

Financial Burden of Cancer on Patients Treated at a Tertiary Health Facility in South West Nigeria

Abstract

Background: Cancer is a growing health concern in the world. The financial burden of cancer affects not only cancer patients and their families, but also the society as a whole. In Nigeria there is a dearth of information about the financial burden of cancer on patients. Hence, there is need to estimate the cost of cancer treatment and to show the resources being allocated to the problem. **Objectives:** The aim of this study was to estimate the financial burden of cancer on patients treated at a tertiary health facility in South West Nigeria. **Materials and Methods:** The study was a cross-sectional study and patients were interviewed using a set of questionnaires that addresses sociodemographic and economic questions involving medical and nonmedical costs (direct medical costs). **Data Analysis:** Data obtained were analyzed using the Statistical Package for Social Sciences (SPSS), version 21.0. Descriptive statistics such as frequencies (%), mean, standard deviation, median, range and *P*-value were used to highlight important and relevant features of the data. For ease of analysis some of the variables such as sociodemographic, medical, and nonmedical costs were grouped or categorized. **Results:** Two hundred and twenty cancer patients participated in the study. The mean age of the patients was 54.1 (standard deviation [SD] = 13.4) years and majority were females (81.4%). Approximately one-third of the respondents were those with breast (35.9%) and cervical (35.5%) cancers, respectively. Majority perceived financial burden as a result of cancer to be significant (82.7%). The mean annual income of patients was \$5,548.7 (SD = \$7,245.4). The main sources of income for their treatments were from their children (26.8%). The mean total cost incurred by patients with cancer was \$5306.9 (SD = \$5045.7), with medical costs accounting for the highest percentage \$3889.4 (SD = \$4372.9); 73.0% and nonmedical costs of \$1417.5 (SD = \$1085.6); 27.0%. Patients with colorectal cancer incurred the highest cost, whereas cervical cancer patients incurred the least cost. **Conclusion:** Financing cancer management is a major challenge for both patients and their caregivers. Cancer care also results in a loss of economic income available to the community/country.

Keywords: Cancer, financial burden, medical cost, nonmedical cost

Introduction

Cancer is the second leading cause of death worldwide and is projected to soon surpass heart disease as the leading cause of death.^[1] It was estimated that 12.7 million new cancer cases and 7.6 million cancer deaths occurred in 2008 worldwide.^[2] In Nigeria, some 100,000 new cases of cancer occur every year, with a high case fatality ratio.^[3] It is projected that by 2015, 500,000 new cancer cases will be found in Nigeria.^[4] Furthermore, 60%–70% of Nigerian cancer patients present late.^[5] Financing cancer treatment is a major challenge for both developed and developing countries. The occurrence of a cancer has a significant negative impact as the treatments are very expensive, quality of

life is degraded, and the disease often leads to death. Cancer also causes a loss of economic income available to the community. This consists of two elements: the cost of care, and productivity losses due to the impact of illness on employment.^[6]

In a poor-resource setting like Nigeria, where most of the patients belong to poor socioeconomic class,^[7] and patients pay out of pocket, financing cancer treatment has become a serious burden on the patients and their immediate family members.^[8] Most families sell their properties, get loans, and even children drop out of school just for them to be able to get the prescribed treatment.^[8]

Nigeria is also a political federation with 36 states with multiethnic groups. Nigerian health system has been evolving over the years.

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The current structure of health sector in Nigeria comprises of local government which is responsible for primary health facilities while the state and federal government are responsible for secondary health facility and tertiary health facility, respectively. Cancer treatments are only offered in nine tertiary cancer centers that are all located in city areas and therefore suspected cases of cancers in the rural areas are normally referred to the tertiary cancer centers for diagnosis and treatment.

Most of the cancer patients in Nigeria and other developing countries are from low socioeconomic class. Financing cancer treatment is a major challenge for these patients, as the treatments are very expensive and National Health Insurance Scheme (NHIS) does not cover all cancer treatments.

However, many developed countries have information on the cost of cancer treatment, which assist in planning for it. Because of the structure of financing cancer treatment involving the patients and relative with minimal contribution from the government, the financial implication of the disease is not usually ascertained in Nigeria. This study is therefore conceived to provide an estimate of financial burden of cancer on patients treated at the Department of Radiation Oncology, University College Hospital, Ibadan.

Materials and Methods

Study location

The study was carried out in the Radiation Oncology Department, University College Hospital (UCH), Ibadan, Nigeria. UCH is located in Ibadan North, Local Government area of Oyo State. Oyo state is one of the 36 states in Nigeria. The state was created in 1976 out of the old western region, it has an estimated population of 5.2 million (National Population Commission, 2005). Radiation Oncology Department was established in the year 1987; it is equipped with a telecobalt and high dose rate (HDR) Co60 brachytherapy machines with modern treatment planning system. The Department has eight radiation oncologists and four certified medical physicists. The clinic serves as a referral center for radiotherapy and oncology services in the southwest, southeast, and south southern regions of the country. Indeed, there are also referrals from other parts of the country and neighboring countries.

During the study period, a total number of 854 cancer patients were seen in the clinic.

Study population

Patients with histological diagnosis of cancer who completed treatment and were on follow-up in the Radiation Oncology Department, UCH, Ibadan were participated in the study.

Inclusion criteria

All histologically diagnosed cancer patients who completed treatment and were on follow-up in the Radiation Oncology Department were included in the study.

Exclusion criteria

Patients who were too ill to be interviewed using the World Health Organization performance status scale were excluded from the study.

Study design

This was a cross-sectional study.

Data collection instruments

Data were collected with the following questionnaire/instruments.

Questionnaire

This is proforma to collect data on patient's age, gender, educational level, living place, and employment status, type of cancer, and stage of disease. No standardized or validated instrument is available to assess self-reported economic cost information and therefore the researcher developed an available questionnaire that addressed different economic costs. The questionnaire covered medical and nonmedical costs (direct medical costs) such as costs for screening/investigations, treatment (surgery, radiotherapy, chemotherapy, and other drugs), consultation fees, transportation, food and lodging, hospitalization fees were all included. In addition, data concerning level of burden, source of income, annual income, cost of domestic services, and health insurance were covered. The questionnaire was developed by the researcher after an exhausting literature review.

Data collection

The study was conducted within a period of 10 months at the outpatient clinic of Radiation Oncology Department, University College Hospital Ibadan, South West Nigeria. All histologically diagnosed cancer patients who received treatment and were on follow-up were considered. Voluntary consent was obtained from the patients. The study was approved by the joint ethical review committee of the University of Ibadan/University College Hospital, Ibadan. The patients were interviewed while waiting at the reception to see their doctors. Research assistants were recruited and trained to administer the questionnaires to the patients, to remove bias that the researcher may introduce because of prior knowledge of the study. The researcher imputes the cost for each component by identifying each unit cost and total cost for all inputs needed in the management. The components involved are medical and nonmedical costs that include laboratory tests, radiological procedures, treatments, consultation fees, food and lodging, and transportation. Imputed travel costs were calculated based on the amount spent for each trip multiplied by the number of trips. All costs were expressed in naira and converted to prevailing rate of the US dollar as of July 2, 2020.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software program, version 21.0.

Results

At the end of the study, 220 patients were interviewed who had completed treatment and were on follow-up.

The sociodemographic characteristics of the patients are presented in Table 1. The mean age of patients was 54.1 (SD = 13.4) years and ranged between 3 and 82 years. The modal age groups were 46–55 and 56–65 year, each accounting for 27.7% of cases. Most of the patients were female (81.4%). Approximately half had tertiary education (51.8%). Trading was the predominant occupation (55.5%), whereas civil servants constituted approximately one-third (28.2%) of the study population.

Table 2 shows the site and stage at presentation among respondents. Approximately one-third of the respondents presented with breast (35.9%) and cervical cancers (35.5%) each. More than half presented in stage III of the disease (58.6%).

Table 1: Sociodemographic characteristics

Variable	Frequency (N = 220)	%
Age (years)		
Mean (SD)	54.1 (13.4)	
≤25	6	2.7
26–35	9	4.1
36–45	42	19.1
46–55	61	27.7
56–65	61	27.7
66–75	26	11.8
≥76	16	6.9
Sex		
Female	179	81.4
Male	41	18.6
Marital status		
Single	13	5.9
Married	169	76.8
Widowed	34	15.5
Divorced	3	1.4
Not disclosed	1	0.4
Level of education		
Primary	40	18.2
Secondary	36	16.4
Tertiary	114	51.8
None	30	13.6
Occupation		
Civil servant	62	28.2
Trading	122	55.5
Farmer	2	0.9
Teachers	13	5.9
Students	6	2.7
Others	15	6.8
Ethnic group		
Yoruba	156	70.9
Igbo	47	21.4
Hausa	2	0.9
Others	15	6.8

The economic profile of patients is presented in Table 3. The mean annual income of patients was \$5,548.7 (SD = \$7245.4) and ranged between \$75.1 and \$50,081.38. Majority of the patient’s source of income for their treatment was 26.8% from their children, 20.0% self-sponsored, 19.1% self-sponsored and spouse, 15.0% from spouse, 7.7% self, relatives and friends, 5.5% from relatives and friends, 2.7% from parents, and 1.4% from employer.

Table 4 shows treatment modalities received by patients. More than half (60.0%) underwent surgery, whereas most had chemotherapy (94.5%) and radiotherapy (92.3%).

The overall mean cost of cancer treatment (medical and nonmedical) is presented in Figure 1. Overall mean cost was \$5306.9 (SD = \$5045.7) and ranged from \$1089.3 to \$48829.4. Total mean medical cost was \$3889.4 (SD = \$4372.9) and ranged from \$601.0 to 43821.2. Total mean nonmedical cost was \$1417.5 (SD = \$1085.6) and ranged from \$112.7 to 5634.2.

Cost of treatment according to site is presented in Figure 2. Total mean cost was highest in patients with colorectal cancer. Total mean medical cost incurred was highest for patients with

Table 2: Site and stage on presentation

Variable	Frequency	%
Site of cancer		
Breast	79	35.9
Cervix	78	35.5
Prostate	19	8.6
Lung	3	1.4
Colorectal	7	3.2
Nasopharynx	5	2.3
Ovaries	4	1.8
Skin	2	0.9
Others	23	10.4
Stage of disease		
I	8	3.7
II	37	16.8
III	129	58.6
IV	46	20.9

Table 3: Economic profile on presentation

Variable	Frequency	Percentage (%)
Annual income (\$US equivalent)		
Mean (SD)	\$5,548.7 (\$7245.4)	
Source of income		
Self	44	20.0
Spouse	33	15.0
Relatives and friends	12	5.5
Employer	3	1.4
Children	59	26.8
Religious organizations	4	1.8
Self and spouse	42	19.1
Self, relatives, and friends	17	7.7
Parents	6	2.7

Table 4: Treatment modalities

Variable	Frequency	%
Surgery	132	60.0
Chemotherapy	208	94.5
Radiotherapy	203	92.3
Type of radiotherapy (n = 203)		
External beam radiotherapy	177	87.6
Brachytherapy	3	1.5
Both	22	10.9
Other treatment	84	38.2
Treatment type (n = 84)		
Hormonal	78	92.9
Targeted	1	1.2
Both	2	2.4
Others	3	3.6

colorectal cancer, followed by those with prostate, ovarian, lung, breast, nasopharyngeal, skin, and cervical cancers, respectively. Total mean nonmedical cost incurred was highest for patients with lung cancer, followed by those with prostate, colorectal, ovarian, breast, nasopharyngeal, skin, and cervical cancers, respectively.

Mean cost of cancer treatment according to stage of diagnosis and treatment type is presented in Figure 3. Overall cost, medical cost, and nonmedical cost incurred were all highest among patients presenting with stage IV disease compared to other stages.

Economic indicators among respondents are presented in Table 5. The mean number of sick leave days was 93.4 (SD = 61.6) days and ranged between 10 and 270 days. More

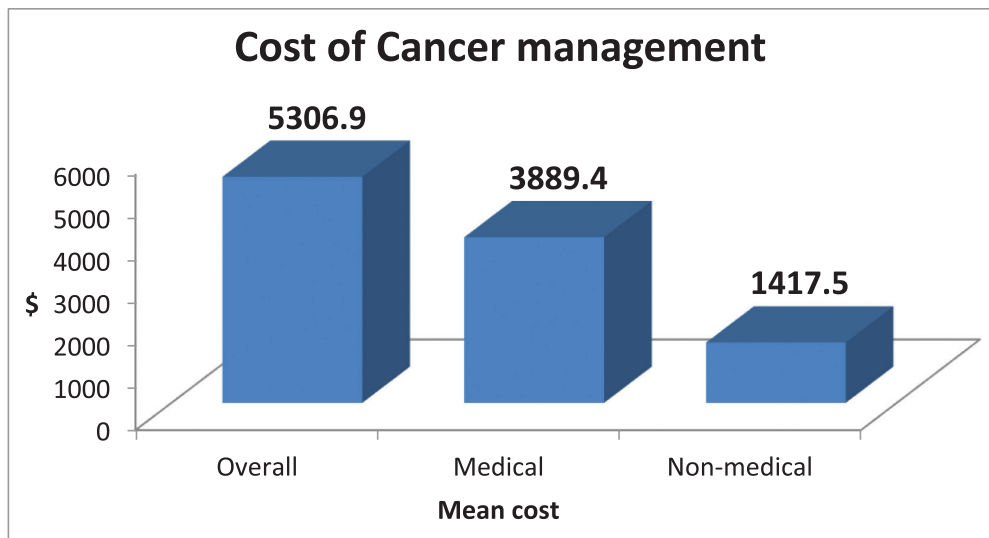


Figure 1: Cost of cancer management

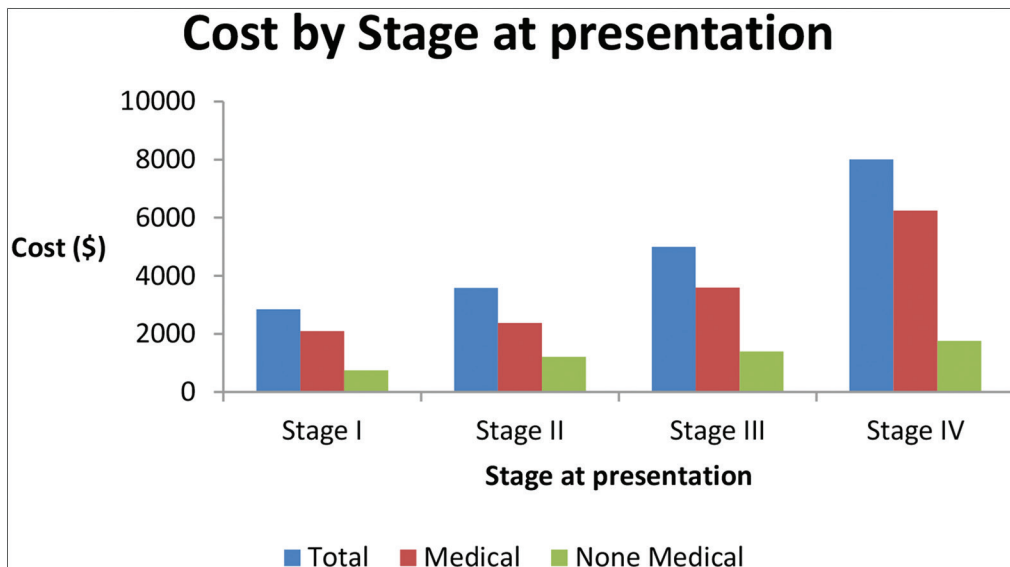


Figure 2: Cost of treatment according to the cancer staging

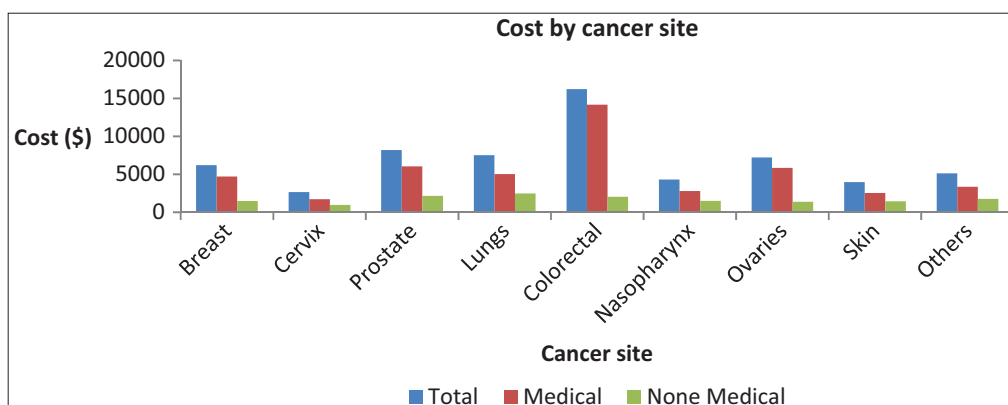


Figure 3: Cost of treatment according to cancer site

Table 5: Economic indicators

Variable	Frequency	(%)
Sick leave days		
Mean (SD)	93.4 (61.6)	
Work loss	13	5.9
Hospitalization	153	69.5
Perception of economic burden		
None	1	0.5
Slight	2	0.9
Moderate	22	10.0
Significant	182	82.7
Unmanageable	13	5.9
Health insurance	0	0

than half of the respondents were hospitalized (69.5%) as a result of surgery, chemotherapy, or treatment complications. The range of hospital stayed was between 2 and 28 days. Majority of the patients perceived the economic burden as a result of cancer to be significant (82.7%) and none of the patients had any health insurance that covered their cancer treatment.

Discussion

This study estimated the medical and nonmedical costs incurred by patients with cancer. Patients are largely unaware of the financial implication of cancer diagnosis and its treatment, which consist of medical and nonmedical costs.^[9]

Breast, cervical, and prostate cancers were the commonest malignancies observed among the respondents, similar to findings in the previous studies.^[3,8] The patients benefited from both chemotherapy and radiotherapy as reported in earlier studies.^[8,10]

Majority of patients were traders and majority of the patients source of income for their treatment were from children (26.8%) and self-sponsored (20.0%), this is similar to findings in New South Wales (NSW).^[11]

In this study, the mean direct cost (medical and nonmedical) incurred by patients with cancer was \$5306.9 with medical costs taking the higher percentage (73.0%) compared to

nonmedical costs (27.0%). This finding is in agreement with the report of the study conducted in Harvard School of Public Health by Bloom *et al.*^[12] in which medical costs accounted for higher percentage (46.0%) compared to nonmedical costs (27.0%) and productivity losses (27.0%).

The total costs incurred was highest in patients with colorectal cancer, because most of them presented with metastatic disease which necessitated the used of very expensive chemotherapy and targeted therapy in some of them. This was followed by those with prostate, ovarian, lung, and breast cancer, respectively, whereas cervical cancer patients incurred the least costs. A similar study in NSW reported that lung cancer patients incurred the highest costs followed by colorectal, breast, and stomach cancer, respectively.^[11] The least costly cancers were bladder, kidney, and brain cancer.^[11] Contrary to these findings, it was found that non-melanoma skin cancer (NMSC) was the most costly cancer in Australia in 2011.^[13] Also Chu *et al.*^[14] in Taiwan found that breast cancer has the highest medical costs.

The total medical costs incurred by cancer patients were highest among patients presenting at stage IV because most of them received expensive drugs such as targeted therapies and longer hospital stay, this was followed by those presenting in stage III, II, and I, respectively. A similar pattern was observed in studies done by Berraho *et al.*^[6] in Morocco, Wolstenholme *et al.*^[15] in the United Kingdom, and Barron *et al.*^[16,17] in the USA.

In this study, cost of chemotherapy was found to account for the greatest proportion of total medical costs which was similar to the study done by Nguyen *et al.*^[18] in central Vietnam, in which costs of chemotherapy account for 64.9% of total medical costs.

It has been shown in global practice that two-third of all cancer patients require radiotherapy with or without other type of treatment,^[19] which is consistent in this study. The mean total cost of radiotherapy in this study was \$474.8, which was in line with the previous studies by Adenipekun *et al.*^[8] and Eyesan *et al.*^[20]

Mohanti *et al.*^[19] in India reported the mean cost of radiotherapy of RS5310(\$3804.0). However, Warren *et al.*^[9] in the USA reported the costs of radiotherapy between \$3496 and \$5629 for common cancers.

The mean cost of surgery in this study was highest for patients with prostate cancer which is contrary to the study done by Warren *et al.*^[9] in which colorectal cancer has the highest mean cost of surgery, followed by lung, prostate, and breast, respectively.

The patients with cancer incurred costs in relation to seeing their doctors regarding their cancer treatment. This study reported a mean consultation fee of \$222.8 with a range of \$31.3–1252.0, which is similar to the finding of Sharp *et al.*^[21] in Ireland.

The mean nonmedical costs incurred by cancer patients in this study was \$1417.5 with lodging \$710.5 taking the highest costs followed by feeding \$367.7, transportation \$367.4, and domestic services \$341.5, respectively. Sharma *et al.*^[19] in India reported that 59% of total cost is spent in nonmedical cost. This is higher than finding in this study (29%). Approximately 50% of patients spent R640 (\$10.3) on food and lodging.^[19]

Majority of patients perceived the financial burden as a result of cancer to be significant (82.7%), followed by those who said it is moderate (10%), unmanageable (5.9%), slight (0.9%), and none (0.5%). A similar study by Long *et al.*^[22] in Ontario reported contrary results, in which higher percentage response to financial burden question as none (26.9%), followed by slight (26.9%), somewhat (25.1%), significant (16.5%), and unmanageable (3.9%). Health insurance in Ontario is most likely responsible for the higher percentage of none and slight and also lower unmanageable compared to this study which was done in a setting where there is no health insurance coverage. In addition, early presentation may also lessen the burden.

Centre for Disease Control and Prevention (CDC) reported that in 2001–2005, 50% of total medical cost of cancer was paid by private insurance, which was similar to a study done in the USA by Florence *et al.*^[23,24] in which 42% of total medical costs were paid by private insurance. In contrary to this study, none of the patients had any health insurance that covered their cancer treatment.

Conclusions

Financing cancer treatment is a serious burden on patients and their families in our environment as they pay out of pocket. Colorectal cancer and stage IV disease patients incur the highest cost and take more sick leave days.

There is a need for a comprehensive health insurance program that will incorporate cancer care and help reduce the burden on our patients.

Ethical policy and institutional review board statement

The study was approved by the joint ethical review committee of the University of Ibadan/University College Hospital, Ibadan (UI/UCH Ethics committee assigned number: UI/EC/14

/0010). Each participant gave a written informed consent before the interview.

Data availability statement

The datasets will be available from the corresponding author on reasonable request.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

MMI and MAG conceived the idea of this study and conducted the literature search. MMI ran the statistical analyses and drafted the manuscript. MMI, AAA, and OBC participated in the conceptualized design of this work. MMI, MAG, AAA, OBC, and AA interpreted the study results and revised its intellectual context. All the authors contributed to the writing of the paper, and reviewed and approved its final version for submission.

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