

Research Article

Epidemiological, Clinical, and Therapeutic Profile of Long-term Breast Cancer Survivors in Cameroon: A Retrospective Cohort Study

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Abstract

Introduction: Breast cancer (BC) is a major public health challenge in Sub-Saharan Africa (SSA) due to late diagnosis and low survival. Studying "long-term survivors" is essential to identifying resilience factors and successful strategies. This study aims to describe the epidemiological, clinical, and therapeutic characteristics of long-term breast cancer survivors at the Yaounde General Hospital (YGH) in Cameroon and identify factors associated with prolonged survival. **Methods:** In this retrospective cohort study (2008–2018), we analyzed 204 patient records. Long-term survivors were defined as the 68 patients (33.3% of the cohort) who survived for at least three years after their diagnosis. Data were collected using a standardized questionnaire. Descriptive statistics were used to detail their profile. Prognostic factors were identified using a Cox regression model. **Results:** The cohort was predominantly female (98.5%), with a median overall survival of 73.92 months (6.16 years). Patients were typically diagnosed at earlier stages (IIA, IIB, IIIA), and signs of locally advanced disease were rare. Key prognostic factors included (OR = 8.3, $p < 0.001$), radiotherapy (OR = 2.7, $p = 0.001$), and hormone therapy (OR = 2.9, $p = 0.001$), and achieving a complete clinical response to initial treatment (OR = 4.5, $p < 0.001$). The paradoxical association between relapse occurrence (OR = 2.8, $p = 0.001$), and prolonged survival highlights the role of rigorous follow-up. **Conclusion:** Long-term survivors are characterized by less aggressive initial presentation and access to complete, multimodal treatment. Prioritizing early diagnosis and continuous oncological follow-up is key to improving regional prognosis.

Keywords

Long-term Survivors, Breast Cancer, Profile, Cameroon

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1. Introduction

In Sub-Saharan Africa (SSA), breast cancer (BC) represents the leading cause of cancer mortality among women [1, 2]. A recent meta-analysis reported 1-, 3-, and 5-year survival rates of approximately 79%, 56%, and 40% respectively for breast cancer patients in sub-Saharan Africa [3]. In contrast to high-income countries where five-year survival rates often exceed 80% [4, 5], structural challenges in the region including weak health systems, a lack of screening infrastructure, and socio-economic barriers lead to less favorable outcomes. However, gradual progress has been made through the establishment of regional oncology centers, improved training of health professionals, and collaborative initiatives that strengthen cancer management capacity across SSA [6]. A large registry-based study across 12 African countries reported that 64.9% of breast cancer cases were diagnosed at advanced stages (III/IV) and 18.4% presented with metastases at diagnosis [7]. In Cameroon, it is well established that over 80% of patients are diagnosed at locally advanced stages (Stages III and IV), resulting in five-year survival rates that are significantly lower than global averages [8, 9]. Despite ongoing reforms, major inequalities persist in access to diagnostic facilities and radiotherapy services, particularly between urban and rural areas [10].

Although this challenging context, a proportion of patients manage to defy the prognosis by achieving prolonged survival. Although long-term survival (≥ 5 years) remains uncommon in the region, this population is slowly increasing with better access to treatment. The African Breast Cancer –Disparities in Outcomes (ABC-DO) cohort recently showed that at 7-year follow-up, only about 33% of women were still alive across several sub-Saharan African countries [11]. These "long-term survivors" (traditionally defined as those surviving beyond five years, or three years in cohorts from resource-limited settings) constitute an essential study group [3]. In resource-limited settings where 5-year survival rates remain below 50%, a 3-year survival threshold is often used as a pragmatic marker of prolonged survival. A systematic review of 49 SSA studies reported an average 3-year survival rate of 56% [3]. Their epidemiological, clinical, and therapeutic profile can reveal factors of resilience and effective management strategies that lead to cure or durable disease control, even in the absence of optimal resources. Understanding what distinguishes these patients can critically inform health policies and resource allocation. Recent global analyses confirm that although survival outcomes are gradually improving in low- and middle-income countries, significant disparities remain between regions, emphasizing the need for context-specific cancer control strategies [12].

The primary objective of this study is to describe the detailed (epidemiological, clinical, and therapeutic) profile of long-term breast cancer survivors managed at the Yaounde General Hospital (YGH), a reference center in Cameroon. Our secondary objective is to identify the prognostic factors in-

dependently associated with prolonged survival in this African cohort.

2. Materials and Methods

2.1. Study Design

This was a retrospective cohort study conducted in the medical oncology department of the YGH, covering a period of 11 years (from January 1, 2008, to December 31, 2018). YGH is a reference center for cancer care in Cameroon.

2.2. Population, Sampling, and Cohort Definition

The study population included all patients (men and women) with histologically confirmed breast cancer who received treatment at the YGH during the study period. A non-probability consecutive sampling method allowed for the inclusion of 204 patients. Inclusion criteria were: histologically confirmed breast cancer diagnosis and initiation of treatment at YGH between 2008 and 2018. Exclusion criteria were: incomplete medical records precluding determination of initial stage, treatment modalities, or final outcome.

The "long-term survivors" cohort was defined as patients with an overall survival of at least three years from the date of initial diagnosis [3].

2.3. Data Collection and Analysis

Data were extracted from medical records and oncology registries. They covered socio-demographic characteristics, clinical parameters (WHO stage, local extension signs), pathological features (histological type, SBR grade, hormone receptor - HR/HER2 status), and therapeutic modalities (surgery, chemotherapy, radiotherapy, hormone therapy).

Missing data for biological markers (e.g., HR/HER2 status) were treated by limiting the analysis of these specific variables to patients with available data, and the total n is explicitly noted in the tables for each variable.

Descriptive variables were expressed as percentages or medians (with interquartile range - IQR). Survival analysis was performed using the Kaplan-Meier method, and curve comparisons by the Log-Rank test. The identification of factors associated with long-term survival was carried out using a Cox regression model (univariate and multivariate), with a statistical significance threshold set at $p < 0.05$.

2.4. Ethical Considerations

The study received research authorizations and ethical

clearance from the Centre Regional Ethics Committee for Human Health Research (CRERSH/C) CE N°517/CRERSHC/2019 of April 12, 2019, and the Institutional Ethical Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Yaounde I N° 087/UYI/FMSB/VDRC/CSD of April 11, 2019. Confidentiality of all information was ensured.

3. Results

3.1. General and Demographic Characteristics

Of the 204 patients initially included, 68 (33.3%) were classified as long-term survivors. The median overall survival for this sub-cohort was 73.92 months (6.16 years).

- 1) Gender and Age: The cohort was overwhelmingly female (98.5%), with a median age over 50 years (61.8%).
- 2) Socio-economic and General Status: Nearly half of the patients were unemployed (47.1%). However, an overwhelming proportion (73.5%) had an excellent general condition (WHO 0) at the time of diagnosis or treatment initiation.
- 3) Time to Treatment: Long-term survivors presented with significant but manageable time-to-treatment delays,

with a median of 4 months between the first consultation and diagnosis.

3.2. Clinical and Pathological Profile

The clinical profile of long-term survivors was markedly less aggressive than that of non-surviving patients:

- 1) Disease Stages: The majority of long-term survivors were diagnosed at early or intermediate stages (Figure 1). Signs of locally advanced disease (ulceration, *orange peel*) were extremely rare (0% and 4.4% respectively). The presence of lymphadenopathy (13.2%) or breast mass (5.9%) was also low. The liver was the most frequent metastatic site of the ten patients with stage IV. Some patients had more than one metastatic site (Figure 2).
- 2) Histology and Grade: The dominant histological type was ductal carcinoma (89.7%), with a predominance of Grade II (66.7%) according to the SBR score, suggesting tumors of intermediate malignancy (Table 1).
- 3) Hormone Receptor (HR/HER2) Status: A high proportion of tested cases were Negative for Hormone Receptors (ER/PR Negative: 60%), while 18.2% were HER2-positive (low rate of testing performed) (Table 1).

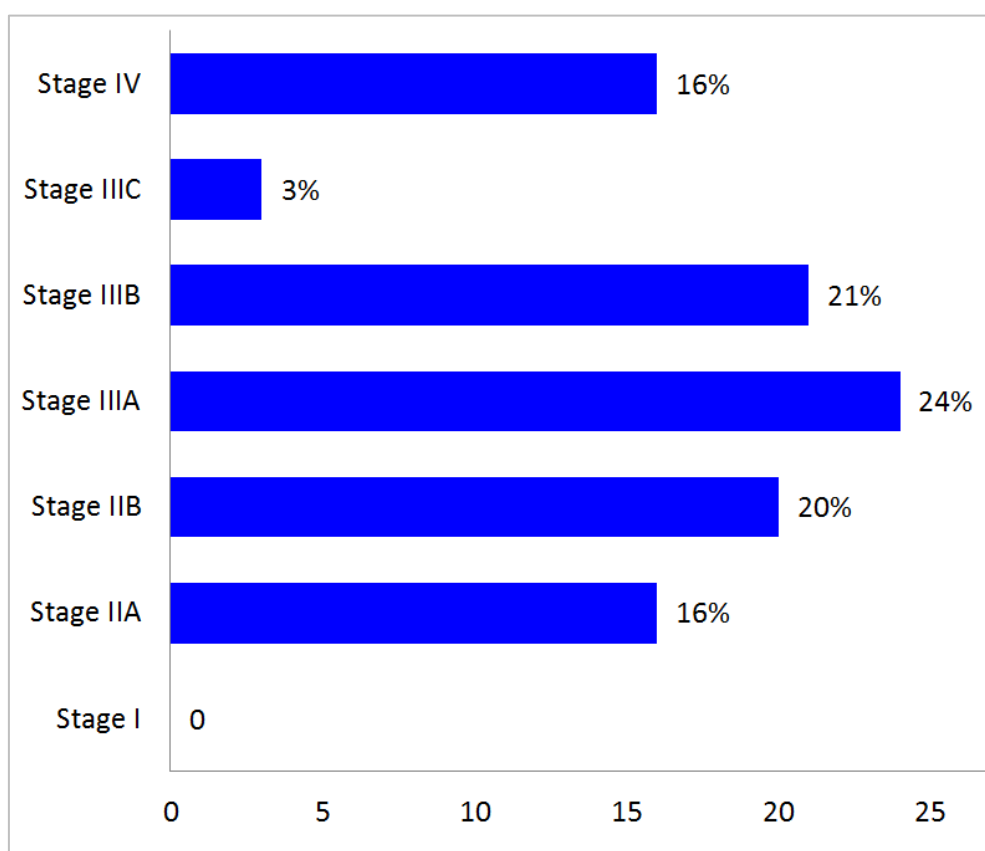


Figure 1. WHO Stages of cancer.

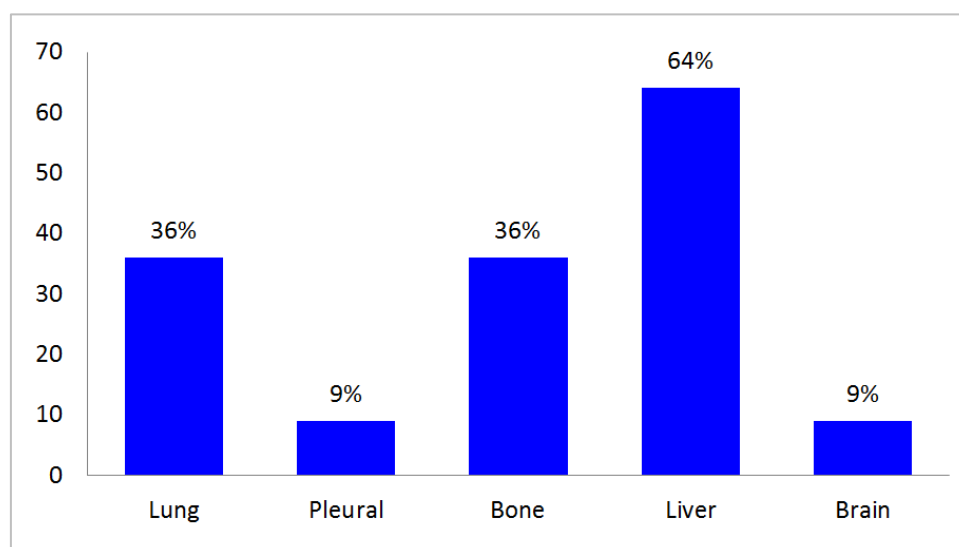


Figure 2. Sites of metastasis.

Table 1. Pathologic characteristics of patients.

Variables	Number	Percentage
Histologic type (n= 68)		
Ductal	61	89.7
Lobular	4	5.9
Other	3	4.4
SBR Grade (n = 57)		
I	5	8.8
II	38	66.7
III	14	24.6
Vascular Emboli (n = 6)		
Yes	2	33.3
No	4	66.7
HER 2 (n = 11)		
Negative	9	81.8
Positive	2	18.2
HR (n = 10)		
Negative	6	60
Positive	4	40
Ki67 (n = 2)		
< 10%	0	0
10 – 20%	0	0
> 20%	2	100

3.3. Therapeutic Profile of Patients

Access to complete, multimodal treatment was a major characteristic of this population.

- 1) Surgery: The vast majority of long-term survivors benefited from surgery (92.6%). Among these, 81% underwent radical surgery (mastectomy), and 19% had breast-conserving surgery. Negative resection margins were observed in 38.1% of patients, while positive margins in 19% and unspecified in 42.9%. The lymphnode dissection was performed in 68.3% of patients.
- 2) Radiotherapy and Hormone Therapy: More than half of the patients received radiotherapy (52.9%) and nearly 40% had hormone therapy (39.7%).
- 3) Chemotherapy: Chemotherapy was administered to 100% of the long-term survivors, with 64.7% requiring a second line and 27.9% a third line of treatment, indicating continuous management. The Doxorubicin and Cyclophosphamide was the most frequent regimen (50%).

3.4. Clinical Response

Response to treatment was a determining factor.

- 1) Clinical Response: The majority of long-term survivors (61.8%) achieved a Complete Clinical Response to their initial treatment.
- 2) Relapses: Although the occurrence of a relapse is counterintuitive, 60.3% of this cohort experienced one. The most frequent locations were the scar/ipsilateral breast (48.8%) and the lungs (39%). Notably, cerebral relapses were very rare (2.4%).

Table 2. Response and Relapse Characteristics.

Variables	Number	Percentage
Clinical Response		
Complete Response	42	61.8
Partial Response	23	33.8
Disease Stabilization	0	0
Progression	3	4.4
Relapses		
Yes	41	60.3
No	27	39.7
Relapse Location (n = 89)		
Ipsilateral breast scar	20	48.8
Ipsilateral lymph node	5	12.2
Contralateral lymph node	3	7.3
Contralateral breast	4	9.8
Lungs	16	39.0

Variables	Number	Percentage
Pleura	15	36.6
Bone	10	24.4
Liver	8	19.5
Brain	1	2.4
Retina	1	2.4

3.5. Factors Associated with Survival

Access to therapeutic multimodality proved to be the strongest characteristic of this cohort. The multivariate Cox model confirmed that surgery, hormone therapy, and achieving a complete clinical response were independent and significant predictors of prolonged survival (Table 3).

The observation that 60.3% of long-term survivors had experienced a relapse (OR = 2.8; $p=0.001$) is a paradoxical finding. The most frequent relapses were local/regional (scar/ipsilateral breast) or pulmonary, while cerebral metastases were rare (2.4%) (Table 3).

Table 3. Factors associated with survival in multivariate analysis.

Therapeutic Modality	Proportion in Long-Term Survivors (n, %)	Univariate Odds Ratio (OR)	p-value
Surgery	63 (92.6%)	8.3	<0.001
Radiotherapy	36 (52.9%)	2.7	0.001
Hormone Therapy	27 (39.7%)	2.9	0.001
Chemotherapy (1st line)	68 (100%)	Not evaluable	-
Complete Clinical Response	42 (61.8%)	4.5	<0.001
Occurrence of Relapse	41 (60.3%)	2.8	0.001

4. Discussion

Our study on long-term breast cancer survivors at the Yaounde General Hospital (YGH) provides crucial insights to guide cancer control efforts in Sub-Saharan Africa (SSA). Our results demonstrate that prolonged survival is, unsurprisingly, primarily determined by diagnosis at a less advanced stage, a finding that reaffirms a universal clinical truth [7].

While Cameroonian and regional studies typically show a stark predominance of Stages III and IV diagnoses [8, 9], the profile of our survivor cohort is characterized by a low incidence of locally advanced signs, with most patients falling into Stages IIA, IIB, and IIIA. This stage range represents a

critical "window of opportunity" for long-term survival in the SSA context. This finding confirms the importance of awareness and screening campaigns. We underscore the urgent need to intensify efforts focused on breast self-awareness and early clinical consultation rather than relying on mammographic screening, which is often inaccessible and cost-prohibitive in the region. Encouragingly, recent hospital-based data indicate modest improvements in early-stage detection in urban centers of Cameroon, suggesting that ongoing awareness initiatives are beginning to yield measurable impact [9, 13].

The most powerful factor associated with prolonged survival was access to complete multimodal care, particularly surgery, radiotherapy, and hormone therapy. Access to comprehensive multimodal therapy has consistently been identified as a strong determinant of survival. In the ABC-DO

cohort, it was estimated that earlier-stage diagnosis and access to treatment could reduce breast-cancer mortality by roughly one-third [11]. This highlights the necessity of strengthening health infrastructure and subsidizing treatments to make them accessible to a broader population base.

- 1) **Crucial Role of Surgery:** With an Odds Ratio (OR) of 8.3, surgery stands as the single most critical intervention for survival. This underlines its essential role in achieving curative outcomes in earlier stages and effective local control in advanced stages. However, the high proportion of radical mastectomies (81%) in our cohort, compared to the conservative surgeries common in high-income countries [14], reflects the persistent reality of delayed diagnosis, where breast-conserving options are frequently unavailable.
- 2) **Radiotherapy and Hormone Therapy:** The positive impact of radiotherapy (OR=2.7) and hormone therapy (OR=2.9) on survival confirms the efficacy of multimodal management, even within a resource-limited setting. The association of these therapies with prolonged survival emphasizes that investment in radiotherapy infrastructure and subsidized long-term hormone therapy (5–10 years), is a non-negotiable priority for improving regional prognosis [15], especially considering the high costs and logistical challenges that often compromise patient adherence.
- 3) **Treatment Response:** Achieving a Complete Clinical Response to initial treatment (OR=4.5) was a strong and independent prognostic factor, acting as a key marker of tumor sensitivity and the quality of care received.

A fascinating and central observation of this study is the unexpected positive association between the occurrence of relapse (OR=2.8) and prolonged overall survival. This phenomenon, often referred to as the "relapse paradox," does not imply that relapse is beneficial. Instead, it reflects a selection and follow-up bias: Only patients who survive long enough (≥ 3 years) can develop a detectable relapse within the study period. Patients who succumb quickly do not reach this stage and patients who do relapse are likely included in a structured, rigorous follow-up program. Their prompt diagnosis and effective subsequent management of recurrences allows for prolonged overall survival despite the recurrence [16]. Similar findings have been reported in recent African studies, which underscore the essential role of organized survivorship and follow-up programs in maintaining favorable outcomes among breast cancer patients [17].

This study, being retrospective, inherently faced several limitations related to data completeness and potential biases.

- 1) **Small Sample Size and Retrospective Nature:** The relatively small sample size ($n=68$) of long-term survivors limits the statistical power for highly detailed subgroup analysis. The retrospective design makes the data susceptible to recall bias in the original medical records and missing information.
- 2) **Incomplete Biomarker Data:** Data for Hormone Re-

ceptor (HR) and HER2 status were frequently missing (Table 1), which significantly restricts the comprehensiveness of biological survival analyses. This is a common and critical challenge in resource-limited settings.

- 3) **Potential Selection Bias:** The finding of the "relapse paradox" strongly suggests the presence of selection bias in the cohort: patients who survive long term are likely those who had better access to care, higher adherence to treatment, and more rigorous follow-up, representing a highly selected subset of the overall breast cancer population in Cameroon. This may limit the generalizability of our findings to the broader, underserved BC population in SSA.

Despite these challenges, this study provides valuable and rare data on the determinants of long-term breast cancer survival in a critical, resource-limited setting.

5. Conclusion

Long-term breast cancer survivors at the Yaounde General Hospital are characterized by a less advanced stage at diagnosis and effective access to complete, multimodal management (surgery, radiotherapy, hormone therapy). These factors are the cornerstones of prolonged survival in Sub-Saharan Africa.

Our results provide strong evidence that breast cancer survival in the region can be significantly improved by prioritizing two strategic axes:

- 1) Enhancing early diagnosis through awareness campaigns and access to quality clinical examination.
- 2) Improving access and adherence to standard treatments (surgery, radiotherapy, and hormone therapy) and continuous oncological follow-up.

Larger-scale prospective studies, including complete hormone receptor and HER2 status, are needed to refine the understanding of the biological and behavioral factors influencing long-term survival in this context.

Abbreviations

ABC-DO	African Breast Cancer –Disparities in Outcomes
YGH	Yaounde General Hospital
SSA	Sub-Saharan Africa
MD	Doctor of Medicine
MPH	Master of Public Health
ORCID	Open Researcher and Contributor ID
WHO	World Health Organization
SBR	Scarff-Bloom-Richardson (Grade)
HR	Hormone Receptors
HER2	Human Epidermal Growth Factor Receptor 2
IQR	Interquartile Range
OR	Odds Ratio

P p-value
 CRERSH Centre Regional Ethics Committee for Human Health Research

Author Contributions

Berthe Sabine Esson Mapoko: Conceptualization, Methodology, Data curation, Formal Analysis, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – review & editing.

Esther Dina Bell: Validation, Visualization, Writing – review & editing.

Veronique Batoum Mboua: Validation, Visualization, Writing – review & editing.

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Conflicts of Interest

The authors declare no conflicts of interest.

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