. These hospitals were chosen because of their great BC patient turnover, and reputation for good records. The study lasted 8 months, from November 2024 to June 2025. The period of study (entry) was 5 years, from 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2019. Five-year survival data were recorded until December 2024. Our study population consisted of patients treated for BC in the selected hospitals during the entry period of the study after histological diagnosis, who had adequate 5-year follow-up, considering their time of entry. We excluded patients who had crucial missing information, patients with comorbidities (diabetes, hypertension, and heart failure), patients who were lost to follow-up or died from other causes. Sampling was consecutive, and non-probabilistic. The calculated minimum sample size was 158 (using Cochran's formula).

**Procedure:** We obtained research authorization from the management of the hospitals of interest and ethical clearance from the Centre Regional Ethics Committee for Human Health Research and the Institutional Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I. We then started data collection by identifying cases of patients who were managed for BC between 1<sup>st</sup> January 2015 and 31<sup>st</sup> December 2019 from hospital registers, retrieving their files, and extracting data with the aid of a data collection sheet designed, pretested and adapted for this study. The survival time of patients within 5 years, from the date of unequivocal diagnosis of BC was obtained by active and passive methods. The passive assessment was based on medical records and the active measures involved contacting the patients or their relatives by phone when information was lacking in their medical records. The variables studied included socio-demographic characteristics (age, gender, marital status, level of education, occupation, region of origin, and residence setting), obstetrical characteristics for women (gravidity and parity), clinical characteristics (presenting complaints, affected breast, physical features, tumour grades, TNM clinical stage), histopathological features (tumour types and grades), immunohistochemistry (molecular subtype), treatment received and patient outcome.

**Data analysis:** After collection, we verified our data for completeness and did cleaning. We then created an input mask with Epi info 7 software. The data collected were entered and analysed using IBM's Statistical Package for Social Sciences (SPSS) version 23.0. Qualitative variables were presented in the form of headcount and proportion. Quantitative variables were expressed as mean or median, and their dispersion parameter (standard deviation or interquartile range, respectively) as appropriate.

We determined the overall 5-year survival rate using the Kaplan-Meier's survival curve, and used Cox regression to identify factors associated with survival with BC, and the hazard ratios to measure their impact, with a significance level set at 5%. This study was done in full regard of the ethical principles of the declaration of Helsinki.

### 3. Results

We reviewed a total of 1115 cases of BC from hospital registers, found 728 patient files, excluded 225 for incomplete files or chronic comorbidity, and retained 503. BC was unilateral in the majority of cases (94.8%), and predominantly left-sided in 69.6%.

#### 3.1. Socio-Demographic Characteristics

We had 479 females (95.2%) and 24 males (4.8%). The age extremes were 16 years and 78 years, with a mean age of  $48.4 \pm 10.4$  years. Age was <40 years in 63 (12.5%). The predominant age range was 45 - 54 (46.3%) and the majority of patients were married (52.5%). Most patients had a secondary level of education (48.9%), and were unemployed (43.7%). Natives of the Centre (43.5%) and West (38.0%) regions were the most represented (**Table 1**).

**Table 1.** Distribution of cases of breast cancer according to sociodemographic characteristics at two referral hospitals of Yaoundé from 2015 to 2019 (N = 503).

Variable	Categories	Number (n)	Proportion (%)
<b>Age group</b>	15 - 24	16	3.2
	25 - 34	27	5.4
	35 - 44	102	20.3
	45 - 54	233	46.3
	55+	125	24.9
<b>Marital status</b>	Married	264	52.5
	Single	165	32.8
	Widow/divorced	58	11.6
	Unspecified	16	3.2
<b>Educational level</b>	None Primary	109	21.5
	Secondary	246	48.9
	University	90	17.9
	Unspecified	58	11.5
<b>Occupation</b>	Unemployed/students	246	48.9
	Informal sector	117	23.3
	Formal private sector	58	11.5
	Civil servant	53	10.5
	Unspecified	29	5.8
<b>Region of origin</b>	Centre	219	43.5
	West	191	38.0
	Grand north	19	3.8
	*Others	74	2.8

\*Others: South 14, North-west 14, South-west 11, East 11, Littoral 9, Foreigners 9, unspecified 6.

### 3.2. Obstetrical Characteristics

Of the 479 women, 7.3% were nulligravidas, 7.5% primigravidas, 30.1% paucigravidas (2 - 3 pregnancies), 37.4% multigravidas (4 - 5 pregnancies), and 17.7% grand multigravidas. With respect to parity, 7.7% were nulliparous, 12.1% primiparous, 42.4% pauciparous (2 - 3 deliveries), 31.5% multiparous, and 6.3% grand multiparous.

#### 3.2.1. Clinical Characteristics and Staging of BC in the Study Population

The median time from onset of symptoms to consultation was 2.9 [1.9 - 5.9] months, with extremes of 3 days and 4 years. Majority of patients (53.1%) consulted within 3 months following the onset of symptoms with breast nodules being the main complaint in 86.9% of cases. The majority of breast cancer cases were diagnosed at Stage III (36.6%) or IV (38.2%), as shown in **Table 2**.

**Table 2.** Distribution of population according to time lapse and reason for consultation.

Variable	Number (N = 503)	Proportion (%)
<b>Time lapse for consultation (months)</b>		
0-3	267	53.1
4 - 11	164	32.6
12 - 24	67	13.3
≥24	5	1.0
<b>Presenting complain</b>		
Lump	437	86.9
Breast pain	135	26.8
Skin changes	82	16.3
Ulceration	37	7.4
Nipple discharge	17	3.4
<b>Breast cancer stage (TNM)</b>		
Stage I	13	2.6
Stage II	114	22.7
Stage III	184	36.6
Stage IV	192	38.2

#### 3.2.2. Histopathological Characteristics and Grading of BC in the Study Population

Invasive ductal carcinoma was the most common histological type of BC, accounting for 80.9%. Grade II was the most predominant tumour grade with 71.8% (**Table 3**).

### 3.3. Biological Subtypes of Breast Cancer

Complete immunohistochemistry was performed by 7.8% (39/503) of patients.

However, up to 63 did hormone receptor testing. BC was mostly progesterone receptor negative (90.5%) and HER 2 negative (89.8%) and the most represented subtype was triple negative BC (64.1%), followed by luminal A (25.6%). All tested for ki67 were negative (**Table 4**).

**Table 3.** Distribution of breast cancer cases according to histological types, tumour grade, and TNM stage at two referral hospitals of Yaoundé from 2015 through 2019 (N = 503).

Variable	Categories	Number (n)	Proportion (%)
Cancer types	Invasive ductal carcinoma	407	80.9
	Invasive lobular carcinoma	76	15.1
	Medullary carcinoma	8	1.6
	Papillary carcinoma	5	1.0
	Mucinous carcinoma	5	
	Tubular carcinoma	2	0.4
Tumour grade	Grade I	44	8.7
	Grade II	361	71.8
	Grade III	98	19.5

**Table 4.** Prevalence of biological (immunohistochemistry) receptors among breast cancers at two referral hospitals of Yaoundé from 2015 to 2019.

Biological marker	Number of positive cases	Prevalence (%)
HER2 (N = 49)	5	10.2
Oestrogen (N = 63)	40	63.5
Progesterone (N = 63)	6	9.5
Luminal A (N = 39)	10	25.6
Luminal B (N = 39)	0	0.0
Triple negative (N = 39)	25	64.1

### 3.4. Treatment Received by the Study Participants

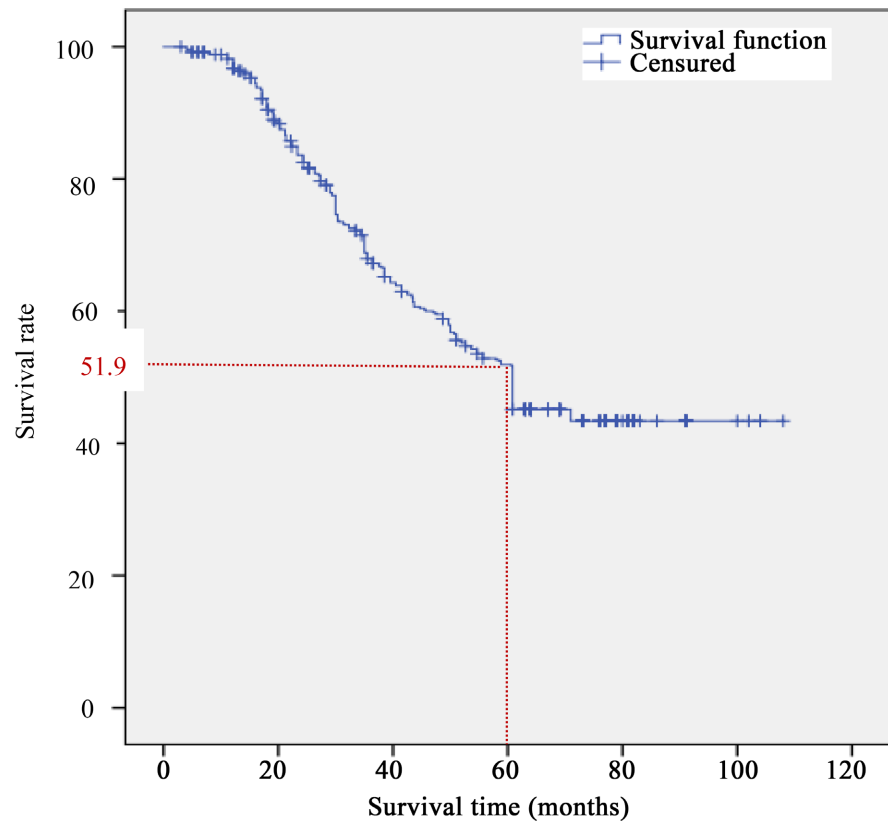
The most common therapeutic regimens recorded were chemotherapy alone (46.5%) and surgery + chemotherapy (44.7%) as presented in **Table 5**.

**Table 5.** Distribution of breast cancer cases at two referral hospitals of Yaoundé from 2015-2019 according to treatment modalities.

Treatment modality	Number/frequency	Proportion (%)
Chemotherapy alone	234	46.5
Surgery + chemotherapy	225	44.7
Surgery alone	34	6.8
Chemotherapy + radiotherapy	5	1.0
Surgery + chemotherapy + radiotherapy	5	1.0

### 3.5. Patient Outcome and Determinants of Overall BC Survival

The Kaplan-Meier curve showed that the median survival of the population was 67.2 months (95% CI: 63.7 - 70.7). The 5-year (60 months) survival rate was 51.9% (Figure 1).



**Figure 1.** Kaplan-Meier survival curve of breast cancer cases managed at two hospitals in Yaoundé from 2015 to 2019.

Multivariate Cox proportional hazards regression identified several independent predictors of overall survival. Male sex (aHR: 7.07; 95% CI: 3.97 - 12.57;  $p < 0.001$ ), consultation delay  $\geq 6$  months (aHR: 2.20; 95% CI: 1.66 - 2.90;  $p < 0.001$ ), invasive ductal carcinoma (aHR: 2.01; 95% CI: 1.30 - 3.10;  $p = 0.002$ ), and advanced stage (aHR: 4.92; 95% CI: 3.14 - 7.71;  $p < 0.001$ ) were most prominently associated with poorer survival. University level of education (aHR: 0.57; 95% CI: 0.40 - 0.83;  $p = 0.003$ ) and combined treatment including surgery (aHR: 0.73; 95% CI: 0.56 - 0.95;  $p = 0.021$ ) were associated with improved survival (Table 6).

**Table 6.** Independent predictors of overall survival among breast cancer patients treated at two referral hospitals of Yaoundé (2015-2019).

Variable	aHR [95% CI]	p-value
Age $\geq 50$ years	0.90 [0.70 - 1.17]	0.437
Male gender	7.07 [3.97 - 12.57]	<0.001

**Continued**

Single marital status	0.78 [0.60 - 1.02]	0.077
University level of education	0.57 [0.40 - 0.83]	0.003
Rural residence	1.71 [1.31 - 2.23]	<0.001
Time limit of consultation $\geq$ 6 months	2.20 [1.66 - 2.90]	<0.001
Invasive ductal carcinoma type	2.01 [1.30 - 3.10]	0.002
Grade 3 tumour	1.75 [1.30 - 2.35]	<0.001
Stage 3 - 4 on TNM classification	4.92 [3.14 - 7.71]	<0.001
Surgery + another treatment modalities	0.73 [0.56 - 0.95]	0.021

TNM: tumour, nodes and metastases, aHR: adjusted hazard ratio.

## 4. Discussion

We carried out this study to contribute to the understanding of the epidemiology and types of BC diagnosed and treated in our setting, as well as the survival of patients in relation to treatment and other factors. Our results confirm some of the findings from previous studies, which states that the five-year survival rate of breast cancer in developing countries is relatively poor.

### 4.1. Limitations

A possible limitation to our study is the fact that many files were not found or excluded because records were not optimally organized and some files were poorly filled. This could have introduced some form of selection bias, leading to a misrepresentation of breast cancer characteristics and outcome in our setting. This was further compounded by the retrospective nature of our data collection. However, we could not afford the length of time required for a prospective approach, and so opted to be exhaustive, including all the cases we could, and working at two hospitals that concentrate BC cases.

### 4.2. Socio-Obstetrical Characteristics

The mean age of the study population was  $48.4 \pm 10.4$  years and the extremes 16 - 78 years. This result is consistent with a study carried out in Benin in 2024, which reported a mean age of  $48.74 \pm 11.73$  years and extreme ages of 19 to 85 years [7]. Patients in our study reflect a trend consistent with previous research, highlighting the burden of breast cancer among relatively younger women. This finding underscores the potential influence of genetic, lifestyle and environmental factors unique to our demographics. Our study population was predominantly female (95.2%), a finding that aligns with global figures that show BC mainly affects women.

Most participants were married (52.5%), had a secondary education level (48.9%), were unemployed (43.7%), lived in an urban area (63.4%), and hailed from the Centre (43.5%) or West (38.0%) region. This is similar to findings by other Cameroon studies [4] [8]. These figures reflect the demographics of women in Cameroonian

cities in line with the Demographic and Health Survey of 2018 [9]. They also highlight the socioeconomic challenges faced by our study participants.

Most participants had had more than two pregnancies (84.9%), exceeding the values recorded in Cameroon in 2024 (57.4%) [4]. Possible reasons for higher results in our studies could be accounted for by differences in cultural and societal norms around family planning, reproductive health, and childbearing in our study population.

### 4.3. Clinical Characteristics

Of the 503 BC cases we included, 267 (53.1%) sought consultation within 3 months of symptom onset, with a range of 3 days to 4 years. These findings are similar to studies in Benin, where most participants (78.4%) consulted within 6 months [7].

The primary reason for consultation was an incidental discovery of a breast nodule by patients in 86.9% of cases. This result correlates with studies in Cameroon, where most patients (54.29%) presented with a breast nodule [10]. Breast cancer was unilateral in 94.8% of cases, predominantly left-sided in 69.6% of cases, with the upper-outer quadrant most commonly affected (64.4%). These findings align with a 2015 Cameroonian study, where left breast cancer was more frequent (52%), and the upper-outer quadrant was most commonly affected [11]. However, our result differs from a Nigerian study in 2010, where 52.2% of breast tumours were in the right breast [12]. This discrepancy may be due to differences in biological or environmental factors.

At clinical diagnosis, a breast nodule was found in 91.1% of cases, often associated with other symptoms. Most BC cases were diagnosed at Stage III (36.6%) or IV (38.2%), consistent with a 2022 study in Cameroon, where 21.1% and 48.2% of patients were diagnosed with clinical stages 3 and 4, respectively [2]. The late-stage diagnosis in our study, is a common trend in developing countries, which could be explained by the limited access to screening and late consultation.

### 4.4. Para-Clinical Characteristics

Invasive ductal carcinoma was the most common histological type of BC, accounting for 80.9% of cases. This finding is consistent with studies conducted in Cameroon, where 96.9% to 84.7% of participants had this histological type [4] [10]. Similarly, a study in Southwest Nigeria in 2021 found that invasive ductal carcinoma was the most prevalent (89.2%), followed by invasive lobular carcinoma (6.6%) [13].

The majority of tumours were Grade II (71.8%), followed by Grade III (19.5%), and then Grade I (8.7%). This indicates that the majority of tumours were moderately aggressive and required combined therapeutic modalities. These findings align with other Cameroonian studies, where most participants were diagnosed with Grade II breast cancers [2] [8]. Additionally, 2015 studies in Cameroon found that SBR II was the most frequent grade (66%), followed by SBR III (20%), and grade I (14%) [11].

BC tumours were predominantly progesterone receptor-negative (90.5%), fol-

lowed by HER2-negative breast cancer (89.8%). Immunohistochemistry was performed in 7.8% of patients, revealing that the most represented subtype was triple-negative breast cancer (64.1%), followed by luminal A (25.6%). This result is consistent with earlier studies in Cameroon (2024), which revealed a high proportion of poor prognostic features with triple-negative and luminal A tumours most represented [4].

#### **4.5. Therapeutic Features**

The most common therapeutic regimens for BC treatment were chemotherapy alone (46.5%) and a combination of surgery and chemotherapy (44.7%), accounting for over 90% of cases. This finding is consistent with a study in Cameroon, which reported that chemotherapy was the most common type of conventional therapy employed [8].

The high proportion of patients receiving chemotherapy alone or surgery + chemotherapy is supported by the observation that many patients presented with advanced disease (Stage III and IV) requiring systemic treatment for locally advanced disease and metastases.

Radiotherapy was used in only a small proportion of cases (2%), often in combination with other treatment modalities. A possible explanation for this low utilization is the absence of a radiotherapy unit in Yaoundé, such that patients are referred to Douala for radiotherapy. This increases the risk of patients being lost to follow-up.

#### **4.6. Five-Year Survival**

The Kaplan-Meier survival curve indicates that the median survival time for the study population was 67.2 months (95% CI: 63.7 - 70.7 months). At 5 years (60 months), the survival rate was 51.9%, meaning that approximately half of the study population survived for 5 years following diagnosis.

This finding is consistent with the trend of low 5-year survival rates reported in Sub-Saharan Africa. For instance, in Southwest Nigeria reported 5-year survival rates was 37.6%, for patients diagnosed and treated between 2004 and 2008 [13]. The difference in survival rates may be attributed to the fact that this study focused on patients with a more recent follow-up (2015-2019), suggesting advances in therapeutic modalities which could have contributed to improved survival rates in this study.

However, 5-year survival rates in Africa remain significantly lower compared to developed countries [14]. Several factors may contribute to the low survival rates in Africa such as late-stage diagnosis, financial constraints limiting access to adequate treatment, superstitious beliefs surrounding BC, and the quest for healing through prayers alone.

#### **4.7. Factors Associated with Survival**

After multivariate analysis, the independent factors associated with a decrease sur-

vival included being a male (7-times risk). This is in line with studies carried out in 2024 which stated that men had higher death rates than women across all stages of BC [15]. This may also be due to lack of awareness among men, leading to late-stage diagnosis. The observation that patients residing in rural areas were less likely to survive BC (aHR 1.71;  $p < 0.001$ ) is in line with an international review and meta-analysis in 2018, which stated that rural-dwellers were more likely to die when they developed BC than urban-dwellers (HR: 1.05, 95%CI 1.02 - 1.07) [16]. However, our figure was bigger probably in relation to beliefs mentioned above, as well as challenges in accessing specialized care.

Presenting more than 6 months after the onset of symptoms was associated with poorer survival (HR: 2.20;  $p < 0.001$ ), as was a TNM stage of 3 or 4 (HR: 4.92;  $p < 0.001$ ). had a significantly higher risk of decreased survival in breast cancer. These results were similar to those observed in Cameroon in 2022 where clinical stage 3 ( $p = 0.010$ ) was associated with a reduction in survival [4]. Spread to nearby tissues and lymph nodes, and distant metastasis make it more challenging to achieve complete remission, even with adequate resources.

Patients diagnosed with invasive ductal carcinoma, or Grade 3 disease had decreased survival rates than patients diagnosed with other histological types (HR: 2.01). This is attributed to the greater aggressiveness associated with these histological features [17]. Aggressive tumours spread more quickly to attain stages III and IV, which are associated with poorer survival.

## 5. Conclusions

Breast cancer is predominantly the woman's disease but a few cases that occur in men carried a worse prognosis. Invasive ductal carcinoma was the most common histological type, biology revealed a predominance of aggressive subtypes, and most cancers were diagnosed at advanced stages (III or IV). Chemotherapy alone, and surgery + chemotherapy were the most commonly used therapeutic regimens.

The median survival time was the modest and the 5-year survival rate below average. Independent factors associated with a decreased survival included male gender, rural residence, delayed presentation, invasive ductal carcinoma, high grade tumours and advanced TNM stage. Higher survival factors were a university-level education and receiving treatment associated with surgery, with a second therapeutic modality.

These findings emphasize the need for breast cancer awareness, structured screening programs, and increased availability of and access to all treatment modalities. There is also a need for more research to increase our understanding of the predominance of aggressive subtypes in our setting, as well as related factors that can be addressed to control this disease.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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