

Original Article

Chemotherapy Default among Breast Cancer Patients in Yenagoa, Nigeria: Patterns and Predictors

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Abstract

Background: Chemotherapy default is a critical barrier to effective breast cancer management in resource-limited settings. This study evaluated the patterns and predictors of chemotherapy default among breast cancer patients in a tertiary hospital in Nigeria.

Methods: A cross-sectional study design was utilized involving 60 patients with histologically confirmed breast cancer. Chemotherapy Default was operationally defined as the failure to complete at least 80% of the prescribed cycles, based on the principle of Relative Dose Intensity. Data regarding sociodemographic and clinical characteristics were extracted from medical records. Predictors of default were identified using a multivariable binary logistic regression model, incorporating variables that met the screening threshold of $p < 0.25$ in bivariate analysis.

Results: The overall chemotherapy default rate was 33.3% (20/60). The multivariable analysis identified Advanced Disease (Manchester Stage 4) as the strongest independent predictor of default (Adjusted OR = 6.74; 95% CI: 1.69 – 26.86; $p = 0.007$). Duration of symptoms exceeding 12 months was also significantly associated with default (Adjusted OR = 4.23; 95% CI: 1.05 – 17.02; $p = 0.042$). Sociodemographic factors, including age and parity, were not statistically significant after adjustment for clinical stage. The study was limited by a relatively small sample size ($n=60$), which contributed to wide confidence intervals for the reported risk estimates.

Conclusion: Late presentation and advanced disease stage are the primary drivers of chemotherapy default in this cohort. Interventions should prioritize early detection programs and targeted counseling for patients presenting with advanced-stage disease to improve treatment adherence.

Keywords: Chemotherapy for breast cancer, treatment default, Niger Delta, Nigeria.

Introduction

Breast cancer is a leading cause of cancer mortality among women globally, with significant survival disparities between high-income countries (HICs) and low- and middle-income countries (LMICs) like Nigeria. While five-year survival rates exceed 90% in HICs, they remain below 40% in Nigeria (1). This disparity stems from multiple factors, including late-stage presentation and high rates of chemotherapy default (2, 3). Chemotherapy is a cornerstone of breast cancer treatment but its effectiveness is dependent on timely and complete administration (4, 5) with default or non-adherence leading to accelerated tumor cell repopulation, disease progression, and worsened survival outcomes (6, 7). High rates of treatment default and abandonment are well-documented across sub-Saharan Africa, with reported rates ranging from 25% to 40% for various cancers. This is much higher than the 10% default rate in high income countries (3). A systematic review and meta-analysis of Nigerian studies found that breast cancer patients have a high default rate, with mortality among defaulters reaching as high as 50% (5). Several factors have been identified as key drivers of chemotherapy default in African settings. Financial constraints have been cited as the single most significant factor, accounting for 60-70% of treatment abandonment (7). High direct costs of chemotherapy drugs as well as ancillary expenses for tests, supportive medications, and hospital fees impose an unbearable financial burden on patients who largely pay out-of-pocket (14). In Nigeria, the average cost of a single cycle of chemotherapy can be over ₦350,000 (\$760), a figure which is far beyond the means of most patients (9).

Studies have revealed a strong association between advanced disease stage and treatment default, with odds ratios ranging from 3.5 to 5.2 (15, 16). Late presentation is a major problem in

Nigeria, often due to delayed referral systems, limited diagnostic capacity, and reliance on traditional medicine (3). Advanced disease is associated with more aggressive treatment plans, higher costs and poorer prognosis which can lead to treatment abandonment (18). While less common than financial constraints, severe treatment side effects are a contributing factor in 15-20% of cases and may lead patients to discontinue treatment (19). The standard chemotherapy regimens in Nigeria, such as anthracycline-based chemotherapy (ABC) are known for their significant side effects including nausea, vomiting, hair loss, and neutropenia (20).

There is a notable lack of prior data from the Niger Delta region, which has unique socioeconomic and environmental challenges that may influence health-seeking behavior and treatment adherence (10, 11). Existing studies are often descriptive with limited multivariable analyses to identify independent predictors of default. This study aims to provide region-specific data and use statistical analysis to confirm the key predictors of chemotherapy default in the Niger Delta.

Methods and materials

Study area and population

This study was conducted at the Federal Medical Centre, a 400 bed multi-specialty hospital in Yenagoa, Nigeria which currently functions as the teaching hospital for the Bayelsa Medical University. Oncology services are provided by the surgical or medical units managing the patient since a stand-alone oncology unit has not yet been established. The time period encompassed by the study was January 2019 to December 2023 and a total population sampling technique was used. No sample size calculation

was performed as all eligible patient records during the study period were included.

Eligibility criteria

Inclusion criteria: All histologically confirmed breast cancer patients who were prescribed and commenced chemotherapy at Federal Medical Centre Yenagoa within the study period.

Exclusion criteria: Patients with incomplete medical records, those referred to other facilities for further care, and those still receiving treatment at the time of the study. A complete-case analysis approach (list wise deletion) was used where cases with missing data on any covariate in the model were excluded. Using these criteria 12 of 72 patients were excluded from the study, resulting in a final population size of 60 patients.

Variables

The primary outcome studied was chemotherapy completion, defined as the patient receiving at least 80% of the prescribed chemotherapy cycles. This threshold was selected based on the principle of Relative Dose Intensity (RDI), where evidence suggests that receiving less than 85% of the planned dose intensity is associated with significantly poorer survival outcomes (32, 33). These cycles were given as determined by standard treatment protocols with the average number of cycles being between 6 and 8 depending on the exact regime employed 34. The key predictors examined were demographics (age, parity), clinical stage (Manchester stage) and symptom duration (the time from the patient noticing symptoms to the start of treatment). Financial constraint was objectively determined and recorded only when explicitly documented in the medical records (e.g., clinicians' notes stating "treatment delayed due to funds," social welfare referrals, or signed discharge against medical advice forms citing financial incapacity).

Data collection methods

Data was collected from patient records by surgical residents using a structured proforma. To ensure data quality and minimize extraction error, an inter-rater reliability check was performed. A second independent reviewer (a senior registrar) blindly re-abstracted data from a random sample of 10% of the case files. Discrepancies were resolved by consensus and review by one of the senior investigators.

Data entry and analysis

Data was exported to an Excel spreadsheet and analysis carried out using IBM statistical package for social sciences (SPSS) version 27 (IBM Corporation, Armonk, New York, USA), with the significance level set at $\alpha=0.05$. Normality was assessed using the Shapiro–Wilk test and since data was non- normally distributed, Mann–Whitney U tests were applied to compare continuous variables (age, symptom duration, parity) between the completer and defaulter groups. A multivariable binary logistic regression model was fitted to identify independent predictors of default. Variable selection followed the Hosmer & Lemeshow criterion: all variables with a p-value < 0.25 in the bivariate analysis (Age, Parity, Manchester Stage, and Symptom Duration) were entered into the multivariable model to control for potential confounding factors. Results were presented as Odds Ratios (OR) with 95% Confidence Intervals (CI). A p-value < 0.05 was considered statistically significant.

Results

The study cohort consisted of 60 breast cancer patients. The overall chemotherapy default rate was 33.3% (20 out of 60 patients) (Fig. 1). As shown in Table 1, there were significant differences between the defaulters and completers on several key variables:

Manchester Stage: The median Manchester stage for defaulters was 4, compared to a median

of 3 for completers, with a statistically significant difference (p=0.001). This indicates

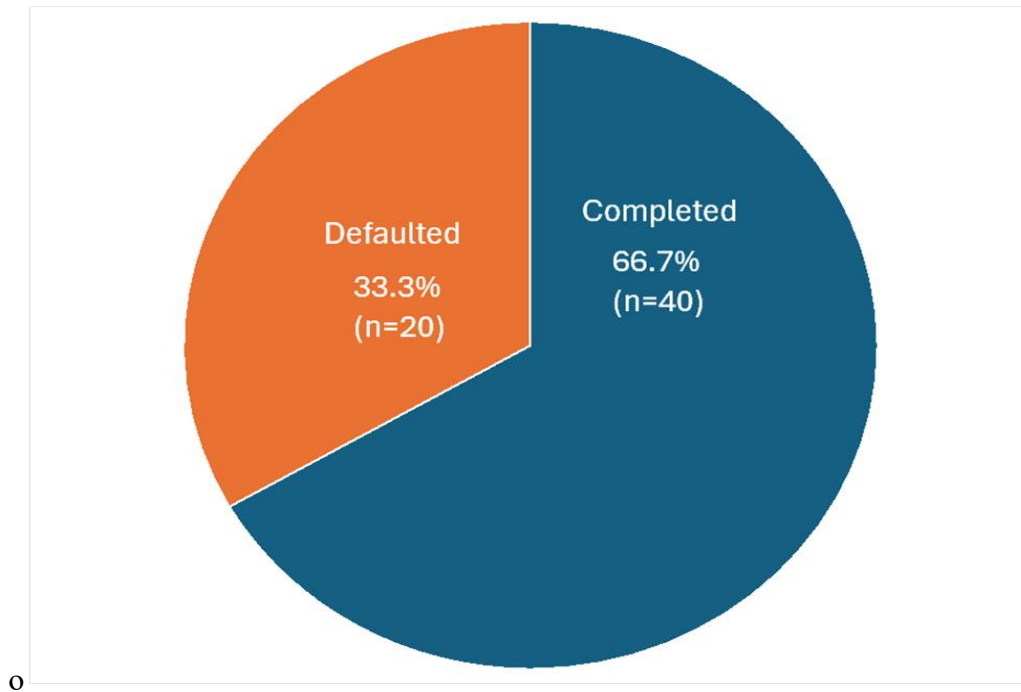


Figure 1: Pie chart showing proportion of chemotherapy completers to chemotherapy defaulters.

that patients presenting with more advanced disease were significantly more likely to default. Clinical stage was assessed using the Manchester staging system which is routinely employed at

the study institution. Equivalence of the Manchester system to TNM staging is shown in Table 2.

Table 1: Comparison of Sociodemographic and Clinical Characteristics between Chemotherapy Defaulters and Completers

Variables	Defaulted	Completed	Mann-Whitney U	p-value
	Median (Range)	Median (Range)		
Age (years)	48.00 (31.00-75.00)	45.00 (30.00-70.00)	437.00	0.122
Parity	3.00 (0.00-6.00)	4.00 (0.00-9.00)	421.00	0.237
Duration of breast symptoms (months)	30.00 (2.00-60.00)	9.00 (0.21-60.00)	287.50	0.001*
Manchester stage	4.00 (1.00-4.00)	3.00 (1.00-4.00)	286.00	0.001*

*Statistically significant

Table 2: Equivalence Table: Manchester vs TNM Staging.

Manchester Stage	Clinical Description (Manchester)	Approximate TNM Equivalent
Stage I	Tumour confined to the breast. Skin involvement absent. No palpable axillary lymph nodes.	T1 or T2, N0, M0 (Tumour < 5cm, Node Negative)
Stage II	Tumour confined to the breast. Palpable, mobile axillary lymph nodes.	T1 or T2, N1, M0 (Tumour < 5cm, Mobile nodes)
Stage III	Tumour extending beyond breast limits. Skin fixation (ulceration, oedema/peau d'orange) or chest wall fixation of fixed/matted axillary lymph nodes.	T3 or T4, Any N, M0 OR Any T, N2 or N3, M0 (Locally Advanced Disease)
Stage IV	Distant metastases present (bone, lung, liver, contralateral breast)	Any T, Any N, M1 (Metastatic Disease)

Symptom Duration: The median symptom duration was substantially longer among defaulters (30 months) compared to completers (9 months), a highly significant finding ($p=0.001$).

Among non-completers, 50% died before completing treatment, 45% cited financial constraints, and 5% discontinued due to toxicity (Figure 2).

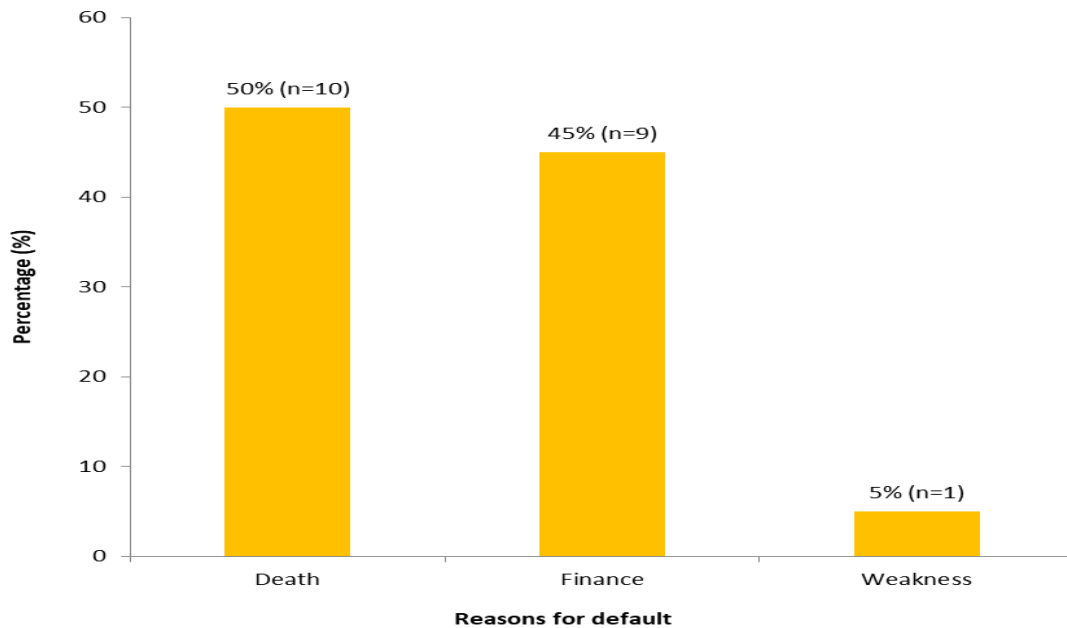


Figure 2: Reasons for default from chemotherapy.

Multivariable Analysis:

A multivariable binary logistic regression was performed to ascertain the independent effects of

age, parity, symptom duration, and Manchester stage on the likelihood of chemotherapy default.

The model was statistically significant ($\chi^2(4) = 28.1$, $p < 0.001$) and correctly classified 81.7% of cases.

Advanced disease remained the most robust predictor of default. Patients presenting with Manchester Stage 4 disease had 6.7 times higher odds of defaulting compared to those with earlier stages (Adjusted OR = 6.74; 95% CI: 1.69 –

26.86; $p = 0.007$). A symptom duration exceeding 12 months was independently associated with a 4-fold increase in the odds of default (Adjusted OR = 4.23; 95% CI: 1.05 – 17.02; $p = 0.042$). After adjusting for clinical stage and symptom duration, neither age ($p = 0.58$) nor parity ($p = 0.96$) were significant predictors of chemotherapy default (Table 3).

Table 3: Multivariable Logistic Regression Predicting Chemotherapy Default

Predictor	B (Coeff)	S.E.	Wald	p-value	Odds Ratio (OR)	95% C.I.
Age	-0.023	0.041	0.31	0.578	0.98	0.90 – 1.06
Parity	-0.012	0.231	0.00	0.960	0.99	0.63 – 1.56
Symptom Duration (>12 months)	1.442	0.710	4.12	0.042*	4.23	1.05 – 17.02
Manchester Stage (Stage 4)	1.908	0.706	7.30	0.007*	6.74	1.69 – 26.86
Constant	-0.875	1.980	0.19	0.658	0.42	

Discussion

Data from our study showed that advanced Manchester stage is a powerful predictor of default from chemotherapy. Patients presenting with Stage 4 disease experience a poorer prognosis and require more intensive and prolonged treatment, which increases the financial and physical toll. This is consistent with studies from other African countries where delays in diagnosis are common (22, 23). The long symptom duration (median 30 months) among defaulters underscores the urgent need to address delays in the healthcare-seeking journey. Reasons for these delays include a lack of public awareness, reliance on traditional healers and other alternative care, as well as limited access to diagnostic facilities (17, 24).

This study shows that financial constraints account for a massive 45% of defaults, which reinforces the findings of several studies in Nigeria (9, 14, 15). This is not merely a patient-level problem but emanates from a healthcare system where out-of-pocket payments are the norm and health insurance coverage is minimal

(4). The cost of chemotherapy, ancillary expenses for tests, supportive drugs, and travel, creates unsustainable health expenditure for most families (26, 27). A significant number of patients in the region sell assets like land and jewelry to fund treatment, with many still abandoning therapies due to spiraling costs (28). The finding of 50% mortality among defaulters most of whom presented with advanced disease highlights the role of late presentation in treatment non completion. It also spotlights the inability of the healthcare system to provide adequate care for patients with advanced disease (29, 30).

To address these issues a multi-pronged intervention strategy has become an urgent need. Public health campaigns, in partnership with community and religious leaders, are necessary to raise awareness about breast cancer symptoms and the importance of early detection (22, 31). Financial challenges faced by patients will require systemic reforms, including expanding the National Health Insurance Scheme (NHIS) and the Bayelsa Health Insurance Scheme (BHIS) to cover a broader range of cancer drugs

and treatments (26). Hospitals and non-governmental organizations (NGOs) can also play a vital role by establishing patient aid funds and offering sliding-scale fees (26). Programs by organizations like multinational oil companies which offer grants for cancer care are excellent models that should be scaled up (30). Integration of robust palliative care services into oncology departments is essential to improve outcomes for patients with late-stage disease (31).

Limitations

The study is of a retrospective type and the small sample size from a single institution may affect the application of the findings to the region and the entire country. While the multivariable model identified significant predictors, the relatively small sample size (n=60) resulted in wide Confidence Intervals for the odds ratios, particularly for Manchester Stage. This reflects the statistical limitations inherent in small cohorts. However, the rigorous variable selection process ($p < 0.25$) ensures that potential confounders were accounted for, strengthening the validity of the significant associations observed. Financial constraint was assessed indirectly from patient records without any direct input from the patients. This may affect the fidelity of the data. Results could also be compromised by recall bias when patients might not clearly remember the duration of their symptoms or attempt to minimize them during the initial encounter found in the records. Future research will include larger, multicenter, prospective studies to further validate these results and explore the effectiveness of proposed interventions such as awareness campaigns and health insurance programs.

Conclusion

This study reveals a high chemotherapy default rate driven primarily by late-stage presentation and significant financial barriers. These findings underscore the need for targeted interventions,

including improved palliative care for advanced cases, the introduction of patient financing programs and health insurance schemes. Initiatives such as the Bayelsa Health Insurance Scheme (BHIS) while still embryonic, could be further developed to involve this demographic. Enhanced community awareness campaigns to reduce diagnostic delays are a vital adjunct when one remembers that ignorance and wrong perceptions are the main drivers of late presentation in the Niger Delta.

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Ethical considerations

This study was approved by the Research Ethics Committee of Bayelsa Medical University. A waiver of informed consent was obtained since this was a retrospective study with anonymized patient data. Ethical Approval number: BMU/REC/273/25.

Data availability statement

The data that support this study are available from the corresponding author upon reasonable request.

Conflicts of interest

The authors declared that no conflicts of interest exist.

Funding statement

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