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## The burden of out-of-pocket payments among cardiovascular disease patients in public and private hospitals in Ibadan, South-West, Nigeria

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## The burden of out-of-pocket payments among cardiovascular disease patients in public and private hospitals in Ibadan, South-West, Nigeria

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### Abstract

**Objectives:** Given that the mechanism for financial protection is underdeveloped in Nigeria, out-of-pocket payment (OOP) for treating cardiovascular disease could impose substantial financial burden on individuals and their families. This study estimated the burden of OOP expenditures incurred by a cohort of CVDs patients in Ibadan, Nigeria.

**Design and settings:** This study utilized a descriptive cross-sectional study design. A standardized survey questionnaire originally developed by Initiative for Cardiovascular Health Research in Developing Countries (ICHRDC) was used to electronically collect data from all the 744 CVDs patients who accessed healthcare between 4<sup>th</sup> November 2019-31<sup>st</sup> January 2020 in the cardiology departments of private and public hospitals in Ibadan, Nigeria. Baseline characteristics of respondents were presented using percentages and proportions. The OOP payments were reported as means  $\pm$  standard deviation. Costs/OOP payments were in Nigerian Naira (NGN (₦)). The average US Dollar (USD (\$) to NGN (₦) at the time of data collection was ₦ 362.12 per \$1. All Quantitative data were analyzed using STATA version 15.

**Outcome measures:** The burden of outpatient, inpatient and rehabilitative care OOP payments

**Results:** Majority of the CVDs patients were within the age range of 45-74 years and 68.55% of them were females. The diagnostic conditions reported among CVDs patients were hypertensive heart failure (84.01%); dilated cardiomyopathy (4.44%); ischaemic heart disease (3.9%), and anaemic heart failure (2.15%). Across all the hospital facilities, the annual direct and indirect outpatient costs were ₦ 421,595.7 $\pm$ ₦ 855,962.0 (\$1,164.2 $\pm$ \$2,363.8) and ₦19,146.5 $\pm$ ₦53,610.1 (\$52.87 $\pm$ \$148.05). Similarly, the average direct and indirect OOP payments per hospitalization across all facilities were ₦182,302.4 $\pm$ ₦249,090.4 (\$503.43 $\pm$ \$687.87) and ₦ 14,700.8 $\pm$ ₦ 69,297.1 (\$40.60 $\pm$ \$191.37), respectively. The average rehabilitative cost after discharge from index hospitalization was ₦30,012.0 (\$82.88).

**Conclusion:** The burden of OOP payment among CVDs patients is enormous. There is a need to increase efforts to achieve universal health coverage (UHC) in Nigeria.

**Keywords:** Cardiovascular diseases, Out-of-pocket payment, Universal health coverage, Catastrophic health expenditure

**Manuscript word count:** 3,419

**Strengths and limitations of this study**

- For the first time, this study estimated all the OOP expenditures relating to outpatient, hospitalization as well as rehabilitative care in Nigeria.
- The study involved patients ailing from a wide range of CVDs
- The implementation of this study is methodologically robust as it attempted to avoid some of the weaknesses observed in previous studies.
- The findings in the study will be useful for reiterating the urgent need to scale up efforts to achieving universal health coverage in Nigeria
- The OOP payments elicited for hospitalized CVDs patients may have been underestimated since data was collected after the patients were discharged to avoid bogging them and/or their caregivers at a time when they were seriously ill and hospitalized.

## Background

The prevalence of cardiovascular diseases (CVDs) is increasing in low-and-middle-income-countries (LMICs), imposing a substantial economic burden on economies, households and individuals.[1-3] In many developing countries, CVDs are becoming the leading cause of morbidity and deaths.[4] Recently, sub-Saharan Africa (SSA) countries are experiencing an unprecedented rise in the number of individuals coming down with heart-related diseases.[5-7] A study reported that this health condition accounts for between 7-9 percent of all hospital admissions in the African region.[8] Between 1990 and 2017, the number of deaths related to CVDs in SSA increased by over 50% in absolute terms.[9,10]

Worse still, Universal Health Coverage (UHC) remains low in majority of the countries in SSA and as a result, the burden of medical payments is often disproportionately borne by individuals and their households. This constitutes large economic burdens for families and predisposes them to catastrophic healthcare payments and other impoverishment impacts of Out-of-Pocket (OOP) payments.

In Nigeria, the mechanism for financial protection against excessive medical payments is underdeveloped as only about 5% of the entire population is covered by the health insurance provided under the National Health Insurance Scheme (NHIS).[11] A study conducted to compare the level of UHC in three SSA countries, Ghana, Kenya and Nigeria, revealed that Nigeria had the lowest UHC of the countries, with 1.1% of the female population and 3.1% of male population covered by social health insurance, respectively.[12]

Consequently, there has been over dependence on OOP payments as the major source of healthcare financing in Nigeria. As revealed in Figure 1,

**Figure 1:** Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)

In view of the rising levels of chronic disease like CVDs and the desire to achieve UHC by 2030 in the country, there is an increasing demand for research evidence in connection with the economic burden posed by OOP payments on patients. Therefore, this study aimed at estimating the OOP health expenditures (the direct and indirect costs) of treatment incurred by patients receiving outpatient and inpatient care in public and private hospital facilities in Ibadan, a South-Western State in Nigeria. In addition, homecare cost for patients who required rehabilitative care after hospitalization was estimated. Findings in the study will be useful for ascertaining the cost-effectiveness of the efforts to control modifiable risk factors for CVDs while

also aiding the design of policy interventions for preventing the economic distress associated with OOP payments for medical services in Nigeria and in similar countries in SSA.

## Material and methods

### *Study design*

This study utilized a descriptive cross-sectional study design.

### *Description of study area*

Data was collected in the cardiology departments/out-patient clinics of purposively selected private and public (secondary and tertiary), general and specialized, hospital facilities in Ibadan, Oyo State, South West, Nigeria. Ibadan is the capital of Oyo State. The city is also regarded as the third most populous city in Nigeria, behind Lagos and Kano. However, it is renowned as Nigeria's largest city in terms of geographical area. The city is situated within South-West, Nigeria, 128km inland north-east of Lagos and 350km south-west of Abuja, the federal capital territory (FCT) of Nigeria. The residents and natives of the city are the Yorubas, although individuals from other ethnic groups across the country live in the city too. There are eleven (11) local government areas (LGAs) in Ibadan which are stratified into five (5) urban LGAs and six semi-urban LGAs. Major health care facilities like the University College Hospital (UCH) and many other large public and private hospitals are located in Ibadan. These hospitals, especially UCH, serves as referral centers for other facilities in Oyo State and indeed, facilities in Nigeria as a whole.

### *Study population*

The study population consisted of individuals seeking healthcare related to heart conditions (CVDs) in private and public (secondary and tertiary), general and specialized, hospital facilities in Ibadan, Oyo State, South West, Nigeria.

### *Inclusion and exclusion criteria*

Respondents were considered eligible to participate if he/she is 18 years and older and have been clinically confirmed to have any of the CVDs.

### *Sample size determination and sampling procedure*

To estimate the sample size for a continuous outcome variable such as costs and assuming that mean (average) cost  $\mu$  and standard deviation  $\sigma$  are normally distributed. The width of the precision of a given sample size according to Brownell et. al.[13] can be expressed as:

$$\left(W = 1.96 \times \frac{\sigma}{\sqrt{n}}\right)^2 \quad (1)$$

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3 However, it is difficult to identify studies with appropriate value for  $\sigma$ , therefore in the absence of this,  
4 Brownell et. al. proposed the following formula:

$$5 \left( \frac{1.96 \times C_v}{V} \right)^2 \quad (2)$$

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9 Where  $C_v$  denote the coefficient of variation (i.e. the ratio of the standard deviation and the mean cost),  $V$   
10 represent the desired level of precision which is 95% confidence interval (CI). The  $C_v$  for a 95% CI is 0.50.  
11 Thus, the minimum sample size was determined as follows:

$$12 n = \left( \frac{1.96 \times 0.50}{0.05} \right)^2 = 384 \quad (3)$$

13 Adjusting the sample size for 10% non-response rate:

$$14 n_f = \frac{n}{1 - NR} \quad (4)$$

15 Where  $n_f$  denotes non-response and  $NR$ , non-response rate

$$16 n_f = \frac{384}{1 - 0.1} = 427 \quad (5)$$

### 17 *Sampling technique*

18 Major hospitals that provide health care services for chronic diseases like CVDs are not widely spread  
19 across Ibadan city. They are clustered in a few urban and semi-urban LGAs within the city. Therefore, those  
20 LGAs were purposively selected. Following this, the only tertiary hospital facility, UCH and two secondary  
21 hospitals, Adeoyo State Hospital and Jericho Specialist Hospital, in Ibadan were included in the study.  
22 Also, data were collected from all the specialized heart hospitals in the city. These facilities include Elyon  
23 Heart Rehabilitation Center, Brofam Specialist Hospital and Fountain Heart Clinic. Therefore, a total  
24 sampling of all the 744 CVDs patients that attended the outpatient clinics of these hospital facilities between  
25 4<sup>th</sup> November 2019-31<sup>st</sup> January 2020 was carried out.

### 26 *Data collection*

27 Data was collected using a standardized survey questionnaire originally developed by Initiative for  
28 Cardiovascular Health Research in Developing Countries (ICHRDC) which has been used in a previous  
29 study.[14] This tool was adapted and designed using the REDcap software.[15] The validity and reliability  
30 of the questionnaire was ensured by pre-testing it in facilities that were similar to the ones included in the  
31 study. A total of 43 questionnaires, 10% of the estimated sample size, were administered for the pretest.  
32 Completed questionnaires were checked for completeness. The Cronbach Alpha was utilized to test for  
33 internal consistency. From the results generated, necessary corrections were made accordingly. The  
34 instrument was then utilized to elicit information on respondents' demographic characteristics, medical  
35 history, individual and household economic information, OOP payments (i.e. direct and indirect costs)



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3 incurred towards outpatient CVDs treatment, inpatient care (for those hospitalized in the last 15 months  
4 prior to the study) as well as those who require homebased rehabilitative medical care. Trained research  
5 assistants administered the research tool electronically using tablets after written informed consent was  
6 obtained from the participants. Strict data quality was ensured by the principal investigator and 2 data  
7 collection supervisors. Regular review of the data collected were conducted by reviewing hospital patient  
8 treatment records, especially to verify the costs of hospitalization reported by patients. All the data collected  
9 were anonymized.  
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#### 14 *Ethical approval*

15 This study involved human subjects and necessary ethical procedures were followed. Ethical approval was  
16 obtained from the University of Ibadan/University College Hospital ethics review committee  
17 (NHREC/05/01/2008a). Approval was also obtained from respective hospital facilities.  
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#### 22 *The burden of OOP payments among CVDs patients*

23 This study adopted a micro-costing of all the OOP payments incurred by patients towards accessing  
24 outpatient, inpatient and homebased medical services. This methodology for estimating the burden of OOP  
25 payments, i.e. direct costs and indirect costs, follows that adopted in previous studies.[1,16-21] Directs  
26 costs relate to expenditures incurred when paying for hospital fees, purchase of medicines/drugs,  
27 transportation to and fro to access outpatient and inpatient treatment (also referred to as direct non-medical  
28 cost), medical consumables, laboratory tests, emergency room, hospital bed and radiological  
29 procedures.[22] Similarly, indirect costs referred to the costs associated with loss of work/productivity as a  
30 result of sick days as well as the income loss by the caregiver (s) who accompanied the patients to the  
31 clinic/hospital.[23-26] Estimated outpatient costs were annualized while inpatient cost relates to cost per  
32 hospitalization and home care costs includes all the costs incurred after discharge from an index  
33 hospitalization.  
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#### 43 *Outpatient OOP payments*

44 This includes costs/payments for hospital charges, costs of drugs, laboratory costs and other costs which  
45 were associated with outpatient treatment.  
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#### 49 *Inpatient OOP payments*

50 Expenditures incurred for emergency room, hospital bed, treatment, surgery, purchase of drugs, laboratory  
51 tests, food expenses, costs of ambulance service and other costs incurred during index hospitalization in the  
52 last 15 months.  
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### *Homebased/rehabilitative OOP payments*

This includes doctor fees, nurse fees, physiotherapist costs, occupational rehabilitation, costs of drugs, and laboratory costs.

### *Statistical analysis*

Baseline characteristics of respondents was presented using percentages and proportions. The OOP payments for outpatient, inpatient and homebased medical services was reported as means  $\pm$  standard deviation. All Quantitative data was analyzed using STATA version 15 and costs/OOP payments were in Nigerian Naira (NGN (₦)). The average US Dollar (USD (\$)) to NGN at the time of data collection was ₦ 362.12 per \$1. All through this article, the patient-perspective costs (direct and indirect) are used interchangeably with OOP medical payments.

### *Patient and Public involvement statement*

Apart from being research participants, there was no patient and/or public involvement in the design and execution of this study

## **Results**

The background characteristics of respondents is depicted in Table 1. The highest number of CVDs patients were within age groups 55-64 years (27.69%) and 65-74 years (30.11%). Respondents within ages below 45 years (10.22%), age group 45-54 years (17.88), and those with ages above 74 years (14.7%), were the lowest. Majority of the patients were females (68.55%). Of the participants, 211 (28.36%) had primary education, 184 (24.73%) had secondary education, 203 (27.28%) had tertiary education while 146 had no formal education. Also, 515 (69.22%) were married, 200 (26.88%) had lost his/her partner, 14 (1.88%) were divorced and 15 (2.02%) were never married. Those who are self-employed (35.62%) were the highest and respondents who cannot work due to disability (2.02%) were the fewest. The prevalence of participants who had ever smoke was 8.33% and only 9.19% of respondents consumed alcohol in the last one month prior to the time data was collected.

Variable	Frequency	Percent (%)
<b>Age group( Years)</b>		
<45	76	10.22
45-54	133	17.88
55-64	206	27.69
65-74	224	30.11
>74	105	14.11
<b>Gender</b>		
Male	234	31.45
Female	510	68.55
<b>Educational level</b>		
None	146	19.62
Primary	211	28.36
Secondary	184	24.73
Tertiary	203	27.28
<b>Marital status</b>		
Single	15	2.02
Divorced/Separated	14	1.88
Widow/Widower	200	26.88
Married	515	69.22
<b>Occupation</b>		
Employed (government)	65	8.74
Employed (non-government)	19	2.55
Employed (self)	265	35.62
Unemployed	100	13.44
Retired	152	20.43
Artisan	128	17.2
Disabled/Cannot work	15	2.02
<b>Ever smoked</b>		
No	682	91.67
Yes	62	8.33
<b>Currently smoking</b>		
No	61	98.39
Yes	1	1.61
<b>Ever consumed alcoholic drink</b>		

Table 1: Background characteristics of respondents (N=744)

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3	No	559	75.13
4	Yes	185	24.87
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6	<b>Consumed alcohol in last 1 month</b>		
7	No	168	90.81
8	Yes	17	9.19
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3 Table 2 shows the clinical/medical characteristics of respondents. Majority of the patients were undergoing  
4 treatment due to hypertensive heart failure (84.01%). This was followed by dilated cardiomyopathy  
5 (4.44%), ischaemic heart disease (3.9%), and anaemic heart failure (2.15%), in that order. Of the 744 CVDs  
6 patients, 128 (17.41%) were hospitalized in the last 15 months and majority of them (81.25%) were  
7 hospitalized once in the last 15 months while only two (1.56%) were hospitalized more than five times  
8 during that period. As such, the hospitalization rate among this cohort of CVDs patients was 17.42%. Also,  
9 for all the hospitalized patients, the average length of hospital stay (LoHS) was 8.2 days.  
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Table 2: Medical characteristics of respondents (N=744)

Health Issue	Frequency	Percent
<b>Cardiovascular diseases</b>		
Alcoholic cardiomyopathy	3	0.4
Anaemic heart failure	16	2.15
Complete heart block	6	0.81
Congenital heart disease	5	0.67
Cor pulmonale	1	0.13
Dilated cardiomyopathy	33	4.44
Hypertensive heart disease	625	84.01
Ischaemic heart disease	29	3.9
Pericardial valvular heart disease	7	0.94
Peripartum cardiomyopathy	5	0.67
Thyroid disease	3	0.4
Other	11	1.48
<b>Hospitalized in the last 15 months?</b>		
No	607	82.59
Yes	128	17.41
<b>No of time hospitalized</b>		
Once	104	14.06
Twice	18	2.42
Thrice	4	0.54
Five times	2	0.27
<b>length of hospital stay (LoHS)</b>		
1 to 3 days	13	1.74
4 to 6 days	26	3.51
7 to 9 days	38	5.11
10 to 12 days	16	2.16
>12 days	35	4.71
Average LoHS	8.2 days	

### *Estimates of annualized outpatient OOP payments*

The OOP payment for different components of outpatient medical services among CVDs patients by private and public (Federal and State) hospital facilities are reported in Table 3. The cost of laboratory test was the highest relative to other components of OOP payments in private and Federal owned hospital facilities, ₦ 535,042.1±622,683.4 (\$1,477.5±\$1,719.6) and ₦ 265,091.7±396,839.7 (\$732.1±\$1,095.9), respectively. For patients who accessed healthcare in State owned hospital facilities, the cost of drugs/medicines was the highest when compared with other components of OOP payments, ₦ 238,917.4±₦886,081.5 (\$659.8±\$2,446.9). As expected, the annual average OOP payments in private hospitals was higher than that incurred in public hospitals (both Federal and State owned hospitals): ₦ 283,515.8 (\$782.9) for private hospital facilities; ₦115,593.5 (\$319.2) for Federal owned hospital; ₦ 85,959.1 (\$237.4). Across all the hospital facilities, the annual direct and indirect costs were ₦ 421,595.7±₦ 855,962.0 (\$1,164.2± 2,363.8) and ₦19,146.5±₦53,610.1 (\$52.87±\$148.05). Estimated OOP payments are heavy-tailed to the right, hence the higher value of the standard deviation from the mean.

Table 3: Annualized OOP payments for outpatient treatment among CVDs patients

Hospital type	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
<b>Private</b>					
Hospital charges	38	0.0	90,000.0	51,978.9	20,366.8
Lab test cost	38	0.0	2,400,000.0	535,042.1	622,683.4
Cost of drug	38	14,400.0	3,974,400.0	529,357.9	844,813.3
Other medical costs	38	0.0	384,000.0	17,684.2	65,785.1
Average cost				283,515.8	
<b>Federal</b>					
Hospital charges	338	0.0	42,000.0	15,571.6	7,213.0
Lab test cost	338	0.0	2,400,000.0	265,091.7	396,839.7
Cost of drug	338	0.0	3,360,000.0	176,600.7	293,799.6
Other medical costs	324	0.0	150,000.0	5,110.0	17,084.5
Average cost				115,593.5	
<b>State</b>					
Hospital charges	368	0.0	25,200.0	3,135.3	2,498.9
Lab test cost	368	0.0	1,440,000.0	95,701.6	185,896.8
Cost of drug	368	0.0	1,210,000.0	238,917.4	886,081.5
Other medical costs	359	0.0	259,200.0	6,082.2	27,118.9
Average cost				85,959.1	
Average direct out-patient cost (all facilities)				<b>421,595.7</b>	<b>855,962.0</b>
Average indirect out-patient cost (all facilities)				<b>19,146.5</b>	<b>53,610.1</b>

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5 *Estimates of OOP payments per hospitalization*

6 Table 4 shows the OOP payment per hospitalization among CVDs patients. The cost of treatment, ₦  
7 68,428.57±~~₦~~ 108,814.60 (\$188.97±\$300.49), was the highest in private hospitals, followed by the cost of  
8 laboratory tests, ₦ 51,428.57±~~₦~~ 55,280.67. In the Federal owned facility, OOP payments for laboratory  
9 tests was the largest, ₦78,456.55±~~₦~~99,141.23 (\$216.66± \$273.78). This was followed by the costs of  
10 treatment and the costs of drugs, ₦49,577.62±~~₦~~91,349.57 (\$136.91±\$252.26) and  
11 ₦47,050.60±~~₦~~64,373.54 (\$129.93±\$177.11), respectively. Similarly, the costs of laboratory test and OOP  
12 payments to purchase drugs per hospitalization, were the largest in State owned hospitals. Following a  
13 similar pattern to the OOP payments for outpatient care, patients who attended State hospitals incurred the  
14 least OOP payment per an episode of hospitalization, ₦91,075.67 (\$251.51) relative to those who accessed  
15 care in private and Federal hospitals, ₦193,665.71 (\$534.81) and ₦254,559.19 (\$702.97). Relative to that  
16 of outpatient care, CVDs patients who were admitted in the Federal hospital, incurred the highest OOP  
17 payment. Overall, the average direct and indirect OOP payments per hospitalization across all facilities  
18 were ₦182,302.4±~~₦~~ 249,090.4 (\$503.43±\$687.87) and ₦ 14,700.8±~~₦~~ 69,297.1 (\$40.60±\$191.37),  
19 respectively.  
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Table 4: OOP payment per hospitalization among CVDs patients

Hospital type	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
<b>Private</b>					
Emergency room	7	0.00	0.00	0.00	0.00
Hospital bed	7	0.00	30,000.00	6,442.86	10,752.34
Treatment	7	0.00	300,000.00	68,428.57	108,814.60
Surgery	7	0.00	0.00	0.00	0.00
Cost of drug	7	0.00	50,000.00	23,571.43	20,354.01
Lab test cost	7	0.00	160,000.00	51,428.57	55,280.67
Food expenses	7	0.00	7,000.00	1,964.29	2,451.31
Cost of ambulance	5	0.00	0.00	0.00	0.00
Other medical costs	5	0.00	184,150.00	41,830.00	79,980.43
Average cost				193,665.71	
<b>Federal</b>					
Emergency room	83	0.00	20,000.00	872.29	3,430.90
Hospital bed	84	0.00	1,680,000.00	28,651.19	182,802.10
Treatment	84	0.00	500,000.00	49,577.62	91,349.57
Surgery	184	0	5400000.0	185543.5	812300.1
Cost of drug	84	0.00	400,000.00	47,050.60	64,373.54
Lab test cost	84	0.00	450,000.00	78,456.55	99,141.23
Food expenses	84	0.00	100,000.00	6,696.43	14,935.59
Cost of ambulance	76	0.00	2,500.00	32.89	286.77
Other medical costs	78	0.00	250,000.00	9,352.56	29,655.76
Average cost				254,559.19	
<b>State</b>					
Emergency room	37	0.00	15,000.00	675.68	2,677.62
Hospital bed	37	0.00	56,000.00	4,808.11	9,937.68
Treatment	37	0.00	400,000.00	3,6891.89	80,026.31
Surgery	37	0.00	0.00	0.00	0.00
Cost of drug	37	0.00	105,000.00	20,794.59	20,575.74
Lab test cost	37	0.00	100,000.00	23,540.54	23,462.26
Food Expenses	37	0.00	56,000.00	2,689.19	9,275.90
Cost of ambulance	37	0.00	0.00	0.00	0.00
Other medical costs	37	0.00	31,500.00	1,675.68	5,408.61
Average cost				91,075.67	
Average direct out-patient cost (all facilities)				<b>182,302.4</b>	<b>249,090.4</b>
Average indirect out-patient cost (all facilities)				<b>14,700.8</b>	<b>69,297.1</b>

In figure 2,

Figure 2: Components of total OOP payments for hospitalized CVDs patients

*Estimates of OOP payments for homebased/rehabilitative care*

The OOP payment incurred by CVDs patients who required rehabilitative care after discharge from the hospital is reported in table 5. The highest cost incurred was physiotherapy costs, ₦144,000.0±₦401,905.8 (\$397.66±\$1,109.87), followed by the cost of drugs, ₦35,161.8±₦334,195.4 (\$97.10±\$922.89). The average rehabilitative cost was ₦30,012.0 (\$82.88).

Table 5: OOP payments for homebased/rehabilitative care among CVDs patients

Cost components	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
Doctor fee	355	0.0	60000.0	459.7	4,256.5
Nurse fee	336	0.0	600,000.0	2,035.7	32,855.7
Lab Test	336	0.0	118,020.0	15,428.6	106,186.6
Cost of drug	335	0.0	600,000.0	35,161.8	334,195.4
Occupational Rehabilitation	334	0.0	276,000.0	9,556.9	152,789.1
Physiotherapist cost	334	0.0	1,440,000.0	144,000.0	401,905.8
Other medical cost	333	0.0	360,000.0	3,441.4	29,510.7
Average cost				30,012.0	

## Discussion

This study estimated the OOP payments (direct and indirect costs) incurred to access outpatient, inpatient and rehabilitative care among CVDs patients attending private and public healthcare facilities in Ibadan, Nigeria. As such, the study fills an important gap in the literature by providing estimates of the financial burden of treating heart-related diseases, entirely from patients' perspective. For the first time, all possible OOP expenditures relating to outpatient, hospitalization as well as rehabilitative care incurred by individuals ailing from a wide range of CVDs were estimated. This provides policymakers with a comprehensive source of information with overarching implications for healthcare financing in Nigeria and in SSA as a whole.

Regarding the baseline profile of CVDs patients in this study, majority were within the age range of 45-74 years. This is consistent with findings in previous studies that most chronic non-communicable diseases, especially CVDs, manifest earlier and during the most productive ages of individuals in developing

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3 countries compared with what is obtainable in advanced countries.[27-30] Also, the prevalence of CVDs  
4 was higher among females relative to males, a finding which has also been revealed in earlier  
5 studies.[30,31] Hypertensive heart failure and ischaemic heart disease were the predominant diagnostic  
6 conditions relative to other types of CVDs. A study conducted to investigate the profile of acute heart failure  
7 in a tertiary hospital in Abeokuta, Nigeria, reported that hypertensive heart failure was the commonest heart  
8 condition, (about 78.5 percent of all cases) observed in the study.[32] Another study assessed the pattern of  
9 CVDs in Abuja, the Federal Capital Territory (FCT) of Nigeria and compared this pattern with that of a  
10 similar study implemented in South Africa, the Heart of Soweto Study. The study reported that hypertensive  
11 heart failure was the predominant (i.e. 61% of the cases) diagnostic condition among CVDs patients and  
12 that heart-related patients in Abuja were twice likely to present with hypertensive heart disease relative to  
13 that observed in the South African study.[33]

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21 The OOP payment incurred by CVDs patients who accessed outpatient healthcare services in private  
22 hospital facilities was higher on average, relative to those who were treated in public hospitals. The average  
23 OOP payment expended by patients who attended private hospitals was almost three times that incurred by  
24 patients who were treated in the Federal owned/tertiary hospital. Patients who accessed treatment in the  
25 State owned hospitals incurred the least average outpatient costs per year. Apparently, the fact that private  
26 facilities are driven by the aim of maximizing profit is enough reason to charge higher fees for healthcare  
27 services. Another justification for the differences in OOP payments in private and public hospitals is that  
28 patients who accessed healthcare services in public hospitals enjoy subsidized charges. However, this  
29 reduced treatment fees oftentimes impose huge financial burden on individuals and families, especially the  
30 poor ones. Also, patients are sometimes weary of accessing healthcare in public owned facilities due to  
31 long waiting time and poor infrastructure as these hospitals are usually overstretched as a result of high  
32 hospital attendance rate.

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41 A different pattern was shown for OOP payment per hospitalization. It was observed that all severe cases  
42 of CVDs hospitalizations (i.e. those requiring surgery) were managed in the Federal owned hospital. This  
43 is because tertiary hospital facilities have a higher number of physicians with different expertise compared  
44 with the resources available in private and State owned facilities. Presumably, this had impact on the  
45 average OOP payment per hospitalization incurred in Federal owned facility as this was the highest relative  
46 to that incurred in private and State owned hospitals.

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51 In general, the contribution of different cost categories as a proportion of total OOP payments by hospital  
52 type was examined. The costs of drugs and laboratory tests were particularly high in all the facilities. An  
53 earlier study on the economic burden of heart failure in Abeokuta, Nigeria revealed that the cost of drugs  
54 and transportation represent about 90% of total costs.[20] Also, another study conducted in a similar SSA  
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country, found that the cost of drugs was about 50 percent of the total OOP expenditures incurred by patients.[17] This imply that the cost of purchasing medicines among CVDs patients represented a significant financial burden for patients. In addition, this present study also revealed that the costs of laboratory tests are equally substantial in connection with outpatient OOP payments. Overall, the average direct OOP payments for outpatient and inpatient healthcare services across all facilities, were ₦ 421,595.7±₦ 855,962.0 (\$1,164.2± 2,363.8) and ₦ 421,595.7±₦ 855,962.0 (\$1,164.2± 2,363.8). These seem very high in a country where almost 89.2 million (i.e. 40.1% of the entire population) are adjudged to be poor.[34] On the other hand, the low contribution of indirect cost to total cost is indicative of the level of unemployment as many of the patients and their caregivers reported little income loss due to sick days.

Among the patients who needed rehabilitative care at home after discharge, physiotherapy cost was the major OOP payments made which is reasonable since most CVDs patients may require physiotherapy sessions after hospitalization in order to regain the ability to engage in basic activities of daily living that might have been affected by illness.

### **Limitation of the study**

Compared with earlier studies conducted in Nigeria, the implementation of this study is methodologically robust as it attempted to avoid some of the weaknesses observed in the few previous studies reviewed. However, there some are some limitations that are noteworthy. First, the OOP payments elicited for hospitalized CVDs patients may have been underestimated since data was collected after the patients were discharged to avoid bogging the patients and/or their caregivers at time when they are seriously ill and hospitalized. Despite this, attempts were made to ensure that the estimates were as accurate as possible by verifying the inpatient OOP payments incurred by patients from hospital records. Second, there was no follow ups on individual patients which would have been beneficial for capturing other OOP payments over a longer period. But this was not possible due to the design and duration of the study. These limitations should therefore be considered when interpreting the findings of this study.

### **Conclusion**

The burden of OOP payment among CVDs patients is high as revealed in this study. This could further expose patients and their families to financial hardship which will be detrimental to achieving the twin target of poverty eradication and good health as articulated in the SDGs. Therefore, the is a need to increase efforts to achieve universal health coverage (UHC) in Nigeria.

### **Acknowledgement**

N/A

### Contributors

FA conceived the idea, designed the study, collected and analyzed the data and wrote the manuscript.

### Competing interest

The author declares that there are no competing interests

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### Data availability statement

The data utilized for this study will be available on request from the corresponding author.

### Data sharing statement

No additional data available

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5 **Figure 1:** Percentage contribution of government health expenditure and OOP payments in current health  
6 expenditures in Nigeria (2010-2017)  
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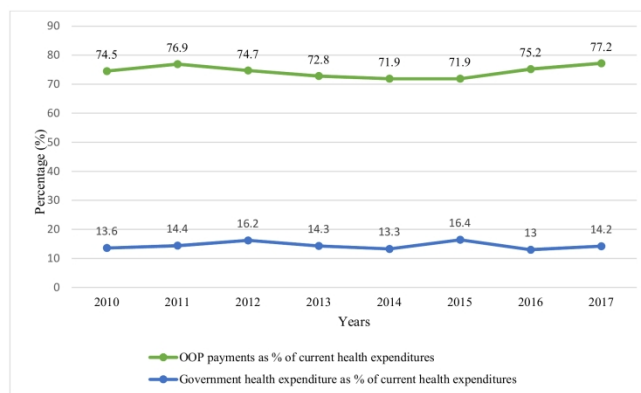
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11 approximately 74.5% of total current health expenditure was financed through OOP payments in 2010  
12 relative to about 13.6% government health expenditures as percentage of current health expenditures. The  
13 proportional contribution of OOP payments increased to 77.2% of current health spending in 2017, which  
14 represented larger year on year burdens of OOP medical outlays on individuals and their families. In  
15 contrast, government health spending marginally increased from 13.6% to 14.2% of current health  
16 expenditures within the review period.  
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24 **Figure 2:** Components of total OOP payments for hospitalized CVDs patients

25 OOP payments for accessing health care among hospitalized patients across all the hospitals were  
26 combined. The cost of laboratory test was 30 percent of total OOP payments incurred by patients. Also,  
27 23.08% of medical expenditures was devoted to paying for hospital treatment. Payments for emergency  
28 room, 0.38% and ambulance, 0.01% were the lowest.  
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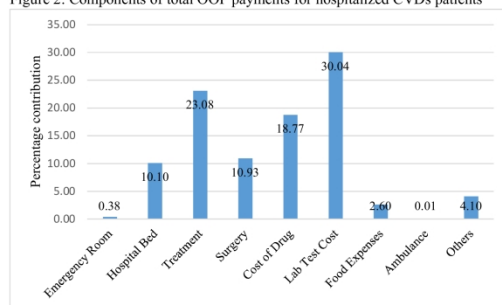
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Figure 1: Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)



Source: WHO: Global Health Observatory data repository

Figure 2: Components of total OOP payments for hospitalized CVDs patients



210x297mm (300 x 300 DPI)

# BMJ Open

## The burden of out-of-pocket payments among cardiovascular disease patients in public and private hospitals in Ibadan, South-West, Nigeria

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Keywords:	Health economics < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, CARDIOLOGY, PUBLIC HEALTH

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## The burden of out-of-pocket payments among cardiovascular disease patients in public and private hospitals in Ibadan, South-West, Nigeria

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### Abstract

**Objectives:** Given that the mechanism for financial protection is underdeveloped in Nigeria, out-of-pocket payment (OOP) for treating cardiovascular disease could impose substantial financial burden on individuals and their families. This study estimated the burden of OOP expenditures incurred by a cohort of CVDs patients in Ibadan, Nigeria.

**Design and settings:** This study utilized a descriptive cross-sectional study design. A standardized survey questionnaire originally developed by Initiative for Cardiovascular Health Research in Developing Countries (ICHRDC) was used to electronically collect data from all the 744 CVDs patients who accessed healthcare between 4<sup>th</sup> November 2019-31<sup>st</sup> January 2020 in the cardiology departments of private and public hospitals in Ibadan, Nigeria. Baseline characteristics of respondents were presented using percentages and proportions. The OOP payments were reported as means  $\pm$  standard deviation. Costs/OOP payments were in Nigerian Naira (NGN (₦)). The average US Dollar (USD (\$) to NGN (₦) at the time of data collection was ₦ 362.12 per \$1. All Quantitative data were analyzed using STATA version 15.

**Outcome measures:** The burden of outpatient, inpatient and rehabilitative care OOP payments

**Results:** Majority of the CVDs patients were within the age range of 45-74 years and 68.55% of them were females. The diagnostic conditions reported among CVDs patients were hypertensive heart failure (84.01%); dilated cardiomyopathy (4.44%); ischaemic heart disease (3.9%), and anaemic heart failure (2.15%). Across all the hospital facilities, the annual direct and indirect outpatient costs were ₦ 421,595.7 $\pm$ ₦ 855,962.0 (\$1,164.2 $\pm$ \$2,363.8) and ₦19,146.5 $\pm$ ₦53,610.1 (\$52.87 $\pm$ \$148.05). Similarly, the average direct and indirect OOP payments per hospitalization across all facilities were ₦182,302.4 $\pm$ ₦249,090.4 (\$503.43 $\pm$ \$687.87) and ₦ 14,700.8 $\pm$ ₦ 69,297.1 (\$40.60 $\pm$ \$191.37), respectively. The average rehabilitative cost after discharge from index hospitalization was ₦30,012.0 (\$82.88).

**Conclusion:** The burden of OOP payment among CVDs patients is enormous. There is a need to increase efforts to achieve universal health coverage (UHC) in Nigeria.

**Keywords:** Cardiovascular diseases, Out-of-pocket payment, Universal health coverage, Catastrophic health expenditure

**Manuscript word count:** 3,419

### Strengths and limitations of this study

- A micro-costing approach was adopted to estimate the costs of accessing CVDs treatment from entirely patients perspective.
- The implementation of this study is methodologically robust as it attempted to avoid some of the weaknesses observed in previous studies conducted in Nigeria.
- A total sampling of all CVDs patients who attended general and specialized heart hospitals during the period of the study was carried out.
- The OOP payments elicited for hospitalized CVDs patients may have been underestimated since data was collected after the patients were discharged to avoid bogging them and/or their caregivers at a time when they were seriously ill and hospitalized.
- This study was a hospital-based study and as a result, CVD patients who did not visit the hospitals because of inability to pay were not captured in the study.

## Background

The prevalence of cardiovascular diseases (CVDs) is increasing in low-and-middle-income-countries (LMICs), imposing a substantial economic burden on economies, households and individuals.[1-3] In many developing countries, CVDs are becoming the leading cause of morbidity and deaths.[4] Recently, sub-Saharan Africa (SSA) countries are experiencing an unprecedented rise in the number of individuals coming down with heart-related diseases.[5-7] A study reported that this health condition accounts for between 7-9 percent of all hospital admissions in the African region.[8] Between 1990 and 2017, the number of deaths related to CVDs in SSA increased by over 50%.[9,10]

Furthermore, Universal Health Coverage (UHC) remains low in majority of the countries in SSA and as a result, the burden of medical payments is often disproportionately borne by individuals and their households. This constitutes large economic burdens for families and predisposes them to catastrophic healthcare payments and other impoverishment impacts of Out-of-Pocket (OOP) payments.

In Nigeria, the mechanism for financial protection against excessive medical payments is underdeveloped as only about 5% of the entire population is covered by the health insurance provided under the National Health Insurance Scheme (NHIS).[11] A study conducted to compare the level of UHC in three SSA countries, Ghana, Kenya and Nigeria, revealed that Nigeria had the lowest UHC of the countries, with 1.1% of the female population and 3.1% of male population covered by social health insurance, respectively.[12]

Consequently, there has been over dependence on OOP payments as the major source of healthcare financing in Nigeria. As revealed in Figure 1,

**Figure 1:** Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)

In view of the rising levels of chronic disease like CVDs and the desire to achieve UHC by 2030 in the country, there is an increasing demand for research evidence in connection with the economic burden posed by OOP payments on patients. Therefore, this study aimed at estimating the OOP health expenditures (the direct and indirect costs) of treatment incurred by patients receiving outpatient and inpatient care in public and private hospital facilities in Ibadan, a South-Western State in Nigeria. In addition, homecare cost for

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3 patients who required rehabilitative care after hospitalization was estimated. Findings in the study will be  
4 useful for ascertaining the cost-effectiveness of the efforts to control modifiable risk factors for CVDs while  
5 also aiding the design of policy interventions for preventing the economic distress associated with OOP  
6 payments for medical services in Nigeria and in similar countries in SSA.  
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## 10 **Material and methods**

### 11 *Study design*

12 This study utilized a descriptive cross-sectional study design.  
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### 16 *Description of study area*

17 Data was collected in the cardiology departments/out-patient clinics of purposively selected private and  
18 public (secondary and tertiary), general and specialized, hospital facilities in Ibadan, Oyo State, South West,  
19 Nigeria. Ibadan is the capital of Oyo State. The city is also regarded as the third most populous city in  
20 Nigeria, behind Lagos and Kano. However, it is renowned as Nigeria's largest city in terms of geographical  
21 area. The city is situated within South-West, Nigeria, 128km inland north-east of Lagos and 350km south-  
22 west of Abuja, the federal capital territory (FCT) of Nigeria. The residents and natives of the city are the  
23 Yorubas, although individuals from other ethnic groups across the country live in the city too. There are  
24 eleven (11) local government areas (LGAs) in Ibadan which are stratified into five (5) urban LGAs and six  
25 semi-urban LGAs. Major health care facilities like the University College Hospital (UCH) and many other  
26 large public and private hospitals are located in Ibadan. These hospitals, especially UCH, serves as referral  
27 centers for other facilities in Oyo State and indeed, facilities in Nigeria as a whole.  
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### 38 *Study population*

39 The study population consisted of individuals seeking healthcare related to heart conditions (CVDs) in  
40 private and public (secondary and tertiary), general and specialized, hospital facilities in Ibadan, Oyo State,  
41 South West, Nigeria.  
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### 46 *Inclusion and exclusion criteria*

47 Respondents were considered eligible to participate if he/she is 18 years and older and have been clinically  
48 confirmed to have any of the CVDs.  
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### 51 *Sample size determination and sampling procedure*

52 To estimate the sample size for a continuous outcome variable such as costs and assuming that mean  
53 (average) cost  $\mu$  and standard deviation  $\sigma$  are normally distributed. The width of the precision of a given  
54 sample size according to Brownell et. al. [13] can be expressed as:  
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$$\left(W = 1.96 \times \frac{\sigma}{\sqrt{n}}\right)^2 \quad (1)$$

However, it is difficult to identify studies with appropriate value for  $\sigma$ , therefore in the absence of this, Brownell et. al. proposed the following formula:

$$\left(\frac{1.96 \times C_v}{V}\right)^2 \quad (2)$$

Where  $C_v$  denote the coefficient of variation (i.e. the ratio of the standard deviation and the mean cost),  $V$  represent the desired level of precision which is 95% confidence interval (CI). The  $C_v$  for a 95% CI is 0.50.

Thus, the minimum sample size was determined as follows:

$$n = \left(\frac{1.96 \times 0.50}{0.05}\right)^2 = 384 \quad (3)$$

Adjusting the sample size for 10% non-response rate:

$$n_f = \frac{n}{1 - NR} \quad (4)$$

Where  $n_f$  denotes non-response and  $NR$ , non-response rate

$$n_f = \frac{384}{1 - 0.1} = 427 \quad (5)$$

### *Sampling technique*

Major hospitals that provide health care services for chronic diseases like CVDs are not widely spread across Ibadan city. They are clustered in a few urban and semi-urban LGAs within the city. Therefore, those LGAs were purposively selected. Following this, the only tertiary hospital facility, UCH and two secondary hospitals, Adeoyo State Hospital and Jericho Specialist Hospital, in Ibadan were included in the study. Also, data were collected from all the specialized heart hospitals in the city. These facilities include Elyon Heart Rehabilitation Center, Brofam Specialist Hospital and Fountain Heart Clinic. Therefore, a total sampling of all the 744 CVDs patients that attended the outpatient clinics of these hospital facilities between 4<sup>th</sup> November 2019-31<sup>st</sup> January 2020 was carried out.

### *Data collection*

Data was collected using a standardized survey questionnaire originally developed by Initiative for Cardiovascular Health Research in Developing Countries (ICHRDC) which has been used in a previous study. [14] This tool was adapted and designed using the REDcap software. [15] The validity and reliability of the questionnaire was ensured by pre-testing it in facilities that were similar to the ones included in the study. A total of 43 questionnaires, 10% of the estimated sample size, were administered for the pretest. Completed questionnaires were checked for completeness. The Cronbach Alpha was utilized to test for internal consistency. From the results generated, necessary corrections were made accordingly. The

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3 instrument was then utilized to elicit information on respondents' demographic characteristics, medical  
4 history, individual and household economic information, OOP payments (i.e. direct and indirect costs)  
5 incurred towards outpatient CVDs treatment, inpatient care (for those hospitalized in the last 15 months  
6 prior to the study) as well as those who require homebased rehabilitative medical care. All the costs incurred  
7 per outpatient visit were elicited. The recall period for inpatient was 15 months while that of homebased  
8 rehabilitative care was 1 month similar to that adopted in a previous study. [14] Trained research assistants  
9 administered the research tool electronically using tablets after written informed consent was obtained from  
10 the participants. Strict data quality was ensured by the principal investigator and 2 data collection  
11 supervisors. Regular review of the data collected were conducted by reviewing hospital patient treatment  
12 records, especially to verify the costs of hospitalization reported by patients. All the data collected were  
13 anonymized.

### 21 *Ethical approval*

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23 This study involved human subjects and necessary ethical procedures were followed. Ethical approval was  
24 obtained from the University of Ibadan/University College Hospital ethics review committee  
25 (NHREC/05/01/2008a). Approval was also obtained from respective hospital facilities.

### 29 *The burden of OOP payments among CVDs patients*

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31 This study adopted a micro-costing of all the OOP payments incurred by patients towards accessing  
32 outpatient, inpatient and homebased medical services. This methodology for estimating the burden of OOP  
33 payments, i.e. direct costs and indirect costs, follows that adopted in previous studies.[1,16-21] Directs  
34 costs relate to expenditures incurred when paying for hospital fees, purchase of medicines/drugs,  
35 transportation to and fro to access outpatient and inpatient treatment (also referred to as direct non-medical  
36 cost), medical consumables, laboratory tests, emergency room, hospital bed and radiological  
37 procedures.[22] Similarly, indirect costs referred to the costs associated with loss of  
38 work/productivity/income as a result of sick days as well as the income/wages loss by the caregiver (s) who  
39 accompanied the patients to the clinic/hospital.[23-26] For outpatient and inpatient care, information were  
40 elicited from patients and/or patients' caregiver (s) to calculate the indirect cost. The number of days absent  
41 from work due to outpatient and inpatient care was multiplied by patient's earnings per day. Following  
42 similar procedure, the wages lost for caregiving was also ascertained. Estimated outpatient costs were  
43 annualized while inpatient cost relates to cost per hospitalization. Homebased care costs includes all the  
44 costs incurred for rehabilitative care outside of the hospital. Patients reported the average OOP payment  
45 incurred for homebased/rehabilitative care on a monthly basis and this cost was annualized. The presence  
46 of co-morbidity could potentially bias the estimated costs upward, as a result of this, participants were asked  
47 to report on the OOP payments related to CVD treatment only.

### *Outpatient OOP payments*

This includes costs/payments for hospital charges, costs of drugs, laboratory costs and other costs which were associated with outpatient treatment.

### *Inpatient OOP payments*

Expenditures incurred for emergency room, hospital bed, treatment, surgery, purchase of drugs, laboratory tests, food expenses, costs of ambulance service and other costs incurred during index hospitalization in the last 15 months.

### *Homebased/rehabilitative OOP payments*

This includes doctor fees, nurse fees, physiotherapist costs, occupational rehabilitation, costs of drugs, and laboratory costs.

### *Statistical analysis*

Baseline characteristics of respondents was presented using percentages and proportions. The OOP payments for outpatient, inpatient and homebased medical services was reported as means  $\pm$  standard deviation. All Quantitative data was analyzed using STATA version 15 and costs/OOP payments were in Nigerian Naira (NGN (₦)). The average US Dollar (USD (\$)) to NGN at the time of data collection was ₦ 362.12 per \$1. All through this article, the patient-perspective costs (direct and indirect) are used interchangeably with OOP medical payments.

### *Patient and Public involvement statement*

Apart from being research participants, there was no patient and/or public involvement in the design and execution of this study

## **Results**

The background characteristics of respondents is depicted in Table 1. The highest number of CVDs patients were within age groups 55-64 years (27.69%) and 65-74 years (30.11%). Respondents within ages below 45 years (10.22%), age group 45-54 years (17.88), and those with ages above 74 years (14.7%), were the lowest. Majority of the patients were females (68.55%). Of the participants, 211 (28.36%) had primary

education, 184 (24.73%) had secondary education, 203 (27.28%) had tertiary education while 146 had no

Variable	Frequency	Percent (%)
<b>Age group( Years)</b>		
<45	76	10.22
45-54	133	17.88
55-64	206	27.69
65-74	224	30.11
>74	105	14.11
<b>Gender</b>		
Male	234	31.45
Female	510	68.55
<b>Educational level</b>		
None	146	19.62
Primary	211	28.36
Secondary	184	24.73
Tertiary	203	27.28
<b>Marital status</b>		
Single	15	2.02
Divorced/Separated	14	1.88
Widow/Widower	200	26.88
Married	515	69.22
<b>Occupation</b>		
Employed (government)	65	8.74
Employed (non-government)	19	2.55
Employed (self)	265	35.62
Unemployed	100	13.44
Retired	152	20.43
Artisan	128	17.2
Disabled/Cannot work	15	2.02
<b>Ever smoked</b>		
No	682	91.67
Yes	62	8.33

formal education. Also, 515 (69.22%) were married, 200 (26.88%) had lost his/her partner, 14 (1.88%) were divorced and 15 (2.02%) were never married. Those who are self-employed (35.62%) were the highest and respondents who cannot work due to disability (2.02%) were the fewest. The prevalence of participants who had ever smoke was 8.33% and only 9.19% of respondents consumed alcohol in the last one month prior to the time data was collected.

Table 1: Background characteristics of respondents (N=744)

**Currently smoking**

No	61	98.39
Yes	1	1.61

**Ever consumed alcoholic drink**

No	559	75.13
Yes	185	24.87

**Consumed alcohol in last 1 month**

No	168	90.81
Yes	17	9.19

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3 Table 2 shows the clinical/medical characteristics of respondents. Majority of the patients were undergoing  
4 treatment due to hypertensive heart failure (84.01%). This was followed by dilated cardiomyopathy  
5 (4.44%), ischaemic heart disease (3.9%), and anaemic heart failure (2.15%), in that order. Of the 744 CVDs  
6 patients, 128 (17.41%) were hospitalized in the last 15 months and majority of them (81.25%) were  
7 hospitalized once in the last 15 months while only two (1.56%) were hospitalized more than five times  
8 during that period. As such, the hospitalization rate among this cohort of CVDs patients was 17.42%. Also,  
9 for all the hospitalized patients, the average length of hospital stay (LoHS) was 8.2 days.  
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Table 2: Medical characteristics of respondents (N=744)

Health Issue	Frequency	Percent
<b>Cardiovascular diseases</b>		
Alcoholic cardiomyopathy	3	0.4
Anaemic heart failure	16	2.15
Complete heart block	6	0.81
Congenital heart disease	5	0.67
Cor pulmonale	1	0.13
Dilated cardiomyopathy	33	4.44
Hypertensive heart disease	625	84.01
Ischaemic heart disease	29	3.9
Pericardial valvular heart disease	7	0.94
Peripartum cardiomyopathy	5	0.67
Thyroid disease	3	0.4
Other	11	1.48
<b>Hospitalized in the last 15 months?</b>		
No	607	82.59
Yes	128	17.41
<b>No of time hospitalized</b>		
Once	104	14.06
Twice	18	2.42
Thrice	4	0.54
Five times	2	0.27
<b>length of hospital stay (LoHS)</b>		
1 to 3 days	13	1.75
4 to 6 days	26	3.51
7 to 9 days	38	5.11
10 to 12 days	16	2.16
>12 days	35	4.71
Average LoHS	8.2 days	

### *Estimates of annualized outpatient OOP payments*

The OOP payment for different components of outpatient medical services among CVDs patients by private and public (Federal and State) hospital facilities are reported in Table 3. The cost of laboratory test was the highest relative to other components of OOP payments in private and Federal owned hospital facilities, ₦ 535,042.1±622,683.4 (\$1,477.5±\$1,719.6) and ₦ 265,091.7±396,839.7 (\$732.1±\$1,095.9), respectively. For patients who accessed healthcare in State owned hospital facilities, the cost of drugs/medicines was the highest when compared with other components of OOP payments, ₦ 238,917.4±₦886,081.5 (\$659.8±\$2,446.9). As expected, the annual average OOP payments in private hospitals was higher than that incurred in public hospitals (both Federal and State owned hospitals): ₦ 283,515.8 (\$782.9) for private hospital facilities; ₦115,593.5 (\$319.2) for Federal owned hospital; ₦ 85,959.1 (\$237.4). Across all the hospital facilities, the annual direct and indirect costs were ₦ 421,595.7±₦ 855,962.0 (\$1,164.2± 2,363.8) and ₦19,146.5±₦53,610.1 (\$52.87±\$148.05). Estimated OOP payments are heavy-tailed to the right, hence the higher value of the standard deviation from the mean.

Table 3: Annualized OOP payments for outpatient treatment among CVDs patients

Hospital type	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
<b>Private</b>					
Hospital charges	38	0.0	90,000.0	51,978.9	20,366.8
Lab test cost	38	0.0	2,400,000.0	535,042.1	622,683.4
Cost of drug	38	14,400.0	3,974,400.0	529,357.9	844,813.3
Other medical costs	38	0.0	384,000.0	17,684.2	65,785.1
Average cost				283,515.8	
<b>Federal</b>					
Hospital charges	338	0.0	42,000.0	15,571.6	7,213.0
Lab test cost	338	0.0	2,400,000.0	265,091.7	396,839.7
Cost of drug	338	0.0	3,360,000.0	176,600.7	293,799.6
Other medical costs	324	0.0	150,000.0	5,110.0	17,084.5
Average cost				115,593.5	
<b>State</b>					
Hospital charges	368	0.0	25,200.0	3,135.3	2,498.9
Lab test cost	368	0.0	1,440,000.0	95,701.6	185,896.8
Cost of drug	368	0.0	1,210,000.0	238,917.4	886,081.5
Other medical costs	359	0.0	259,200.0	6,082.2	27,118.9
Average cost				85,959.1	
Average direct out-patient cost (all facilities)				<b>421,595.7</b>	<b>855,962.0</b>
Average indirect out-patient cost (all facilities)				<b>19,146.5</b>	<b>53,610.1</b>



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5 *Estimates of OOP payments per hospitalization*

6 Table 4 shows the OOP payment per hospitalization among CVDs patients. The cost of treatment, ₦  
7 68,428.57±~~₦~~ 108,814.60 (\$188.97±\$300.49), was the highest in private hospitals, followed by the cost of  
8 laboratory tests, ₦ 51,428.57±~~₦~~ 55,280.67. In the Federal owned facility, OOP payments for surgical  
9 procedure was the highest ₦ 3,414,000.0 (\$9,429.8) was the highest and this is followed by the costs of  
10 laboratory tests, ₦78,456.55±~~₦~~99,141.23 (\$216.66± \$273.78). This was followed by the costs of treatment  
11 and the costs of drugs, ₦49,577.62±~~₦~~91,349.57 (\$136.91±\$252.26) and ₦47,050.60±~~₦~~64,373.54  
12 (\$129.93±\$177.11), respectively. Similarly, the costs of laboratory test and OOP payments to purchase  
13 drugs per hospitalization, were the largest in State owned hospitals. Following a similar pattern to the OOP  
14 payments for outpatient care, patients who attended State hospitals incurred the least OOP payment per an  
15 episode of hospitalization, ₦91,075.67 (\$251.51) relative to those who accessed care in private and Federal  
16 hospitals, ₦193,665.71 (\$534.81) and ₦254,559.19 (\$702.97). Relative to that of outpatient care, CVDs  
17 patients who were admitted in the Federal hospital, incurred the highest OOP payment. Overall, the average  
18 direct and indirect OOP payments per hospitalization across all facilities were ₦182,302.4±~~₦~~ 249,090.4  
19 (\$503.43±\$687.87) and ₦ 14,700.8±~~₦~~ 69,297.1 (\$40.60±\$191.37), respectively.  
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Table 4: OOP payment per hospitalization among CVDs patients

Hospital type	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
<b>Private</b>					
Emergency room	7	0.00	0.00	0.00	0.00
Hospital bed	7	0.00	30,000.00	6,442.86	10,752.34
Treatment	7	0.00	300,000.00	68,428.57	108,814.60
Surgery	7	0.00	0.00	0.00	0.00
Cost of drug	7	0.00	50,000.00	23,571.43	20,354.01
Lab test cost	7	0.00	160,000.00	51,428.57	55,280.67
Food expenses	7	0.00	7,000.00	1,964.29	2,451.31
Cost of ambulance	5	0.00	0.00	0.00	0.00
Other medical costs	5	0.00	184,150.00	41,830.00	79,980.43
Average cost				193,665.71	
<b>Federal</b>					
Emergency room	83	0.00	20,000.00	872.29	3,430.90
Hospital bed	84	0.00	1,680,000.00	28,651.19	182,802.10
Treatment	84	0.00	500,000.00	49,577.62	91,349.57
Surgery	10	1,440,000	5,400,000.0	3,414,000.0	5,400,000
Cost of drug	84	0.00	400,000.00	47,050.60	64,373.54
Lab test cost	84	0.00	450,000.00	78,456.55	99,141.23
Food expenses	84	0.00	100,000.00	6,696.43	14,935.59
Cost of ambulance	76	0.00	2,500.00	32.89	286.77
Other medical costs	78	0.00	250,000.00	9,352.56	29,655.76
Average cost				752,339.3	
<b>State</b>					
Emergency room	37	0.00	15,000.00	675.68	2,677.62
Hospital bed	37	0.00	56,000.00	4,808.11	9,937.68
Treatment	37	0.00	400,000.00	3,6891.89	80,026.31
Surgery	37	0.00	0.00	0.00	0.00
Cost of drug	37	0.00	105,000.00	20,794.59	20,575.74
Lab test cost	37	0.00	100,000.00	23,540.54	23,462.26
Food Expenses	37	0.00	56,000.00	2,689.19	9,275.90
Cost of ambulance	37	0.00	0.00	0.00	0.00
Other medical costs	37	0.00	31,500.00	1,675.68	5,408.61
Average cost				91,075.67	
Average direct out-patient cost (all facilities)				<b>182,302.4</b>	<b>249,090.4</b>
Average indirect out-patient cost (all facilities)				<b>14,700.8</b>	<b>69,297.1</b>

In figure 2,

Figure 2: Components of total OOP payments for hospitalized CVDs patients

*Estimates of OOP payments for homebased/rehabilitative care*

The annualized OOP payment incurred by CVDs patients who required rehabilitative care is reported in table 5. The highest cost incurred was physiotherapy costs,  $\text{N}144,000.0 \pm \text{N}401,905.8$  ( $\$397.66 \pm \$1,109.87$ ), followed by the cost of drugs,  $\text{N}35,161.8 \pm \text{N}334,195.4$  ( $\$97.10 \pm \$922.89$ ). The average rehabilitative cost was  $\text{N}30,012.0$  ( $\$82.88$ ).

Table 5: Annualized OOP payments for homebased/rehabilitative care among CVDs patients

Cost components	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
Doctor fee	355	0.0	60000.0	459.7	4,256.5
Nurse fee	336	0.0	600,000.0	2,035.7	32,855.7
Lab Test	336	0.0	118,020.0	15,428.6	106,186.6
Cost of drug	335	0.0	600,000.0	35,161.8	334,195.4
Occupational Rehabilitation	334	0.0	276,000.0	9,556.9	152,789.1
Physiotherapist cost	334	0.0	1,440,000.0	144,000.0	401,905.8
Other medical cost	333	0.0	360,000.0	3,441.4	29,510.7
Average cost				<b>30,012.0</b>	

## Discussion

This study estimated the OOP payments (direct and indirect costs) incurred to access outpatient, inpatient and rehabilitative care among CVDs patients attending private and public healthcare facilities in Ibadan, Nigeria. As such, the study fills an important gap in the literature by providing estimates of the financial burden of treating heart-related diseases, entirely from patients' perspective. For the first time, all possible OOP expenditures relating to outpatient, hospitalization as well as rehabilitative care incurred by individuals ailing from a wide range of CVDs were estimated. This provides policymakers with a comprehensive source of information with overarching implications for healthcare financing in Nigeria and in SSA as a whole.

Regarding the baseline profile of CVDs patients in this study, majority were within the age range of 45-74 years. This is consistent with findings in previous studies that most chronic non-communicable diseases, especially CVDs, manifest earlier and during the most productive ages of individuals in developing

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3 countries compared with what is obtainable in advanced countries.[27-30] Also, the prevalence of CVDs  
4 was higher among females relative to males, a finding which has also been revealed in earlier  
5 studies.[30,31] Hypertensive heart failure and ischaemic heart disease were the predominant diagnostic  
6 conditions relative to other types of CVDs. A study conducted to investigate the profile of acute heart failure  
7 in a tertiary hospital in Abeokuta, Nigeria, reported that hypertensive heart failure was the commonest heart  
8 condition, (about 78.5 percent of all cases) observed in the study. [32] Another study assessed the pattern  
9 of CVDs in Abuja, the Federal Capital Territory (FCT) of Nigeria and compared this pattern with that of a  
10 similar study implemented in South Africa, the Heart of Soweto Study. The study reported that hypertensive  
11 heart failure was the predominant (i.e. 61% of the cases) diagnostic condition among CVDs patients and  
12 that heart-related patients in Abuja were twice likely to present with hypertensive heart disease relative to  
13 that observed in the South African study. [33]

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16 The OOP payment incurred by CVDs patients who accessed outpatient healthcare services in private  
17 hospital facilities was higher on average, relative to those who were treated in public hospitals. The average  
18 OOP payment expended by patients who attended private hospitals was almost three times that incurred by  
19 patients who were treated in the Federal owned/tertiary hospital. Patients who accessed treatment in the  
20 State owned hospitals incurred the least average outpatient costs per year. Apparently, the fact that private  
21 facilities are driven by the aim of maximizing profit is enough reason to charge higher fees for healthcare  
22 services. Another justification for the differences in OOP payments in private and public hospitals is that  
23 patients who accessed healthcare services in public hospitals enjoy subsidized charges. However, this  
24 reduced treatment fees oftentimes impose huge financial burden on individuals and families, especially the  
25 poor ones. Also, patients are sometimes weary of accessing healthcare in public owned facilities due to  
26 long waiting time and poor infrastructure as these hospitals are usually overstretched as a result of high  
27 hospital attendance rate.

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30 A different pattern was shown for OOP payment per hospitalization. It was observed that all severe cases  
31 of CVDs hospitalizations (i.e. those requiring surgery) were managed in the Federal owned hospital. This  
32 is because tertiary hospital facilities have a higher number of physicians with different expertise compared  
33 with the resources available in private and State owned facilities. Presumably, this had impact on the  
34 average OOP payment per hospitalization incurred in Federal owned facility as this was the highest relative  
35 to that incurred in private and State owned hospitals.

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38 In general, the contribution of different cost categories as a proportion of total OOP payments by hospital  
39 type was examined. The costs of drugs and laboratory tests were particularly high in all the facilities. An  
40 earlier study on the economic burden of heart failure in Abeokuta, Nigeria revealed that the cost of drugs  
41 and transportation represent about 90% of total costs. [20] Also, another study conducted in a similar SSA  
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3 country, found that the cost of drugs was about 50 percent of the total OOP expenditures incurred by  
4 patients. [17] This imply that the cost of purchasing medicines among CVDs patients represented a  
5 significant financial burden for patients. In addition, this present study also revealed that the costs of  
6 laboratory tests are equally substantial in connection with outpatient OOP payments. This finding is not  
7 unexpected because in some cases, the equipment used for carrying out laboratory tests can be in short  
8 supply in hospital facilities in Nigeria. Where the equipment are available, the costs of laboratory tests can  
9 sometimes be quite expensive for patients. Another reason for the significant contribution of laboratory  
10 costs to the overall OOP payments in this study is that sometimes patients may need to travel to another  
11 hospital facility located within or outside the state where they are being managed to have access to  
12 laboratory test services. The costs of transportation will usually serve to increase the overall OOP  
13 expenditures incurred for laboratory tests.  
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21 Comparing the average OOP payments incurred across federal, state and private owned hospitals, the  
22 outpatient costs were expectedly the highest in private hospitals. However, it was observed that all the  
23 cases/patients requiring surgery during inpatient stay accessed the federal owned hospital and as a result  
24 the average costs of accessing inpatient care in the federal owned hospital was substantially higher relative  
25 to the mean costs incurred in state and private owned hospital facilities. This gap was due to the huge costs  
26 of surgeries. Evidence in this study also showed that the OOP payments incurred in public hospital facilities  
27 remains high against the expectation that the costs of healthcare services should be much cheaper in those  
28 facilities. This represents a cause for concern and the government needs to do more regarding the efforts  
29 towards ensuring UHC in Nigeria.  
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36 In general, the average direct OOP payments for outpatient and inpatient healthcare services across all  
37 facilities, were ~~₦ 421,595.7~~±~~₦ 855,962.0~~ (\$1,164.2± 2,363.8) and ~~₦ 421,595.7~~±~~₦ 855,962.0~~ (\$1,164.2±  
38 2,363.8). These seem very high in a country where almost 89.2 million (i.e. 40.1% of the entire population)  
39 are adjudged to be poor. [34] On the other hand, the low contribution of indirect cost to total cost is  
40 indicative of the level of unemployment as many of the patients and their caregivers reported little income  
41 loss due to sick days.  
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46 Among the patients who needed rehabilitative care at home, physiotherapy cost was the major OOP  
47 payments made which is reasonable since most CVDs patients may require physiotherapy sessions after  
48 hospitalization in order to regain the ability to engage in basic activities of daily living that might have been  
49 affected by illness. Compared to the average OOP payments incurred for outpatient and inpatient healthcare  
50 services among CVD patients, the average costs incurred for homebased/rehabilitative care is much lower.  
51 This shows that majority of the OOP payments borne by CVD patients are incurred for accessing outpatient  
52 and inpatient care services in Nigeria.  
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### **Strengths and Limitation of the study**

Compared with earlier studies conducted in Nigeria, the implementation of this study is methodologically robust as it attempted to avoid some of the weaknesses observed in the few previous studies reviewed. However, there are some limitations that are noteworthy. First, the OOP payments elicited for hospitalized CVDs patients may have been underestimated since data was collected after the patients were discharged to avoid bogging the patients and/or their caregivers at time when they are seriously ill and hospitalized. Despite this, attempts were made to ensure that the estimates were as accurate as possible by verifying the inpatient OOP payments incurred by patients from hospital records. Second, there was no follow ups on individual patients which would have been beneficial for capturing other OOP payments over a longer period. But this was not possible due to the design and duration of the study. These limitations should therefore be considered when interpreting the findings of this study.

### **Conclusion**

The burden of OOP payment among CVDs patients is high as revealed in this study. This could further expose patients and their families to financial hardship which will be detrimental to achieving the twin target of poverty eradication and good health as articulated in the SDGs. Therefore, there is a need to increase efforts to achieve universal health coverage (UHC) in Nigeria.

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N/A

### **Contributors**

FA conceived the idea, designed the study, collected and analyzed the data and wrote the manuscript.

### **Competing interest**

The author declares that there are no competing interests

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## 28 **Data availability statement**

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30 The data utilized for this study will be available on request from the corresponding author.  
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## 32 **Data sharing statement**

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34 No additional data available  
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8 **Figure 1:** Percentage contribution of government health expenditure and OOP payments in current health  
9 expenditures in Nigeria (2010-2017)  
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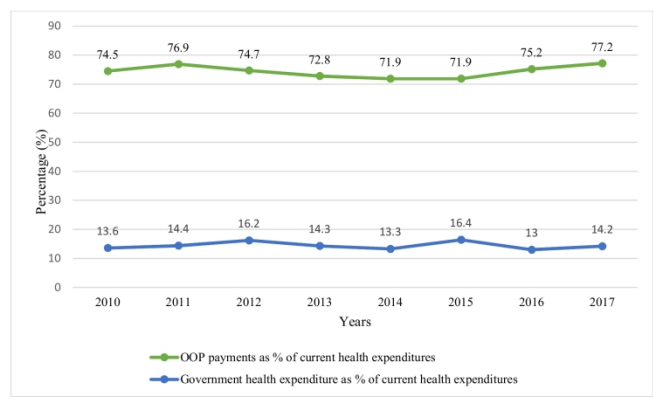
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14 approximately 74.5% of total current health expenditure was financed through OOP payments in 2010  
15 relative to about 13.6% government health expenditures as percentage of current health expenditures. The  
16 proportional contribution of OOP payments increased to 77.2% of current health spending in 2017, which  
17 represented larger year on year burdens of OOP medical outlays on individuals and their families. In  
18 contrast, government health spending marginally increased from 13.6% to 14.2% of current health  
19 expenditures within the review period.  
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26 **Figure 2:** Components of total OOP payments for hospitalized CVDs patients  
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28 OOP payments for accessing health care among hospitalized patients across all the hospitals were  
29 combined. The cost of laboratory test was 30 percent of total OOP payments incurred by patients. Also,  
30 23.08% of medical expenditures was devoted to paying for hospital treatment. Payments for emergency  
31 room, 0.38% and ambulance, 0.01% were the lowest.  
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Figure 1: Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)



Source: WHO: Global Health Observatory data repository

Figure 1: Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)

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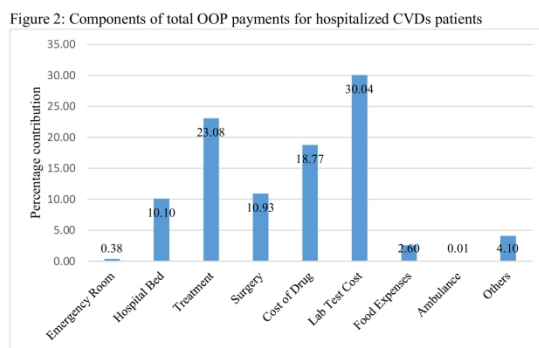


Figure 2: Components of total OOP payments for hospitalized CVDs patients

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# BMJ Open

**The burden of out-of-pocket payments among cardiovascular disease patients in public and private hospitals in Ibadan, South-West, Nigeria: A cross-sectional study**

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## The burden of out-of-pocket payments among cardiovascular disease patients in public and private hospitals in Ibadan, South-West, Nigeria: A cross-sectional study

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### Abstract

**Objectives:** Given that the mechanism for financial protection is underdeveloped in Nigeria, out-of-pocket payment (OOP) for treating cardiovascular disease could impose substantial financial burden on individuals and their families. This study estimated the burden of OOP expenditures incurred by a cohort of CVDs patients in Ibadan, Nigeria.

**Design and settings:** This study utilized a descriptive cross-sectional study design. A standardized survey questionnaire originally developed by Initiative for Cardiovascular Health Research in Developing Countries (ICHRDC) was used to electronically collect data from all the 744 CVDs patients who accessed healthcare between 4<sup>th</sup> November 2019-31<sup>st</sup> January 2020 in the cardiology departments of private and public hospitals in Ibadan, Nigeria. Baseline characteristics of respondents were presented using percentages and proportions. The OOP payments were reported as means  $\pm$  standard deviation. Costs/OOP payments were in Nigerian Naira (NGN (₦)). The average US Dollar (USD (\$) to NGN (₦) at the time of data collection was ₦ 362.12 per \$1. All Quantitative data were analyzed using STATA version 15.

**Outcome measures:** The burden of outpatient, inpatient and rehabilitative care OOP payments

**Results:** Majority of the CVDs patients were within the age range of 45-74 years and 68.55% of them were females. The diagnostic conditions reported among CVDs patients were hypertensive heart failure (84.01%); dilated cardiomyopathy (4.44%); ischaemic heart disease (3.9%), and anaemic heart failure (2.15%). Across all the hospital facilities, the annual direct and indirect outpatient costs were ₦ 421,595.7 $\pm$ ₦ 855,962.0 (\$1,164.2 $\pm$ \$2,363.8) and ₦19,146.5 $\pm$ ₦53,610.1 (\$52.87 $\pm$ \$148.05). Similarly, the average direct and indirect OOP payments per hospitalization across all facilities were ₦182,302.4 $\pm$ ₦249,090.4 (\$503.43 $\pm$ \$687.87) and ₦ 14,700.8 $\pm$ ₦ 69,297.1 (\$40.60 $\pm$ \$191.37), respectively. The average rehabilitative cost after discharge from index hospitalization was ₦30,012.0 (\$82.88).

**Conclusion:** The burden of OOP payment among CVDs patients is enormous. There is a need to increase efforts to achieve universal health coverage (UHC) in Nigeria.

**Keywords:** Cardiovascular diseases, Out-of-pocket payment, Universal health coverage, Catastrophic health expenditure

**Manuscript word count:** 3,419



### Strengths and limitations of this study

- A micro-costing approach was adopted to estimate the costs of accessing CVDs treatment from entirely patients perspective.
- The implementation of this study is methodologically robust as it attempted to avoid some of the weaknesses observed in previous studies conducted in Nigeria.
- A total sampling of all CVDs patients who attended general and specialized heart hospitals during the period of the study was carried out.
- The OOP payments elicited for hospitalized CVDs patients may have been underestimated since data was collected after the patients were discharged to avoid bogging them and/or their caregivers at a time when they were seriously ill and hospitalized.
- This study was a hospital-based study and as a result, CVD patients who did not visit the hospitals because of inability to pay were not captured in the study.

## Background

The prevalence of cardiovascular diseases (CVDs) is increasing in low-and-middle-income-countries (LMICs), imposing a substantial economic burden on economies, households and individuals.[1-3] In many developing countries, CVDs are becoming the leading cause of morbidity and deaths.[4] Recently, sub-Saharan Africa (SSA) countries are experiencing an unprecedented rise in the number of individuals coming down with heart-related diseases.[5-7] A study reported that this health condition accounts for between 7-9 percent of all hospital admissions in the African region.[8] Between 1990 and 2017, the number of deaths related to CVDs in SSA increased by over 50%.[9,10]

Furthermore, Universal Health Coverage (UHC) remains low in majority of the countries in SSA and as a result, the burden of medical payments is often disproportionately borne by individuals and their households. This constitutes large economic burdens for families and predisposes them to catastrophic healthcare payments and other impoverishment impacts of Out-of-Pocket (OOP) payments.

In Nigeria, the mechanism for financial protection against excessive medical payments is underdeveloped as only about 5% of the entire population is covered by the health insurance provided under the National Health Insurance Scheme (NHIS).[11] A study conducted to compare the level of UHC in three SSA countries, Ghana, Kenya and Nigeria, revealed that Nigeria had the lowest UHC of the countries, with 1.1% of the female population and 3.1% of male population covered by social health insurance, respectively.[12]

Consequently, there has been over dependence on OOP payments as the major source of healthcare financing in Nigeria. As revealed in Figure 1,

**Figure 1:** Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)

In view of the rising levels of chronic disease like CVDs and the desire to achieve UHC by 2030 in the country, there is an increasing demand for research evidence in connection with the economic burden posed by OOP payments on patients. Therefore, this study aimed at estimating the OOP health expenditures (the direct and indirect costs) of treatment incurred by patients receiving outpatient and inpatient care in public and private hospital facilities in Ibadan, a South-Western State in Nigeria. In addition, homecare cost for

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3 patients who required rehabilitative care after hospitalization was estimated. Findings in the study will be  
4 useful for ascertaining the cost-effectiveness of the efforts to control modifiable risk factors for CVDs while  
5 also aiding the design of policy interventions for preventing the economic distress associated with OOP  
6 payments for medical services in Nigeria and in similar countries in SSA.  
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## 10 **Material and methods**

### 11 *Study design*

12 This study utilized a descriptive cross-sectional study design.  
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### 16 *Description of study area*

17 Data was collected in the cardiology departments/out-patient clinics of purposively selected private and  
18 public (secondary and tertiary), general and specialized, hospital facilities in Ibadan, Oyo State, South West,  
19 Nigeria. Ibadan is the capital of Oyo State. The city is also regarded as the third most populous city in  
20 Nigeria, behind Lagos and Kano. However, it is renowned as Nigeria's largest city in terms of geographical  
21 area. The city is situated within South-West, Nigeria, 128km inland north-east of Lagos and 350km south-  
22 west of Abuja, the federal capital territory (FCT) of Nigeria. The residents and natives of the city are the  
23 Yorubas, although individuals from other ethnic groups across the country live in the city too. There are  
24 eleven (11) local government areas (LGAs) in Ibadan which are stratified into five (5) urban LGAs and six  
25 semi-urban LGAs. Major health care facilities like the University College Hospital (UCH) and many other  
26 large public and private hospitals are located in Ibadan. These hospitals, especially UCH, serves as referral  
27 centers for other facilities in Oyo State and indeed, facilities in Nigeria as a whole.  
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### 38 *Study population*

39 The study population consisted of individuals seeking healthcare related to heart conditions (CVDs) in  
40 private and public (secondary and tertiary), general and specialized, hospital facilities in Ibadan, Oyo State,  
41 South West, Nigeria.  
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### 46 *Inclusion and exclusion criteria*

47 Respondents were considered eligible to participate if he/she is 18 years and older and have been clinically  
48 confirmed to have any of the CVDs.  
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### 51 *Sampling technique*

52 Major hospitals that provide health care services for chronic diseases like CVDs are not widely spread  
53 across Ibadan city. They are clustered in a few urban and semi-urban LGAs within the city. Therefore, those  
54 LGAs were purposively selected. Following this, the only tertiary hospital facility, UCH and two secondary  
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3 hospitals, Adeoyo State Hospital and Jericho Specialist Hospital, in Ibadan were included in the study.  
4 Also, data were collected from all the specialized heart hospitals in the city. These facilities include Elyon  
5 Heart Rehabilitation Center, Brofam Specialist Hospital and Fountain Heart Clinic. Therefore, a total  
6 sampling of all the 744 CVDs patients that attended the outpatient clinics of these hospital facilities between  
7 4<sup>th</sup> November 2019-31<sup>st</sup> January 2020 was carried out. Details of the sample size calculation and sampling  
8 procedure is provided in the supplementary material.  
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#### 14 *Data collection*

15 Data was collected using a standardized survey questionnaire originally developed by Initiative for  
16 Cardiovascular Health Research in Developing Countries (ICHRDC) which has been used in a previous  
17 study. [13] This tool was adapted and designed using the REDcap software. [14] The validity and reliability  
18 of the questionnaire was ensured by pre-testing it in facilities that were similar to the ones included in the  
19 study. A total of 43 questionnaires, 10% of the estimated sample size, were administered for the pretest.  
20 Completed questionnaires were checked for completeness. The Cronbach Alpha was utilized to test for  
21 internal consistency. From the results generated, necessary corrections were made accordingly. The  
22 instrument was then utilized to elicit information on respondents' demographic characteristics, medical  
23 history, individual and household economic information, OOP payments (i.e. direct and indirect costs)  
24 incurred towards outpatient CVDs treatment, inpatient care (for those hospitalized in the last 15 months  
25 prior to the study) as well as those who require homebased rehabilitative medical care. All the costs incurred  
26 per outpatient visit were elicited. The recall period for inpatient was 15 months while that of homebased  
27 rehabilitative care was 1 month similar to that adopted in a previous study. [13] Trained research assistants  
28 administered the research tool electronically using tablets after written informed consent was obtained from  
29 the participants. Strict data quality was ensured by the principal investigator and 2 data collection  
30 supervisors. Regular review of the data collected were conducted by reviewing hospital patient treatment  
31 records, especially to verify the costs of hospitalization reported by patients. All the data collected were  
32 anonymized.  
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#### 44 *Ethical approval*

45 This study involved human subjects and necessary ethical procedures were followed. Ethical approval was  
46 obtained from the University of Ibadan/University College Hospital ethics review committee  
47 (NHREC/05/01/2008a). Approval was also obtained from respective hospital facilities.  
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#### 52 *The burden of OOP payments among CVDs patients*

53 This study adopted a micro-costing of all the OOP payments incurred by patients towards accessing  
54 outpatient, inpatient and homebased medical services. This methodology for estimating the burden of OOP  
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3 payments, i.e. direct costs and indirect costs, follows that adopted in previous studies.[1,15-20] Direct costs  
4 relate to expenditures incurred when paying for hospital fees, purchase of medicines/drugs, transportation  
5 to and fro to access outpatient and inpatient treatment (also referred to as direct non-medical cost), medical  
6 consumables, laboratory tests, emergency room, hospital bed and radiological procedures.[21] Similarly,  
7 indirect costs referred to the costs associated with loss of work/productivity/income as a result of sick days  
8 as well as the income/wages loss by the caregiver (s) who accompanied the patients to the  
9 clinic/hospital.[22-25] For outpatient and inpatient care, information were elicited from patients and/or  
10 patients' caregiver (s) to calculate the indirect cost. The number of days absent from work due to outpatient  
11 and inpatient care was multiplied by patient's earnings per day. Following similar procedure, the wages lost  
12 for caregiving was also ascertained. No indirect costs were recorded for respondents/caregivers who were  
13 unemployed and those who had regular paid job because they may not have incurred any income loss due  
14 to CVD treatment. For CVD patients who were self-employed, the average hourly/daily earnings were  
15 elicited and this was multiplied by the number of hours/days spent while receiving treatment as a result of  
16 CVD. Estimated outpatient costs were annualized while inpatient cost relates to cost per hospitalization.  
17 Homebased care costs include all the costs incurred for rehabilitative care outside of the hospital. Patients  
18 reported the average OOP payment incurred for homebased/rehabilitative care on a monthly basis and this  
19 cost was annualized. The presence of co-morbidity could potentially bias the estimated costs upward and  
20 to partially mitigate this effect, participants were asked to report on the OOP payments related to CVD  
21 treatment only and where necessary guidance was sought from the attending physicians to ensure that  
22 possible effects of co-morbidity is minimised.  
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#### 36 *Outpatient OOP payments*

37 This includes costs/payments for hospital charges, costs of drugs, laboratory costs and other costs which  
38 were associated with outpatient treatment.  
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#### 42 *Inpatient OOP payments*

43 Expenditures incurred for emergency room, hospital bed, treatment, surgery, purchase of drugs, laboratory  
44 tests, food expenses, costs of ambulance service and other costs incurred during index hospitalization in the  
45 last 15 months.  
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#### 50 *Homebased/rehabilitative OOP payments*

51 This includes doctor fees, nurse fees, physiotherapist costs, occupational rehabilitation, costs of drugs, and  
52 laboratory costs.  
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*Statistical analysis*

Variable	Frequency	Percent (%)	Baseline characteristics of
<b>Age group( Years)</b>			respondents was presented using
<45	76	10.22	percentages and proportions. The
45-54	133	17.88	OOP payments for outpatient,
55-64	206	27.69	inpatient and homebased medical
65-74	224	30.11	services was reported as means ±
>74	105	14.11	standard deviation. All Quantitative
<b>Gender</b>			

data was analyzed using STATA version 15 and costs/OOP payments were in Nigerian Naira (NGN (₦)). The average US Dollar (USD (\$)) to NGN at the time of data collection was ₦ 362.12 per \$1. All through this article, the patient-perspective costs (direct and indirect) are used interchangeably with OOP medical payments.

*Patient and Public involvement statement*

Apart from being research participants, there was no patient and/or public involvement in the design and execution of this study

**Results**

The background characteristics of respondents is depicted in Table 1. The highest number of CVDs patients were within age groups 55-64 years (27.69%) and 65-74 years (30.11%). Respondents within ages below 45 years (10.22%), age group 45-54 years (17.88), and those with ages above 74 years (14.7%), were the lowest. Majority of the patients were females (68.55%). Of the participants, 211 (28.36%) had primary education, 184 (24.73%) had secondary education, 203 (27.28%) had tertiary education while 146 had no formal education. Also, 515 (69.22%) were married, 200 (26.88%) had lost his/her partner, 14 (1.88%) were divorced and 15 (2.02%) were never married. Those who are self-employed (35.62%) were the highest and respondents who cannot work due to disability (2.02%) were the fewest. The prevalence of participants who had ever smoke was 8.33% and only 9.19% of respondents consumed alcohol in the last one month prior to the time data was collected.

Table 1: Background characteristics of respondents (N=744)

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3	Male	234	31.45
4	Female	510	68.55
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6	<b>Educational level</b>		
7	None	146	19.62
8	Primary	211	28.36
9	Secondary	184	24.73
10	Tertiary	203	27.28
11			
12	<b>Marital status</b>		
13	Single	15	2.02
14	Divorced/Separated	14	1.88
15	Widow/Widower	200	26.88
16	Married	515	69.22
17			
18	<b>Occupation</b>		
19	Employed (government)	65	8.74
20	Employed (non-government)	19	2.55
21	Employed (self)	265	35.62
22	Unemployed	100	13.44
23	Retired	152	20.43
24	Artisan	128	17.2
25	Disabled/Cannot work	15	2.02
26			
27	<b>Ever smoked</b>		
28	No	682	91.67
29	Yes	62	8.33
30			
31	<b>Currently smoking</b>		
32	No	61	98.39
33	Yes	1	1.61
34			
35	<b>Ever consumed alcoholic drink</b>		
36	No	559	75.13
37	Yes	185	24.87
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39	<b>Consumed alcohol in last 1 month</b>		
40	No	168	90.81
41	Yes	17	9.19
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3 Table 2 shows the clinical/medical characteristics of respondents. Majority of the patients were undergoing  
4 treatment due to hypertensive heart failure (84.01%). This was followed by dilated cardiomyopathy  
5 (4.44%), ischaemic heart disease (3.9%), and anaemic heart failure (2.15%), in that order. Of the 744 CVDs  
6 patients, 128 (17.41%) were hospitalized in the last 15 months and majority of them (81.25%) were  
7 hospitalized once in the last 15 months while only two (1.56%) were hospitalized more than five times  
8 during that period. As such, the hospitalization rate among this cohort of CVDs patients was 17.42%. Also,  
9 for all the hospitalized patients, the average length of hospital stay (LoHS) was 8.2 days.  
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Table 2: Medical characteristics of respondents (N=744)

Health Issue	Frequency	Percent
<b>Cardiovascular diseases</b>		
Alcoholic cardiomyopathy	3	0.4
Anaemic heart failure	16	2.15
Complete heart block	6	0.81
Congenital heart disease	5	0.67
Cor pulmonale	1	0.13
Dilated cardiomyopathy	33	4.44
Hypertensive heart disease	625	84.01
Ischaemic heart disease	29	3.9
Pericardial valvular heart disease	7	0.94
Peripartum cardiomyopathy	5	0.67
Thyroid disease	3	0.4
Other	11	1.48
<b>Hospitalized in the last 15 months?</b>		
No	607	82.59
Yes	128	17.41
<b>No of time hospitalized</b>		
Once	104	14.06
Twice	18	2.42
Thrice	4	0.54
Five times	2	0.27
<b>length of hospital stay (LoHS)</b>		
1 to 3 days	13	1.75
4 to 6 days	26	3.51
7 to 9 days	38	5.11
10 to 12 days	16	2.16
>12 days	35	4.71
Average LoHS	8.2 days	

### *Estimates of annualized outpatient OOP payments*

The OOP payment for different components of outpatient medical services among CVDs patients by private and public (Federal and State) hospital facilities are reported in Table 3. The cost of laboratory test was the highest relative to other components of OOP payments in private and Federal owned hospital facilities, ₦ 535,042.1±622,683.4 (\$1,477.5±\$1,719.6) and ₦ 265,091.7±396,839.7 (\$732.1±\$1,095.9), respectively. For patients who accessed healthcare in State owned hospital facilities, the cost of drugs/medicines was the highest when compared with other components of OOP payments, ₦ 238,917.4±₦886,081.5 (\$659.8±\$2,446.9). As expected, the annual average OOP payments in private hospitals was higher than that incurred in public hospitals (both Federal and State owned hospitals): ₦ 283,515.8 (\$782.9) for private hospital facilities; ₦115,593.5 (\$319.2) for Federal owned hospital; ₦ 85,959.1 (\$237.4). Across all the hospital facilities, the annual direct and indirect costs were ₦ 421,595.7±₦ 855,962.0 (\$1,164.2± 2,363.8) and ₦19,146.5±₦53,610.1 (\$52.87±\$148.05). Estimated OOP payments are heavy-tailed to the right, hence the higher value of the standard deviation from the mean.

Table 3: Annualized OOP payments for outpatient treatment among CVDs patients

Hospital type	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
<b>Private</b>					
Hospital charges	38	0.0	90,000.0	51,978.9	20,366.8
Lab test cost	38	0.0	2,400,000.0	535,042.1	622,683.4
Cost of drug	38	14,400.0	3,974,400.0	529,357.9	844,813.3
Other medical costs	38	0.0	384,000.0	17,684.2	65,785.1
Average cost				283,515.8	
<b>Federal</b>					
Hospital charges	338	0.0	42,000.0	15,571.6	7,213.0
Lab test cost	338	0.0	2,400,000.0	265,091.7	396,839.7
Cost of drug	338	0.0	3,360,000.0	176,600.7	293,799.6
Other medical costs	324	0.0	150,000.0	5,110.0	17,084.5
Average cost				115,593.5	
<b>State</b>					
Hospital charges	368	0.0	25,200.0	3,135.3	2,498.9
Lab test cost	368	0.0	1,440,000.0	95,701.6	185,896.8
Cost of drug	368	0.0	1,210,000.0	238,917.4	886,081.5
Other medical costs	359	0.0	259,200.0	6,082.2	27,118.9
Average cost				85,959.1	
Average direct out-patient cost (all facilities)				<b>421,595.7</b>	<b>855,962.0</b>
Average indirect out-patient cost (all facilities)				<b>19,146.5</b>	<b>53,610.1</b>

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5 *Estimates of OOP payments per hospitalization*

6 Table 4 shows the OOP payment per hospitalization among CVDs patients. The cost of treatment, ₦  
7 68,428.57±~~₦~~ 108,814.60 (\$188.97±\$300.49), was the highest in private hospitals, followed by the cost of  
8 laboratory tests, ₦ 51,428.57±~~₦~~ 55,280.67. In the Federal owned facility, OOP payments for surgical  
9 procedure was the highest ₦ 3,414,000.0 (\$9,429.8) was the highest and this is followed by the costs of  
10 laboratory tests, ₦78,456.55±~~₦~~99,141.23 (\$216.66± \$273.78). This was followed by the costs of treatment  
11 and the costs of drugs, ₦49,577.62±~~₦~~91,349.57 (\$136.91±\$252.26) and ₦47,050.60±~~₦~~64,373.54  
12 (\$129.93±\$177.11), respectively. Similarly, the costs of laboratory test and OOP payments to purchase  
13 drugs per hospitalization, were the largest in State owned hospitals. Following a similar pattern to the OOP  
14 payments for outpatient care, patients who attended State hospitals incurred the least OOP payment per an  
15 episode of hospitalization, ₦91,075.67 (\$251.51) relative to those who accessed care in private and Federal  
16 hospitals, ₦193,665.71 (\$534.81) and ₦254,559.19 (\$702.97). Relative to that of outpatient care, CVDs  
17 patients who were admitted in the Federal hospital, incurred the highest OOP payment. Overall, the average  
18 direct and indirect OOP payments per hospitalization across all facilities were ₦182,302.4±~~₦~~ 249,090.4  
19 (\$503.43±\$687.87) and ₦ 14,700.8±~~₦~~ 69,297.1 (\$40.60±\$191.37), respectively.  
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Table 4: OOP payment per hospitalization among CVDs patients

Hospital type	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
<b>Private</b>					
Emergency room	7	0.00	0.00	0.00	0.00
Hospital bed	7	0.00	30,000.00	6,442.86	10,752.34
Treatment	7	0.00	300,000.00	68,428.57	108,814.60
Surgery	7	0.00	0.00	0.00	0.00
Cost of drug	7	0.00	50,000.00	23,571.43	20,354.01
Lab test cost	7	0.00	160,000.00	51,428.57	55,280.67
Food expenses	7	0.00	7,000.00	1,964.29	2,451.31
Cost of ambulance	5	0.00	0.00	0.00	0.00
Other medical costs	5	0.00	184,150.00	41,830.00	79,980.43
Average cost				193,665.71	
<b>Federal</b>					
Emergency room	83	0.00	20,000.00	872.29	3,430.90
Hospital bed	84	0.00	1,680,000.00	28,651.19	182,802.10
Treatment	84	0.00	500,000.00	49,577.62	91,349.57
Surgery	10	1,440,000	5,400,000.0	3,414,000.0	5,400,000
Cost of drug	84	0.00	400,000.00	47,050.60	64,373.54
Lab test cost	84	0.00	450,000.00	78,456.55	99,141.23
Food expenses	84	0.00	100,000.00	6,696.43	14,935.59
Cost of ambulance	76	0.00	2,500.00	32.89	286.77
Other medical costs	78	0.00	250,000.00	9,352.56	29,655.76
Average cost				752,339.3	
<b>State</b>					
Emergency room	37	0.00	15,000.00	675.68	2,677.62
Hospital bed	37	0.00	56,000.00	4,808.11	9,937.68
Treatment	37	0.00	400,000.00	3,6891.89	80,026.31
Surgery	37	0.00	0.00	0.00	0.00
Cost of drug	37	0.00	105,000.00	20,794.59	20,575.74
Lab test cost	37	0.00	100,000.00	23,540.54	23,462.26
Food Expenses	37	0.00	56,000.00	2,689.19	9,275.90
Cost of ambulance	37	0.00	0.00	0.00	0.00
Other medical costs	37	0.00	31,500.00	1,675.68	5,408.61
Average cost				91,075.67	
Average direct out-patient cost (all facilities)				<b>182,302.4</b>	<b>249,090.4</b>
Average indirect out-patient cost (all facilities)				<b>14,700.8</b>	<b>69,297.1</b>

In figure 2,

Figure 2: Components of total OOP payments for hospitalized CVDs patients

*Estimates of OOP payments for homebased/rehabilitative care*

The annualized OOP payment incurred by CVDs patients who required rehabilitative care is reported in table 5. The highest cost incurred was physiotherapy costs, ₦144,000.0±₦401,905.8 (\$397.66±\$1,109.87), followed by the cost of drugs, ₦35,161.8±₦334,195.4 (\$97.10±\$922.89). The average rehabilitative cost was ₦30,012.0 (\$82.88).

Table 5: Annualized OOP payments for homebased/rehabilitative care among CVDs patients

Cost components	Number of respondents	Minimum cost (₦)	Maximum cost (₦)	Mean cost (₦)	Std. dev (₦)
Doctor fee	355	0.0	60000.0	459.7	4,256.5
Nurse fee	336	0.0	600,000.0	2,035.7	32,855.7
Lab Test	336	0.0	118,020.0	15,428.6	106,186.6
Cost of drug	335	0.0	600,000.0	35,161.8	334,195.4
Occupational Rehabilitation	334	0.0	276,000.0	9,556.9	152,789.1
Physiotherapist cost	334	0.0	1,440,000.0	144,000.0	401,905.8
Other medical cost	333	0.0	360,000.0	3,441.4	29,510.7
Average cost				<b>30,012.0</b>	

## Discussion

This study estimated the OOP payments (direct and indirect costs) incurred to access outpatient, inpatient and rehabilitative care among CVDs patients attending private and public healthcare facilities in Ibadan, Nigeria. As such, the study fills an important gap in the literature by providing estimates of the financial burden of treating heart-related diseases, entirely from patients' perspective. For the first time, all possible OOP expenditures relating to outpatient, hospitalization as well as rehabilitative care incurred by individuals ailing from a wide range of CVDs were estimated. This provides policymakers with a comprehensive source of information with overarching implications for healthcare financing in Nigeria and in SSA as a whole.

Regarding the baseline profile of CVDs patients in this study, majority were within the age range of 45-74 years. This is consistent with findings in previous studies that most chronic non-communicable diseases, especially CVDs, manifest earlier and during the most productive ages of individuals in developing

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3 countries compared with what is obtainable in advanced countries.[26-29] Also, the prevalence of CVDs  
4 was higher among females relative to males, a finding which has also been revealed in earlier  
5 studies.[29,30] Hypertensive heart failure and ischaemic heart disease were the predominant diagnostic  
6 conditions relative to other types of CVDs. A study conducted to investigate the profile of acute heart failure  
7 in a tertiary hospital in Abeokuta, Nigeria, reported that hypertensive heart failure was the commonest heart  
8 condition, (about 78.5 percent of all cases) observed in the study. [31] Another study assessed the pattern  
9 of CVDs in Abuja, the Federal Capital Territory (FCT) of Nigeria and compared this pattern with that of a  
10 similar study implemented in South Africa, the Heart of Soweto Study. The study reported that hypertensive  
11 heart failure was the predominant (i.e. 61% of the cases) diagnostic condition among CVDs patients and  
12 that heart-related patients in Abuja were twice likely to present with hypertensive heart disease relative to  
13 that observed in the South African study. [32]

21 The OOP payment incurred by CVDs patients who accessed outpatient healthcare services in private  
22 hospital facilities was higher on average, relative to those who were treated in public hospitals. The average  
23 OOP payment expended by patients who attended private hospitals was almost three times that incurred by  
24 patients who were treated in the Federal owned/tertiary hospital. Patients who accessed treatment in the  
25 State owned hospitals incurred the least average outpatient costs per year. Apparently, the fact that private  
26 facilities are driven by the aim of maximizing profit is enough reason to charge higher fees for healthcare  
27 services. Another justification for the differences in OOP payments in private and public hospitals is that  
28 patients who accessed healthcare services in public hospitals enjoy subsidized charges. However, this  
29 reduced treatment fees oftentimes impose huge financial burden on individuals and families, especially the  
30 poor ones. Also, patients are sometimes weary of accessing healthcare in public owned facilities due to  
31 long waiting time and poor infrastructure as these hospitals are usually overstretched as a result of high  
32 hospital attendance rate.

41 A different pattern was shown for OOP payment per hospitalization. It was observed that all severe cases  
42 of CVDs hospitalizations (i.e. those requiring surgery) were managed in the Federal owned hospital. This  
43 is because tertiary hospital facilities have a higher number of physicians with different expertise compared  
44 with the resources available in private and State owned facilities. Presumably, this had impact on the  
45 average OOP payment per hospitalization incurred in Federal owned facility as this was the highest relative  
46 to that incurred in private and State owned hospitals.

51 In general, the contribution of different cost categories as a proportion of total OOP payments by hospital  
52 type was examined. The costs of drugs and laboratory tests were particularly high in all the facilities. An  
53 earlier study on the economic burden of heart failure in Abeokuta, Nigeria revealed that the cost of drugs  
54 and transportation represent about 90% of total costs. [19] Also, another study conducted in a similar SSA  
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3 country, found that the cost of drugs was about 50 percent of the total OOP expenditures incurred by  
4 patients. [16] This imply that the cost of purchasing medicines among CVDs patients represented a  
5 significant financial burden for patients. In addition, this present study also revealed that the costs of  
6 laboratory tests are equally substantial in connection with outpatient OOP payments. This finding is not  
7 unexpected because in some cases, the equipment used for carrying out laboratory tests can be in short  
8 supply in hospital facilities in Nigeria. Where the equipment are available, the costs of laboratory tests can  
9 sometimes be quite expensive for patients. Another reason for the significant contribution of laboratory  
10 costs to the overall OOP payments in this study is that sometimes patients may need to travel to another  
11 hospital facility located within or outside the state where they are being managed to have access to  
12 laboratory test services. The costs of transportation will usually serve to increase the overall OOP  
13 expenditures incurred for laboratory tests.  
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21 Comparing the average OOP payments incurred across federal, state and private owned hospitals, the  
22 outpatient costs were expectedly the highest in private hospitals. However, it was observed that all the  
23 cases/patients requiring surgery during inpatient stay accessed the federal owned hospital and as a result  
24 the average costs of accessing inpatient care in the federal owned hospital was substantially higher relative  
25 to the mean costs incurred in state and private owned hospital facilities. This gap was due to the huge costs  
26 of surgeries. Evidence in this study also showed that the OOP payments incurred in public hospital facilities  
27 remains high against the expectation that the costs of healthcare services should be much cheaper in those  
28 facilities. This represents a cause for concern and the government needs to do more regarding the efforts  
29 towards ensuring UHC in Nigeria.  
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36 In general, the average direct OOP payments for outpatient and inpatient healthcare services across all  
37 facilities, were  $\text{₦ } 421,595.7 \pm \text{₦ } 855,962.0$  ( $\$1,164.2 \pm 2,363.8$ ) and  $\text{₦ } 421,595.7 \pm \text{₦ } 855,962.0$  ( $\$1,164.2 \pm$   
38  $2,363.8$ ). These seem very high in a country where almost 89.2 million (i.e. 40.1% of the entire population)  
39 are adjudged to be poor. [33] On the other hand, the low contribution of indirect cost to total cost is  
40 indicative of the level of unemployment as many of the patients and their caregivers reported little income  
41 loss due to sick days.  
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46 Among the patients who needed rehabilitative care at home, physiotherapy cost was the major OOP  
47 payments made which is reasonable since most CVDs patients may require physiotherapy sessions after  
48 hospitalization in order to regain the ability to engage in basic activities of daily living that might have been  
49 affected by illness. Compared to the average OOP payments incurred for outpatient and inpatient healthcare  
50 services among CVD patients, the average costs incurred for homebased/rehabilitative care is much lower.  
51 This shows that majority of the OOP payments borne by CVD patients are incurred for accessing outpatient  
52 and inpatient care services in Nigeria.  
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### **Strengths and limitation of the study**

Compared with earlier studies conducted in Nigeria, the implementation of this study is methodologically robust as it attempted to avoid some of the weaknesses observed in the few previous studies reviewed. However, there are some limitations that are noteworthy. The OOP payments elicited for hospitalized CVDs patients may have been underestimated since data was collected after the patients were discharged to avoid bogging the patients and/or their caregivers at a time when they are seriously ill and hospitalized. Despite this, attempts were made to ensure that the estimates were as accurate as possible by verifying the inpatient OOP payments incurred by patients from hospital records. In addition, there was no follow ups on individual patients which would have been beneficial for capturing other OOP payments over a longer period. Although, this was not possible due to the design and duration of the study. Despite the efforts to reduce the effects of co-morbidity/multi-morbidity on the estimated costs, it is not unlikely that some level of bias remains. Lastly, the conceptualization of indirect costs in this study is a narrow one. Other indirect costs which relates to reduced healthcare and loss of employment for other family members, as well as reduced school attendance of children were not included in the calculation of indirect costs. This may mean that the indirect cost is quite higher than what is reported in the study. Therefore, these limitations should be considered when interpreting the findings of this study.

### **Conclusion**

The burden of OOP payment among CVDs patients is high as revealed in this study. This could further expose patients and their families to financial hardship which will be detrimental to achieving the twin target of poverty eradication and good health as articulated in the SDGs. Therefore, there is a need to increase efforts to achieve universal health coverage (UHC) in Nigeria.

### **Acknowledgement**

N/A

### **Contributors**

FA conceived the idea, designed the study, collected and analyzed the data and wrote the manuscript.

### **Competing interest**



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3 The author declares that there are no competing interests  
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### 36 **Data availability statement**

37 The data utilized for this study will be available on request from the corresponding author.  
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### 40 **Data sharing statement**

41 No additional data available  
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**Figure 1:** Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)

approximately 74.5% of total current health expenditure was financed through OOP payments in 2010 relative to about 13.6% government health expenditures as percentage of current health expenditures. The proportional contribution of OOP payments increased to 77.2% of current health spending in 2017, which

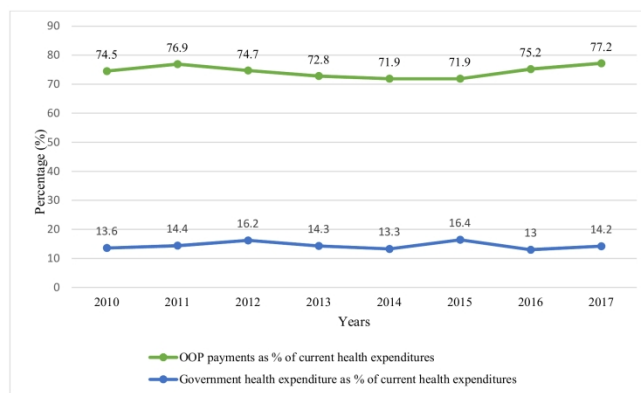
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3 represented larger year on year burdens of OOP medical outlays on individuals and their families. In  
4 contrast, government health spending marginally increased from 13.6% to 14.2% of current health  
5 expenditures within the review period.  
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11 **Figure 2:** Components of total OOP payments for hospitalized CVDs patients

12 OOP payments for accessing health care among hospitalized patients across all the hospitals were  
13 combined. The cost of laboratory test was 30 percent of total OOP payments incurred by patients. Also,  
14 23.08% of medical expenditures was devoted to paying for hospital treatment. Payments for emergency  
15 room, 0.38% and ambulance, 0.01% were the lowest.  
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Figure 1: Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)



Source: WHO: Global Health Observatory data repository

Figure 1: Percentage contribution of government health expenditure and OOP payments in current health expenditures in Nigeria (2010-2017)

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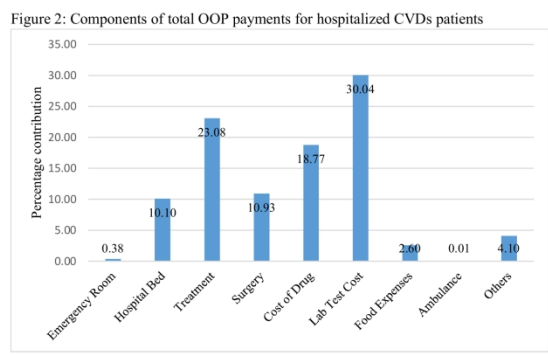


Figure 2: Components of total OOP payments for hospitalized CVDs patients  
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### Sample size determination and sampling procedure

To estimate the sample size for a continuous outcome variable such as costs and assuming that mean (average) cost  $\mu$  and standard deviation  $\sigma$  are normally distributed. The width of the precision of a given sample size according to Johnston et. al. [1] can be expressed as:

$$\left(W = 1.96 \times \frac{\sigma}{\sqrt{n}}\right)^2 \quad (1)$$

However, it is difficult to identify studies with appropriate value for  $\sigma$ , therefore in the absence of this, Johnston et. al. proposed the following formula:

$$\left(\frac{1.96 \times C_v}{V}\right)^2 \quad (2)$$

Where  $C_v$  denote the coefficient of variation (i.e. the ratio of the standard deviation and the mean cost),  $V$  represent the desired level of precision which is 95% confidence interval (CI). The  $C_v$  for a 95% CI is 0.50.

Thus, the minimum sample size was determined as follows:

$$n = \left(\frac{1.96 \times 0.50}{0.05}\right)^2 = 384 \quad (3)$$

Adjusting the sample size for 10% non-response rate:

$$n_f = \frac{n}{1-NR} \quad (4)$$

Where  $n_f$  denotes non-response and  $NR$ , non-response rate

$$n_f = \frac{384}{1-0.1} = 427 \quad (5)$$

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