Author’s response to reviews

Title: Epidemiology and Risk Factors for Hypertension in Rwanda: Implication for Non-Communicable Diseases Prevention and Control

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Author’s response to reviews:

Editor-in-Chief,

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Dear Editor,

As instructed, we have addressed all the comments of the reviewers. All inputs are clearly marked in track change in the revised manuscript for ease of reference. The point-by-point
changes made to the manuscript as well as responses to the comments of the reviewers are as follows:

Reviewer #1

1. This is a population-based cross-sectional study with hypertension in Rwanda. I hope this paper was a valuable report, but I feel some modifications would be needed.

2. Authors were written in "population-based data to inform policy development are scarce in some countries", but the statement was overstated. This was one cross-sectional study by sampling-based. I hope the evidence was some limitations.

This was the first national population based cross-sectional study conducted in Rwanda to assess the prevalence of hypertension; we have deleted “in some countries” from this sentence thus specifying that population-based data is scarce only in Rwanda (Line 28)

3. This was a secondary analysis but, main study design and results was still unclear.

The methods section was reviewed to include the information on the main study design. The results are described in the full report on non-communicable diseases in Rwanda for which reference has been inserted at the end of the paragraph (Line 102-188)

4. Notations with sample size equation was still unclear.

We have included the notations of the letters in the sample size equation. The formula for cross-sectional (or prevalence) studies was applied to calculate the sample size, and recommendations from WHO regarding design effect, the recommended number of age-sex estimates and non-response rate were taken into consideration to determine the final sample size. Reference is indicated in the text (Line 113-114)

5. L75-80, this paragraph was unclear. Was this your opinions or previous statement from some articles (if yes, citations were needed)

This opinion was based on the findings from the population-based study in one Bugesera district (reference 16) and health facility based findings (reference 14). We have included these citations at end of the statement.
6. L97, "recommended when the prevalence is unknown", Why and Who was recommended?

The sample size calculation for cross-sectional study takes into consideration the estimated baseline levels (prevalence) of the behavior or indicators that are being measured. If the baseline estimates are not known, it is recommended to use 0.50 (p). Please see reference 22.

7. L98, "This basic sample size was adjusted for design effect for complex sample design (1.50)," was unclear. What was 1.50?

A Design effect (DEFF) is an adjustment made to find effective survey sample size, due to a complex sampling method resulting in larger sample sizes (e.g. cluster sampling, stratified sampling etc.). In the case of STEPS surveys, the design effect of 1.50 is recommended (Reference to WHO STEPS manual).

8. Sampling methodology was still unclear. I hope the section was needed more details and some citations. What was "Enumeration Areas", "a sampling frame for random selection of EAs", "Probability Proportional to Size (PPS) sampling", "systematic random sampling method", "The sampling interval", "Kish sampling" and "Kish selection method"?

We have described the sampling methods in more details and provided related reference (Line 122 - 137). The Kish method is described in the endnote (Line 410 – 416).

9. L122, 126, I hope roles of "survey team" and member of "data collection team "should be written more. Was both teams same?

We included the roles of each member of the team in the text (Line 146 - 152).

10. L129, Who was "survey supervisors"? Was he/she in survey team?

The supervisor was the person who planned the movement and data collection of each team and checked to ensure that the questionnaires were well completed (Line 146 – 147). Yes, s/he was part of the survey team.

11. L128, What was "e-STEPs"?
e-STEPS is a suite of software that allows for the preparation and implementation of data collection using Personal Digital Assistants (PDAs). We have included this explanation in the manuscript text (Line 156 – 157)

12. L149, "7116" analyzed data number should move on results section.
This sentence has been removed and inserted in the result section and the required rephrasing done. (Line 209 – 210)

13. L156, "multivariate logistic regression was conducted for all variables of interest with p-value <0.05 defined as threshold for significance." was still unclear. How to select the variables? Whether it was on univariate model under 0.05 p-value or on multivariable model under p-value 0.05? Was the model valid from clinical and public perspectives? You should write first candidate variables and all selected variables in the model.
We have rephrased this sentence to make it clearer and listed the variables of interest (Line 201 – 204)

14. L157-158, the last sentence was should deleted. It was not appropriate on "data analysis".
Sentence deleted (Line 205 – 206)

15. L175, the data was a epidemiological study, You could not decide them by P-value.
You should interpret the effect size.
The analysis was reviewed and the sentence was rephrased (Line 226)

16. L184, In multivariable model, 95%CI was not shown. You should add them on all text and tables.
CIs have been included as suggested (Line 236 - 245)

17. L184, Most low P-values (0.000) should be shown as "<0.000" on all.
Modifications made as suggested

18. In discussion, I hope you should discuss below,

1) From this findings, how to plan you can new future health plan in Rwanda.

2) The data was some limitations you written. What was the best data? What can you plan next future study?

We have made recommendations on what should be done in future (Line 345 – 358). The best method to establish association and causation would be using data from a cohort study which compare exposed and non-exposed groups for a given period and identify the risks

Reviewer #2

Reviewer 2: Study title: Epidemiology and Risk Factors for Hypertension in Rwanda Implication for Non-Communicable Diseases Prevention and Control

Reviewer: Fakir Yunus

Reviewer comments:

Overall, the study is interesting and well-written and provides relevant fresh insights on the HTN in Rwanda and it's risk factors. Nevertheless, I have a number of suggestions for improving the manuscript.

* Abstract:

2. Conclusion: Please consider writing what you found in your study. I think, the way it is written here, does not indicate appropriately that HTN is a concern for Rwanda. You may consider to say, Given the high prevalence of HTN ……I suggest to re-write the conclusion.

We have re-written the conclusions as suggested (Line 42-43)

* Keyword:
3. The authors mentioned that 'hypertension', 'high blood pressure', is there any difference, how 'awareness' could be an keyword for this study.

We have revised the keyword accordingly (Line 48 – 49)

* Introduction:

1. The authors mentioned that 'This study provides population-based national estimates of the prevalence and risk factors associated with hypertension in Rwanda.', so this should be reflected in the title. Please mention that this is an nationally representative study.

We have mentioned that this is a nationally representative study (Line 94). We also rephrased the title to include that the study is a population-based national estimate (Line 1 – 2)

2. Lit review is poor, I suggest the authors to do more lit review on HTN in Rwanda, its known risk factors, its consequence on health, its prevention…

Further literature review on HTN in Rwanda was conducted and appropriate references have been included in the introduction section (Line 73-82)

* Methods:

3. Sample size and method section: would helpful, if authors consider to make a flowchart of the multi-stage sampling.

We have included the sampling flowchart as additional file 1

4. I strongly suggest to cite each of the definition mentioned here in the Definition and measurement of variables.

The relevant citations have been included and biochemical variables were defined. (Line 168-188)

5. Which guideline the survey followed to collect biochemical sample, please cite.

The survey followed the WHO STEPS guidelines. Reference included as suggested
6. It is great that the authors rightly mentioned the detail of measuring blood pressure. Please cite if OMRON Automatic blood pressure monitor and CardioChek PA has been used elsewhere in research.

The automated blood pressure measuring instrument (OMRON®) and CardioChek PA are the instruments recommended by WHO for measuring blood pressure and lipids during STEPS surveys data collection. Appropriate citations were included in the text.

7. It is not clear what are the variables assessed in this study including the outcome variables, and how they were captured. I suggest writing a separate paragraph explaining the variables assessed including the outcome variables. For instance, how did they define semi-urban areas, level of education- is it completed? What university and high, which institute is here meant by 'high'.

The paragraph was included in the text in Line 192 – 204. The term high was removed to avoid confusion. The education level is classified as completed.

8. Also justify why the authors choose to capture those particular risk factors, is there any previous relationship with these factors (height, weight waist circum..lipids… etc.). I suggest to justify and cite accordingly.

Yes these are the factors associated with hypertension in Rwanda as cited under the introduction section. Furthermore, these risk factors are recommended for consideration by the STEPS surveillance system (Line 201 -204). We thus documented the status of these risk factors and the association with hypertension and provide national estimates.

9. Data analysis, also would great if authors explain the variables that been re-categorize from the original dataset.

Re-categorized variables from the original dataset are included in the text and additional file 2 as suggested (Line 191 - 192)

10. The authors mentioned that 'multivariate logistic regression was conducted for all variables of interest'- it is not clear what are the variable of interest??? Also, write a few sentences on which variables and why you put those in the final model.
We have included these variables in the text and explanation provided on why they were included in the final model (Line 201 - 204)

11. The authors did not mentioned about those HTN patients who are already taking anti-HTN medicine and their BP is now in control. This may lead to an underestimate the results.

The patients who were already on medication were included in the analysis as having hypertension. The sentence was added in the definition of high blood pressure (Line 169-170)

* Results:

12. P8 L173, the author mentioned 'a doctor' - please make it clear that they are the registered physician or they are village doctors

We specified in the text that this is a physician (Line 223 – 225)

13. P8 L172-173: The authors mentioned that 'Among respondents who were hypertensive, 22.1% self-reported that they had been previously diagnosed by a doctor while more than 75% were unaware of their status.' - first of all, I did not find it in the tables. The authors later discussed about it, but failed to explain how data was collected on this issue. It is indeed a important findings.

The sentence on awareness was rephrased and figures added in the table 1

14. Table 1: I find it very difficult to match if the total % is 100. Table 2 has been not been appropriately written. For instance, 'the prevalence of hypertension increased with increase in BMI from 20.3% to 28.4% among overweight and obese respectively'. I understand the authors ran chi-square test to measure the association. Please write the interpretation in correct way. Moreover, rest of the results in this table in poor written.

The table have been reviewed to make them well understood and the statement on BMI was rephrased (Line 230-231).

15. Table 2: what did the author mean by 'χ2=6.32' in the overall in the table 2

This was changed and only p-values were kept
16. Table 3 & 4; Please write the exact number rather writing 'more likely' when you explain the regression model. Question remains, how much more?

The sentence was rephrased and the number were added (Line 236-247)

17. Table 3 & 4: I suggest to write each of the variables you analyzed, should be written in the results both the significant and non-significant variables. The authors should not be biased only the significant results.

The sentence on non-significant variables was added in the results section. Line 243 - 244

* Discussion:

18. It seems that the authors did an another lit review in the discussion. It is poorly written. The authors should be discussing their findings and then do the lit review to support and/or discrepancies with other research articles in the similar context. The authors should consider to re-write and discuss each of the variables in this way.

The discussion section was reviewed according to the suggestions given by the reviewer (Line 251 – 290)

19. P10 L213 214, please the statement is incorrect and difficult to claim such conclusion. It reads like a causal relationship are there, however, the authors did not investigate this phenomenon in this study. The authors may claim that the low awareness may because of the inadequate public health intervention ……

The statement was rephrased (Line 262 – 264)

* Conclusion:

20. Please avoid mentioning the number/percentages in the conclusion section.

Please write clearly what you found.

Percentage were deleted and the statement was rephrased (Line 349)
Editorial policies

• We reviewed the manuscript again to ensure that it adheres to your journal’s editorial policies and requirements

• The declaration section with all mandatory sub-sections has been included in the manuscript.

In addition to the above, we also rephrased the title of the manuscript and addressed other minor issues. We are therefore resubmitting the manuscript for your kind consideration. We are available to clarify the responses above and any other issues in the revised manuscript.

We look forward to hearing from you at your earliest convenience.

Yours sincerely,

Dr Marie-Rosette Nahimana