

## Challenges of Distance to Access of Radiotherapy Management of Breast Cancer in Nigeria

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### ABSTRACT

**Background:** The shortage of radiotherapy services in Nigeria has led to tremendous suffering for breast cancer patients across the country. The aim of this study is to explore the effect of distance on the care of breast cancer patients in Nigeria.

**Materials and Methods:** This was a retrospective study of breast cancer patients from 1st January 2003 to 31st December 2012 in University College Hospital (UCH), Ibadan. Data obtained included biodata, disease features and follow-up information using a structured questionnaire. Univariate, bivariate and multivariate statistics was used to analyse the data. **Results:** We studied 504 breast cancer patients. The mean age of the patients was 47.7 ( $\pm 10.6$ ) years, late presentation with symptoms beyond 3 months was seen in 88.1% while advanced stage disease was seen in 58.7% of patients. Patients that lived at distances within 50 km and beyond 50 km from UCH, Ibadan were 74 (14.7%) and 430 (85.3%) respectively. Majority of the patients 87.3% completed treatment, however, 94.8% of patients treated during the period discontinued follow-up care at the end of the study. The reasons for discontinuation were "death", "financial constraints" and "referred back to distant primary surgeon after treatment" accounting for 90 (18.8%), 230 (48.1%) and 158 (33.1%) respectively. The factors affected by distance were socioeconomic status [OR=2.9; 95% CI=1.42-6.01], bilateral breast cancer disease [OR=14.22; 95% CI = 7.32 - 27.620], left breast disease (OR=11.45; 95% CI = 5.89 - 22.62) and reasons for discontinuing follow-up care: financial constraints [OR=2.0; 95% CI=0.9 - 3.2], and referred back to primary breast surgeon [OR=3.0; 95% CI=1.3 - 6.0]. **Conclusion:** Long distance and shortage of functioning radiotherapy centres in Nigeria are critical challenges for breast cancer treatment, leading patients to late presentation with advanced disease and poor compliance with follow-up care. Therefore, more centres should be built in each state to minimise these challenges.

**Keywords:** Breast cancer, Long distance, Radiotherapy, Follow-up, Challenges.

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#### Introduction

Worldwide breast cancer is the leading female malignancy and it's the most common cancer in Nigeria.<sup>1</sup> The major challenge in the management of breast cancer in Nigeria is the limitation of resources resulting many patients to develop advanced-stage breast cancer that will require multiple treatment modalities, including radiotherapy. It is projected that more than 50% of cancer patients would receive external beam radiation.<sup>2</sup> The biggest gap between radiotherapy machine availability and need is in Nigeria and West Africa. Nigeria has only one radiotherapy machine per population of

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19.4 million people, while Senegal and other West African Countries have a ratio of 1:10million, compared to the one machine per 250,000 people available in high income countries.<sup>3,4</sup>

Currently, there are 9 radiotherapy centres in Nigeria,<sup>5</sup> however, less than five centres have functioning therapy machine at a time, out of which some centres stay grounded for months to years. Consequently, a substantial proportion of breast cancer patients in Nigeria, cannot receive radiotherapy treatment early, may not complete the prescribed courses of treatment, and do not attend post therapy surveillance, a follow-up care required to assess effectiveness of therapy and detect and treat early recurrence of the disease. A mixture of poor education, poverty, long distance to treatment centre and a high percentage of nonorthodox healing practices among the populace contribute to late presentation, loss to follow-up and poor survival among cancer patients,<sup>2,3</sup> according to recent report from Ibadan, patients discontinuing follow-up care were more likely to be older than the age of 45years (HR=1.415; 95% CI= 1.044 - 1.917), have metastasis (HR=1.793; 95% CI=1.396 - 2.302), be anaemic (HR=1.404; 95% CI = 1.120 - 1.760), and have late-stage disease (HR=1.310; 95% CI = 1.407-1.639).<sup>6</sup> Longer distances imply more financial burden on the patient and caregivers who must take more time off from work, they suffer loss of pay and incur the costs of feeding, travelling, and accommodation at the referral hospital, such expenditure can be sufficiently enormous to discourage the patient from adherence to referral, treatment and routine follow-up care.<sup>7-10</sup> Other benefits of follow-up care include management of therapy related side effects, psychosocial support and counselling during follow-up in order to improve quality of life and physical performance, reevaluation of current adjuvant therapy, and monitoring of compliance with endocrine therapies.<sup>6,11-13</sup> The aim of this study was to explore the effect of distance on the care of breast cancer patients at UCH, Ibadan.

## Materials and Methods

### Study design and setting:

This is a retrospective cross-sectional study (with prospective elements) on breast cancer patient on follow-up care at the Radiation Oncology Clinic, University College Hospital (UCH), Ibadan, Nigeria. The department is equipped with external beam Tele-cobalt and HDR Co60 Brachytherapy machines with modern treatment planning system. During the follow-up of these patients being studied, the department served as the main radiotherapy training and referral centre in Nigeria including some West African countries. Annually the department treats about 200-300 breast cancer patients.

The study participants were breast cancer patients with histological diagnosis referred for adjuvant radiotherapy to the breast or chest wall over a period of 10 years. Patients whose records were without accompanying histological confirmation of diagnosis, patients without case file or radiotherapy treatment cards were excluded. Also patients whose incomplete information could not be ascertained through phone calls were also excluded.

### Data Collection Instrument and Procedures:

Hospital case files with follow-up records and radiotherapy treatment cards of breast cancer patients attended to between 2003 and 2012 were retrieved from the clinic medical records. The data was collected using a data extraction form which contained: age at registration; sex; educational status; marital status; stage of breast cancer at diagnosis (Manchester staging classification was used as it was then the commonest staging classification used by surgeons referring patients for radiotherapy outside of Ibadan during the period being studied); grade of differentiation; histology of breast cancer; lymph node status; presence of metastasis; duration of symptoms before diagnosis; distance of home town from University College Hospital, Ibadan (in kilometres); breast surgery performed (no surgery, breast conservation surgery or radical surgery); whether patient received adjuvant



chemotherapy or radiotherapy to the chest wall; baseline packed cell volume (PCV); and the reasons for discontinuation of follow-up care. The reasons for discontinuation were death; referred back to primary breast surgeon after treatment and financial constraints. Information missing in the folder, including up to date status of the patients as at the time of the study were sought through phone calls using mobile numbers of "patients" and or of "next of kin" provided by patients during file registration.

Data Management and Analysis.

The data were carefully entered and analysed using SPSS statistics for windows version 16.0 (SPSS Inc., Chicago Ill., USA). Regular checks were done to detect and correct errors. The dependent or the outcome variable was defined as the distance from home town to UCH, Ibadan in Kilometres. The independent variables explored were the sociodemographic characteristics and clinical factors such as age, marital status, duration of disease symptoms before diagnosis, educational status, stage of disease, site of breast disease, baseline PCV, and metastasis and the reasons for discontinuation of follow-up care.

Frequency, percentage, mean, median, range, and standard deviation were used to summarize the sociodemographic, clinical, and treatment variables of the patients and presented using tables and graphs. Bivariate analysis using cross tabulation and X<sup>2</sup> was used to test for an association between the dependent variable "distance of home town to UCH, Ibadan" and independent variables such as age, marital status, educational status, duration of symptoms before diagnosis, stage of disease at presentation, site of breast disease, reasons for discontinuation of follow-up care, metastasis, anaemia and breast surgery.

Independent variables were considered to show significant association with distance when the p-value was  $\leq 0.05$ . Multivariate analysis was carried out using logistic regression, this was done using covariates that showed statistically significant

association with distance at p-value  $< 0.1$  on bivariate analysis.

## Results

Sociodemographic and clinical characteristics:

The univariate analysis of sociodemographic and clinical characteristics is presented in table 1: A total of 504 (Females: n=500, Males: n=4) patients satisfied the inclusion criteria. The mean age of patients (both sexes) was 47.69 years with a standard deviation of 10.63. Most of the patients were between the ages of 41 and 50 years (34.1%); their mean ages were 61.25 years for males and 47.58 years for females. Only 74 (14.7%) live at a distance  $\leq 50$  km from UCH, Ibadan, while the majority 430 (85.3%) live  $> 50$  km away from UCH, Ibadan. Further, the proportion of patients who live within 100 km, 100-200 km and beyond 200 km to UCH, Ibadan were 26.6%, 26.2% and 47.2% respectively. The commonest site of breast cancer was on the left breast [244, (48.4%)] while right breast accounted for about 227 (45.0%) and 33 (6.5%) of breast cancer were seen in both breasts during the study. Stages I, II, III, and IV accounted for 29 (5.8%), 177 (35.1%), 138 (27.4%), and 155 (30.8%), respectively. Early-stage breast cancer (stages I&II) accounted for 40.9% while late-stage breast cancer (stages III&IV) constituted the majority. Invasive ductal carcinoma [443, (87.9%)] accounted for the most common histological type of breast cancer seen. Grade II breast cancer was also the most common, being seen in 303 (60.1%) of the cases, while 202 (40.1%) had distant metastases. Distant metastasis was most commonly found in the bone (116, 23.0%) and the lungs [104, (20.6%)]. Three hundred and ten patients (61.5%) had a normal PCV  $\geq 33\%$  at baseline before treatment while 194 (38.5%) had low packed cell volume (PCV  $< 33\%$ ). Most of the women with breast cancer underwent radical breast surgery 413 (81.9%). Almost all the patients 87.3% completed the prescribed treatment, however, 94.8% discontinued follow-up care at the end of the study. The reasons for discontinuation were



patients death while on follow-up care 90 surgeon 230(48.1%) and financial constraints (18.8%), referral back to primary breast 158(33.1%).

**Table 1: Sociodemographic and clinical characteristics of breast cancer patients studied.**

Variable	Frequency (%)
Age groups distribution.	
≤30	13(2.6%)
31-40	134(26.6%)
41-50	172(34.1%)
51-60	122(24.2%)
61-70	60(11.9%)
>70	3(0.6%)
Sex	
Male	4(0.8%)
Female	500 (99.2%)
Marital status	
Single	23 (4.6%)
Married	412 (81.7%)
Divorced	7(1.4%)
Separated	1 (0.2%)
Widow	44 (8.7%)
Unknown	17 (3.4%)
Educational status	
None	182 (36.1%)
Below primary	8.0 (1.6%)
Primary school	41 (8.1%)
Secondary school	117 (23.2%)
Distance from home town to UCH, Ibadan	
≤ 50KM	74 (14.7%)
> 50KM	430 (85.3%)
Duration of symptoms before diagnosis	
≤ 12 months	370 (73.4%)
> 12 months	134 (26.6%)
Site of disease	
Right	227 (45.0%)
Left	244 (48.4%)
Bilateral	33 (6.5%)
Stage of disease (Manchester staging)	
I	29 (5.8%)
II	177 (35.1%)
III	138 (27.4%)
IV	155 (30.8%)
Unknown	5 (1.0%)



Histological type	
Invasive ductal carcinoma	443 (87.9%)
Invasive lobular carcinoma	23 (4.6%)
Inflammatory breast cancer	10 (2.0%)
Breast sarcoma	2 (0.2%)
Anaplastic carcinoma	3 (0.6%)
Malignant cystosarcoma phylloides	4 (0.8%)
Mucinous carcinoma	5 (1.0%)
Squamous cell carcinoma	4 (0.8%)
Pagets disease	2 (0.2%)
Others	8 (1.6%)
Histological grade	
I	89 (17.7%)
II	303 (60.1%)
III	84 (16.7%)
Unknown	28 (5.6%)
Surgery	
No surgery	34 (6.7%)
Radical surgery	413 (81.9%)
Breast conservation surgery	57 (11.3%)
Completed chemotherapy	
Yes	498 (98.8%)
No	6 (1.2%)
Completed radiotherapy	
Yes	493 (97.8%)
No	11 (2.2%)
Completed hormonal therapy	
Yes	236 (46.8%)
No	268 (53.2%)
Developed metastasis	
Yes	202 (40.1%)
No	302 (59.9%)
Baseline packed cell volume (PCV)	
Low (PCV < 33%)	194 (38.5%)
Normal (PCV ≥ 33%)	310 (61.5%)
Reason for discontinuation of follow-up care.	
Death on follow-up.	90 (18.8%)
Referral back to breast surgeon.	230(48.1%)
Financial constraints.	158(33.1%)

**Patient Related Factors**

Bivariate analysis was carried out to determine the factors associated with distance from home town to UCH, Ibadan among breast cancer patients. Table 2 shows the comparison of proportion of patients who live near (up to 50 km) and Far (beyond 50 km) to UCH, Ibadan. At the bivariate analysis level of education ( $\chi^2=5.256$ ;  $p =0.022$ ), reasons for discontinuation of follow-up care

( $\chi^2=46.815$ ;  $p=0.000$ ), site of breast disease ( $\chi^2=7.554$ ;  $p<0.023$ ) and categories of breast surgery ( $\chi^2X^2=p<0.001$ ) were all associated with distance from home town to UCH, Ibadan. Breast cancer patients with "primary school education and below", those who "died on follow-up", "referred to for follow-up care with their primary surgeon", right breast cancer, and "no breast surgery" were more likely to be affected by distance than the others.

**Table 2: Cross tabulation of Patient Related Factors**

Variable	Distance of home town to UCH, Ibadan			$\chi^2$	P-value
	Near (up to 50Km)	Far (beyond 50 Km)	Total (%)		
Age					
Younger age group					
Older age group	32	200	232 (46.0)	0.271	0.602
	42	230	272 (54.0)		
Marital status					
Married	60	352	412 (81.7)	0.026	0.873
Not Married	14	78	92 (18.3)		
Level of education					
Primary school education and below	43	188	231 (45.8)	5.264	0.022*
Secondary school education and above	31	242	273 (54.2)		
Socioeconomic status					
Lower status	17	143	160 (31.7)	3.081	0.079*
Higher status	57	287	344 (68.3)		
Duration of symptoms before diagnosis.					
Below 7 months	20	158	178 (35.3)	3.405	0.182





7 - 12 months						
Above 12 months	29	163	192 (38.1)			
	25	109	134 (26.6)			
Reason for discontinuation of follow-up care.						
Death on follow-up.	17	73	90 (18.8)	46.815	0.000	*
Referral back to primary breast surgeon.	44	114	158 (33.1)			
Financial constraints.	8	222	230 (48.1)			
Site of breast disease						
Right breast.	34	193	227 (45)	7.554	0.023	*
Left breast.	30	214	244 (48.4)			
Bilateral breast.	10	23	33(6.5)			
Breast surgery						
No surgery	9	25	34 (6.7)	7.554	0.023	*
Radical surgery	56	357	413 (81.9)			
Conservation surgery	9	48	57 (11.3)			
Presence of distant metastasis						
Yes	29	174	202 (40.1)	0.181	0.670	
No	46	256	302 (59.9)			
Anaemia during treatment						
Yes	30	164	194 (38.5)	0.154	0.695	
No	44	266	310 (61.5)			
Stage of disease						
Early Stage.	34	172	293 (58.7)	0.988	0.320	
Late Stage.	39	254	206 (41.3)			

\* Statistically significant at 10% level;  $\chi^2$  = Chi square; Km = kilometres

#### Patient Related Factors

The multivariate analysis was done using logistic regression using covariates that

showed statistically significant association with distance at  $p < 0.1$ . Table 3 shows the results of the logistic regression of variables



affected by distance to UCH, Ibadan were: Patients with low socioeconomic status [OR=2.9; 95% CI = 1.42 - 6.01; financial constraints [OR=2.0; 95% CI =0.9 - 3.2], referred back to primary breast surgeon [OR=3.0; 95% CI =1.3 - 6.0], bilateral breast

cancer disease (OR=14.22; 95%CI = 7.32 - 27.620) and left breast disease (OR=11.45; 95%CI = 5.89 - 22.62) were mostly affected by distance statistically significantly.

**Table 3: Logistic Regression of Patient Related Factors**

Variable	Odds Ratio	95% CI	P-value
<b>Level of education</b>			
Secondary school education and above	1.00	-----	-----
Primary school education and below	1.20	0.69 - 2.22	0.467.
<b>Socioeconomic status</b>			
Higher status	1.00	-----	-----
Lower status	2.90	1.42 - 6.01	0.004 *
<b>Reasons for discontinuation of follow-up care.</b>			
Death on follow-up.	1.00	-----	-----
Financial constraints.	2.00	0.9 - 3.2	0.000 *
Referred back to primary breast surgeon.	3.00	1.3 - 6.0	0.001 *
<b>Site of breast disease</b>			
Right breast disease	1.00	-----	-----
Left breast disease	11.45	5.89 - 22.62	0.000 *
Bilateral breast disease	14.22	7.32 - 27.62	0.000 *

\* Statistically significant at 5% level; CI = Confidence Interval, OR = Odds Ratio; 1.00 = Reference category.

## Discussion

The incidence and mortality of breast cancer is rising in Africa and in regions categorised to be in transition such as South America and Asia.<sup>14, 15</sup> These drifts likely reflect a combination of demographic factors associated with social and economic development, including the postponement of childbearing and having fewer children, greater levels of obesity and physical inactivity, and increases in breast cancer screening and awareness.

<sup>14</sup> Because of limited resources, the increase in burden of breast cancer in these regions would bring with it increase suffering<sup>16-18</sup>

including difficulty to access radiotherapy services due to distance.

In this study, we found that the mean age of breast cancer patients was 47.69 ( $\pm$  10.26) years, with a gender variability of 61.25 years for males and 47.58 years for females, respectively. At about the same time, Jedy-Agba et al., 2012 while comparing Ibadan and Abuja cancer registries reported a similar mean age of 47.5years from Ibadan and a lower mean of 44.8 years from Abuja,<sup>19</sup> similarly, from Ile Ife, Nigeria, a mean age of 48 ( $\pm$ 12.3) years [20] and from Niger Delta,





Nigeria,<sup>21</sup> Kenya<sup>22</sup> and Beirut, Lebanon.<sup>23</sup> Conversely, the mean age of breast cancer patients in sub-Saharan Africa is a decade younger than those in Caucasians.<sup>10, 24</sup> Male breast cancer accounted for 0.8% of cases of breast cancer in our study, this does not compare with report of previous studies from Ibadan 2.9% and Maiduguri 3.7% respectively,<sup>25, 26</sup> there is however, a non-uniform reporting among Western countries and Caucasians, where less than 1% were quoted<sup>27</sup> and about 1.9% - 2.9% were reported among White and Black Americans respectively.<sup>28</sup> Late presentation with advanced stage disease (stage III& IV) was seen in 58.2% of the patients studied, unfortunately when compared to earlier studies from Nigeria and sub-Saharan Africa the outlook remained poor and the same, since prognosis of breast cancer is dependent on stage of disease at presentation.<sup>11, 20, 29-31</sup> The factors responsible for late presentation with advanced disease in this study were low and poor level of education as 69% of the patients were not educated beyond secondary, and distance as almost half of the patients came from far places in Nigeria outside South Western states with mean duration of symptoms before diagnosis of 11.64 months. A similar duration of 11.2 months was also reported from Ile-Ife, Nigeria.<sup>20</sup> The low education level among these patients may lead to poor understanding of symptoms and compliance with measures at early detection, presentation and follow-up.

About 40% of patients in this study had metastasis, this can be explained by the fact that large number of these patients presented late with advanced disease, they had palpable axillary nodes within and beyond axilla with a significant proportion of about 40% presenting for the first time with anaemia, Adisa et al., reported a higher figure of 52%

with metastasis from Ile-Ife, Nigeria<sup>32</sup> while Bray et al reported 26% from the US.<sup>15</sup>

Our study reported that majority of the patients 80.2% discontinued follow-up care due to (financial constraints 48.1% and referral back to primary surgeon for care 33.1%) combined after completion of treatment. Financial constraints and referral are factors affected by distance,<sup>33-36</sup> and most of our patients 85.3% lived at distances beyond 50 km to UCH, Ibadan, out of which 73.4% lived at distances 100 km and beyond to UCH, Ibadan. Athas et al<sup>37</sup> described that increasing distance to radiotherapy facility is associated with decrease use of the services and Nattinger et al<sup>38</sup> from US SEER data of cohort of about 22,000 breast cancer patients found that women who live 40 miles and more away from radiotherapy facility have decreased chances of receiving radiotherapy compared to those who live less than 40 miles to the facility.

In this study, the patients mostly affected by distance were those with low socioeconomic status, those with financial constraints and, referred back to primary surgeons, also patients with left breast disease and bilateral breast disease. Socioeconomic inequalities are the major factors linked to higher burden of breast cancer,<sup>39,40</sup> therefore, patients with low socioeconomic status are more likely not to come for treatment, to complete their treatment or remain on follow-up care. Financial constraints are also linked to low socioeconomic status<sup>41, 42</sup> and thus, follow-up care discontinuation. Bilateral breast disease is associated with higher disease burden including distance metastasis, poor prognosis and poor survival.<sup>43, 44</sup> As the disease progresses, and as the patient grows more dependent more support is needed to keep up with follow up care. Kaku et al<sup>45</sup> and Paul et al<sup>46</sup> observed similar trends among patients



with advanced stage cervical cancer in India. Thus, patients without high disease burden and better performance status were more likely and more capable to keep-up to their follow-up care. Although the study has both retrospective and prospective elements, it is limited by its majority retrospective nature, some cases were excluded due to incomplete information and inability to reach patients and or their next of kin through phone calls, thus lowering the sample size. The study was carried out in a unit of one hospital instead of a multicentre study so generalization of the result of the study is limited. Despite all the limitations, the study has highlighted an important gap in the management of breast cancer patients which could shape further research and influence policy towards breast cancer care in Nigeria.

In conclusion, our study showed that distance of 50 km and more to radiotherapy treatment facility have negative effect on the ability of breast cancer patients to comply with follow-up therapy and supportive care, and that breast cancer patients with the following characteristics: low socioeconomic status, those who discontinue care due to financial constraints and, referred back to breast surgeon and bilateral breast cancer were mostly affected by distance. At least one tertiary hospital in each state in Nigeria should be equipped with state of the arts cancer treatment facilities to bring radiotherapy care to peoples' access.

#### **Ethical Consideration.**

Ethical clearance to conduct the study was obtained from the Joint Ethical Review committee of the University of Ibadan/University College Hospital, Ibadan. All information collected in this study were coded with numbers. The names of patients was not used to maintain confidentiality. The

data extraction forms were kept in a locked cupboard; the data entered on the computer were password protected and were accessible to the researcher only. The study was non-invasive and ethical measures to avoid or reduce any harm to the patients was adhered to strictly.

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