ORIGINAL RESEARCH

# Financial Burden of Hypertension Management on Clients Patronizing Community Pharmacies in a Nigerian Metropolis

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## ABSTRACT

**Background:** The World Health Organization describes universal health coverage as ensuring that individuals have access to needed health services in a manner ensuring non exposure to financial hardship. This is particularly important for patients with chronic conditions like hypertension.
**Objectives:** To assess the cost burden due to management of hypertension.
**Methods:** Hypertensive clients with a written prescription patronizing 15 randomly selected community pharmacies in Uyo metropolis were enrolled for the survey. Clients responded (demographics, income, expenditure on healthcare services and other spendings) on a pretested and structured questionnaire. The study was conducted according to the declaration of Helsinki. Data were descriptively analysed using frequency and percentage, with Kruskal-Wallis test at (95%, CI) to compare variables.
**Results:** Clients (224 of 231) comprising of 55.4% females completed the study. Most clients (92.9 %) were 35 years and older, while 54.9% had no tertiary education. Study revealed 60% of clients made less than ₦60,000 (US$ 150.5) monthly and mean household monthly income was ₦98,302 (US$ 246.49). The average cost of hypertension management was ₦7,964 (US$ 20.0) while mean healthcare expenses was ₦12,497 (US$ 31.34). Mean household food and non-food expenses were ₦44.39 (US$ 0.11) and non-food at ₦53,917 (US$ 135.20) respectively. There was statistically significant difference in the percentage of income spent on healthcare across the income groups (P=0.001). The lower income groups recorded higher percentage expenditure (P=0.005).
**Conclusion:** The study showed high financial burden due to management of hypertension. This finding will aid in policy framework for government intervention for healthcare financing.

**Keywords:** Financial burden; Hypertension; Household expenditure; community pharmacy

## INTRODUCTION

There are three aspects of universal health coverage with financial burden protection as a pivotal consideration[1]. Households are required to gain access to needed healthcare services without undue financial hardship. As health is an important indicator of human development, it is pertinent to ensure that members of every household have access to facilities that promote their health. Financial burden protection is therefore at the core of universal health coverage. It is defined as the direct payments to obtain health services in

such a manner that persons do not experience financial hardship or their living standard threatened[2]. Considering the trend from the mid-20th century, the global burden of disease shifted from communicable diseases to non-communicable diseases (NCDs). With the advent and increasing globalization, even developing countries are experiencing the shift in disease burden[3]. One such non-communicable disease is hypertension. The prevalence of hypertension in Nigeria has been on a steady increase. A study puts the prevalence of hypertension in Nigeria at 38.1% with 44% in the south-south region[4]. There is scarce literature on research that evaluates the healthcare expenditure and the financial burden on persons managing hypertension in the study area.

Hypertension is a chronic disease characterized by elevated blood pressure (BP). Blood pressure levels greater than 140/90 mm Hg mark the beginning of the categorization of hypertension[5]. Hypertension is a known burden factor for cerebrovascular, cardiovascular and peripheral vascular diseases. It is estimated that 1.13 billion of world's population have hypertension. Two-thirds of this population lives in low and middle-income countries (LMIC)[6].

Financial burden is assessed in terms of catastrophic health expenditure (CHE). The impoverishment due to out-of-pocket payments for healthcare services highlights the significance of financial burden[1]. Catastrophic spending is defined as out-of-pocket spending for healthcare that is in excess of a certain proportion of a household's income. The burden of the disease is therefore evident in the household. The CHE entails healthcare payment settlements in excess of a certain fraction of the household income. For CHE to occur, it is necessary that 3 basic factors are present. These are out-of-pocket payments, low household capacity to pay, and lack of prepayment mechanisms[7]. In most Nigerian settings, all three conditions are usually met which highlights the importance of this study. Also, the recent devaluation of the naira has led to an increase in the price of drugs and possibly related healthcare services. The economy of Nigeria has also faced a crunch in recent times as one of the after-effects of the COVID-19 pandemic and unchecked inflation. These factors have affected the capacity to pay for healthcare among individuals and households in Nigeria. The objective of this study, therefore, was to relate the demographics of hypertensive clients patronizing community pharmacies in Uyo metropolis to the financial burden incurred due to the management of hypertension.

## METHODS

### Study area

The study was conducted in Uyo, the capital city of Akwa Ibom state, south southern Nigeria. The latitude of Uyo is 5.038963 and longitude 7.909470 with a total area of 140 square miles. It is situated in the north central part of the state. Uyo is comprised of settlements including Efiat Offot, Eniong Offot, Aka Offot, Afaha Oku, Ikot Udoro Oku, Ikot Ebido Oku, Ikot Ntuen Oku, Afaha Ube Itam, Itiam Etoi Ewet Offot, and Uyo. The current metro area population of Uyo in 2021 is 1, 200,000[4].

### Study population

The study population comprises of hypertensive clients patronizing community pharmacies in the study area. The 2021 population of Uyo, Akwa Ibom state was projected to be 1,200,000 and the prevalence of hypertension in the south south geopolitical zone of Nigeria was estimated at 44%[4,8]. This gives a study population of approximately 528,000 people.

### Inclusion criteria

Clients above 30 years who have been diagnosed with hypertension and have been on anti-hypertensive medication for at least a month prior to the commencement of the study were eligible for the study.

### Exclusion Criteria

Clients who are critically ill or have altered mental states and may have difficulties in

giving informed consent were excluded from the study. Clients from the same family were similarly excluded from the study.

**Sample size**

A calculated sample size of 205 was obtained using the Cochrane sample size formula for large populations which gives confidence interval (CI) at 95%, margin of error at 5% and a population proportion at 44%.

$$n = \frac{NZ^2\sigma^2}{(N-1)e^2+Z\sigma^2} \text{.....Equation 1}$$

$$n = 1200000x(1.96)^2x10^2/(1200000 - 1)(1.5)^2 + 1.96^2 x\ 10^2$$

n = 205

where:

n= sample size, N= population size, e= acceptable sampling error, $\sigma$= standard deviation of the sample, Z = z value at reliability or significant level (95%) with z value as 1.96

**Sampling method**

Questionnaires were administered to hypertensive clients as they visited the study sites/pharmacies and met the enrolment requirements. Fifteen community pharmacies were randomly selected from the different settlements in the city. A total of 240 questionnaires were produced after ascertaining the reliability of the tool.

**Study design**

This study was a cross-sectional survey on hypertensive clients in Uyo Metropolis. The study was carried out by the administration of pretested questionnaires to clients patronizing the pharmacies in the study area during a 6-month period (May to October, 2021). The questionnaire featured independent variables such as age, gender, marital status, occupation, personal monthly income, total healthcare expenditure and household variables (e.g., food expenditure and total household expenditure) in relation to the dependent variables expressed as the burden occasioned by hypertension management. An exploratory interview approach and documentation was adopted to get qualitative and quantitative information relating to the clients' disease and management. The patronizing pharmacists were interviewed to corroborate on the responses received from the clients. Interviews were based on the pattern of prescribing and drug request with respect o hypertension management.

**Study instrument**

The questionnaire had 3 sections namely the demographics, medical/drug enquiries and non-drug related enquiries. There was a total of 41 questions with demographics (6), medical/ drug related (15) and non-drug (e.g., income, food-related expenditure, non-food expenditure (e.g., transportation), dependents and other spendings alongside, disease burden and work/productivity challenges) related enquiries (20). Enquiries were structured questions for the medical/drug related and non-drug related probes. Enquiries were framed to give answers with clarity and unambiguity. Clients were made to express in detail their responses to the enquiries.

**Data Collection**

Copies of the self-administered instruments were distributed to clients who met the inclusion criteria while visiting the community pharmacies to see the pharmacists for appointments or for purchase or refill of prescriptions. For each of the clients approached, trained research assistants with skills for research and health surveillance made the encounter. Clients who responded favourably to the information about the research were requested to fill the informed consent form and proceeded to filling the questionnaire as they tendered their prescription/drug requests. Responses to enquiries on medical history, disease management information, consultation payments at the various service points (e.g., hospitals, clinics, laboratories and pharmacies), purchase of drugs (at hospital/clinic or other sources) alongside their personal income and expenditure profile were received with the questionnaire. Thereafter, quantification of average cost of treating hypertension as the summation of the

direct cost and indirect costs were collated[9]. Information relating to direct costs including cost of drugs (hospital and pharmacy-sourced) from purchase receipts, cost of consultation with physicians/pharmacists, and expenditure on diagnosis and laboratory tests) associated with hypertension was gathered from the instrument. The costs of transportation during visits to the hospital/pharmacy were also obtained. This was supplemented with information obtained through interviews with the patronizing pharmacists.

**Statistical analysis**

The data obtained were analyzed using the statistical package for social sciences (SPSS) version 20.0 (IBM, USA). Descriptive statistics such as the (frequency, percentage, mean, and standard deviation) were used to present respondents' socio-demographic and cost of treatment. Kruskal Wallis test was performed to adjudge if the independent variables relate to the dependent variable (cost of hypertension management). Confidence interval was at 95%.

**Ethical approval**

Approval for this study was obtained from the Health Ethics Institutional Review Board of University of Uyo with approval number UU/IRB/2124. Written/verbal informed consent was obtained from the clients. The study was conducted in accordance with the declaration of Helsinki[10].

## RESULTS

A total of 231 clients enrolled into the study. About 224 (97%) valid cases of completed data were obtained and analyzed. The seven clients who were dropped could not give accurate and satisfactory information about their health and financial relation.

Table 1 shows demographic characteristics of clients in this study. There were more females (55.4%) than males in this study. About 92.9% of the clients were 35 years and older, with 54.9% without tertiary education. More than half (72.8%) were married with dependents while 27.2% were unmarried with dependents.

**Table 1: Demographic characteristics of the clients**

| Variables | Frequency (n=224) | Percent (%) |
|---|---|---|
| **Gender** | | |
| Male | 100 | 44.6 |
| Female | 124 | 55.4 |
| **Age** | | |
| 18-25 | 7 | 3.1 |
| 26-35 | 9 | 4.0 |
| 36-45 | 69 | 30.8 |
| 46-55 | 82 | 36.6 |
| 56-65 | 41 | 18.3 |
| >65 | 16 | 7.1 |
| **Educational Level** | | |
| Non-Formal | 2 | .9 |
| Primary | 17 | 7.6 |
| Secondary | 104 | 46.4 |
| Tertiary | 101 | 45.1 |
| **Marital Status** | | |
| Married | 163 | 72.8 |
| Single | 23 | 10.3 |
| Divorced | 10 | 4.5 |
| Widowed | 28 | 12.5 |

Table 2 presents disease and medication-related data of the clients. Almost all the clients (91%) have had hypertension for more than 3 years, and 61% are on more than one drugs. Most clients (82.6%) were not on any health insurance scheme.

This study revealed that majority (83.5%) of respondents received an average monthly income of less than 100, 000 Nigerian Naira (US$251); year 2021 average monthly exchange rate (NGN398 = 1 US$).

According to Figure 2, calcium channel blockers (CCB) was the most frequently prescribed medication (71.9 %), followed by diuretics (37.9 %), and angiotensin-converting enzyme inhibitors (37.9%). . The least prescribed were alpha blockers and beta blockers.

**Table 2: Clinical data of the Clients**

| Variables | Frequency (n=224) | Percent (%) |
|---|---|---|
| **How long have you been diagnosed with hypertension** | | |
| <1year | 87 | 38.8 |
| 1-3years | 81 | 36.2 |
| 4-10years | 37 | 16.5 |
| >10years | 19 | 8.5 |
| **Do you have any other disease** | | |
| Yes | 35 | 15.6 |
| No | 189 | 84 |
| **How many antihypertensive medications are you taking now?** | | |
| 1 | 63 | 28.2 |
| 2 | 90 | 40.0 |
| 3 | 47 | 21.0 |
| 4 | 14 | 6.3 |
| 5 | 6 | 2.7 |
| >5 | 4 | 1.8 |
| **Are you on any health insurance program** | | |
| Yes | 39 | 17.4 |
| No | 185 | 82.6 |
| **If yes, what type? (n=39)** | | |
| NHIS | 22 | 56.4 |
| Greenfield | 8 | 20.5 |
| Others | 9 | 23.1 |

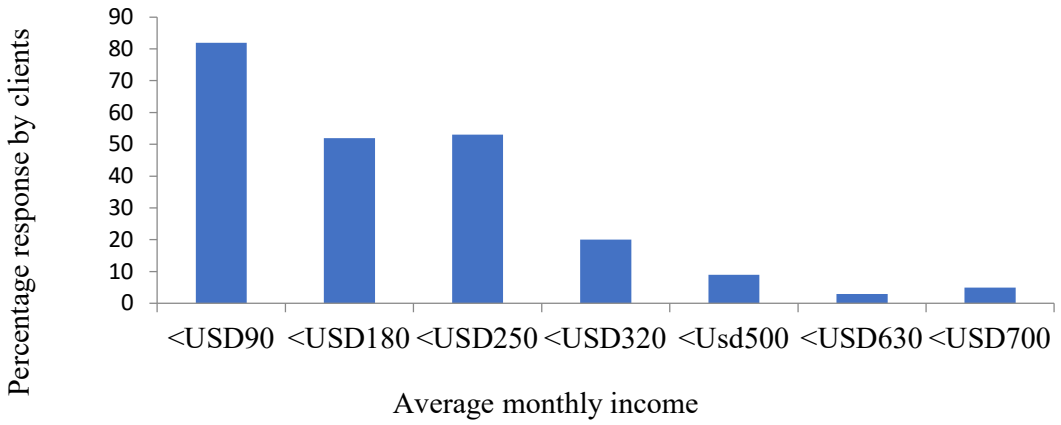


**Figure 1: The average monthly income of clients** (Year 2021 average monthly exchange rate - NGN398 = 1 US$).

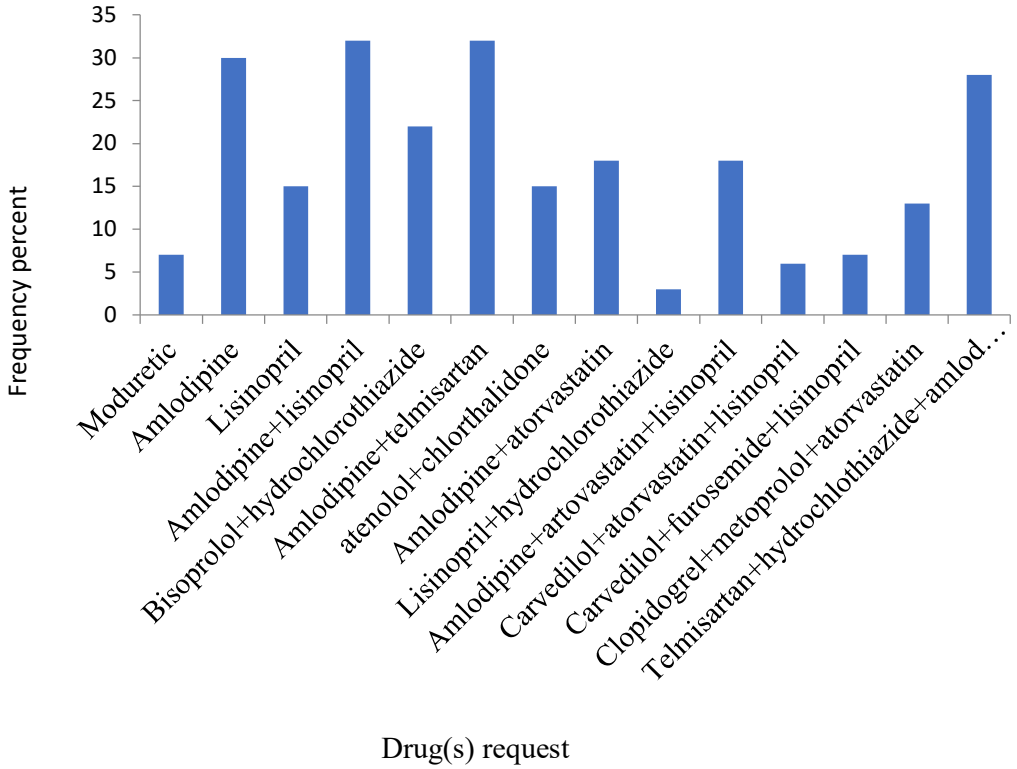


**Figure 2: Prescribed medication for hypertension presented for refill in the CPs**

In Table 3, the mean cost of management of hypertension for the clients based on their income group is presented. The mean monthly cost of management of hypertension was ₦7964 ± 5590 (US$ 19.97±14.02). However, when accounting for other non - healthcare costs, the total cost of management became ₦12,497±8543 (US$31.35±21.42). The major direct cost was attributed to purchase of antihypertensive medications with a mean cost of ₦3505±2653 (US$ 8.79±6.65).

**Table 3: Cost associated with management of hypertension**

| | Monthly Cost of Hypertension Management | | | | | Household Monthly Income & Expenditure | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Drugs | Diagnosis | Consultation | Transportation | Total | HI | HFE | H non-food Expenses | Household healthcare expenses |
| Mean (₦) | ₦ 3505 (US$8.99) | ₦2359 (US$6.05) | ₦633 (US$1.63) | ₦1480 (US$3.80) | ₦7964 (7977) (US$20.43) | ₦98302 (US$252.19) | ₦44385 (US$113.87) | ₦53917 (US$138.32) | ₦12497 (US$32.06) |
| SD | 2656 (6.81) | 3516 (9.02) | 1237 (3.17) | 1807 (4.64) | 5990 (15.37) | 65949 (169.19) | 33940 (87.07) | 40795 (104.66) | 8543 (21.92) |

NB: HI =Household income; HFE =Household food expenses; TNFE =Total non-food expenses; HHE =Household healthcare expenses (Year 2021 average monthly exchange rate -NGN398 = 1 US$).

The mean capacity of households to pay for the management of hypertension measured as non-food expenditure was ₦53917 ± 40795 (US$ 135.20±102.29). In relating the healthcare expenditure to respondents' income, the Kruskal-Wallis test was employed considering the various classes of income in the study and their healthcare expenditure. The Kruskal-Wallis test also revealed a significant difference in the percentage of non-food income spent on healthcare across the different income groups $X^2$ (6, n =224) relates to 83.270 (P=0.01). The lower income groups recorded a higher percentage expenditure than the higher income groups. Similarly, the test revealed a significant difference in the percentage of non-food expenditure versus healthcare across the different groups.

**Table 4: Clients' Monthly Healthcare Expenditure based on Income Level**

| Income | Frequency | Mean expenditure (USD) ± S.D |
|---|---|---|
| <₦35000(US$ 87.9) | 82 | 42.8 ± 20.6 |
| ₦35000-64999(US$167.1) | 52 | 26.4 ± 13.5 |
| ₦65000-94999(US$244.2) | 53 | 18.9 ± 11.3 |
| ₦95000-124999(US$ 321.3) | 20 | 19.0 ± 8.9 |
| ₦125000-154999(US$398.5) | 9 | 13.0 ± 15.8 |
| 185000-244999(US$629.8) | 3 | 30.6 ± 8.3 |
| >₦274999(US$706.9) | 5 | 12.3 ± 3.2 |
| P-value | | 0.001 |

With respect to years lived with hypertension $X^2$ (3, n=224) relates to 24.626, p=0.00. There was a statistically significant difference observed in the sub-groups of years of managing hypertension. The median test showed that clients with fewer years lived with hypertension recorded a higher expenditure than those who have lived longer with hypertension.

Furthermore, the statistical analysis showed that there was no significant difference in the percentage of non-food expenditure spent on healthcare between respondents who enrolled in insurance schemes and those who did not $X^2$ (3.680, n =224), p=0.055. The median test was used to corroborate this finding and showed no difference in percentage expenditure between the two groups.

## DISCUSSION

Health expenditure is a summation of all expenditures incurred for accessing healthcare services.

Clients enrolled into this study were aged 30 years and above. This was so designed to survey persons who are independent. The direct cost in this study was limited to the cost of antihypertensive mediations. The cost considered the dosages on the prescription and prices of medications in the pharmacy and the receipt value of drugs if procured from the hospital/clinic. Other calculations were based on the reported estimations of personal expenditure for non-drug and others considered spending weather a receipt was available or otherwise.

Studies on the cost of hypertension management in Nigerian scenarios show varying results[12,13]. This study revealed varied prescribing patterns and request for medications. Similarly, there is an observed high variance in the data around the mean for direct cost for hypertension management indicating that the expenditure among the clients varied widely. This also relates to the variability in the healthcare services and cost in the study area. The result shows varied request and therefore cost of drugs for the management of hypertension, either as monotherapy or combinations. This invariably will contribute to the differing cost of management of hypertension among the clients. This study finding differs from a similar study conducted in Oyo and Lagos states of Nigeria. Ilesanmi and colleagues, and Oshibogun and Okwor which both reported lower drug related expenditure in the management of hypertension[11,12]. This study revealed a mean monthly cost of management of hypertension of US$ 20.43±15.37 as compared with Ilesanmi and co-workers who reported a value of US$ 3.61±1.40 as the mean monthly cost[11]. Studies in metropolitan city of Lagos reported average monthly costs of hypertension management as US$ 5.2 and US$ 16.58, respectively[12-14]. It is therefore posited that the cost of management of hypertension varies with location.

Furthermore, quantifying the indirect costs of management of hypertension, especially hours lost from work was a challenge. Translating the stated hours of absence from work due to disease into monetary terms was a function of quantitative inexactness. It is however noted as a component of the overall cost and impact of the disease.

In any setting, the availability of modern diagnostic tools and consultation with specialists add to the cost of management of hypertension. In this study, the cost of management of hypertension was not based on the use of such facilities yet the values obtained appear comparatively higher than has been reported in similar scenarios in previous studies[15,16]. In the south-south region of Nigeria, the literature on catastrophic expenditure is limited. However, available reports showed that households in Bayelsa and Cross River states are more likely to incur out-of-pocket (OOPs) than in Akwa Ibom state[17]. This present study buttressed that submission as it has showed that OOPs are characteristic of healthcare access in Akwa Ibom state. Furthermore, WHO report in 2005 revealed that 70% of payments for health services in Africa are OOPs[8].

Various studies have been carried out to evaluate the level of exposure of various populations to financial burden[19,20]. Studies in some African countries like Burkina Faso and Uganda showed CHE proportions of 15% and 2.9% respectively[21,22]. In 2017, 11.1% of Kenyan households experienced CHE while 4% were pushed below the poverty line[23]. In this study, secondary data obtained from using the Harmonized Nigeria Living Standard Survey (HNLSS) 2009/2010 evaluating CHE revealed outputs indicating that 16.4% and 13.7% of households incurred CHE at a 10% and 40% threshold of total expenditure and non-food expenditure, respectively. The incidence of impoverishment due to OOP expenditure was thereafter computed, for this study, at 0.8%. This present study therefore indicates some level of burden on the hypertensive clients in the study area just like other African countries. A study carried out in Enugu and Anambra states of Nigeria assessed the incidence of CHE among households and pegged it at a threshold of 40% of non-food expenditure. The results in this study showed an incidence rate of 14.8% and 27%, respectively. A similar study revealed that 98% of payments were of OOP expenditure status with incidence of CHE. The socioeconomic class of respondents may affect the outcome of CHE evaluation[24,25]. Considering that people living with chronic health conditions pay more for healthcare, the incidence of CHE and impoverishment is expected to be much higher in such populations[26]. Healthcare is said to be foregone when the individual or household is not able to afford those needed health services. As a result, the patient does not pay for healthcare and cannot incur any financial burden. This is the case with most clients living with chronic health conditions, especially in developing countries[27]. Also, people living in rural areas may not have access to hospitals, pharmacies and laboratories and therefore also forgo healthcare through this avenue. This parameter is not easy to evaluate and not much research has been done on it.

**Limitations of study**

There was no computation of absolute values of indirect cost except as relayed by the clients. Costs that fall within the common knowledge of the clients in management of hypertension were thus relied upon. Costs that are associated with a chronic situation that may lead to complications were exempted.

## CONCLUSION

This study revealed that the cost burden associated with hypertension management is high. It, therefore, expresses the need for increased government intervention, in the study area through healthcare funding, thereby preventing of out-of-pocket payments thus reducing the cost burden associated with hypertension management.

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## REFERENCES

1. Saksena P, Hsu J and Evans DB. Financial burden protection and universal health coverage: Evidence and measurement challenges. PLOS Medicine, 2014;11(9):e1001701 Doi:10.1371/journal.pmed.1001701
2. World Health Organization. Health financing. World Health Organization, 2021.https://www.who.int/health_financing/topics/financial-protection/en/ (Accessed December 19, 2022)
3. World Health Organization. Preventing chronic diseases: a vital investment. Geneva. World Health Organization, 2005. https://books.google.com.ng/books?hl=en&lr=&id=dF00DgAAQBAJ&oi=fnd&pg=PR3&dq=3.+World+health+Organization.+Preventing+chronic+diseases:+a+vi

tal+investment&ots=8XZ6NtviPC&sig=52c9poB2BEsmAWQWweAV6_S1U1o&redir_esc=y#v=onepage&q=3.%20World%20health%20Organization.%20Preventing%20chronic%20diseases%3A%20a%20vital%20investment&f=false. (Accessed January 15, 2023)

4. Odili AN, Chori BS, Danladi B, Nwakile PC, Okoye IC, Abdullahi U, *et al*. Prevalence, awareness, treatment and control of hypertension in Nigeria: Data from a nationwide survey 2017. Global Heart Journal, 2020;15(1):47. Doi: 10.5334/gh.848.
5. World Health Organization. A global brief on hypertension: silent killer, global public health crisis: World Health Day 2013 (No. WHO/DCO/WHD/2013.2). World Health Organization 2013. https://apps.who.int/iris/handle/10665/79059. (Accessed January 15, 2023)
6. World Health Organization. Fact on the prevalence of hypertension. World Health Organization, 2019. https://www.who.int. (Accessed April 29, 2020)
7. Aregbeshola SB and Khan SM. Out-of-Pocket payments, catastrophic health expenditure and poverty among households in Nigeria 2010. International Journal of Health Policy and Management, 2018;7(9):798-806.
8. United Nations. Common Country Analysis. February, 2022. https://nigeria.un.org/sites/default/files/202207/Common%20Country%20Analysis%202022_Nigeria.pdf. (Accessed January 15, 2023)
9. Rijal A, Adhikari TB, Khan AM and Berg-Beckhoff G. The economic impact of non-communicable diseases among households in South Asia and their coping strategy: A systematic review. PLoS ONE, 2018;13(11). e0205745. Doi:10.1371/journal,pone.0205745. Erratum In. PLOS One.2019; 14(1):e0211588
10. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. The Journal of American Medical Association, 2013 Nov 27;310(20):2191-4. doi: 10.1001/jama.2013.281053.
11. Ilesanmi OS, Ige OK and Adebiyi AO. The managed hypertensive: the costs of blood pressure control in a Nigerian town. The Pan African Medical Journal. 2012;12:96. Epub2012. https://pubmed.ncbi.nlm.nih.gov/23133696/.
12. Osibogun A and Okwor T. Antihypertensive prescription and cost patterns in ana outpatient department of Teaching Hospital in Lagos State Nigeria. Open Journal of Preventive Medicine, 2014;4:156-63. Doi. 10.4236/ojpm.2014.44021
13. Hendriks ME, Bolarinwa OA, Nelissen HE, Boers AC, Gomez GB, Tan SS, *et al*. Costs of cardiovascular disease prevention care and scenarios for cost saving: a micro-costing study from rural Nigeria. Journal of Hypertension, 2015;33(2):376-84. DOI:10.1097/HJH.0000000000000402.
14. Bakare OQ, Akinyinka MR, Goodman O, Kuyinu YA, Wright OK, Adeniran A, *et al*. Antihypertensive use, prescription patterns, and cost of medications in a Teaching Hospital in Lagos, Nigeria. Nigerian Journal of Clinical Practice, 2016 Sep-Oct;19(5):668-72. doi: 10.4103/1119-3077.188709.
15. Bay N, Juga E, Macuacua C, Joao J, Costa M, Stewart S, *et al*. Assessment of care provision for hypertension at the emergency Department of an Urban Hospital in Mozambique. BMC Health Services Research, 2019;19:975. https://doi.org/10.1186/s12913-019-4820-8
16. Willmen T, Völkel L, Ronicke S, Hirsch MC, Kaufed J, Rychlik RP, *et al*. Health economic benefits through the use of diagnostic support systems and expert knowledge. BMC Health Services Research, 2021;21:947. https://doi.org/10.1186/s12913-021-06926-y

17. Apere TO and Karimo TM. Determinants of Out-of-Pocket healthcare expenditure in the south-south geopolitical zone of Nigeria. International Journal of Economic Finance and Management, 2014;3(6):296-30. Doi.https://www.academia.edu/9828718/Determinants_of_Out_Of_Pocket_Healthcare_Expenditure_in_the_healthcare-of-Apere/756c96945352364b4413cb1117fb677b55efc30#.
18. World Health Organization. World Health Organization global expenditure database. 2018 Retrieved from https://data.worldbank.org/indicator/SH.XPD.OOPC.CH.ZS?location NGon Accessed January 15, 2023)
19. Kankeu HT, Saksena P, Xu K and Evans DB. The financial burden from non-communicable diseases in low- and middle-income countries: a literature review. Health Research Policy Systems, 2013;11(31). Doi: https://doi.org/10.1186/1478-4505-11-31
20. Brinda EM, Andrés RA and Enemark U. Correlates of out-of-pocket and catastrophic health expenditures in Tanzania: Results from a National Household Survey. BMC International Health Human Right, 2014;14(5). Doi: http://www.biomedcentral.com/1472-698X/14/5. (Retrieved January 15, 2023)
21. Su TT, Kouyaté B and Flessa S. Catastrophic household expenditure for health care in a low-income society: a study from Nouna District, Burkina Faso. Bulletin of World Health Organization, 2006;84(1):21-7. doi: 10.2471/blt.05.023739.
22. Xu K, Evans D, Karrin G and Aguilar-Rivera AM. Technical Brief for Policy Makers. Designing health financing systems to reduce catastrophic health expenditure. World Health Organization, Department of Health Systems Financing. Health Financing Policy, 2005; 1-4. https://WHO_EIP_HSF_PB_05.02_eng.pdf
23. Barasa EW, Maina T and Ravishankar N. Assessing the impoverishing effects and factors associated with the incidence of catastrophic health care payments in Kenya. International Journal for Equity in Health, 2017;16(31). https://doi.org/10.1186/s12939-017-0526-x
24. Onwujekwe O, Hanson K., Uzochukwu B, Ichoku H, Ike E and Onwughalu, B. Are malaria treatment expenditures catastrophic to different socio-economic and geographic groups and how do they cope with payment? A study in southeast Nigerian. Tropical Medicine and International Health, 2010;15(1):18–25. doi.org/10.1111/j.1365 3156.2009.02418.x
25. Onwujekwe O, Hanson K and Uzochukwu B. Examining inequities in incidence of catastrophic health expenditures on different healthcare services and health facilities in Nigeria. PLoS ONE. 2012;7(7):e40811. doi:10.1371/journal.pone.0040811
26. Gwatkin DR and Ergo A. Universal health coverage: friend or foe of health equity? Lancet. 2011; 377(9784): Doi: 10.1016/S0140-6736(10)62058-2.
27. Khatib R, McKee M, Shannon H, Chow C, Rangarajan S, Teo K, *et al*. PURE study investigators. Availability and affordability of cardiovascular disease medicines and their effect on use in high-income, middle-income, and low-income countries: an analysis of the PURE study data. Lancet. 2016; 387(10013):61-9. Doi: 10.1016/S0140-6736(15)00469-9.