

## MEDICATION NON-ADHERENCE AND COST ASSOCIATED WITH HOSPITALISATION OF HYPERTENSIVE IN-PATIENTS IN A TERTIARY HOSPITAL, SOUTHWESTERN NIGERIA

ADUKE ELIZABETH IPINGBEMI<sup>1\*</sup>, WILSON OYEKIGHO ERHUN<sup>2</sup> AND RASAQ ADISA<sup>1</sup>

<sup>1</sup>Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, University of Ibadan, Ibadan, Nigeria

<sup>2</sup>Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, Obafemi Awolowo University, Ile Ife, Nigeria

Published online: 25 May 2023

To cite this article: IPINGBEMI, A. E., ERHUN, W. O. & ADISA, R. (2023) Medication non-adherence and cost associated with hospitalisation of hypertensive in-patients in a tertiary hospital, southwestern Nigeria, *Malaysian Journal of Pharmaceutical Sciences*, 21(1): 47–62, <https://doi.org/10.21315/mjps2023.21.1.4>

To link to this article: <https://doi.org/10.21315/mjps2023.21.1.4>

### ABSTRACT

The study aimed at estimating the cost of hospitalisation associated with medication non-adherence (MNA) among hypertensive in-patients in a tertiary healthcare facility in southwestern Nigeria. It involved a cross-sectional retrospective review of 322 medical records of hypertensive in-patients at the University College Hospital between 2013 and 2015. Physician's documentation of MNA in the patients' medical records prior to admission determined the eligibility into the study. Direct medical costs mainly consultation, medications, laboratory costs for individual patients during hospitalisation were calculated using out-of-pocket payer's perspective approach. Data were summarised with descriptive statistics, Pearson's product moment correlation coefficient was used to determine relationship between length of stay in hospital, cost of management and number of comorbidities at  $p < 0.05$  considered statistically significant. Of the 322 medical records of hypertensive in-patients evaluated within the 3-year study period, 230 (71.4%) had a documentation of MNA. The average age was  $55.9 \pm 15.7$  years old. Artisans/self-employed ( $n = 82$ ; 35.7%) and petty traders ( $n = 61$ ; 26.5%) made up the majority of the patients. The total cost of hospitalisation for the period studied was USD100,461.40 for all the patients, with an average of  $USD52.00 \pm 28.10$ /patient/day, more than a quarter of which was spent on pharmaceuticals. Similarly, the costs of management also increased with increase in length of hospitalisation (Pearson's product moment correlation  $r = 0.539$ ,  $p = 0.000$ ). The number of comorbid diseases increased the length of hospitalisation ( $r = 0.133$ ,  $p = 0.044$ ). Cost associated with hospitalisation in relation to MNA is high among the studied participants. There is a need to develop strategies to enhance medication adherence among patients with hypertension.

**Keywords:** Non-adherence, Cost, Management, Hospitalisation, Hypertension

\*Corresponding author: [pharmaduke@yahoo.com](mailto:pharmaduke@yahoo.com)

## INTRODUCTION

The global prevalence of hypertension as at 2019 was 59% in women and 49% in men, with women achieving higher curative and control rate as compared to men (NCD-Risk Factor Collaboration 2021). Despite the fact that low- and middle-income countries (LMICs) have improved towards management of hypertension in recent decades, only one in three people in LMICs are aware of their hypertension status and about 8% have their blood pressure regulated (Schutte *et al.* 2021). Non-communicable diseases, such as hypertension, were responsible for almost 70% of deaths worldwide, with 75% of those deaths happening in low- and middle-income nations (Global Health Observatory 2019). This growing burden of health problems of LMICs deepens the income disparity, adds to the financial problems of patients and caregivers, and raises costs for the health system, which is already dealing with issues like low physician-to-patient ratios and limited access to medicines (Schutte *et al.* 2021).

In Nigeria, hypertension is the most often identified cardiovascular disease (CVD) risk factor, accounting for nearly a quarter of emergency hospital admissions in major cities (Ansa *et al.* 2016). According to previous studies, one in every four adult Nigerians is hypertensive, and hypertension ignorance is a primary cause of CVD deaths in the country (Ogah *et al.* 2012; Adeloye *et al.* 2015). The poor accessibility to quality healthcare in the country increases the risk of complications arising from the disease (Yaya *et al.* 2018; Cremer *et al.* 2019).

Patients with chronic diseases, such as hypertension, have a low rate of medication adherence. Low compliance with antihypertensive medicines and lifestyle changes, as well as low compliance with regular follow-up visits and suboptimal pharmacotherapy, constitute a significant impediment to achieving optimum blood pressure, with a consequence of poor hypertension control (Karakurt and Kaşıkçı 2012; Abegaz *et al.* 2017). More than 40% of patients with chronic diseases including hypertension discontinued their medication(s) in less than a year of commencement (Blaschke *et al.* 2012). Poor access to care is significantly linked to non-adherence, implying that expanding insurance coverage could help close the gap in death disparities (Young *et al.* 2015). Despite this, studies have shown that high drug costs and out-of-pocket payment have a detrimental impact on medication adherence (Holbrook *et al.* 2021; Alefan *et al.* 2022). Many studies have reported that medication non-adherence is associated with increase in inpatient admission, emergency department visit and total medical cost (Cutler *et al.* 2018; Tajeu and Muntner 2020). However, most of these studies were conducted in developed countries with little or no local studies to provide a clear understanding of the cost implications of non-adherence to medication among patients with chronic diseases. In addition, most developed countries usually have a well-established and functional health insurance schemes that can be easily accessed by the citizens, thereby alleviating cost-related medication non-adherence (Chang *et al.* 2011; Keisler-Starkey *et al.* 2021). Whereas, in Nigeria like many other developing countries (Fenny, Yates and Thompson 2018; Ly, Bassoum and Faye 2022) access to functional health insurance scheme is lacking for majority of the populace, with most patients making out-of-pocket payments for their medications (Alawode and Adewole 2021). Also, in Nigeria, 40% of the population, or about 83 million people, lives below the country's poverty line of ₦137,430 (USD381.75) per year (National Bureau of Statistics 2020) which is a reflection of the financial capability of the citizens. This research was therefore undertaken to provide an insight into medication non-adherence and the associated cost of management among hypertensive in-patients in a tertiary hospital in Nigeria with a view to provide information that may guide policy makers on quality healthcare and disease management.

## METHODS

### Study Site

The study was carried out at the University College Hospital (UCH) Ibadan, Nigeria.

### Study Population

Only case notes of adult patients diagnosed with hypertension and admitted to the UCH Ibadan, Nigeria between the years 2013 and 2015 were used for the study. Available information from the Record Department of UCH indicated that 322 patients were on admission during the 3-year period.

### Inclusion and Exclusion Criteria

All case notes of adult patients diagnosed primarily with hypertension and were admitted between the years 2013 and 2015, with records of non-adherence to medication at the point of admission were included in the study. While those admitted due to other reason(s) aside non-adherence were excluded from the study.

### Sample Size

The sample size for this study was determined using the Raosoft sample size calculator [[https://www.raosoft.com/sample\\_size.html](https://www.raosoft.com/sample_size.html)]. The estimated population of 322 case notes for hypertensive patients admitted for the 3-year study period, at 95% confidence level and 5% margin of errors was inputted into the calculator to give a sample size of 175. An additional 20% attrition rate was considered, which gave a minimum representative sample size of 210, as target case notes to sample. However, with the total sampling approach, 230 case notes were reviewed at the end of the study.

### Sampling Approach

The case notes of hypertensive patients admitted between the years 2013 and 2015, were retrieved from the record department using their respective hospital number on the admission register. The case notes were chronologically arranged according to the year of admission, and subsequently, a total sampling of all the case notes of eligible patients with a physician assessment and documentation of medication non-adherence prior to admission was done. Only these eligible patients' case notes were evaluated.

## DATA COLLECTION

In this study, each eligible case note was evaluated with focus on any physician's documented note on medication non-adherence, as well as the possible reason(s) for such non-adherence behaviour. Such physician notes included '*patient did not take his/her medications regularly due to financial constraint*'; '*patient had stopped using his/her medications for sometimes because he/she is tired*' etc). In this study, there was no specific tool used to assess patients' medication adherence rather the assessment was based solely on the physician's judgement of the medication adherence status of patients as documented

in their case notes. Other parameters that were also retrospectively retrieved from the case notes included the sociodemographic (age, sex, marital status and residence), age at diagnosis, year of diagnosis, comorbidities, laboratory investigations, medications used, duration of hospital stay and other services provided while on admission (physiotherapy and dieticians).

### Cost Estimation

Direct and indirect medical costs were included in this study cost items. Costs of medications which included antihypertensives and other medications for comorbid diseases, cost of all laboratory investigations related to the disease state in focus, bed fee, cost of diets provided, cost of blood transfusion, oxygen use and physiotherapist services, were all included in direct medical costs. The cost of medication was estimated by multiplying the unit dose by the total cost of medications used during the hospitalisation.

The cost of all direct medical costs was calculated using the hospital tariff of each year. The indirect medical cost was the cost of transportation (to and from the hospital) based on the state's tariff set by the National Union of Road Transport Workers (NURTW). USD1.00 was estimated to worth ₦156.50 in 2013, ₦170.00 to USD1.00 in 2014 and ₦189.00 to USD1.00 in 2015 ([www.oando.com](http://www.oando.com)). The average exchange rate for the 3 years was ₦171.80 to USD1.00 and was used for the cost estimation.

### Data Analysis

Statistical Package for Social Sciences (SPSS) version 23.0 was used to analyse the data. Data was summarised using descriptive statistics including frequency, percentage and mean  $\pm$  standard deviation (SD). The hospitalisation cost was calculated for all the patients. The Pearson product moment correlation coefficient was used to determine the relationship between the cost of hospitalisation, the number of comorbidities and length of stay in the hospital. Fisher's exact test was also used as appropriate, with  $p < 0.05$  considered statistically significant.

### Ethical Approval

Ethical approval was received from the UI/UCH Research Review Board with certification number UI/UCH EC Registration Number: NHREC/05/01/2008a.

## RESULTS

Of the 322 case notes available for review, 230 (71.4%) had record of non-adherence to medication. The number of patients admitted in each year with a record of non-adherence included: 87 (37.8%) in 2013; 73 (31.7%) in 2014; and 70 (30.4%) in 2015. There were 137 (59.6 %) males. The patients had a mean age  $55.9 \pm 15.7$  years old and an average age of diagnosis of hypertension was  $54.2 \pm 15.0$  years old. The majority ( $n = 175$ ; 76.1%) had been diagnosed in the last 1–5 years of data collection period. The mean number of days on admission was  $9.56 \pm 6.8$  days with average systolic blood pressure (SBP) and diastolic blood pressure (DBP) at admission were  $165 \pm 8.9$  mmHg and  $98 \pm 5.2$  mmHg (Table 1).

**Table 1:** Social demographic and clinical parameters of patients.

Variable		Frequency N = 230 (%)
Gender	Male	137 (59.6)
	Female	93 (40.4)
Age (years old) mean $\pm$ SD		55.9 $\pm$ 15.7
Age (years old) when diagnosed mean $\pm$ SD		54.2 $\pm$ 15.0
Occupation	Self-employed/Artisans	82 (35.7)
	Petty traders	61 (26.5)
	Civil servant	30 (13.0)
	Retiree	25 (10.9)
	Unemployed	20 (8.7)
	Employed in a private establishment	12 (5.2)
Residence	Ibadan	204 (88.7)
	Outside Ibadan	26 (11.3)
Years since diagnosis	1–5	175 (76.1)
	6–10	26 (11.3)
	> 10	29 (12.6)
Average years of diagnosis mean $\pm$ SD		5.0 $\pm$ 5.3
Years of first registration in the facility (years)	1	208 (90.4)
	2–5	12 (5.2)
	> 5	10 (4.4)
Year of admission	2013	87 (37.8)
	2014	73 (31.7)
	2015	70 (30.4)
Number of comorbidity	0	27 (11.7)
	1	138 (60.0)
	2	45 (19.6)
	> 2	20 (8.7)
Number of days on admission	1–10	161 (70.0)
	11–20	51 (22.2)
	> 20	18 (7.8)
Number of days on admission; mean $\pm$ SD		9.56 $\pm$ 6.8
Blood pressure (mm Hg); mean $\pm$ SD	Mean SBP at admission	165 $\pm$ 8.9
	Mean DBP at admission	98 $\pm$ 5.2
	Mean SBP at discharge	138 $\pm$ 6.8
	Mean DBP at discharge	78 $\pm$ 5.9

Notes: SBP = systolic blood pressure; DBP = diastolic blood pressure; SD = standard deviation.

### Physician's Documented Reasons for Non-Adherence to Medication(s) in the Case Note

Of the 230 patients' case notes reviewed, 179 (77.8%) had reasons for their medication non-adherence documented, while no reason was documented for 51 (22.2%) patients. Twenty (12.2%) of the patients were National Health Insurance Scheme (NHIS) enrollees, while the remaining 202 (87.8%) were non-NHIS enrollees who paid for their medical bills out-of-pocket. Unaffordability of medications ( $n = 133$ ; 57.8%) was documented as the most common reason for medication non-adherence among the patients (NHIS enrollees;  $n = 3$ ; 10.7%; non-NHIS enrollees:  $n = 130$ ; 64.4%,  $p < 0.001$ ). Detail of other reasons is shown in Table 2.

**Table 2:** Physician's documented reasons for medication non-adherence in the case notes.

Reasons for non-adherence to medication	NHIS enrollee N = 28 (%)	Non-NHIS enrollee N = 202 (%)	P-value
Unaffordability of medication	3 (10.7)	130 (64.4)	< 0.001*
Tired of medication use	6 (21.4)	40 (19.8)	< 0.001
No reason documented	19 (67.9)	32 (15.8)	
Total	28	202	

Notes: \*Fisher's exact test; NHIS = National Health Insurance Scheme.

### Complications and Comorbid Conditions among the Studied Patients

The most prevalent comorbidity among the patients was hypertensive heart disease. Of the comorbidities/complications documented for the patients, stroke accounted for the highest hospitalisation expenditures (₦2,860,335.00/USD16,649.20) throughout the studied years. Details of expenditures on the disease comorbidities are shown in Table 3.

### Costs Associated with Hospitalisation During the Management of the In-Patients between 2013 and 2015

The cost associated with the management of complications (stroke, heart failure, renal and hypertensive heart disease) among the patients was USD53,933.80 which was 57.9% of the overall cost of management (USD93,095.60) for the period of study. Cost of managing stroke among 51 patients was the highest (USD16,649.20), with an average of USD326.50 per patient. Cost associated with management of renal failure among the patients was estimated to be USD15,972.30 with an average of USD254.70 per patient. The ranked order of costs spent on management were cost of laboratory investigations (40%) > cost of medications (31.3%) > bed fee (13.8%). Overall, the average costs of management was ₦69,538.30 ± 34,138.90 (USD404.80 ± 19.90) and ₦8,937.30 ± 4,828.50 (USD52.00 ± 28.20) per patient per day for the 3 years study period (Table 4).

The duration of admission increases with the increase in number of comorbid diseases (Pearson product moment correlation  $r = 0.133$ ;  $p = 0.044$ ). The correlation was significant but the strength was weak ( $r < 0.3$ ). Similarly, the costs of management also increased with increase in number of days on admission ( $r = 0.539$ ;  $p < 0.001$ ). The correlation was significant and the strength of the correlation was high. The more the number of days on admission, the higher the costs of management.

**Table 3:** Complications and comorbid diseases among in-patients and the associated costs of management.

Comorbid condition	Frequency N = 327 (%)	Total costs of management (₦) during period of admission for all patients (USD)	Mean (USD)
Hypertensive heart diseases	83 (25.4)	2,719,250.00 (15,828.00)	32,762.00 ± 24,645.20 (190.70 ± 143.40)
Renal failure	65 (19.9)	2,744,045.00 (15,972.30)	42,216.10 ± 21,242.00 (245.70 ± 123.60)
Heart failure	54 (16.5)	942,200.00 (5,484.30)	17,448.10 ± 12,245.00 (101.60 ± 71.30)
Cerebrovascular accident (stroke)	51 (15.6)	2,860,335.00 (16,649.20)	56,085.00 ± 15,425.00 (326.50 ± 89.80)
Chest infection (e.g. Pneumonia)	25 (7.6)	448,090.00 (2,608.20)	17,923.60 ± 5,452.00 (104.30 ± 31.70)
Sepsis	23 (7.0)	382,660.00 (2,227.40)	16,637.40 ± 8,424.00 (96.80 ± 49.0)
Dyslipidemia	16 (4.9)	37,000.00 (215.40)	2,312.50 ± 825 (13.50 ± 4.80)
Peptic ulcer disease	5 (1.5)	8,200.00 (47.70)	1,640.00 ± 235.00 (9.50 ± 1.40)
Liver disease	3 (0.9)	68,600.00 (399.30)	22,866.70 ± 5,425.00 (133.10 ± 31.60)
Neuropathy	2 (0.6)	8,600.00 (50.10)	4,300.00 ± 405 (25.0 ± 2.40)
Total	327	10,218,980.00 (59,481.80)	

Notes: N > 230 because there were some patients who have more than one comorbid disease or complication. Conversion of USD to Naira using an average conversion rate for 2013, 2014 and 2015 (oando.com) = ₦171.80 to USD1 and this was used for the cost estimation in USD.

## DISCUSSION

From this study, more than one-third of the case notes of hypertensive in-patient reviewed had documentation of medication non-adherence prior to admission. Our study findings also reveal the likely consequences of non-adherence among the studied in-patients, which seems enormous with overall cost of management largely linked to increase in number of complications/disease comorbidities. Non-adherence to therapy has been shown to be responsible for 33% to 69% of medication-related hospital admissions in the United States (Benjamin 2012). This perhaps corroborated our study findings in relation to the huge hospitalisation cost obtained for the hypertensive in-patients. The huge expenses of the cost of management during admission are of concern especially considering the fact that majority of the patients' treatment expenses were borne out-of-pocket. In addition, majority of the patients belong to low socioeconomic class comprising of petty traders, retiree and artisans with meagre income level/status.

The average cost of hospitalisation per day in this study may be an indication of catastrophic spending on the part of the patients especially in a country where many of the citizen lives on less than USD57.00 per month (National Bureau of Statistics 2020). However, this might have been largely avoided if the patients had been adhering to their medications. The average blood pressure of  $\geq 160/100$  mmHg (i.e. JNC VII stage 2

**Table 4:** Costs of hospitalisation for hypertensive in-patients between 2013 and 2015.

Cost items	Year of admission	Number of patients	Amount (₦)	Amount (USD)	Total (₦)	Mean cost/year (₦) ± SD	Mean cost/year (USD) ± SD	Percentage of grand total cost
Cost of other drugs (n = 225)	2015	68	1,968,250.00	11,456.60		18,223.70 ± 17,513.30	106.10 ± 101.90	
	2014	70	1,475,870.00	8,590.60		18,232.40 ± 20,367.10	106.10 ± 118.50	
	2013	87	1,352,005.00	7,869.70	4,796,125.00	25,043.40 ± 25,505.40	145.80 ± 148.50	27.8
Anti-hypertensives (n = 230)	2015	70	204,685.00	1,191.40		2,380.80 ± 1,834.50	13.90 ± 10.70	
	2014	73	203,845.00	1,186.50		2,485.40 ± 2,067.30	14.50 ± 12.0	
	2013	87	198,335.00	1,155.60	607,065.00	2,976.70 ± 2,530.40	17.30 ± 14.70	3.5
Total for all medications					5,403,190.00			
Laboratory fee (n = 230)	2015	70	1,911,250.00	11,124.90		25,238.60 ± 19,248.30	146.90 ± 112.0	
	2014	73	2,302,380.00	13,401.50		33,203.10 ± 19,415.0	193.30 ± 113.0	
	2013	87	2,695,850.00	15,691.30	6,909,480.00	31,216.0 ± 19,282.30	181.70 ± 112.20	40.0
Bed fee (n = 230)	2015	70	739,000.00	4,301.50		9,585.70 ± 5,742.20	55.80 ± 33.40	
	2014	73	731,000.00	4,254.90		9,082.20 ± 5,456.20	52.90 ± 31.80	
	2013	87	729,000.00	4,243.30	2,199,000.00	9,942.5 ± 8,374.0	57.90 ± 48.70	12.8
Diet (n = 230)	2015	70	443,400.00	2,581.00		6,334.20 ± 3,564.80	36.90 ± 20.70	
	2014	73	438,600.00	2,553.00		6,265.70 ± 4,567.80	36.50 ± 26.60	
	2013	87	437,400.00	2,546.00	1,319,400.00	5,991.80 ± 3,245.10	34.90 ± 18.90	7.6
Consumables (n = 230)	2015	70	310,500.00	1,807.30		3,497.30 ± 159.30	20.30 ± 0.90	
	2014	73	249,500.00	1,452.30		3,497.30 ± 159.80	20.30 ± 0.90	
	2013	87	280,800.00	1,634.50	840,800.00	4,304.60 ± 398.80	25.0 ± 2.30	4.9
Transportation fee (n = 230)	2015	70	68,900.00	401.00		842.60 ± 832.60	4.90 ± 4.80	
	2014	73	58,800.00	342.30		793.0 ± 735.70	4.60 ± 4.30	
	2013	87	70,300.00	409.20	198,000.00	957.50 ± 1,303.70	5.60 ± 7.60	1.2
Blood transfusion (n = 12)	2015	2	12,000.00	69.90		600.00 ± 0.0	3.50 ± 0.0	
	2014	4	24,000.00	139.70		12,000.00 ± 0.0	69.80 ± 0.0	
	2013	6	56,000.00	326.00	92,000.00	17,333.30 ± 18,958.80	100.90 ± 110.30	0.5
Physiotherapy (n = 38)	2015	18	44,500.00	259.00		3,178.50 ± 62.80	18.50 ± 0.40	
	2014	12	30,000.00	174.60		2,500.00 ± 0.0	14.50 ± 0.0	
	2013	8	25,000.00	145.50	99,500.00	3,125.00 ± 87.50	18.20 ± 0.50	0.6

(continued on next page)

Table 4: (continued)

Cost items	Year of admission	Number of patients	Amount (RM)	Amount (USD)	Total (RM)	Mean cost/year (RM) ± SD	Mean cost/year (USD) ± SD	Percentage of grand total cost
Oxygen use (n = 52)	2015	14	49,000.00	285.20		3,500.00 ± 0.0	196.60 ± 0.0	
	2014	21	98,000.00	570.40		4,666.70 ± 2,564.50	27.20 ± 14.90	
	2013	17	51,000.00	296.90	198,000.00	3,000.00 ± 0.0	17.50 ± 0.0	1.1
Total cost of hospitalisation (n = 230)	2015	70	5,751,485.00	33,477.80		82,164.10 ± 37,750.60	478.30 ± 248.20	
	2014	73	5,611,995.00	32,665.90		76,876.60 ± 34,252.20	411.20 ± 187.90	
	2013	87	5,895,890.00	34,318.30		67,768.90 ± 32,572.70	394.50 ± 194.60	
Grand total cost of hospitalisation			17,259,270.00	100,461.40		75,040.30 ± 36,242.60	436.80 ± 20.40	
Average cost per patient per day per patient						8,937.30 ± 4,828.50	52.0 ± 28.20	

Notes: Percentage of total cost for each cost items = total of each cost item divided by grand total cost multiplied by 100. Average cost per day per patient = total cost per patient divided by number of days of admission, then the average of was determined

hypertension) at admission among the studied in-patients may corroborate the medication non-adherence status of the patients (Choudhry *et al.* 2022). Thus, there is a need for hypertensive primary care provider to intensify effort in encouraging optimal medication adherence by the patients.

Cost of management in this study increased with the increase in number of commodities and number of days of hospitalisation. The reason may not be far-fetched because cardiovascular complications tend to increase with the increase in blood pressure above normal or target level of < 140/90 mmHg (Guimarães Filho *et al.* 2015), this was the case in the studied cohort with good number of the patients having an existing cardiovascular conditions with average blood pressure at admission far above the target.

This invariably increased the cost of management with cost associated with management of comorbid diseases and complications of hypertension accounting for about two-third of total cost of management. Previous studies have also reported significant increase in cost of hospitalisation as a result of associated complications among hypertensive patients (Mutowo *et al.* 2016; Wierzejska *et al.* 2020; Zeru and Muluneh 2020).

In this study, cost of managing cerebrovascular accident, renal failure, hypertensive heart disease and heart failure accounted for more than half of the total cost of management. This is an indication of high financial implication of complications resulting from non-adherence to medication(s) among the patients. Furthermore, hypertensive heart disease and cerebrovascular disease (e.g. stroke) has been reported to be the two most common causes of disability in the world (Roth *et al.* 2020). Although, there was 14.5% fall in the global age-standardised CVD death rates between 2006 and 2016 (Liu *et al.* 2019), the burden of CVD remains higher in LMICs compared to high-income countries (HICs), with LMICs accounting for more than 80% of CVD deaths (Bovet and Paccaud 2012; GBD 2013; Bowry *et al.* 2015). The development of these complications among patients in LMICs is largely due to non-adherence and poor access to good health care facilities (Masyuko *et al.* 2021).

Cerebrovascular accident (stroke) accounted for the highest cost of complications in this study, which is consistent with Ivanova and Petrova (2009), and Wajngarten and Silva's (2019) studies in Europe. The increase in cost might be attributed to some relatively expensive laboratory investigations such as Cranial Computed Tomography-Scan or Magnetic Resonance Imaging which were usually essential for the diagnosis of stroke (Vymazal *et al.* 2012), as well as physiotherapy services. All these complications are largely preventable if the patients were able to attain optimal blood pressure control.

In addition, CVD has greater impact on working-age populations in LMICs substantially more than it does in HICs, the average age for patients in this study is still active working age in the country (Gheorghe *et al.* 2018). Half of cardiovascular fatalities in sub-Saharan Africa occur in the 30 years old–69 years old of age group, at least ten years sooner than in HICs (Gheorghe *et al.* 2018). The economic burden of CVD is of great concern globally and specifically in LMICs with USD3.7 trillion economic loss between 2011 and 2015 in LMICs (Gheorghe *et al.* 2018). This could be reduced if earlier diagnosis and treatment is initiated and adherence to both drug and non-drug approaches is put into place.

Attaining all of the globally approved risk factor targets of CVDs in many LMICs, particularly in the poorest settings, may not be enough to fulfill the worldwide target of a 25% reduction in CVD mortality by 2025 (Dugani and Gaziano 2016). Insufficient health funding, inadequate governance, inefficient care delivery systems and an emphasis on curative care at the expense of preventive, to name a few issues, have been indicated to contribute far more to the CVD burden than risk factor levels, which remain low in LMICs compared to HICs (Gheorghe *et al.* 2018).

Unaffordability of medication cost was the most common reason given for non-adherence to medication among the uninsured patients in this study and this is similar to the reason obtained from previous studies in LMICs such as Cameroun (Adidja *et al.* 2018) and developed countries (Madden *et al.* 2008; De Avila, Meltzer and Zhang 2021). The low number of enrollees of NHIS in this study is a consistent concern that has also been raised in previous studies in Nigeria (Adewole and Osungbade 2016; Alawode and Adewole 2021). Though, the scheme has put in place measures to expand its services to the informal sector who are not public servants or uniformed officers, only a small number of people are enrolled with significant numbers of Nigerians paying for their medical bills out-of-pocket (Adewole and Osungbade 2016). Cost related non-adherence has been shown to increase among uninsured patients compared to their counterparts (Nasseh *et al.* 2012; Tajeu and Muntner 2020). Uninsured patients are prone to out-of-pocket payment method which usually leads to failure to fill or refill a prescription, delay filling a prescription, skip doses or take smaller doses to make medication last longer (De Avila, Meltzer and Zhang 2021). This can eventually increase healthcare utilisations as the disease worsen, requiring hospitalisation (Zhang, Lee and Meltzer 2014; Zhang and Meltzer, 2016) as revealed in this study.

There is, therefore, the need for more public enlightenment on the benefits of the health insurance scheme to the populace especially the informal sectors in order to reduce cost-related non-adherence among patients especially those with chronic diseases. Furthermore, factors related to non-adherence among patients with chronic diseases, particularly hypertension need to be explored and strategies that could resolve it need to be put into place in the health sector to reduce the burden associated with the disease progression as a result of non-adherence.

### Limitations of the Study

The study was retrospective, thus, there was no direct contact with the patients to establish/confirm the documented report on their medication non-adherence and the precise reason(s) for such non-adherence. The study was only based on physician's subjective judgment of a patient's non-adherence status as documented in their case notes. There could have been some patients among those admitted who were overlooked in the course of evaluating their medication adherence. As a result, hospitalisation costs may be significantly greater than those stated in the study. Furthermore, indirect expenses (such as mortality and productivity loss) incurred by patients and caregivers were not taken into consideration in this study, which would have further increase the cost of hospitalisation. In addition, this study focused mainly on patients with documentation of medication non-adherence in their case notes prior to admission, and thus, did not capture cost of management for patients who adhere to their medication(s) and yet were admitted during the period studied for some other reasons. Also, a comparison of the cost of management/expenses between patients who adhere to their medications and those who do not, would have been a valuable addition to the study findings. Nonetheless, future study may need to put all these gaps into consideration so as to ensure a far-reaching conclusion.

### CONCLUSION

The hospitalisation costs/expenses for hypertensive in-patients who may defaulted in medication adherence in the studied facility is enormous with an average of USD52.00 per day. This cost/expense may constitute or considered as a burden for an individual in

a country with very low monthly income (USD57.00 per month). It is therefore suggested that healthcare practitioners and policymakers need to develop strategies to improve patient's medication adherence, which may invariably reduce cost of in-patient hypertensive management.

## ACKNOWLEDGEMENTS

The authors acknowledge the staff of record department of University College Hospital, Ibadan, Oyo state, Nigeria for their support during the period of data collection.

## REFERENCES

- ABEGAZ, T. M., SHEHAB, A., GEBREYOHANNES, E. A., BHAGAVATHULA, A. S. & ELNOUR, A. A. (2017) Nonadherence to antihypertensive drugs: A systematic review and meta-analysis, *Medicine*, 96(4): e5641. <https://doi.org/10.1097/MD.0000000000005641>
- ADELOYE, D., BASQUILL, C., ADEREMI, A. V., THOMPSON, J. Y. & OBI, F.A. (2015) An estimate of the prevalence of hypertension in Nigeria: A systematic review and meta-analysis, *Journal of Hypertension*, 33(2): 230–242. <https://doi.org/10.1097/HJH.0000000000000413>
- ADEWOLE, D. A. & OSUNGBADE, K. O. (2016) Nigeria National Health Insurance Scheme: A highly subsidized health care program for a privileged few, *International Journal of Tropical Disease and Health*, 19(3): 1–11. <https://doi.org/10.9734/IJTDH/2016/27680>
- ADIDJA, N. M., AGBOR, V. N., AMINDE, J. A., NGWASIRI, C. A., NGU, K. B. & AMINDE, L. N. (2018) Non-adherence to antihypertensive pharmacotherapy in Buea, Cameroon: A cross-sectional community-based study, *BMC Cardiovascular Disorder*, 18: 150. <https://doi.org/10.1186/s12872-018-0888-z>
- ALAWODE, G. O. & ADEWOLE, D. A. (2021) Assessment of the design and implementation challenges of the National Health Insurance Scheme in Nigeria: A qualitative study among sub-national level actors, healthcare and insurance providers, *BMC Public Health*, 21: 124. <https://doi.org/10.1186/s12889-020-10133-5>
- ALEFAN, Q., CHEEKIREDDY, V. M. & BLACKBURN, D. (2022) Cost-related non-adherence can be explained by a general non-adherence framework, *Journal of the American Pharmacists Association*, 62(3): 658–673. <https://doi.org/10.1016/j.japh.2022.01.011>
- ANSA, V., OTU, A., OKU, A., NJIDEOFFOR, U., NWORAH, C. & ODIGWE, C. (2016) Patient outcomes following after-hours and weekend admissions for cardiovascular disease in a tertiary hospital in Calabar, Nigeria, *Cardiovascular Journal of Africa*, 27(5): 328–332. <https://doi.org/10.5830/CVJA-2016-025>
- BENJAMIN, R. M. (2012) Medication adherence: Helping patients take their medicines as directed, *Public Health Reports*, 127(1): 2–3. <https://doi.org/10.1177/003335491212700102>

- BLASCHKE, T. F., OSTERBERG, L., VRIJENS, B. & URQUHART, J. (2012) Adherence to medications: Insights arising from studies on the unreliable link between prescribed and actual drug dosing histories, *Annual review of Pharmacology and Toxicology*, 52: 275–301. <https://doi.org/10.1146/annurev-pharmtox-011711-113247>
- BOVET, P. & PACCAUD, F. (2012) Cardiovascular disease and the changing face of global public health: A focus on low and middle income countries, *Public Health Review*, 33(2): 397–415. <https://doi.org/10.1007/BF03391643>
- BOWRY, A. D., LEWEY, J., DUGANI, S. B., & CHOUDHRY, N. K. (2015) The burden of cardiovascular disease in low- and middle-income countries: Epidemiology and management, *The Canadian Journal of Cardiology*, 31(9): 1151–1159. <https://doi.org/10.1016/j.cjca.2015.06.028>
- CHANG, J., PEYSAKHOVICH, F., WANG, W. & ZHU, J. (2011) The UK Health Care System. <http://assets.ce.columbia.edu/pdf/actu/actu-uk.pdf> [5 August 2022].
- CHOUDHRY, N. K., KRONISH, I. M., VONGPATANASIN, W., FERDINAND, K. C., PAVLIK, V. N., EGAN, B. M. *et al.* (2022) Medication adherence and blood pressure control: A scientific statement from the American Heart Association, *Hypertension*, 79(1): e1–e14. <https://doi.org/10.1161/HYP.000000000000203>
- CREMERS, A. L., ALEGE, A., NELISSEN, H. E., OKWOR, T. J., OSIBOGUN, A., GERRETS, R. *et al.* (2019) Patients' and healthcare providers' perceptions and practices regarding hypertension, pharmacy-based care, and mHealth in Lagos, Nigeria: A mixed methods study, *Journal of Hypertension*, 37(2): 389–397. <https://doi.org/10.1097/HJH.0000000000001877>
- CUTLER, R. L., FERNANDEZ-LLIMOS, F., FROMMER, M., BENRIMOJ, C. & GARCIA-CARDENAS, V. (2018) Economic impact of medication non-adherence by disease groups: A systematic review, *BMJ Open*, 8(1): e016982. <https://doi.org/10.1136/bmjopen-2017-016982>
- DUGANI, S. & GAZIANO, T. A. (2016) 25 by 25: Achieving global reduction in cardiovascular mortality, *Current Cardiology Reports*, 18(1): 10. <https://doi.org/10.1007/s11886-015-0679-4>
- DE AVILA, J. L., MELTZER, D. O. & ZHANG, J. X. (2021) Prevalence and persistence of cost-related medication non-adherence among medicare beneficiaries at high risk of hospitalization, *Journal of American Medical Association Network Open*, 4(3): e210498. <https://doi.org/10.1001/jamanetworkopen.2021.0498>
- FENNY, A. P., YATES, R. & THOMPSON, R. (2018) Social health insurance schemes in Africa leave out the poor, *International Health*, 10(1): 1–3. <https://doi.org/10.1093/inthealth/ihx046>
- GBD 2013 MORTALITY AND CAUSES OF DEATH COLLABORATORS. (2014) Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: A systematic analysis for the global burden of disease study 2013, *The Lancet*, 385(9963): 117–171. <https://www.sciencedirect.com/science/article/pii/S0140673614616822?via%3Dihub>

GLOBAL HEALTH OBSERVATORY (GHO) data. (2019) <https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/gho-ghe-ncd-mortality-and-morbidity> (11 April 2022).

GHEORGHE, A., GRIFFITHS, U., MURPHY, A., LEGIDO-QUIGLEY, H., LAMPTEY, P. & PEREL, P. (2018) The economic burden of cardiovascular disease and hypertension in low- and middle-income countries: a systematic review, *BMC Public Health*, 18: 975. <https://doi.org/10.1186/s12889-018-5806-x>

GUIMARÃES FILHO, G. C., SOUSA, A. L., JARDIM, T., SOUZA, W. S. & JARDIM, P. C. (2015) Progression of blood pressure and cardiovascular outcomes in hypertensive patients in a reference center, *Arquivos Brasileiros de Cardiologia*, 104(4): 292–298. <https://doi.org/10.5935/abc.20150001>

HOLBROOK, A. M., WANG, M., LEE, M., CHEN, Z., GARCIA, M., NGUYEN, L. *et al.* (2021) Cost-related medication non-adherence in Canada: A systematic review of prevalence, predictors, and clinical impact, *Systematic Reviews*, 10: 11. <https://doi.org/10.1186/s13643-020-01558-5>

IVANOVA, A. D & PETROVA, G. (2009) Hypertension and common complications—Analysis of the ambulatory treatment cost, *Central Europe Journal of Public Health*, 17(4): 223–230. <https://doi.org/10.21101/cejph.a3538>

KARAKURT, P. & KAŞIKÇI, M. (2012) Factors affecting medication adherence in patients with hypertension, *Journal of Vascular Nursing*, 30(4): 118–126. <https://doi.org/10.1016/j.jvn.2012.04.002>

KEISLER-STARKEY, K. & BUNCH, L. N. (2021) *U.S. Census Bureau current population reports, health insurance coverage in the United States: 2020*, pp. 60–274 (Washington DC, U.S.: Government Publishing Office).

LIU, S., LI, Y., ZENG, X., WANG, H., YIN, P., WANG, L. *et al.* (2019) Burden of cardiovascular diseases in China, 1990–2016: Findings from the 2016 Global Burden of Disease study, *JAMA Cardiology*, 4(4): 342–352. <https://doi.org/10.1001/jamacardio.2019.0295>

LY, M. S., BASSOUM, O. & FAYE, A. (2022) Universal health insurance in Africa: A narrative review of the literature on institutional models, *BMJ Global Health*, 7: e008219. <https://doi.org/10.1136/bmjgh-2021-008219>

MADDEN, J. M., GRAVES, A. J., ZHANG, F., ADAMS, A. S., BRIESACHER, B. A., ROSS-DEGNAN, D. *et al.* (2008) Cost-related medication non-adherence and spending on basic needs following implementation of Medicare Part D, *JAMA*, 299(16): 1922–1928. <https://doi.org/10.1001/jama.299.16.1922>

MASYUKO, S., NGONGO, C. J., SMITH, C. & NUGENT, R. (2021) Patient-reported outcomes for diabetes and hypertension care in low- and middle-income countries: A scoping review, *PLoS ONE*, 16(1): e0245269. <https://doi.org/10.1371/journal.pone.0245269>

MUTOWO, M. P., LORGELLY, P. K., LAXY, M., RENZAHO, A. M., MANGWIRO, J. C. & OWEN, A. J. (2016) The hospitalization costs of diabetes and hypertension complications in Zimbabwe: Estimations and correlations, *Journal of Diabetes Research*, 9754230. <https://doi.org/10.1155/2016/9754230>

NASSEH, K., FRAZEE, S. G., VISARIA, J., VLAHIOTIS, A. & TIAN, Y. (2012) Cost of medication nonadherence associated with diabetes, hypertension, and dyslipidemia, *The American Journal of Pharmacy and Benefits*, 4(2): e41–e47.

NATIONAL BUREAU OF STATISTICS (NBS). (2020) 2019 poverty and inequality in Nigeria: Executive summary, (NBS). <https://taxaide.com.ng/wp-content/uploads/2020/05/2019-POVERTY-AND-INEQUALITY.pdf> (12 April 2022).

NCD RISK FACTOR COLLABORATION (NCD-RISC). (2021) Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: A pooled analysis of 1201 population-representative studies with 104 million participants, *The Lancet*, 398(10304): 957–980.

OGAH, O. S., OKPECHI, I., CHUKWUONYE, I. I., AKINYEMI, J. O., ONWUBERE, B. J., FALASE, A. O. *et al.* (2012) Blood pressure, prevalence of hypertension and hypertension related complications in Nigerian Africans: A review, *World Journal of Cardiology*, 4(12): 327–340. <https://doi.org/10.4330/wjc.v4.i12.327>

ROTH, G. A., MENSAH, G. A., FUSTER, V., JOHNSON, C. A., ADDOLORATO, G., AMMIRATI, E. *et al.* (2020) The global burden of cardiovascular diseases and risks: A compass for global action, *Journal of the American College of Cardiology*, 76(25): 2980–2981. <https://doi.org/10.1016/j.jacc.2020.11.021>

SCHUTTE, A. E., SRINIVASAPURA VENKATESHMURTHY, N., MOHAN, S. & PRABHAKARAN, D. (2021) Hypertension in low- and middle-income countries, *Circulation Research*, 128(7): 808–826. <https://doi.org/10.1161/CIRCRESAHA.120.318729>

TAJEU, G. S. & MUNTNER, P. (2020) Cost-related antihypertensive medication non-adherence: Action in the time of COVID-19 and beyond, *American Journal of Hypertension*, 33(9): 816–818. <https://doi.org/10.1093/ajh/hpaa085>

VYMAZAL, J., RULSEH, A. M., KELLER, J. & JANOUSKOVA, L. (2012) Comparison of CT and MR imaging in ischemic stroke, *Insights Imaging*, 3: 619–627. <https://doi.org/10.1007/s13244-012-0185-9>

WAJNGARTEN, M. & SILVA, G. S. (2019) Hypertension and stroke: Update on treatment, *European Cardiology*, 14(2): 111–115. <https://doi.org/10.15420/ecr.2019.11.1>

WIERZEJSKA, E., GIERNAS, B., LIPIAK, A., KARASIEWICZ, M., COFTA, M. & STASZEWSKI, R. (2020) A global perspective on the costs of hypertension: A systematic review, *Archives of Medical Science*, 16(5): 1078–1091. <https://doi.org/10.5114/aoms.2020.92689>

YAYA, S., BISHWAJIT, G., UTHMAN, O. A. & AMOUZOU, A. (2018) Why some women fail to give birth at health facilities: A comparative study between Ethiopia and Nigeria, *PLoS ONE*, 13(5): e0196896. <https://doi.org/10.1371/journal.pone.0196896>

YOUNG, J. H., NG, D., IBE, C., WEEKS, K., BROTMAN, D. J., DY, S. M. *et al.* (2015) Access to care, treatment ambivalence, medication non-adherence, and long-term mortality among severely hypertensive African Americans: A prospective cohort study, *Journal of Clinical Hypertension (Greenwich, Conn.)*, 17(8): 614–621. <https://doi.org/10.1111/jch.12562>

ZERU, A. B. & MULUNEH, M. A. (2020) Admission and inpatient mortality of hypertension complications in Addis Ababa, *Integrated Blood Pressure Control*, 13: 103–110. <https://doi.org/10.2147/IBPC.S268184>

ZHANG, J. X. & MELTZER, D. O. (2016) Identifying patients with cost-related medication non-adherence: A big-data approach, *Journal of Medical Economics*, 19(8): 806–811. <https://doi.org/10.1080/13696998.2016.1176031>

ZHANG, J. X., LEE, J. U. & MELTZER, D. O. (2014) Risk factors for cost-related medication non-adherence among older patients with diabetes, *World Journal of Diabetes*, 5(6): 945–950. <https://doi.org/10.4239/wjd.v5.i6.945>

UNIVERSITY OF IBADAN LIBRARY