

## Assessment of costs and burden associated with cancer chemotherapy in patients attending a tertiary hospital in Zaria, Nigeria

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**Abstract:** This study aimed to determine the costs and burden associated with cancer chemotherapy by calculating the direct costs with or without co-morbidities in patients attending Ahmadu Bello University Teaching Hospital (ABUTH) Zaria, Nigeria. This was retrospective observational study conducted on cancer patients' data as well as cost details through the use of structured questionnaire interview. These data were reviewed and analyzed for relevant inferences. Healthcare associated cost were calculated based on the total amount spent by the patients to that of total number of patients. A total of 31 patients were enrolled, out of which 26 supplied complete health care-related cost details required for the study. The average cost for cancer chemotherapy was 29034.4 (Nigerian Naira), they cost was least among those within the age group 26-35 years, 20405 (Nigerian Naira) and highest among 51-70 years, 62550 (Nigerian Naira). 19 (69.3%) of patients complained of loss of productivity for over > 7 days/ month while 4, (13.4%) never had any decline in their productivity. 13 (50%) of the patients strongly agreed with difficulty in financing cancer chemotherapy while all strongly supports the need for inclusion of chemotherapeutic agents in the national health insurance scheme and the need for government and non-government interventions through cost relieve programs. The average cost of cancer chemotherapy at ABUTH Zaria was 29034.4 (Nigerian Naira). Considering the per capita income of an average Nigerian, cancer chemotherapy places high financial burden in these patients. This justify the need for governmental and non-governmental interventional programs towards relieving these patients.

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**Key words:** Health care cost, cancer chemotherapy. Cost analysis.

### 1. Background

Cancer is an emerging disease condition that causes much morbidity and mortality. It has been established the second most common cause of death in the developed world and on increase in the developing world (Adebamowo and Ajayi, 2000). This is mainly due to the tendency to metastatize and initiate new tumourigenesis. Cancer causes about a quarter of all deaths in developed countries, only slightly less than cardiovascular disease (Ogundipe and Obinna, 2008).

Cancer is rapidly becoming a public health crisis in low-income and middle-income countries. In sub-Saharan Africa, patients often present with advanced disease. Little health-care infrastructure exists, and few personnel are available for the care of patients (Kingham et al., 2013). There are wide variations in the incidence and prevalence of cancer for different anatomical sites, sexes, ages, and racial, ethnic and geographical groups. Cancer rates could further

increase by 50% to 15 million new cases in the year 2020 (WHO, 2003). In 2012, there were an estimated 14.1 million new cases of cancer in the world: 7.4 million (53%) in males and 6.7 million (47%) in females, giving a male: female ratio of 10:9.1 The World Age-Standardized (AS) incidence rate shows that there are 205 new cancer cases for every 100,000 men in the world, and 165 for every 100,000 females.

The WHO estimated incidence of cancer from all sites in 2002 for Nigeria was 90.7 and 100.9 per 10,000 for males and females respectively while mortality rates were 72.2 and 76 respectively. Adebomowo (2013) stated that, the age standardized incidence rate for all invasive cancers from the Ibadan Cancer Registry was 66.4 per 100 000 men and 130.6 per 100,000 women. While from Abuja Cancer Registry, it was 58.3 per 100 000 for men and 138.6 per 100 000 for women respectively. Cancer incidence data from these two population based cancer registries in Nigeria suggests substantial increase in

incidence of breast cancer in recent times. There are 11 cancer registries in Nigeria; located in various tertiary hospitals in various parts of Nigeria. On general note, cancer incidence in Nigeria appears low compared to developed countries however, this may not truly reflect cancer burden in Nigeria (Fatima, 2009).

The impact of cancer and cancer treatment on health care costs has increasingly gained the attention of providers and payers as well as patients and their families. Health care costs include the direct costs of receiving medical care and the nonmedical costs incurred while receiving care such as transportation or childcare expenses (Lyman, 2007). In addition, there are indirect costs associated with the morbidity of cancer care such as days lost from work for the patient or caregiver. Intangible costs such as pain and suffering and loss of companionship are difficult to measure but very real to the patient and family (Lyman, 2007). It has the most devastating economic impact all over the world. Healthcare cost is a national issue of debate in both medical and non-medical fora. In general, cancer treatment is extremely expensive, accounting for about \$72 billion in the USA. Cancer poses challenges for most individuals living in poor and middle income economy countries. The burden of cancer in Nigeria is unknown; mainly because of inconsistent statistics, under-diagnosis and under-reporting (Fatima, 2009). Therefore, pharmacoeconomic studies is needful in order to ascertain the extent to which this portion of the population undergo financial burdens due to cancer (Pallis et al., 2010). More so, to draw the attention of stakeholders; including policy makers and non-governmental organizations so that cancer patients can smile amid agony of pain.

This study aimed to determine the health care cost of cancer chemotherapy among patients attending ABUTH in order to determine the financial burden due to chemotherapy for cancer patients and to determine need for intervention and support by healthcare authorities and other stakeholders.

## 2. Methodology

### 2.1 Study Area

This retrospective study was carried out at the Ahmadu Bello University Teaching Hospital (ABUTH), which is a tertiary health institution located in Shika, Kaduna State, Nigeria. It is the largest hospital that serves all the 19 Northern States of Nigeria and some neighboring countries. Zaria city has a population of 975,153 (Nigerian National Population Commission, 2006).

### 2.2 Analysis of Healthcare costs

Medical records and ledgers of cancer patients who have successfully undergone chemotherapy

during the study period were reviewed and financial information obtained. These included costs of laboratory /radiology investigations, consumables and procedures, medications, surgery, hospital accommodation and feeding. Information about the duration of hospital stay was obtained from the nurses' admission and discharge record. Cost of miscellaneous services were also included.

### 2.3 Questionnaires

A well designed structured questionnaire that addressed the research problem was employed. It consists subjects' sociodemographic data, knowledge of cancer and its chemotherapy, expenses due to the illness, loss of productivity and quality of life, personal views and recommendations

### 2.4 Inclusion criteria

Diagnosed cancer patients on chemotherapy or those that have finished the treatment included:

- Adult patients aged 16 years and above
- Both genders
- Patients that are on chemotherapy alone or in combination with other drugs due to co-morbidities
- Both in- and out- patients.
- Chemotherapy pre-medication costs were included

### 2.5 Exclusion criteria

The following were considered exclusion criteria for the study

- Non-chemotherapy cancer patients
- newly diagnosed cancer patients whom are not on chemotherapy

### 2.6 Ethical Clearance

This protocol of this study was approved by the ethical research committee of Ahmadu Bello University of Teaching. All data were analyzed anonymously throughout the study.

### 2.7 Statistical analysis

Data was systematically analyzed as appropriate using statistical package for social sciences (SPSS) software version 20 (California Inc., USA). A two sided  $p < 0.05$  at 95% confidence interval (CI) was considered statistically significant for t-test to determine the statistical association between the variables.

## 3. Results and Discussion

Finding from this study reveal that the incidence of cancer was higher in female and within age group 36-50 years, this is in consonance with Fatima (2009) findings but differs from cancer reports of the international agency for research on cancer (WHO, 2003). There was higher incidence in unemployed patients than the employed ones probably due to lack of literacy on preventive measures of against cancer.

The mean cost of cancer chemotherapy was found to be N29034.4 per person, more so female patients spent more than the male counterpart. However, despite high incidence in the age group 36-50years high spending was observed in the age group 51-70 years. This might be linked to the multiple supports gained by these patients from their relatives (particularly working-class children) who chose the best they can afford to alleviate the suffering of their

parents. The result reveals that half the cancer patients strongly agreed with the difficulty of financing cancer chemotherapy. In addition, 99.2 % strongly agree for the need of government and non-government intervention as those obtainable with global malaria, tuberculosis and HIV supports. On the need for inclusion cancer chemotherapy into the national health insurance scheme, all patients supported the idea.

**Table 1: Sociodemographic details of the studied patients**

Demographic details	No. of patients	%
Sex (N=31)		
Male	13	42
Female	18	58
Age groups (years, N=31)		
16-25	6	19.4
26-35	4	12.9
36-50	12	38.7
51-70	8	25.8
> 70	1	3.2
Occupation (N=31)		
Civil servant	7	22.6
Trader	4	12.9
Student	7	22.6
Unemployed	9	29.0
Others	4	12.9

Others= retirees and housewives; *p* value > 0.05

**Table 2: Knowledge of cancer**

Response	No. patients	%
Yes	20	64.5
No	11	35.5

*p* value > 0.05

**Table 3: Believe for the effectiveness of chemotherapy**

Response	No. patients	%
Strongly agree	13	42.0
Agree	16	51.6
Undecided	1	3.2
Disagree	1	3.2
Strongly disagree	0	0.0

**Table 4: Estimated healthcare cost expended during illness (N=26)**

Cost category (one episode)	per person	subtotal (N)	% of total cost
Direct cost (medical)			
i. Chemotherapy	29034.4	754894	67.8
ii. Laboratory/ Radiographic investigations	6341.2	164870	14.8
Direct (non-medical)			
i. Transportation	7476.9	194400	17.4
Total	42852.5	1114164	100

Cost of illness= No. of episode x (direct cost per episode + indirect cost per episode)

Note: indirect not considered in this work.

**Table 5: Healthcare costs distributions across patients' demographic data**

Characteristics: (N=26)	Direct cost (medical) Average (N)	Direct cost (non-medical) Average (N)	Total cost Average (N)
Gender			
Male	40929	9600	50529
Female	54969	5920	60489
Age (years)			
16-25	24380	6800	31180
26-35	13405	7000	20405
36-50	26692	5975	32667
51-70	53736	8814	62550
> 70	88000	20000	108000
Occupation			
Civil servant	59151	6340	65491
Trader	35525	9000	44525
Student	19945	7000	26945
Unemployed	25541	5567	31108
Others	50865	13150	64005

Others: retirees

*p* value > 0.05**Table 6: Loss of productivity on cancer patients**

Category	Response	%
Tangible (per month)		
< 7days	7	23.3
> 7days	19	63.3
Not at all	4	13.4
Intangible		
1	17	56.6
2	5	16.7
3	2	6.7
4	6	20.0

Intangible: these are pain, grief, discomfort and loss of leisure time.

1- Signifies only one of pain, grief, discomfort or loss of leisure time.

2- Signifies two of pain, grief, discomfort or loss of leisure time.

3- Signifies three of pain, grief, discomfort or loss of leisure time.

4- Signifies four of pain, grief, discomfort and loss of leisure time.

**Table 7: Response to the financial burden of cancer chemotherapy by the patients (N=22)**

Response	Category		
	PCND	CE	GNI
	N (%)	N (%)	N (%)
Strongly agree	6 (19.4)	18 (58.1)	24 (77.4)
Agree	2 (6.5)	11 (35.4)	6 (19.4)
Undecided	0 (0.0)	0 (0.0)	0 (0.0)
Disagree	10 (32.3)	2 (6.5)	1 (3.2)
Strongly disagree	13 (41.8)	0 (0.0)	0 (0.0)

Key:

PCND = Paying for chemotherapy is not difficult, CE = Chemotherapy is expensive,

GNI = Government and non-government interventions needful

**Table 8: Personal views on Interventional and support programs for cancer patients**

Response	Personal views					
	NHIS		LPC		SGNS	
	No.	%	No.	%	No.	%
Yes	28	93.3	12	40	14	46.7
No	0	0	16	53.3	13	43.3
Not sure	2	6.7	4	6.7	3	10

NHIS= National Health Insurance Scheme, LPC = Literacy on preventive measures of cancer

SGNS = Satisfaction to government and non-government organizations support to cancer patients.

#### 4. Conclusion

The cost of cancer chemotherapy was found to be N29034.4 and there is associated financial burden of cancer treatment on the patients and patients' relative, as well as, the need for more government and non-government organization interventions. The major limitations such of this study was scanty data obtained and values of indirect costs (i.e. loss of productivity). Therefore, this indicates the need for studies especially cohorts and longitudinal.

#### Conflicts of Interest

Authors declare that there no conflict of interest associated with this manuscript.

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