

## PEER REVIEW HISTORY

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### ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	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
<b>AUTHORS</b>	Adeniji, Folashayo

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Karan, Anup Indian Institute of Public Health, Delhi (IIPHD), Public Health Foundation of India, HHealth Economics
<b>REVIEW RETURNED</b>	22-Nov-2020

<b>GENERAL COMMENTS</b>	<p>The burden of out-of-pocket payments among cardiovascular disease patients in public and private hospitals in Ibadan, South-West, Nigeria</p> <p>Comments: This study estimated the burden of out-of-pocket (OOP) expenditures on cardiovascular disease (CVD) in Ibadan, Nigeria. Using data from a primary survey of 744 patients who were discharged from the cardiology departments of private and public hospitals in Ibadan, Nigeria, author present socio-economic characteristics of the CVD patients and the related direct and indirect OOP payments on the medical care. Although the findings of the study may be relevant for policy use in Nigeria the study doesn't provide any additional insights of the OOP burden on patients. There are plethora of literature available on this subject with almost similar findings, many of these literature are already cited by the authors in the introduction and discussion sections. The study also lacks methodological rigour in estimating the OOP burden of CVD. My main comments on the study are as follows:</p> <ol style="list-style-type: none"><li>1. The study fails to review some important literature in this area such as: Mahal et al. 2010; Karan et al. 2014; Huffman 2011. These studies will help improving the methods of the estimation of OOP payments.</li><li>2. The details of the sample calculation is not of great interest for readers. This may be presented in supplementary materials. Instead, more details may be presented on the methods of estimating direct and indirect OOP.</li><li>3. Author doesn't talk about the existence of any co-morbidity among the CVD patients. Co-morbidity often leads to over estimation of treatment cost of CVD. The variations in the cost of treatment across patients may also be explained by the existence of co-morbidity. It is important to address this issue if estimating the OOP burden of CVD.</li></ol>
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	<p>4. Work days and wages lost are not the only indirect costs CVD patients face. The study fails to present a comprehensive estimates of indirect cost. These costs may include reduced health care for other family members, loss of employment of other family members even if one is not directly care giver, reduced school attendance of children etc.</p> <p>5. Author does not present any methodological details on how the indirect cost (workdays lost and wages) were estimated. For instance, what will be wage loss of care givers are self-employed or unemployed. Also for regular wage workers there may not be wage loss as such.</p> <p>References:  Karan A, Engelgau M, Mahal A. (2014). The household-level economic burden of heart disease in India. Tropical Medicine and International Heal. doi:10.1111/tmi.12281.</p> <p>Mahal A, Karan A &amp; Engelgau M (2010) Economic Implications of Non-communicable Disease for India. The World Bank, Washington, DC.</p> <p>Huffman MD, Rao KD, Pichon-Riviere A et al. (2011) A cross-sectional study of the microeconomic impact of cardiovascular disease hospitalization in four low- and middle-income countries. PLoS ONE 6, e20821.</p>
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<b>REVIEWER</b>	Selvaraj, Sakthivel Public Health Foundation of India, Health Economics
<b>REVIEW RETURNED</b>	11-Jan-2021

<b>GENERAL COMMENTS</b>	<p>Manuscript ID: bmjopen-2020-044044</p> <p>Manuscript Title: The burden of out-of-pocket payments among cardiovascular disease in patients in public and private hospitals in Ibadan, South-West, Nigeria</p> <p>The manuscript with its ID and title above is another attempt at examining and generating evidence on the growing burden of households OOP in Nigeria. The key objectives, methods and results emerging from this analysis remain relevant, robust and significant.</p> <p>Some key concerns that authors may want to address are the following:</p> <p>Methods:  Outpatient: Recall period for outpatient OOP payments are not reported while inpatient payments are reported? Similarly, homebased/rehabilitative payments recall period is unknown, as these are not reported in the manuscript. Eventhough the outpatient costs are annualized, it is unclear whether 15 day recall or 30 day recall period was used. And if so, whether it was multiplied to get to annual costs?</p>
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	<p>Moreover, how did outpatient costs for recurring payments, such as, drugs for hypertension or other drugs required on a regular basis taken into account?</p> <p>Although outpatient visits and costs associated with it in a hospital setting is included in the research design, it may be worth examining outpatient costs outside the hospital setting, say in a clinic. The costs in a clinic setting is expected to be significantly different. And most outpatient visits do occur in a clinic other than a hospital.</p> <p>Results and Discussion:</p> <p>It is surprising that laboratory tests costs constitute significant share of overall costs of both inpatient and outpatient. A more in-depth assessment is required to unearth the primary reason for laboratory tests costs to be significantly higher than drug expenses or hospital surgeries, etc. Such results require deep probe since this evidence is contrary to available evidence.</p> <p>The discussion section is evasive on why and what are the reasons for average cost of treatment in Federal hospital is much higher than a private hospital? What could potentially be the reason for significantly higher cost incurred by patients in a government hospital (federal and state) when it is expected to be free or subsidized substantially?</p> <p>Minor comments: Page 4 background: Need attention at the end of the first paragraph. "CVDs in SSA increased by over 50% in absolute terms". If it is expressed in absolute terms, it should ideally be reported in whole numbers and not in percentages.</p> <p>Study design states that it utilized a descriptive cross-sectional study design. Not sure, what is 'descriptive' here means?</p>
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### VERSION 1 – AUTHOR RESPONSE

#### REVIEWER COMMENTS

Reviewer: 1

Dr. Anup Karan, Indian Institute of Public Health, Delhi (IIPHD), Public Health Foundation of India

Comments to the Author:

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

Comments:

This study estimated the burden of out-of-pocket (OOP) expenditures on cardiovascular disease (CVD) in Ibadan, Nigeria. Using data from a primary survey of 744 patients who were discharged from the cardiology departments of private and public hospitals in Ibadan, Nigeria, author present socio-economic characteristics of the CVD patients and the related direct and indirect OOP payments on the medical care. Although the findings of the study may be relevant for policy use in Nigeria the study doesn't provide any additional insights of the OOP burden on patients. There are plethora of literature available on this subject with almost similar findings, many of these literature are already cited by the authors in the introduction and discussion sections. The study also lacks methodological rigour in estimating the OOP burden of CVD. My main comments on the study are as follows:

## Response

The author thanks the reviewer for reading and providing important comments to improve the quality of the manuscript. As rightly noted by the reviewer, the growing level of CVDs in Nigeria represents a major concern for public and population health stakeholders. As such, this study is warranted to provide evidence-based recommendations towards universal health coverage in the country. The author painstakingly reviewed similar studies in developing countries. The reviewed studies provided background information and vital insights regarding methodologies for estimating patient perspective healthcare costs in a robust way. So, this study is particularly suited to a developing country like Nigeria by estimating outpatient, inpatient and rehabilitative care costs borne by CVD patients in one singly study. This is considered a major contribution to what is already known about the burden of OOP payments among CVDs patients in LMICs. Almost all the studies reviewed estimated only the costs associated with outpatient and inpatient care and the costs of rehabilitative care (which can be substantial) was omitted.

Regarding the comment on the methodological rigor of the study. As this is study is part of an overall study on the “Economic Burden of Cardiovascular Diseases in sub-Saharan Africa”, over 100 articles were reviewed in terms of the methodology for examining patient perspective costs, distinct from the provider and society perspectives, respectively. Some of the studies reviewed were cited in the article (see: references 1, 16-21). The methodological procedure for estimating direct and indirect costs adopted in this study follows the widely accepted procedure which has also been used in previous studies (see: references 22-26).

1. The study fails to review some important literature in this area such as: Mahal et al. 2010; Karan et al. 2014; Huffman 2011. These studies will help improving the methods of the estimation of OOP payments.

## Response

The articles referred to by the reviewer were all reviewed (see: references 13 & 14). In fact, the instrument for data collection for the study was adapted from the Huffman 2011 study (reference 14). Similarly, the Karan et al study was an important article for the overall study. However, the study was cited in order manuscripts (under review at another reputable international journals). The methodology adopted in Karan et al is not suitable for this manuscript for the following reasons:

1. The estimation of the economic burden of CVD was estimated at household level and not at individual level
2. Secondary data and not primary data was utilized.
3. The paper adopted a propensity score matching technique to dichotomize households by their CVD status with the aim of investigating the healthcare costs related to CVDs, but this is not the aim in this present study because all the participants are CVD patients.
4. Per se, the methodology used in Karan et al would appear to provide minimal help in terms of the methodological approach in this study.

2. The details of the sample calculation is not of great interest for readers. This may be presented in supplementary materials. Instead, more details may be presented on the methods of estimating direct and indirect OOP.

## Response

This comment is noted. But, I will like to say that the sample size calculation as presented in the manuscript is short and concise. It is useful for those who may want to replicate the study elsewhere. Nonetheless, if the reviewer/editor insists, I will simply move it to appendix/supplementary materials. (see: Tolla et al 2017, for a study that showed the sample size calculation in a paper.

3. Author doesn't talk about the existence of any co-morbidity among the CVD patients. Co-morbidity often leads to over estimation of treatment cost of CVD. The variations in the cost of treatment across patients may also be explained by the existence of co-morbidity. It is important to address this issue if estimating the OOP burden of CVD.

Response

This comment is very valid. All the CVDs patients reported one co-morbidity or another. Therefore, participants were asked to report only expenditures which relate to CVD treatment. This strategy was validated by the finding in another paper which emanated from the overall study ("The microeconomic impact of OOP payments among CVDs"), that having co-morbidity was not a significant determinant of whether a CVD patient incurs catastrophic health expenditures or not.

Further details have been included in the methodology to provide more clarity and to avoid any doubts.

4. Work days and wages lost are not the only indirect costs CVD patients face. The study fails to present a comprehensive estimates of indirect cost. These costs may include reduced health care for other family members, loss of employment of other family members even if one is not directly care giver, reduced school attendance of children etc.

Response

Thank you very much for this comment. However, as described in the methodology section, indirect cost in this study are the costs associated with loss of work/productivity/income as a result of sick days as well as the income/wages loss by the caregiver (s) who accompanied the patients to the clinic/hospital. As such, the costs to other household members were not considered because this study is an individual-level study and according to the numerous studies reviewed, work days lost due to CVD and the related costs as well as the wages lost by the caregivers are sufficient to measure the indirect healthcare costs at patient-level. (see: Huffman et al (2011); & Tolla et al (2017) published in BMJ global. This is also the procedure recommended in Mahal A, Karan A & Engelgau M (2010) Economic Implications of Non-communicable Disease for India. The World Bank, Washington, DC.

The suggestions and extensions made by the reviewer for the calculation of indirect costs seems logical but have not been used in any study that I know of. Nonetheless, that procedure can be considered for future studies.

5. Author does not present any methodological details on how the indirect cost (workdays lost and wages) were estimated. For instance, what will be wage loss of care givers are self-employed or unemployed. Also for regular wage workers there may not be wage loss as such.

Response

This comment is valid and further details regarding how the indirect cost was calculated has been added in the methodology. For self-employed patients and caregivers, their daily earnings were elicited and this was multiplied by the number of days absent from work. For patients who had regular jobs where they are paid per month and for unemployed individuals, no costs were imputed for them. Notice that indirect costs is very low in comparison to direct costs. This was noted in the discussion section and a possible justification for it is the high rate of unemployment in Nigeria. Also, for those with regular paid job, they have access to sick leaves and may not be penalized for skipping workdays in order to access healthcare services. Further details have also been added in the manuscript.

Overall, the author thanks the reviewer for the very useful comments provided.

#### References:

Karan A, Engelgau M, Mahal A. (2014). The household-level economic burden of heart disease in India. *Tropical Medicine and International Heal.* doi:10.1111/tmi.12281.

Mahal A, Karan A & Engelgau M (2010) Economic Implications of Non-communicable Disease for India. The World Bank, Washington, DC.

Huffman MD, Rao KD, Pichon-Riviere A et al. (2011) A cross-sectional study of the microeconomic impact of cardiovascular disease hospitalization in four low- and middle-income countries. *PLoS ONE* 6, e20821.

#### Response

The recommended references by the reviewer were used and referenced in the manuscript.

#### Reviewer: 2

Dr. Sakthivel Selvaraj, Public Health Foundation of India

Comments to the Author:

Manuscript ID: bmjopen-2020-044044

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

The manuscript with its ID and title above is another attempt at examining and generating evidence on the growing burden of households OOP in Nigeria. The key objectives, methods and results emerging from this analysis remain relevant, robust and significant.

#### Response

The author thanks the reviewer for commending the timeliness and science presented in the manuscript.

Some key concerns that authors may want to address are the following:

#### Methods:

Outpatient: Recall period for outpatient OOP payments are not reported while inpatient payments are reported? Similarly, homebased/rehabilitative payments recall period is unknown, as these are not reported in the manuscript. Even though the outpatient costs are annualized, it is unclear whether 15-day recall or 30-day recall period was used. And if so, whether it was multiplied to get to annual costs?

## Response

Visit to the outpatient clinic is routine with similar healthcare expenditure pattern for CVD patients, so data on outpatient costs were collected as they were incurred at the clinic. Patients were also asked to report the number of times they go for outpatient care in a month. With this, the outpatient cost was annualized. Hence, there was no recall period for reporting outpatient costs since those costs were collected as they were incurred. The recall period for rehabilitative care was 1 month and this was also annualized. The idea was that after hospitalization, some patients might require rehabilitative care, although patients who were not hospitalized at all also reported incurring OOP costs for rehabilitative reasons in their homes.

More details on the recall period for outpatient and homebased/rehabilitative care have been provided in the manuscript.

Moreover, how did outpatient costs for recurring payments, such as, drugs for hypertension or other drugs required on a regular basis taken into account?

## Response

As much as possible, all CVD patients were asked to report all recurrent expenses incurred for the purchase of drugs. Special attention was paid to this.

Although outpatient visits and costs associated with it in a hospital setting is included in the research design, it may be worth examining outpatient costs outside the hospital setting, say in a clinic. The costs in a clinic setting is expected to be significantly different. And most outpatient visits do occur in a clinic other than a hospital.

## Response

In Nigeria, there are no clinics (or clinics are within hospitals) and as a result all CVD patients are managed in Federal, State owned hospitals or private owned hospital facilities. Decision on which hospital to access care is made by patients based on factors such as costs, proximity/convenience, waiting time, referrals etc. It is because of this that participants were recruited in those facilities.

## Results and Discussion:

It is surprising that laboratory tests costs constitute significant share of overall costs of both inpatient and outpatient. A more in-depth assessment is required to unearth the primary reason for laboratory tests costs to be significantly higher than drug expenses or hospital surgeries, etc. Such results require deep probe since this evidence is contrary to available evidence.

## Response

Thank you for this observation. First, it is important to note that laboratory costs represent a huge OOP payments burden on patients in Nigeria. This is because in some cases, diagnostic equipment are in short supply within the country and when they are available, it is quite expensive in terms of patients seeking laboratory tests. Therefore, the finding in this study is not unexpected. But, the cost of surgeries (i.e. maximum and average costs) reported in the manuscript is way higher than laboratory costs.

To further highlight the reason for the differences in the reported costs, further details have been

added to the discussion section.

The discussion section is evasive on why and what are the reasons for average cost of treatment in Federal hospital is much higher than a private hospital? What could potentially be the reason for significantly higher cost incurred by patients in a government hospital (federal and state) when it is expected to be free or subsidized substantially?

Response

This is an interesting finding in this study. Healthcare services are supposed to be free in Federal owned hospitals and if not, the costs should be cheaper relative to that obtainable in private facilities. Unfortunately, findings in this study show that that is not quite the case.

As noticed by the reviewer, the average OOP incurred in Federal owned hospitals is higher compared to that incurred in private hospitals. The result showed all the patients who required surgeries attended the Federal owned facility and the average OOP payment was large in Federal owned hospitals due to the huge costs of surgery reported.

Further details have been added in the discussion section to highlight this.

Minor comments:

Page 4 background: Need attention at the end of the first paragraph. "CVDs in SSA increased by over 50% in absolute terms". If it is expressed in absolute terms, it should ideally be reported in whole numbers and not in percentages.

Response

The phrase "in absolute terms" has been deleted. Thank you for the observation.

Study design states that it utilized a descriptive cross-sectional study design. Not sure, what is 'descriptive' here means?

Response

The coinage descriptive cross-sectional study design was adopted from methodological literature in medical sciences/public health. This study design is usually used in quantitative research. Descriptive study design is used when variables are observed with aim of examining characteristics, trends, frequencies and in this case, estimate costs. Unlike, analytical, interventional or experimental study design, descriptive study design does not require any control group and does not place emphasis on causal effects of variables (see: <https://www.scribbr.com/methodology/descriptive-research/>, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6371702/>)

Reviewer: 1

Competing interests of Reviewer: None declared

Reviewer: 2

Competing interests of Reviewer: None declared

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Editor's Comments to Author:

Please revise the title of your manuscript to include the research question, study design and setting. This is the preferred format of the journal.

Response

I believe the title already shows the research question (what is the burden of OOP payments), the study design- among CVD patients (i.e. a cohort cross-sectional study) and the study setting-in Ibadan, south-west, Nigeria.

However, I am open to suggestions or more clarifications on this.

Please revise the 'Strengths and limitations' section of your manuscript (after the abstract). This section should contain five short bullet points, no longer than one sentence each, that relate specifically to the methods. The results, aims or implications of the study should not be summarised here.

Response

The Strengths and limitations section has been revised as instructed.

#### VERSION 2 – REVIEW

<b>REVIEWER</b>	Karan, Anup Indian Institute of Public Health, Delhi (IIPHD), Public Health Foundation of India, HHealth Economics
<b>REVIEW RETURNED</b>	01-Mar-2021

<b>GENERAL COMMENTS</b>	<p>i don't think author has responded to my earlier query satisfactorily. I am particularly concerned about the biases in estimates of OOP payments because of presence of co- or multimorbidity. I don't find it convincing that patient would be able to separate the cost of treatment in case of more than one morbidity. This looks very casual approach to handle the issue. There are large number of literature available in this topic which suggest how the issue of multimorbidity can be handled at least partially, and how much bias may still remain. Author should review those literature apply some of the techniques suggested in literature.</p> <p>Another are of concern is the estimation of indirect cost, which i had mentioned in my earlier comments. I don't understand how can one estimate the indirect costs involved for a man/woman who is not part of labour market. What wage rate will be applied to such person to estimate wage loss? Similarly for self-employment, what would be wage rate? On the other hand a regularly employed person may not exactly face wage loss. I had also mentioned in my earlier comments there are range other types of indirect costs involved which author has completely ignored even to conceptualize.</p> <p>Lastly, I am pretty sure that details about sample size calculation is really not required in the main text. Author can just mention the</p>
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	sample size with the level of any stratification involved and keep the details in a supplementary material.
<b>REVIEWER</b>	Selvaraj, Sakthivel Public Health Foundation of India, Health Economics
<b>REVIEW RETURNED</b>	03-Mar-2021
<b>GENERAL COMMENTS</b>	The paper in its revised form is good to go.

## VERSION 2 – AUTHOR RESPONSE

### Reviewer comments

#### Comment 1

i don't think author has responded to my earlier query satisfactorily. I am particularly concerned about the biases in estimates of OOP payments because of presence of co- or multimorbidity. I don't find it convincing that patient would be able to separate the cost of treatment in case of more than one morbidity. This looks very casual approach to handle the issue. There are large number of literature available in this topic which suggest how the issue of multimorbidity can be handled at least partially, and how much bias may still remain. Author should review those literature apply some of the techniques suggested in literature.

#### Response

The author thanks the reviewer for again flagging the potential effects of co/multi-morbidity on the estimated costs. As suggested, attempts were made to review earlier studies on how to reduce the effects of co-morbidities. In particular, I reviewed the study on “The Economic Implications of Non-Communicable Disease for India” and found it interesting. Mahal et al cited a number of procedures to ensure that the potential impact of co-morbidity on cost estimation is mitigated. In addition to reviewing earlier techniques, they suggested the use of propensity scores matching procedure. However, this present study is unable to adopt that technique because of its huge reliance on having a control group. This reason is because this study is a hospital-based survey which included patients who were being treated for CVDs. Where necessary guidance was sought from attending physicians to ensure that only CVD related costs were captured. In a way, the fact that the respondents were recruited in the cardiology units where medicines and treatment costs were incurred due to CVD could lend a slight credence to the usefulness of the procedure adopted in the study.

Another methodology for detecting the impact of co-morbidity suggested in the literature is calibrating a model of health expenditures/catastrophic health expenditures/poverty induced by out-of-pocket health spending and introducing a dummy variable for the presence of multi-morbidity. This was done and the findings showed that the possible impact of co-morbidity on the estimated costs was mitigated. This result was reported in another manuscript.

Nonetheless, for the avoidance of doubt, the possible effect of co/multi-morbidity has been noted/declared in the limitation of the study.

#### Comment 2

Another area of concern is the estimation of indirect cost, which I had mentioned in my earlier comments. I don't understand how can one estimate the indirect costs involved for a man/woman who is not part of labour market. What wage rate will be applied to such person to estimate wage loss? Similarly for self-employment, what would be wage rate? On the other hand a regularly employed person may not exactly face wage loss. I had also mentioned in my earlier comments there are range other types of indirect costs involved which author has completely ignored even to conceptualize.

#### Response

In addressing this concern, I like to highlight the following:

1. Calculation of wage loss for those that are unemployed: No wage loss due to CVD was recorded
2. Calculation of wage loss for self-employed respondents: Average hourly/daily earnings was elicited and this was multiplied by the number of hours/days spent due to CVD treatment.
3. Calculation of wage loss for regularly employed respondents: No wage loss due to CVD was recorded

Further details have been provided in the manuscript.

Regarding other components of indirect costs suggested by the reviewer, since the data collection was concluded a long time ago it will be difficult to get additional data on indirect costs. The reviewer's suggestion will help direct my subsequent studies on the subject matter. As it is now, the prevalence

of CVDs represent a huge concern in the country. This study, in spite of its limitations provides needed information to policymakers regarding the magnitude of the CVD problem in economic terms, especially from the perspective of patients.

### Comment 3

Lastly, I am pretty sure that details about sample size calculation is really not required in the main text. Author can just mention the sample size with the level of any stratification involved and keep the details in a supplementary material.

### Response

Details of the sample size calculation has been removed from the main manuscript to supplementary material.

The author immensely thanks the reviewer for the valuable review and comments provided.