Author's response to reviews

Title: Prevalence of cardiovascular disease risk factors among a Nigerian adult population: implication of income level and accessibility to CVD risks screening

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RESPONSE TO REVIEWERS’ REPORT

Title: Prevalence of cardiovascular disease risk factors among a Nigerian adult population: implication of income level and accessibility to CVD risks screening

REVIEWER’S REPORT 1

Major Compulsory Revisions:

1. The limitations of the study are significant yet the authors do not mention them anywhere. Of major concern is selection bias since this study was not based on a random sample. No surprise therefore that in one of the study sites (KWALE) almost 60% of the participants were between 18-24 years of age. Addressing this with some kind of weighting in the analysis would have made some sense.
   
   **Response:** This overreaching study, of which this report is one in a sub, is to establish possibility of screening for prediabetes and cardiovascular complications (PACCS) at young adult age ≥18 years old. Hence, the secondary schools were a discretional recruitment site. The main interest in this reported sub-study is the association of income level and accessibility to CVD risks screening on prevalence of the risk factors of CVD. Perhaps, applying “some kind of weighting in the analysis would have made some sense” if our objective was estimation of the true association (or effect of) between ‘age’ and the outcome.

   **Action 1:** We acknowledge the high percentage of the young adults as a potential limitation in future analyses where age would be considered.

2. The statistical approach and the choice of tests are poorly described and justified and in some instances completely inappropriate. For example, why MANOVA test? Why not a multi-nomial regression of SES over CVD risk factors? Even the choice of variables (or lack thereof of the appropriate categorization) is highly questionable. For example, the use of continuous variables (e.g. BMI) without the corresponding risk categorization (e.g. into underweight, normal, overweight and obese) makes it impossible to makes sense of the public health implications of this study.

   **Response:** MANOVA has been used because ≥2 dependent variables were compared between ≥3 independent groups. The interest was to assess the relationship of income level, educational level and geographical location on CVD risk factors prevalence and CVD risk screening. Multinomial logistic regression is used to model an outcome. Modelling is outside the scope of the present study. We could have considered this statistical method if the objective was to determine the best set of risk factors that predicts future CVD, which is proposed in the 3rd phase of the ‘bigger’ research [1]. The choice of variables in this study was based on the indices that make up two profiles associated with CVD risk. One is the metabolic syndrome profile, and the other includes the variables used for CVD screening in clinical practice. There was appropriate categorization based on the set recommendations and cut-off points outlined in the text. However our emphasis was on obesity for both BMI and WC variables, so the obese/obesity category for BMI and WC was used.
**Action 2:** We have provided further clarifications in the methods section

3. The sample size calculation is incomplete. Because CVD risk factors are known to vary by age and gender, at the minimum the sample size should have been stratified as such. This is why the WHO STEPS protocol multiplies the minimum estimated sample size by 2 (for gender) and by 5 (for each 10 year age interval). Pluse

**Response:** It is admitted that CVD risk factors are known to vary by age and gender. Although our sample population was far above our minimum calculated sample size, it did not meet the criteria specified (x2 for gender and x5 for each 10 year age interval) because of the poor health seeking behaviour of the sample population of which was reported in our preliminary survey [2]. We have acknowledged this as a potential limitation of the study.

**Minor Essential Revisions:**

1. Too many typos and grammatical errors. E.g what does the prevalence of total cholesterol even mean?

   **Response:** corrected where appropriate to read “hypercholesterolemia”

2. See line 64: CVD is already the leading cause of death globally, not by 2030.

   **Response:** Sentence corrected to read “Worldwide, CVD account for the majority of deaths due to chronic diseases”

3. Write acronyms in full first time they are used.

   **Response:** acronyms written in full first

4. IDF is used to classify blood pressure? (See line 121)? Why not ISH/WHO?

   **Response:** The recent consensus statement on harmonizing the metabolic syndrome by the Joint Interim Statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity recommended the cut-points used in the study for sub-Saharan ethnicity and that corresponds to the IDF criteria [3].

   **Action:** we provide further clarification

5. Define all classifications of risk factors in the methods section or submit a table as supplemental contents.

   **Response:** all classifications used are described at the appropriate subsection.

6. Who conducted the interviews and screening? Where they trained? What protocol did they use?

   **Response:** Honour students of the department of Public and Community Health Novena University, Nigeria who are practicing nurses and lab technologists, and staff nurse of Onyx Hospital and Maternity were selected and trained to conduct the interview. I (VMO) and Dr K.A Digban are qualified medical laboratory personnel who carried out the screening. Behavioural informations were gathered, followed by anthropometric measurements and biochemical screening using the WHO STEPS questionnaire over a 3 months period.
7. What referral services if any were provided to those who were eligible for treatment following screening?
   **Response:** Dr I.C. Onyia is a practicing Medical Officer, and responsible for advising those who were eligible for treatment

8. Confidence intervals and p-values should be included in all results.
   **Response:** Confidence intervals and p-values included where appropriate

9. Figure 1 and 2 needs a different color scheme otherwise it is impossible to make sense of it in black and white. Not to mention that the crowdedness of the bars makes the figures visually unappealing.
   **Response:** Figures 1 and 2 re-presented to ease interpretation

10. Table 3 is difficult to interpret. For example what does a 7% prevalence of BMI among the Abbi participants mean??
    **Response:** Table 3A represents the percentage prevalence of CVD risk factors after appropriate categorisation. For BMI and WC variables, interest was on obesity and the values presented are the % prevalence of obesity categories.
    **Action:** the error has been corrected to read 7% prevalence of obesity (BMI), 55.3% prevalence of Obesity (WC) among Abbi participants

11. Include a table with the model and manufacturer of the screening equipment (e.g. the stadiometer and "human" weighing scale) used. Are these validated equipment?
    **Response:** model and manufacturer of screening equipment are indicated at appropriate subsections. These are validated equipment.
REVIEWER'S REPORT 2

Comments:

The authors have assessed different cardiovascular risk factors among adults in Nigeria and the relationship between these factors and some socio-economic variables and access to screening. In general, the writing requires language edition and in some places the epidemiological and statistical terminologies are not properly used. The statistical analysis requires some check by expert as the analysis section did not clear state what analysis were done, how variables were selected or if some assumptions are considered or checked before the analysis. The following comments are made section by section:

1. Title: the author wishes to assess the implication of income level and access on the prevalence of the outcome of interest which are risk factors. However, given the study design used for this assessment it wouldn’t be possible to measure implications, because it requires longitudinal assessment of the factors over the outcome. Thus the author can correct it by saying its “relationship”.
   
   Response: implication replaced with relationship

2. Abstract: in this section the necessary information are clearly described however, the objective stated in this section is not the same as the one reported in the main document.
   
   Response: objective re-written to be in par with that in the main document. It reads “This study sought to assess the prevalence of CVD risk factors and how the difference in prevalence and accessibility to CVD risk screening across income levels and educational backgrounds contributes to disease diagnosis in rural and urban Nigerian adults.”

3. Introduction: in this section the author have tried to establish the statement of the problem however, in line 73 to 81, indicated the presence of prior studies done in Nigeria to assess the same issue. But continue to recommend further exploration of these factors. So it is not clear why the author want to repeat this study when there is evidence already at hand. In other words the rationale for this study is not well established.
   
   Response: Few studies in Nigeria looked at socio-economic status (SES) as an entity. In such instances, it is not clear which component of SES driving the prevalence of cardio-metabolic risk factors. However, no study in Nigeria has looked into the association of components of SES with access to cardio-metabolic risks screening which this study also seeks to explore.
   
   Action: the sentence in the text has been re-written for more clarity.

Methods:

4. In this section, it is good to divide the section in to meaningful sub-sections which will help readers to follow through. For instance the ethics issue was mentioned at different place repeatedly.
   
   Response: subsections has been added
5. The measurement part is poorly described. In line 115 to 128, the different measurements were listed and the standards followed to measure, but did not clearly state the cutoff used for the study. Citing references alone is not enough and is important to provide the entire cutoff used by the researcher. In the same line different bio-markers were measured but their abnormal state was not defined. The same problem was observed when presenting the result which will be described latter.
Response: all reference values/cut-off values have been included in appropriate subsections

6. In line 142 to 145, it is not clear what sample size formula was used; if it is survey, there is no need to consider power but margin of error; if it is comparative cross-sectional instead of using the CVD prevalence you would use the outcome level among exposed and non-exposed. It is appropriate to provide the correct assumptions.
Response: Appropriate corrections have been effected. It reads “Sample size was calculated using the StatCalc application from the Epi-Info software (version 7.1, CDC Atlanta USA). Assuming 25% response distribution at 5% confidence limits (margin of error), the study sample size would be approximately 203 at 90% confidence level or 68 at 90% confidence level for each cluster.”

7. In line 149 to 155, the author described the multi-variate analysis plan; it is not clear why the author wanted to do the analysis in two phases and the author did not tell which multivariate analysis was actually used; how the variables were selected and if any assumptions were checked. The author must provide this information.
Response: The 1st phase of analysis involved dependent variables of yes/no responses of history of blood glucose, blood pressure and cholesterol check-ups/screening and the independent variables (income level, educational level and geographical location). The 2nd phase involved the dependent variable (CVD risk factors including triglyceride, total cholesterol, BMI, systolic & diastolic blood pressure, blood glucose and WC) and independent variables (income level, educational level and geographical location). The dependent variables are interval measurements from independently sampled observations from the population. Fisher’s Least significant difference post hoc analysis was used to determine difference within subgroups. Multivariate normality and homogeneity assumptions were met.

8. In line 154: impact cannot be measured with the design used for this study so avoid such terminologies.
Response: ‘impact’ deleted and ‘relationship’ used

9. Result: this is poorly written sections.
Response: Result section re-written and split into sections

10. The way results are presented is not clear at all. For instance, the author might use different data presentation methods such as tables and figures but in the result section, it is imperative to provide proper description of these results and their interpretations. Instead the author was stating where the results are annexed etc. (line 166-177)
Response: Result section re-written and split into sections

11. It is also appropriate to sub-divide the result sections in to sub-sections to help readers follow through.
Response: Result section re-written and split into sections

12. Line 172-177, the author reported prevalence of different biomarkers; it is not clear whether the prevalence represents the abnormal level or their mere existence in the blood. For instance it says the prevalence of HDL. Such descriptions must be corrected. This is an issue throughout the document.

**Response:** prevalence reported represents the abnormal level of the risk factors. However, the typos have been corrected for example, prevalence of HDL now reads prevalence of low HDL

13. Line 192-198, the author used many abbreviations it is good to provide the description at least when is used for the first time.

**Response:** description provided first before abbreviating

14. Discussion: in this section, some of the discussions are not balanced for instance in line 212-215, the author is claiming that the increasing prevalence is the result of presence of screening program. But it is also fair to think that time and changes with time related to economy, lifestyle should be considered.

**Response:** Sentence rephrased for more clarity “There is indication that increased urban migration and urbanization over time encouraging lifestyle changes is contributory to increase in prevalence of these modifiable risk factors. It is also envisaged that with increase in reporting, the true prevalence of prediabetes and diabetes in Nigeria will be unravelled, especially in apparently healthy subjects in the rural communities”

15. The author also repeats result in the discussion session, infact the results were better described in the discussion section than were in the result. So avoid repeating results.

**Response:** repetitions deleted

16. The author should also avoid making conclusion and recommendation in the middle of the discussion. Line 246-249.

**Response:** recommendation noted and corrected

17. Although the study may issues related to validity nothing was discussed in this section. So either the author is claiming that the study is free of any limitation or did not understand the problem with validity at all.

**Response:** limitations of the study are now provided as a section

18. Figures: the figures which describe prevalence must also consider the 95% confidence interval. It is essential to report it.

**Response:** 95% confidence intervals now included
REVIEWER'S REPORT 3

Major Compulsory revision

1. Design of the study: not clearly stated
   Response: the study is a cross-sectional population based study. The manuscript has been revised to include appropriate subsections for clear presentation.

2. Sampling strategies: How were the participants identified?
   Response: two state cluster sampling was employed. Three clusters were selected and for each cluster, participants were recruited and screened based on meeting the inclusion criteria.

3. Income measurement: Applicability in communities where majority are employed in the informal sector
   Response: Income measurement was as reported by participants. The minimum wage indicator fits both participants employed in formal and informal sectors. For example, the daily cost of transportation, electricity, medical treatment etc are same for individuals employed in both formal and informal sector living in same community. Therefore, the daily income level categories are applicable to all parties in different employment sectors.

4. It is not clear how the multivariate analysis was done
   Response: The 1st phase of analysis involved dependent variables of yes/no responses of history of blood glucose, blood pressure and cholesterol check-ups/screening and the independent variables (income level, educational level and geographical location). The 2nd phase involved the dependent variable (CVD risk factors including triglyceride, total cholesterol, BMI, systolic & diastolic blood pressure, blood glucose and WC) and independent variables (income level, educational level and geographical location). The dependent variables are interval measurements from independently sampled observations from the population. Fisher’s Least significant difference post hoc analysis was used to determine difference within subgroups. Multivariate normality and homogeneity assumptions were met.

5. I didn’t see any analysis with dichotomous outcome variable among tables presented in the document
   Response: The analyses and study did not involve/require outcome variable. Multinomial logistic regression method may have been considered if the objective was ‘to determine/model the best set of risk factors that predicts future CVD’, which is proposed in the 3rd phase of the ‘bigger’ research.[4]

6. Relevant graphs should be part of main document ( choose most relevant )
   Response: Done

7. Tables on Multivariate analysis need to be included
   Response: Fisher’s LSD post hoc analysis table now included

8. The authors failed to discuss the strength and limitation of the study
   Response: Limitations section added

9. # of abbreviations used in the document should be limited
   Response: number of abbreviation substantially reduced

