**Original Article**

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

## Muhammad Inuwa Mustapha1,

**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 heath 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*

**Musa Ali-Gombe2, Adamu Abdullahi3, Adeniyi Adenipekun4, Oladapo Babatunde Campbell4**

*1Oncology unit, Department of Radiology, Aminu Kano Teaching Hospital, Kano, 2Department of Radiology, Gombe State University, Gombe, 3Radiotherapy and*

*Oncology Centre, Ahmadu Bello University Teaching Hospital, Zaria, 4Department of Radiation Oncology, University of Ibadan, Oyo State, Nigeria*

# 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

**Received:** 05-Jan-2022 **Accepted:** 01-Feb-2022 **Published:** 08-Jun-2022

***Address for correspondence:***

*Dr. Muhammad Inuwa Mustapha, Radiation and Clinical Oncology Unit, Department of Radiology, Aminu Kano Teaching Hospital,*

*P.M.B. 3452, Zaria Road, Tarauni Local Government, Kano State, Nigeria.*

*E-mail: mohdimustapha@yahoo. co.uk*

system has been evolving over the years.

|  |
| --- |
| **Access this article online** |
| **Website:**  [www.jwacs-jcoac.org](http://www.jwacs-jcoac.org/) |
| **DOI:** 10.4103/jwas.jwas\_4\_22 |
| **Quick Response Code:** |

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial- ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**How to cite this article:** Mustapha MI, Ali-Gombe M, Abdullahi A, Adenipekun A, Campbell OB. Financial burden of cancer on patients treated at a tertiary health facility in South West Nigeria. J West Afr Coll Surg 2020;10:23-9.

**For reprints contact:** [reprints@medknow.com](mailto:reprints@medknow.com)

© 2022 Journal of the West African College of Surgeons | Published by Wolters Kluwer ‑ Medknow 23

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.

24 Journal of the West African College of Surgeons | Volume 10 | Issue 4 | October-December 2020

# 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

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

**Variable Frequency (*N* = 220) %**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Age (years) |  |  |  | **Table 2: Site and stage on presentation** | | |
| Mean (SD) | 54.1 (13.4) |  |  | **Variable** | **Frequency** | **%** |
| ≤25 | 6 | 2.7 |  | Site of cancer |  |  |
| 26–35 | 9 | 4.1 |  | Breast | 79 | 35.9 |
| 36–45 | 42 | 19.1 |  | Cervix | 78 | 35.5 |
| 46–55 | 61 | 27.7 |  | Prostate | 19 | 8.6 |
| 56–65 | 61 | 27.7 |  | Lung | 3 | 1.4 |
| 66–75 | 26 | 11.8 |  | Colorectal | 7 | 3.2 |
| ≥76 | 16 | 6.9 |  | Nasopharynx | 5 | 2.3 |
| Sex |  |  |  | Ovaries | 4 | 1.8 |
| Female | 179 | 81.4 |  | Skin | 2 | 0.9 |
| Male | 41 | 18.6 |  | Others | 23 | 10.4 |
| Marital status |  |  |  | Stage of disease |  |  |
| Single | 13 | 5.9 |  | I | 8 | 3.7 |
| Married | 169 | 76.8 |  | II | 37 | 16.8 |
| Widowed | 34 | 15.5 |  | III | 129 | 58.6 |
| Divorced | 3 | 1.4 |  | IV | 46 | 20.9 |
| Not disclosed | 1 | 0.4 |  |  |  |  |

**Variable**

|  |  |  |
| --- | --- | --- |
| Level of education |  | |
| Primary | 40 | 18.2 |
| Secondary | 36 | 16.4 |
| Tertiary | 114 | 51.8 |
| None | 30 | 13.6 |
| Occupation |  |  |

### Table 3: Economic profile on presentation

**Annual income ($US equivalent)**

Mean (SD) $5,548.7 ($7245.4)

**Frequency Percentage**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Civil servant | 62 | 28.2 |  |  | **(%)** |
| Trading | 122 | 55.5 | **Source of income** |  |  |
| Farmer | 2 | 0.9 | Self | 44 | 20.0 |
| Teachers | 13 | 5.9 | Spouse | 33 | 15.0 |
| Students | 6 | 2.7 | Relatives and friends | 12 | 5.5 |
| Others | 15 | 6.8 | Employer | 3 | 1.4 |
| Ethnic group |  |  | Children | 59 | 26.8 |
| Yoruba | 156 | 70.9 | Religious organizations | 4 | 1.8 |
| Igbo | 47 | 21.4 | Self and spouse | 42 | 19.1 |
| Hausa | 2 | 0.9 | Self, relatives, and friends | 17 | 7.7 |
| Others | 15 | 6.8 | Parents | 6 | 2.7 |

Journal of the West African College of Surgeons | Volume 10 | Issue 4 | October-December 2020 25

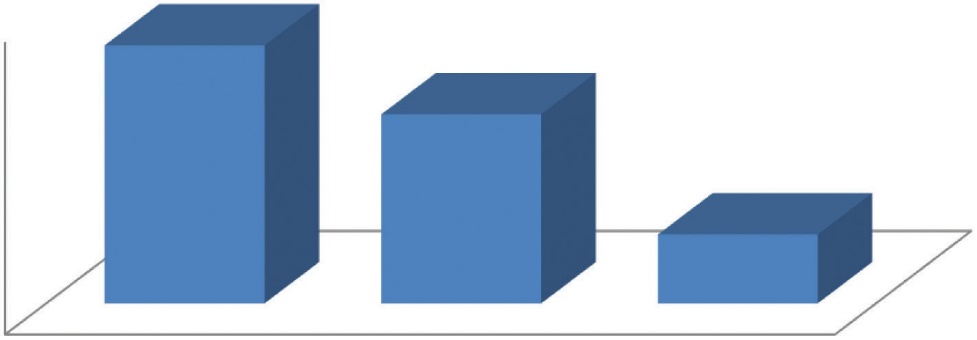
### Table 4: Treatment modalities

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.

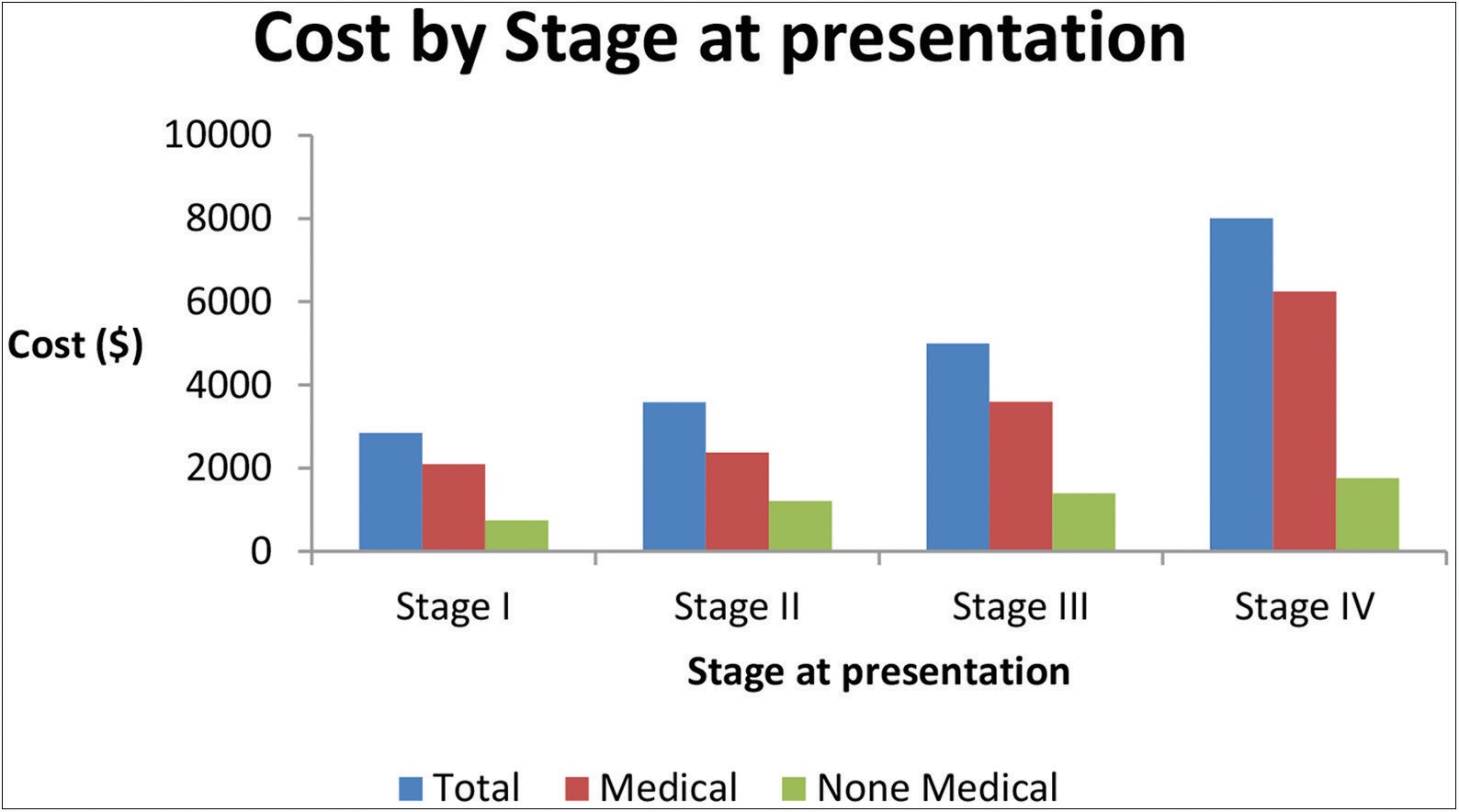
Mean cost of cancer treatment according to stage of diagnosis and treatment type is presented in Figure 3. Overall cost, medical cost, and nonmedical cost incurred were all highest among patients presenting with stage IV disease compared to other stages.

|  |  |  |
| --- | --- | --- |
| **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 |

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**

26 Journal of the West African College of Surgeons | Volume 10 | Issue 4 | October-December 2020



**Cost by cancer site**

20000

15000

**Cost ($)** 10000

5000

0

**Cancer site**

Total Medical None Medical

**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]

Journal of the West African College of Surgeons | Volume 10 | Issue 4 | October-December 2020 27

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.

### Acknowledgement

We gratefully acknowledge all our study participants, and staffs of Radiation Oncology Department, University College Hospital Ibadan. We acknowledge A.O. Lawanson, PhD, at the Health Economic Department, University of Ibadan and A.H. Aminu, PhD, Economic Department, Bayero University Kano, for checking the economic aspects of this paper.

### Financial support and sponsorship

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.

# References

1. Economic of Cancer [Internet]. The Centre for Health and the Social Sciences. The University of Chicago; 2012 [cited 2013 Sep 22]. Available from: [http://chess.uchicago.edu/programs/cancer.html.](http://chess.uchicago.edu/programs/cancer.html) [Last accessed on 2022 Feb 17].
2. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. Int J Cancer 2010;127:2893-917.
3. Jedy-Agba E, Curado MP, Ogunbiyi O, Oga E, Fabowale T, Igbinoba F, *et al*. Cancer incidence in Nigeria: A report from population-based cancer registries. Cancer Epidemiol 2012;36: e271-8.
4. Campbell OB. Cancer burden in Nigeria: A revisit. Paper presented at The Scientific Meeting of the African Cancer Centre; 2014 Nov 25; Abeokuta, Ogun State Nigeria.
5. Campbell O. Rising burden of cancers in the developing countries–– Nigeria. Nursing Oncology Workshop; 2013.
6. Berraho M, Najdi A, Mathoulin-Pelissier S, Salamon R, Nejjari C. Direct costs of cervical cancer management in morocco. Asian Pac J Cancer Prev 2012;13:3159-63.
7. World Bank. Nigeria: Health Nutrition and Population Country Status Report. Washington, DC: World Bank; 2005.
8. Adenipekun A, Omoyeni N, Soyanwo O. Financial burden of cancer treatment on patients with advanced cancer in poor-resource setting. Paper presented at The Scientific Meeting of the Association of Radiation and Clinical Oncology of Nigeria, 2017 Sept 21; Abuja, Nigeria.

28 Journal of the West African College of Surgeons | Volume 10 | Issue 4 | October-December 2020

1. Warren JL, Yabroff KR, Meekins A, Topor M, Lamont EB, Brown ML. Evaluation of trends in the cost of initial cancer treatment. J Natl Cancer Inst 2008;100:888-97.
2. Ketiku KK. The pattern of metastases in Nigerian breast cancer patients. Clin Radiol 1986;37:563-5.
3. The cancer council New South Wales. Cost of Cancer in NSW “A report by Access Economics Pty Limited for The Cancer Council NSW” [Internet]. New South Wales: The Cancer Council; 2007. Available from: <http://www.cancercouncil.com.au/wp-content/uploads/2010/11/> costofcancer\_summary.pdf. [Last accessed on 2022 Feb 17].
4. Bloom D. Global Economic Burden of Breast Cancer [Internet]. Harvard School of Public Health; 2009. Available from: [http://archive.](http://archive/) sph.harvard.edu/breastandhealth/files/david\_bloom\_theglobalburdeno fcancer\_4nov2009\_presentation.pdf. [Last accessed on 2022 Feb 17].
5. AIHW: Health System Expenditure on Cancer and Other Neoplasms in Australia 2008-09 [Internet]. Australian Private Health Insurance - Planet PHI. [cited 2014 Jan 23]. Available from: [http://austphi.tumblr.](http://austphi.tumblr/) com/post/70225206931/aihw-health-system-expenditure-on-cancer- and-other. [Last accessed on 2022 Feb 17].
6. Chu PC, Hwang JS, Wang JD, Chang YY. Estimation of the financial burden to the national health insurance for patients with major cancers in Taiwan. J Formos Med Assoc 2008;107:54-63.
7. Wolstenholme JL, Whynes DK. Stage-specific treatment costs for cervical cancer in the United Kingdom. Eur J Cancer 1998;34:1889-93.
8. Barron JJ, Quimbo R, Nikam PT, Amonkar MM. Assessing the economic burden of breast cancer in a US managed care population. Breast Cancer Res Treat 2008;109:367-77.
9. Legorreta AP, Brooks RJ, Leibowitz AN, Solin LJ. Cost of breast cancer treatment: A 4-year longitudinal study. Arch Intern Med 1996;156:2197-201.
10. Hoang Lan N, Laohasiriwong W, Stewart JF, Tung ND, Coyte PC. Cost of treatment for breast cancer in central Vietnam. Glob Health Action 2013;6:18872.
11. Sharma K, Das S, Mukhopadhyay A, Rath GK, Mohanti BK. Economic cost analysis in cancer management and its relevance today. Indian J Cancer 2009;46:184-9.
12. Eyesan SU, Obalum DC, Nnodu OE, Abdulkareem FB, Ladejobi AO. Challenges in the diagnosis and management of musculoskeletal tumours in Nigeria. Int Orthop 2009;33:211-3.
13. Timmons A, Gooberman-Hill R, Sharp L. “It’s at a time in your life when you are most vulnerable”: A qualitative exploration of the financial impact of a cancer diagnosis and implications for financial protection in health. PLOS One 2013;8:e77549.
14. Longo CJ, Fitch M, Deber RB, Williams AP. Financial and family burden associated with cancer treatment in Ontario, Canada. Support Care Cancer 2006;14:1077-85.
15. CDC––Medical Costs of Cancer Have Nearly Doubled Since 1987 [Internet]. [cited 2014 Dec 14]. Available from: http://www.cdc. gov/cancer/dcpc/research/articles/costs.htm. [Last accessed on 2022 Feb 17].
16. Tangka FK, Trogdon JG, Richardson LC, Howard D, Sabatino SA, Finkelstein EA. Cancer treatment cost in the United States: Has the burden shifted over time? Cancer 2010;116: 3477-84.

Journal of the West African College of Surgeons | Volume 10 | Issue 4 | October-December 2020 29