Author's response to reviews

Title: A cross-sectional study of the prevalence and risk factors for hypertension in rural Nepali women

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Version: 2 **Date:** 22 September 2012

Author's response to reviews: see over

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September 22, 2012

The Biomed Central Editorial Team

Object: MS: 1795173641721005 - A cross-sectional study of the prevalence and risk factors for hypertension in rural Nepali women.

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Thank you for consideration of our manuscript for publication in your journal. We have revised the above manuscript according to reviewers' comments.

Reviewer's report

Title: A cross-sectional study of the prevalence and risk factors for hypertension in rural Nepali women

Version: 1 **Date:** 21 August 2012

Reviewer: Prabhdeep Kaur

Reviewer's report:

Major Compulsory revisions

1. Methods: Criteria used for selection of sub sample need to be explained in detail:

A subsample area was selected for more intensive monitoring during the trial. The area contained roughly 10% of the study population and selection was based on ease of access to clinics and a paved road in order to facilitate biochemical sample collection and to visit women at birth. We added this description to the methods section (page 5). We also added some detail about sampling method of the original study in page 5. We added,

"Briefly, the study was conducted in the rural, low-lying Sarlahi District of Nepal. The study area comprises 30 Village Development Communities (VDCs), each divided into 9 administrative wards. Over a study period from July 1994 to June 1997, 17,531 infants were born to women enrolled in the trial. Women were supplemented before, during and after pregnancy throughout the study period. A subsample area was selected for more intensive monitoring during the trial. The area contained roughly 10% of the study population and selection was based on ease of access to clinics and a paved road in order to facilitate biochemical sample collection and to visit women at birth."

2. Methods: Statistical methods used for the analysis of sub sample need to be elaborated. If linear regression is used, then why authors have mentioned about the reference group?? It appears that logistic regression has been used.

We did linear regression with blood pressure analyzed continuously. The predictor variables were dichotomized as abnormal or normal (e.g. high BMI vs. normal BMI). The 'normal' category served as the reference group for all regressions. Therefore, in this example, the beta coefficient could be interpreted as the difference in blood pressure comparing those with high BMI to those with normal BMI. We have modified the language in the methods section (page 8) to clarify which variables were considered as the outcome and which were the predictor variables. We have also added a footnote to table 4 to provide an interpretation of the beta coefficients (page 25) that says,
"Beta coefficients represent the mean difference in systolic or diastolic blood pressure comparing those with abnormal values of each predictor variable to those with normal values" (page 25).

3. Results; Table 1- Chi square of comparison of three groups does not give any clear message. Two Separate Chi square should be done; One comparing normals vs. Hypertension and another comparing Normal vs. Pre hypertension

The main objective of table 1 is to present a picture of the distribution of hypertension and prehypertension across different characteristics of participants. The reviewer is correct that the chi square doesn't allow one to know exactly which sub-groups are different. However, we have presented those data in table 2 and table 3 (page 23 and 24) with both adjusted and unadjusted analyses, as this reviewer recommended under question 4 below.

4. Results: Table 2- Unadjusted OR should be presented. Whether authors did any stratified analysis to identify confounders or effect modifiers?? What is the need to adjust for everything??

Unadjusted ORs have been added. We included the variables which had a significant chi square value (Table 1) into our multivariate logistic regression. For the SES variables, as there were too many, we did PCA to reduce them to three categories. Thus, all variables presented in the adjusted analysis are adjusted for potential confounding by the other variables.

According to the reviewer's suggestion we tested the effect modification by ethnicity and age. We did not find any effect modification by age. However, we found the effect modification effect by ethnicity. Our model for pre hypertension and its predictors were stratified by ethnicity and a separate table for prehypertension (table 3 in page 24) was added. In the text we modified our method section and added,
"*For both the regression models effect modification by ethnicity and age were evaluated with likelihood ratio tests by comparing two nested multivariate models with and without the interaction term. The result was stratified if any significant interaction was found.*" (page 8).

We also modified our results section (page 9 to 10) according to this new analysis and added,
"We found a significant interaction between ethnicity and socioeconomic status while assessing the association of pre hypertension and its predictors. We therefore have stratified the findings for prehypertension by ethnicity (Table 3). In the case of pre-hypertension, Madheshi women with low farming assets and food storage had a significant 31% increased risk compared to women of high status (p for trend< 0.001). This association was not significant for Pahadi women. However, for Pahadi women those with low household quality and low household assets had increased odds of having prehypertension than those with high household quality (OR, 1.23 and 95% CI, 1.03-1.52) and high household assets (OR, 1.27 and 95% CI, 1.04-1.55)."

In our discussion section (page 12-13), we added,
"household quality and household assets were not associated with hypertension but showed a negative and significant relationship with prehypertension for Pahadi women. Taken together, it could be concluded that women from low SES had more probability of having hypertension or pre hypertension. Our findings do not support the finding from other studies in rural South Asia where higher SES were associated with increased prevalence of hypertension. Rather, these findings indicate that in the context of rural women in a low income country, having a higher SES is a protective factor for health"

5. Results: Table 3- It is not clear whether beta coefficients are for linear regression?? Foot note mentions the use of cut offs for adjusted analysis that implies the use of logistic regression. Two different methods cannot be presented and compared in one table.

We did linear regression with systolic or diastolic blood pressure analyzed continuously. Each predictor variable (high cholesterol, high triglycerides, etc.) was considered as a dichotomous variable with a cutoff described in the footnote. The interpretation of the beta coefficients presented, therefore, is the mean difference in blood pressure comparing those with abnormal values of each predictor variable to those with normal values. We have added a footnote to the table 4 (page 25) to make this more clear. It says,
"Beta coefficients represent the mean difference in systolic or diastolic blood pressure comparing those with abnormal values of each predictor variable to those with normal values" to table 4 to provide an interpretation of the beta coefficients (page 25)."

Minor essential revisions

1. Age group can be mentioned in the abstract:

We added the age range (range 16.4-71.2 years) to the first sentence of the results in abstract (page 3)

2. Discussion is elaborating a lot on prevalence of various biochemical conditions however that was not the objective of the paper. discussion should be focused and in line with the title and objectives

While our primary objective was to examine the prevalence and risk factors of hypertension, we were also interested in describing the epidemiology of other risk factors that tend to cluster with hypertension, such as obesity and dyslipidemia. We have added secondary objective to our introduction (page 5-6). We added,
"We also report the prevalence of other CVD risk factors, such as obesity, cholesterol, triglycerides, and HbA1c, and their association with blood pressure."

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Reviewer's report
Title: A cross-sectional study of the prevalence and risk factors for hypertension in rural Nepali women

Version: 1 **Date:** 19 June 2012

Reviewer: RANIL JAYAWARDENA

Reviewer's report:
This study presents detail of hypertension in middle aged women in a selective sample in Nepal. These findings have limited value for general picture in Nepal or South Asia. However, it is important to disseminate findings from developing countries.

Major Compulsory Revisions

Details of the study design and sample selection must be mentioned.

A subsample area was selected for more intensive monitoring during the trial. The area contained roughly 10% of the study population and selection was based on ease of access to clinics and a paved road in order to facilitate biochemical sample collection and to visit women at birth. We have added this description to the methods section (page 5). We also added some detail about sampling method of the original study in page 5. We added,

"Briefly, the study was conducted in the rural, low-lying Sarlahi District of Nepal. The study area comprises 30 Village Development Communities (VDCs), each divided into 9 administrative wards. Over a study period from July 1994 to June 1997, 17,531 infants were born to women enrolled in the trial. Women were supplemented before, during and after pregnancy throughout the study period. A subsample area was selected for more intensive monitoring during the trial. The area contained roughly 10% of the study population and selection was based on ease of access to clinics and a paved road in order to facilitate biochemical sample collection and to visit women at birth."

Definitions and cut-offs of Obesity/overweight is not correct. Given references are not satisfactory. Asian Indian position statement recommends BMI #23 kg.m-2for overweight and BMI #25 kg.m-2for obesity (Misra et al. 2009).

We have defined overweight as ≥ 23 kg/m^2 and have cited the Misra paper (Page 6) along with the WHO expert committee position statement (Lancet, 2004) in which they have recommended a BMI cut point of 23 as an action point (Public health trigger point) for South Asian people. Instead of calling "general obesity" we used the term "overweight" all through our paper according to the suggestion.

Minor Essential Revisions

Ref. 10 should include access date, last update.

Done

Details of MUAC are needed such as inter and intra variability of measurements and techniques.

Mid-upper arm circumference (MUAC) was measured on the upper left arm at the mid-point of the acromion process and the tip of the olecranon using a standard insertion tape. We have added this more detailed description to the methods (page 7). A random subsample of 101 subjects were revisited to determine intraworker variability of the measurement. The technical error (TEM) of the measurement and intraworker reliability were calculated using the methods described in Ulijaszek SJ and Kerr DA. Anthropometric measurement error and the assessment of nutritional status. British Journal of Nutrition (1999). 82, 165-177. From this, we calculated the %TEM was <1.4% for all workers and the intraworker reliability was >0.99, indicating that there was very low within worker error.

In fact what is the relevance of MUAC with hypertension? (Please provide evidence)

Studies have found a strong correlation between MUAC and BMI, suggesting that MUAC can be used to estimate BMI. From this perspective, we believe that MUAC could be a predictor of cardiovascular risk factors (Hypertension in our study). Indeed, our results suggest (Table 1, 2 and 3) that MUAC was associated both with hypertension and prehypertension in adjusted and unadjusted models. In large population surveys in developing countries, MUAC may prove a useful indicator, when logistical constraints limit the ability to carry scales and stadiometers to remote field settings.
Below are studies and reports that suggest that MUAC and BMI are strongly correlated.

- World Health Organization. Obesity: preventing and managing the Global Epidemic. *Report of a WHO Consultation on Obesity*. Geneva, Switzerland: World Health Organization; 1998.

- Marshall A, Haboubi N, Jones S. Body mass index estimation from waist, neck and midtoarm circumference. Gastrointestinal Nursing. 2011;9(9):37-40.

- Puoane T, Steyn K, Bradshaw D, Laubscher R, Fourie J, Lambert V, Mbananga N. Obesity in South Africa: the South African demographic and health survey. Obes Res. 2002 Oct;10(10):1038-48.

First paragraph in the discussion is repeating some results.

Yes. We have presented a brief summary of what we considered to be the key findings from the results section. We thought that this would be a nice way to tie the results together and provide an introduction to the rest of the discussion section.

Is there any evidence for dietary factors in this population, perhaps they get less salty diet? Or high fruit and vegetable intake?

The dietary patterns in this region of Nepal consist of a rice and lentil-based diet. There is a low intake of meat and other animal source foods and relatively high intake of fruits and vegetables. Unfortunately, we do not have any data on salt intake in this population.

How did you categorized smoking and alcohol consumption? Compared to other regional countries smoking and alcohol prevalence is extremely high in this cohort.

The participants were asked, “Do you smoke cigarettes/bidis” or “Do you drink alcohol”. Those who responded ‘yes” to this questions were categorized as smoker or drinker and those who responded “No” to these questions were categorized as “non smoker” or “non drinker”.

Discretionary Revision

Some similar reference can be removed and limit the number of references.

According to the suggestion, we have removed three similar references:

- Ahmad N, Bhopal R: Burden of non-communicable diseases in South Asia: evidence for epidemic of coronary heart disease in India is weak. BMJ 2004, 328:1499.
- Reddy KK, Rao AP, Reddy TP: Socioeconomic status and the prevalence of coronary heart disease risk factors. Asia Pac J Clin Nutr 2002, 11:98-103.
- Ramachandran A, Snehalatha C, Latha E, Satyavani K, Vijay V: Clustering of cardiovascular risk factors in urban Asian Indians. Diabetes Care 1998, 21:967-971.

Prevalence of Metabolic syndrome can be compared with another regional national level study from Sri Lanka. (Katulanda et al. 2012)

We have read the referenced paper and considered this suggestion. However, we have not focused on the metabolic syndrome prevalence in detail in the discussion section. Therefore, we have decided not to add the new reference.

Level of interest: An article of limited interest

Quality of written English: Acceptable

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests: none

Additional editorial requirement:

(1) Please add the context info of your study within the Background section of the Abstract.

In the abstract we added,
"This paper reports the prevalence and risk factors of hypertension and pre hypertension among adult women in a rural community of Nepal" in page 3

(2) We advise you to seek the assistance of a fluent English speaking colleague, or to have a professional editing service correct your language. Please ensure that particular attention is paid to the abstract.

The second author has (CPS) is a fluent English speaker and has reviewed the manuscript. We have revised minor language and typographical errors throughout.