

## PEER REVIEW HISTORY

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### ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Cardiovascular health knowledge, attitude, and practice/behavior in an urbanizing community of Nepal: a population-based cross-sectional study from Jhaukhel-Duwakot Health Demographic Surveillance Site
<b>AUTHORS</b>	Krettek, Alexandra; Vaidya, Abhinav; Aryal, Umesh Raj

### VERSION 1 - REVIEW

<b>REVIEWER</b>	Dr Yuba Raj Limbu, PhD Consultant cardiologist SG National Heart Centre Kathmandu, Nepal  Competing interests: None
<b>REVIEW RETURNED</b>	20-Apr-2013

<b>THE STUDY</b>	The study aims to address the cardiovascular health KAP in urbanizing community of Nepal, however 70% female participants shows over representation of female population.  Study participants age ranges from 25 to 59 years. Why adults who are less than 25 years or older than 59 years are not included?  Inclusion and exclusion criteria of the study is not clear.
<b>RESULTS &amp; CONCLUSIONS</b>	Demographic profile shows >25% participants are smokers or tobacco consumers, >20% are hypertensives, 3.9% has diabetes, 29.7% has overweight and 9.4% are obese, however KAP on cardiovascular health of these subset of participants is not mentioned because one who is already exposed with cardiovascular risk factor might have better knowledge about cardiovascular health. Despite this, authors have well presented and described the results derived from the given data.
<b>GENERAL COMMENTS</b>	The study is encouraging, however the following study limitations should be described in the discussion. The sample size is smaller. Over representation of female participants. Narrow age range of study participants. Inclusion and exclusion criteria are not clear. Socioeconomic status of the participants/household is not mentioned. Ethnic groups presented in the Table is not the representation of ethnic demography of Nepal

<b>REVIEWER</b>	Gupta, Rajeev Fortis Escorts Hospital, Medicine
<b>REVIEW RETURNED</b>	30-May-2013

**GENERAL COMMENTS**

## General comments:

1. This article addresses an important lacuna in cardiovascular epidemiology in low income countries, especially those in South Asia. This region is the most populous in the world and has the greatest burden of CVD. There is lack of data on knowledge and awareness regarding CVD in this region.
2. The language needs to be improved. There appears discontinuity in the text of the article and the authors have jumbled up the lines at different places. This should be improved.
3. The article format should be more clear in presentation.

## Specific comments:

4. The article summary is too long and should be reduced to 2 points in each sub-heading. You may just focus on two issues here, key messages and strengths and limitations.

## Abstract:

5. Please reduce the length of the abstract.
6. Secondary objectives may be removed.
7. In the results section, first mention that there more women than men (with %), prevalence of CVD risk factors was high (data, %), some data regarding prevalence of various KAP questions should be provided (in %) and then report the correlations. Weak correlations may not be reported here.
8. In conclusion statement, please focus on the present study only. Implications of the study should not be art of the abstract.

## Introduction:

9. The burden of NCD should be derived from the recently published Global Burden of Study (Lancet, Dec 2012). Please revise.
10. Data on prevalence of various NCD lifestyle risk factors are available from the WHO sources as well as GBD study. Please quote those data. Focus on Nepal, rather than all low income countries, is important.
11. The last paragraph should focus on the study question and objective.
12. Reduce the length of the introduction section.

## Methods:

13. Please provide the ethics statement in the first paragraph.
14. The whole sequence of presentation is wrong. A proper sequence could be ethics statement, study site, study population, study tools, interviewers, interview process, data collected, behavioural factors, physical measurements, diagnostic criteria for sub-classification, data management and statistical analyses. The whole section needs revision.
15. More details of the study population selection process should be reported in the second paragraphs.
16. Study tools should be described in greater details. WHO STEPS questionnaire does not assess all the KAP questions. Details of the questionnaire should be appended as appendix to this article.

17. Results:

	<p>18. There are too many subheadings. These should be reduced to (i) demographic and risk factor data, (ii) knowledge assessment, (iii) attitude and practice assessment, and (iv) correlations.</p> <p>19. Too many subgroups (age, ethnicity, education, occupation) are provided in the tables. All should be clubbed into 2 or 3 groups.</p> <p>20. Occupation based classification is difficult in women.</p> <p>21. Most of the correlations are poor and although p values are significant the inferences are not robust. Please reduce the variables assessed and report only the significant variables.</p> <p>22. I would suggest use of a non-parametric test for correlation assessment. Spearman's or Kendall's test should be more appropriate.</p> <p>Discussion:</p> <p>23. The first paragraph should be focussed on the main findings of the study.</p> <p>24. High prevalence of CVD risk factors should be compared to studies in Nepal (hypertension, alcohol and smoking data are available), India, Pakistan and Bangladesh. Maybe use a single source, such as, WHO publication on NCD risk factors.</p> <p>25. Knowledge assessment should compare the present study with low income countries in South Asia and Africa. There is no point comparing the study results with highly developed countries.</p> <p>26. Attitude and practice assessment should be compared to studies in low income countries.</p> <p>27. Socioeconomic variables are important confounders of KAP. This should be discussed in greater details.</p> <p>28. Discussion on gender- and age-related correlates for KAP is also important and should be enhanced.</p> <p>29. There should be a separate section on study limitations.</p>
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### VERSION 1 – AUTHOR RESPONSE

**Dr Yuba Raj Limbu, PhD, Consultant cardiologist, SG National Heart Centre, Kathmandu, Nepal**

We thank the Reviewer for his constructive criticism and comments. Below, we list the Reviewer's concerns in bold, followed by our responses. New text is in italics.

**The study aims to address the cardiovascular health KAP in urbanizing community of Nepal, however 70% female participants shows over representation of female population.**

Females were unintentionally oversampled (72.7%), possibly because they were more accessible during interview time because most were either housewives or farmers. Otherwise, the male:female ratio was 1:1.15 in our study community, similar to the ratio in other parts of Nepal.

There are 2,712 households in the health demographic surveillance site with a total population of 13,669. Among 2,712 households, 840 households were in randomly selected wards. There are 2,068 inhabitants between 25-59 years of age of which 1,033 are female. The table below represents the number of males and females, aged 25-59 years, living in randomly selected wards. These data are also mentioned in the revised manuscript.

In Jhaukhel, the female population was slightly higher than male (see table below) but in Duwakot, the number of males was slightly higher than females in two wards (wards 3 & 5). A majority of the

female population (67%) was involved in housework as housewife and was therefore easily available at home during the survey.

Ward Number	Jhaukhel		
	Male	Female	Sex-ratio
2	113	121	0.933884
3	142	143	0.993007
8	254	263	0.965779
<b>Total</b>	<b>509</b>	<b>527</b>	<b>0.965844</b>
	Duwakot		
	Male	Female	Sex-ratio
2	224	225	0.995556
3	174	171	1.017544
5	128	110	1.163636
<b>Total</b>	<b>526</b>	<b>506</b>	<b>1.039526</b>

We applied the Kish sampling techniques to select household members by applying one of the eight tables. The table suggests selecting the respondents as first oldest male, second next oldest male followed by oldest female and next oldest etc. then we selected respondents accordingly. When number of family members is more than 4, assigned number might be female and the interview was conducted. Therefore, Kish suggests for modifying the tables for special reasons which we did not do. Thus, there is overrepresentation of females (Kish L. Survey sampling. New York: Wiley, 1965).

Another reason for oversampling of females is that enumerators might be biased. All enumerators were female and they might feel more comfortable to take interview with female members of the household though specific instruction on how to conduct interviews were given to enumerators before the survey.

Next, most of the male members were not at home during the survey time even during the second and third visits. We then decided to select any one member who was present at home during the survey time. Although we did have an over-representation of females in our study, we felt that this was a better option than having non-response or unavailability of members.

#### **Study participants age ranges from 25 to 59 years. Why adults who are less than 25 years or older than 59 years are not included?**

Previous studies using the WHO STEPwise approach to chronic disease risk factor surveillance have frequently used the age group 25–64 years. One recent example is from PLoS One. 2011;6(5):e20316 “The burden of selected chronic non-communicable diseases and their risk factors in Malawi: nationwide STEPS survey”.

Thus, we decided to use the same age range as earlier STEPS and WHO-studies. Additionally, life expectancy in Nepal is lower and there are few respondents in our health demographic surveillance site, where the current KAP-study was conducted, that are above 59 years. Our baseline study (Aryal et al. BMC Research Notes 2012;5:489) has revealed that a majority of the population is between 10-30 years of age. The age groups 60-64 and 70-74 years comprise only around 1-2% of the total population our semi-urban study site.

Furthermore, as CVD is a chronic disease that takes years to manifest and also the risk factors to develop their effect, determination of such diseases are usually not done in participants younger than 25 years of age. Additionally, in the WHO Global Health Observatory Data Repository, age-standardized estimates are given as 25+ with age 25 years as a cut-off point for giving estimates and of various risk factor levels for NCDs.

**Inclusion and exclusion criteria of the study is not clear.**

We have conducted a KAP-survey with random sampling in our health demographic surveillance site. There are therefore no formal inclusion and exclusion criteria regarding participants as such, as we surveyed 789 of 840 households in randomly selected six wards of Duwakot and Jhaukhel (non-response rate = 6.07%). After omitting incomplete questionnaires, we included 777 individuals in the analysis. Except for missing recordings for height, weight, or blood pressure, the data reported in our KAP-study cover all 777 respondents. This information was already given in the original version of the submitted manuscript and has been clarified in the revised manuscript.

Methods section, page 6, lines 7-14:

#### *Study population and sample size*

*This study is the first step in the larger HARDIC project that will be conducted in the whole JD-HDSS. Duwakot and Jhaukhel each contain nine administrative wards and we randomly selected three wards from each village. Based on the JD-HDSS 2010 baseline census,<sup>20</sup> we compiled a complete list of households containing adults aged 25-59 years in the selected wards. Next, we selected one adult, of either sex, from all interview households and surveyed 789 of 840 households (non-response rate = 6.07%). We applied the Kish technique to select the respondent.<sup>22</sup>*

Methods section, page 8, lines 4-10:

#### *Data management*

*Supervisors checked all completed questionnaires and, if necessary, asked enumerators to revisit households. After omitting incomplete questionnaires, we included 777 individuals in the analysis. Except for missing recordings for height, weight, or blood pressure, data reported in our KAP-study covers all 777 respondents. We outsourced data entry to a team of data entry operators, public health graduates by qualification. Data was coded and entered in Epidata version 2.1.*

**Demographic profile shows >25% participants are smokers or tobacco consumers, >20% are hypertensives, 3.9% has diabetes, 29.7% has overweight and 9.4% are obese, however KAP on cardiovascular health of these subset of participants is not mentioned because one who is already exposed with cardiovascular risk factor might have better knowledge about cardiovascular health. Despite this, authors have well presented and described the results derived from the given data. The study is encouraging; however the following study limitations should be described in the discussion.**

To directly address the Reviewer's concern, we have added a new paragraph at the end of the Discussion entitled "Study limitations" that covers the issues raised by the Reviewer.

Discussion, page 23, lines 1-9:

#### *Study limitations*

*Females were unintentionally oversampled (72.7%) although the male:female ratio of the study population is 1:1.15.<sup>20</sup> Women were more likely to be available in the households when enumerators visited as most of the females in our study were housewives. The age-range is limited to 25-59 years as the age groups 60-64 and 70-74 years only constitute 1-2% of the total JD-HDSS population. Most of the respondents belonged to the caste/ethnic groups Brahmin, Chhetri, and Newar which are not representative of all caste/ethnic groups in Nepal. Further, respondents' and interviewers' mood as well as place and time of interview may influence the study and a recall bias may occur when questions are asked about history of CVD risk factors.*

- **The sample size is smaller.**

Please refer to our response above for inclusion and exclusion criteria. Sample size has been addressed in the Methods section of the revised manuscript.

- **Over representation of female participants.**

Females were unintentionally oversampled (72.7%), possibly because they were more likely to be available in the households when enumerators visited. This has been addressed in the newly added paragraph "study limitations" as outlined above.

- **Narrow age range of study participants.**

This has been addressed in the newly added paragraph “study limitations” as outlined above. Furthermore, previous studies using the WHO STEPwise approach to chronic disease risk factor surveillance have frequently used the age group 25–59 years. Our baseline study (Aryal et al. BMC Research Notes 2012;5:489) has revealed that a majority of the population is between 10-30 years of age. The age groups 60-64 and 70-74 years are only around 1-2% of the total population in this semi-urban study site.

- **Inclusion and exclusion criteria are not clear.**

Everyone who was selected by random sampling was included in the study. There was no exclusion of participants as such, other than if forms at the end of the field work had not been filled out properly or not all measurements were complete. This is described in the original submission in the Methods as: “we compiled a complete list of households containing adults aged 25-59 years in the selected wards. Next, we selected one adult, of either sex, from all interview households. If a household contained more than one adult, we used the Kish technique to select the respondent” and in the Results as: “We surveyed 789 of 840 households in randomly selected six wards of Duwakot and Jhaukhel (non-response rate = 6.07%). After omitting incomplete questionnaires, we included 777 individuals in the analysis. Except for missing recordings for height, weight, or blood pressure, the data reported here cover all 777 respondents.”

In the revised manuscript, we hope that this has been further clarified in the Methods section by the new subheading “Study population and sample size” and revision of “Data management” as outlined above.

- **Socioeconomic status of the participants/household is not mentioned.**

The KAP-study was conducted in our recently established Health Demographic Surveillance Site in the villages Duwakot and Jhaukhel outside Kathmandu (Aryal et al. BMC Research Notes 2012;5:489). In that first paper establishing the site, we also report on socio-economic classification and therefore did not report it de novo in the submitted manuscript. More than two thirds of the population is economically active and based on education, occupation and income levels attained by heads of the households, 3.5% belonged to lower class, 59.2% belonged to the upper-lower class, 33.4% to lower-middle and 4.1% to upper middle or above. To further clarify this, we added the follow paragraph:

Results, page 9, lines 5-10:

*Demographic characteristics and cardiovascular risk factors*

*Table 1 describes the sex-wise demographic characteristics of the respondents. Seventy percent of all participants were female, and 25% lacked formal education. The median age (IQR) for male and female respondents was 40 (33-49) years and 38 (32-46) years, respectively. Two third of the female respondents were housewives and 3 out of 5 male were either serviceholders or self-employed. We have shown previously that 59.2% belonged to the upper-lower class.<sup>20</sup>*

- **Ethnic groups presented in the Table is not the representation of ethnic demography of Nepal**

According to the 2011 National Census (CBS [Nepal]. National Population and housing census 2011. Kathmandu: National Planning Commission Secretariat; 2012), there are 125 caste/ethnic groups in Nepal. Among them, there are 16.6% Chhetri, 12.2% Brahman-Hill, 7.1% Magar, 6.6% Tharu, 5.8% Tamang, 5.0% Newar, 4.8% Kami, 4.4% Musalman, 4.0% Yadav and 2.3% Rai. The predominant castes in our study site (Jhaukhel and Duwakot) were Newars (36.5%), Chhetris (30.4%) and Brahmins (23.4%); and nearly 97% of the population was Hindu. But in the present study, respondents were 37.8% Brahmin and equal proportions Newars and Chhetris (24.9%). Remaining respondents belonged to other casts. Thus, in revised Table 1, we have defined caste/ethnic group instead of ethnicity.

To also address the concern directly, we have added one sentence in “Study limitations” about caste/ethnicity.

Discussion, page 23, lines 6-7:

*Most of the respondents belonged to the caste/ethnic groups Brahmin, Chhetri, and Newar which are not representative of all caste/ethnic groups in Nepal.*

## Response to Reviewer

**Dr Rajeev Gupta, Fortis Escorts Hospital, Medicine, India**

We thank the Reviewer for his constructive criticism and comments. Below, we list the Reviewer's concerns in bold, followed by our responses. New text is in italics.

### General comments:

**1. This article addresses an important lacuna in cardiovascular epidemiology in low income countries, especially those in South Asia. This region is the most populous in the world and has the greatest burden of CVD. There is lack of data on knowledge and awareness regarding CVD in this region.**

We thank the Reviewer for demonstrating that our work fills an important void in the current knowledge base regarding CVD in South Asia and low-income settings.

**2. The language needs to be improved. There appears discontinuity in the text of the article and the authors have jumbled up the lines at different places. This should be improved.**

Our original submission to *BMJ Open* was edited by our scientific editor, Karen Williams of Kwillis Editing Services, which is located near Boston, MA, USA. We have maintained a longstanding collaboration with Karen for the past 10 years. Karen is a native English speaker with almost 20 years editing experience (among them, 10 years for Harvard Medical School). We therefore believe that we have addressed any concerns in relation to language issues from the outset by always having Karen edit our manuscripts before submission. All our publications to date have been edited by her.

**3. The article format should be more clear in presentation.**

In the revised manuscript, we have tried to balance the journal's requirements for word limit in relation to the Reviewers' suggestions below of additions to certain sections of the manuscript. We hope that we have managed to both follow the guidelines by the journal as well as the Reviewer's comments for a clearer presentation.

### Specific comments:

**4. The article summary is too long and should be reduced to 2 points in each sub-heading. You may just focus on two issues here, key messages and strengths and limitations.**

We have revised the Article summary accordingly.

Article summary, page 4:

*Article focus*

• *We aimed to gain a deeper understanding of knowledge, attitude, and behavior/practice regarding cardiovascular health in a semi-urban community of Nepal, a low-income South Asian country.*

*Key messages*

• *We found a high burden of low physical activity and overweight/obesity; cardiovascular risk factors in our study site exceeded the national average.*

• *Low level of knowledge and attitude towards risk perception combined with poor relation between knowledge, attitude, and behavior scores imply that health promotion strategies that merely increase knowledge of cardiovascular health may be insufficient, thus emphasizing the need for a more holistic approach to disease prevention.*

*Strengths and limitations of the study*

- *This study is the first to extensively explore knowledge, attitude, and behavior/practice regarding cardiovascular health in Nepal and was conducted in a health demographic surveillance site which provides the logistic advantage of further follow-up and intervention.*
- *Using both prompted and unprompted questions in the same study illustrates the variation that may be obtained by these approaches.*
- *Unintentional oversampling of women respondents yielded unsegregated gender-wise results that are more likely to represent knowledge, attitude, and practice/behavior in women.*

## **Abstract:**

### **5. Please reduce the length of the abstract.**

The abstract of 261 words in the original submitted manuscript was below the max limit of 300 words allowed by BMJ Open. In the revised version, we have addressed the concerns by the Reviewer and added results in greater detail and now have 265 words after substantial revision following the Reviewers specific suggestions for the Abstract-section as detailed in the points below. We hope that this is OK as it is still below the word limit but now the abstract contains more details and is better structured.

### **6. Secondary objectives may be removed.**

This section has been removed in the revised Abstract. The revised Abstract now contains the subheadings: *Objectives, Design, Setting, Participants, Results, Conclusions*

### **7. In the results section, first mention that there more women than men (with %), prevalence of CVD risk factors was high (data, %), some data regarding prevalence of various KAP questions should be provided (in %) and then report the correlations. Weak correlations may not be reported here.**

As a direct result of the Reviewers comments, we have substantially rewritten the results of the Abstract.

Abstract, page 2, lines 12-22:

*Results: Seventy percent of all participants were female and 26.9 % lacked formal education. The burden of cardiovascular risk factors was high; 20.1 % were current smokers, 43.3 % exhibited low physical activity, and 21.6 % were hypertensive. Participants showed only poor knowledge of heart disease causes; 29.7 % identified hypertension and 11% overweight and physical activity as causes, whereas only 2.2 % identified high blood sugar as causative. Around 60 % of respondents did not know any heart attack symptoms compared with 20% who knew 2–4 symptoms. Median % scores for knowledge, attitude, and practice/behavior were 79.3, 74.3, and 48.0, respectively. Nearly 44% respondents had insufficient knowledge and less than 20% had highly satisfactory knowledge. Among those with highly satisfactory knowledge, only 14.7% had highly satisfactory attitude and 19.5% and 13.9% had satisfactory and highly satisfactory practices, respectively.*

We agree with the Reviewer that the correlations are not strong. As a direct response to the Reviewer's comments, we applied different methods to measure the relationship between knowledge, attitude and practice. First, we checked the shape of the distribution and found that spontaneous knowledge score was right skewed while the prompt knowledge score was left skewed. But both attitude and practice scores were symmetrically distributed. Thus, Pearson correlation coefficient is not a suitable measure as knowledge score data was skewed and we therefore performed the Spearman's Rank Correlation Coefficient. The values of rank correlation coefficients are also low and negative relationships exist between attitudes and behavior ( $r_s = -0.02$ ,  $p=0.65$ ) and also between attitudes and knowledge ( $r_s = -0.05$ ,  $p=0.14$ ). The knowledge and behavior score is positively correlated ( $r_s = 0.1$ ,  $p=0.01$ ).

We also performed a stratified correlation (sex, age group, caste and education) to determine the relationship between knowledge, attitudes and practice. Again, the correlation was very low and more or less similar as stated above.



Our study states a substantial gap among knowledge, attitudes and practices. A KAP gap occurs when knowledge and favorable attitude do not adapt a practice. There are several factors like social structures and social environments that influence health and health-related behavior of community people. Our findings can be linked with the diffusion of innovation theory which explains that knowledge does not necessarily result in behavior or practice (1). The theory has classified different types of adopters and explains that only 2-3 % of the population applies innovation (or say “knowledge” in our study) into practice and while a majority of the population does not change their behavior unless the benefits are clearly established (1-2). This may be the reason for the low degree of correlation between KAP components.

Correlations describe only the relationship; they do not prove cause and effect. Correlations are necessary, but not a sufficient condition for determining causality. A low degree of correlation cannot be useful for statistical modeling (regression analysis) as it does not explain the amount of effects on the dependent variable (behavior). Thus, we applied the following alternative methods to describe level of knowledge, attitudes and practice:

- Median percentage KAP scores were computed and compared between knowledge, attitude and practice.
  - Total KAP-score was categorized into five groups based on quintile values: ≤20 % ‘highly insufficient’; 21–40 % ‘insufficient’; 41–60 % ‘sufficient’; 61–80 % ‘satisfactory’; >80 % ‘highly satisfactory’. Table 4 explains the percentage distribution of level of knowledge, attitudes and practices. In the table, we have presented the inter-link between levels of knowledge, attitudes and behaviors. For example, we have presented if people have highly insufficient knowledge, then what percentage of them have highly satisfactory practice or attitudes (3). Further, we have compared the level of KAP according to different demographic variables.
1. Rogers EM. Diffusion of innovations. 5th Edition, New York: Free Press; 2010.
  2. Nutbeam Don; Harris E. Wise M. Theory in Nutshell: A practical guide to health promotion theories. 3<sup>rd</sup> edition, Australia : McGraw-Hill Australia Pty Ltd; 2010.
  3. UNICEF. Baseline Survey of the Knowledge, Attitude and Practice (KAP) of Parents/Guardians on Early Childhood Development and Primary Education in Nepal. Lalitpur, Nepal: UNICEF Nepal Country Office; 2009.

**8. In conclusion statement, please focus on the present study only. Implications of the study should not be part of the abstract.**

Our revised manuscript rephrases the Abstract’s conclusion to make it more clear and concise and we have omitted the final sentence “Tailoring health promotion activities to our findings might improve public health literacy for cardiovascular disease.” as suggested given that it is an implication of our study.

Abstract, page 2, lines 23-25:

*Conclusions: Our study demonstrates a gap between cardiovascular health knowledge, attitude, and practice/behavior in a semi-urban community in a low-income nation, even among those already affected by CVD.*

**Introduction:**

**9. The burden of NCD should be derived from the recently published Global Burden of Study (Lancet, Dec 2012). Please revise.**

As a direct consequence of the Reviewer’s suggestion, we have added new text in the Introduction that includes data from the Global Burden of Disease Study.

Introduction, page 4, lines 2-11:

*Noncommunicable diseases (NCDs) pose increasingly important public health problems in low- and middle-income countries (LMICs). In 2008, 80% of global NCD deaths occurred in LMICs,<sup>1</sup> and NCDs recently accounted for 7.9 million of 14.5 million deaths (54%) in Southeast Asia<sup>2</sup> and were responsible for two of every three deaths (34.5 million) worldwide in 2010.<sup>3</sup> Poverty, illiteracy, poor health infrastructure, and demographic transition, including increasing life*

expectancy, are major contributors to rising burden of NCDs in LMICs. Other postulated causes include poor fetal and childhood nutrition.<sup>4,5</sup> A similar pattern is evident in South Asian countries like Nepal, where NCDs currently occur more frequently than communicable diseases and behavioral risk factors such as tobacco smoking are high.<sup>6</sup> Globally, cardiovascular diseases (CVDs) are responsible for one in four deaths (12.9 million).<sup>3</sup>

**10. Data on prevalence of various NCD lifestyle risk factors are available from the WHO sources as well as GBD study. Please quote those data. Focus on Nepal, rather than all low income countries, is important.**

The Introduction is meant as a background and platform for our current study and to motivate and explain why it is important to focus on CVD health literacy and investigate KAP in our setting. The examples provided are there to show what has been done overall and what is lacking in the context of Nepal in terms of knowledge, attitude, and practice/behavior which is directly relevant for the current study.

To address the Reviewer's concern, we have added information from the online WHO Global Health Observatory Data Repository for Nepal in the revised manuscript to demonstrate some of the major risk factors for CVD and their levels in 2009.

Introduction, page 5, lines 1-7:

*Earlier studies report low level of knowledge about heart attack<sup>16</sup> and diabetes symptoms in Nepal<sup>17</sup> Nepal's high prevalence of underlying behavioral risk factors, particularly tobacco and alcohol consumption, and poor cardiovascular health knowledge is a matter of concern.<sup>18</sup> Nationwide in Nepal, the age group 25+ exhibits fasting blood glucose of 5.5 mmol/L for males and 5.4 mmol/L for females, systolic blood pressure of 125.9 mmHg and 126.6 mmHg for males and females respectively, and total cholesterol of 4.1 mmol/L (males) and 4.3 mmol/L (females).<sup>19</sup>*

**11. The last paragraph should focus on the study question and objective.** The last paragraph has been revised according to the Reviewers suggestions.

Introduction, page 5, lines 8-18:

*Currently, attempts to improve cardiovascular health knowledge and behavior in Nepal focus mainly on campaigns that transmit information but pay little attention to the population's actual health literacy. We therefore undertook a community-based KAP study in the Jhaukhel-Duwakot Health-Demographic Surveillance Site (JD-HDSS) outside Kathmandu where NCDs, particularly CVDs, are the predominant cause of morbidity and mortality.<sup>20</sup> Additionally, our pilot study in the Duwakot population demonstrated poor cardiovascular health knowledge.<sup>21</sup> Our study is part of the Heart-Health Associated Research and Dissemination in the Community (HARDIC) project, which is the cardiovascular health component of JD-HDSS. In Nepalese, hardic means "heartily" or "from the heart". This paper reports the baseline results from HARDIC and is the first to conduct a detailed analysis of cardiovascular health knowledge, attitude, and practice/behavior in an urbanizing community of Nepal.*

**12. Reduce the length of the introduction section.**

After revising the Introduction in response to the Reviewer's comments which has included removing text for the benefit of adding more background info, the revised Introduction has approximately the same length as in the original submission. We feel that it contributes a comprehensive platform for our study and find it challenging to cut it down further. Please advise if you would like it even shorter.

**Methods:**

**13. Please provide the ethics statement in the first paragraph.**

The Ethics-section has been moved and is now the first paragraph under the main heading "Methods" in the revised manuscript.

**14. The whole sequence of presentation is wrong. A proper sequence could be ethics statement, study site, study population, study tools, interviewers, interview process, data collected, behavioural factors, physical measurements, diagnostic criteria for sub-classification, data management and statistical analyses. The whole section needs revision.**

We have substantially revised the Methods according to the Reviewer's suggestions and restructured its content. It now has the following new order of headings and subheadings which we hope will make it easier for Readers to follow our methodological procedure:

*METHODS*

*Ethical considerations*

*Study site*

*Study population and sample size*

*Study tools*

*Interviewers*

*Data Collection*

*Interview process*

*Behavioral factors*

*Physical measurements*

*Diagnostic criteria for sub-classification*

*Data management*

*Statistical analyses*

**15. More details of the study population selection process should be reported in the second paragraphs.**

We are not sure how much more info that is required as the original submission of our manuscript already gives precise info on sampling methods, selection etc: "Duwakot and Jhaukhel each contain nine administrative wards. We randomly selected three wards from each village. Based on the JD-HDSS 2010 baseline census, we compiled a complete list of households containing adults aged 25-59 years in the selected wards. Next, we selected one adult, of either sex, from all interview households. If a household contained more than one adult, we used the Kish technique to select the respondent." We have added a subheading called Study population and sample size" in the revised manuscript. Please advise if there is anything particular the Reviewer feels is still missing and we will adjust accordingly.

Methods section, page 6, lines 7-14:

*Study population and sample size*

*This study is the first step in the larger HARDIC project that will be conducted in the whole JD-HDSS. Duwakot and Jhaukhel each contain nine administrative wards and we randomly selected three wards from each village. Based on the JD-HDSS 2010 baseline census,<sup>20</sup> we compiled a complete list of households containing adults aged 25-59 years in the selected wards. Next, we selected one adult, of either sex, from all interview households and surveyed 789 of 840 households (non-response rate = 6.07%). We applied the Kish technique to select the respondent.<sup>22</sup>*

**16. Study tools should be described in greater details. WHO STEPS questionnaire does not assess all the KAP questions. Details of the questionnaire should be appended as appendix to this article.**

We have added an appendix to our resubmission that details the "Score system for knowledge, attitude and practice/behavior questions" that we used in our study. Additionally we have added text in the revised manuscript that gives more details on the procedure.

Methods, page 6, lines 16-21:

*Study tools*

*We structured the basic questionnaire and tailored it for site specific responses in Nepal using the WHO-NCD STEPS (STEP 1 and 2 questionnaires) for demographic information, behavioral and*

*physical measurements 23 and other sources for addressing knowledge, attitude and practice/behavior issues 15, 24-39. Responses to questions on cardiovascular health knowledge, attitude and practice/behavior were given scores in order to compare and correlate the components. A detailed description of the scoring system is given as an appendix to this article.*

## **Results:**

**18. There are too many subheadings. These should be reduced to (i) demographic and risk factor data, (ii) knowledge assessment, (iii) attitude and practice assessment, and (iv) correlations.**

We fully agree with the Reviewer and have modified the Result section accordingly by removing redundant information and adding new variables. The revised Result section has the following headings and subheadings:

*Demographic characteristics and cardiovascular risk factors*

*Knowledge towards cardiovascular disease*

*Knowledge regarding causes and warning signs of heart disease*

*Knowledge on action in case of a heart attack*

*Knowledge on healthy foods for heart diseases*

*Attitudes and practice towards cardiovascular disease*

*Attitude toward heart health in an urbanizing community*

*Practice towards heart diseases*

*Comparison between level of knowledge, attitude and behavior/practice*

**19. Too many subgroups (age, ethnicity, education, occupation) are provided in the tables. All should be clubbed into 2 or 3 groups.**

As a direct response to the Reviewer's concern, we have revised all tables and in condensed form now only highlight critical findings without subgroups. Important data are presented according to sex in three tables and one bar diagram. This is one of the limitations of the tables. We applied chi-square test to compare proportion difference between males and females and reported p-values. We have not presented data according to age, caste, education and occupation as few sub-categories are statistically different, but wherever essential we have mentioned it in the text with supportive data. Table 4 (see comment for query #7) represents overall results and presents data in matrix form having five categories.

**20. Occupation based classification is difficult in women.**

We have slightly modified occupation as defined in the "Non-Communicable Diseases Survey 2007" where occupation is classified as: government employee; non-government employee; self-employed, non-paid; student; homemaker; retired; and unemployed (able to work) (Ministry of Health and Population [Nepal]: WHO STEPS Surveillance: Non communicable disease risk factors survey. Kathmandu: Ministry of Health and Population; 2008). We modified and classified the major occupation in the local context as service (both government and non-government); self-employed; agriculture; housewife (female who is involved in housework); unemployment (able or unable to work); student and non –paid workers. We did not find any respondents who were students during the study period. Most likely, because most of the respondents were 25 years and above and are involved in paid work.

In the study site, a majority of women (67%) were involved only in their own household work like cooking, cleaning and taking care of family members and children which means responsibilities where payment has no value. Thus, such women were classified as housewives. Remaining women were involved in paid jobs like service, self-employed etc. In the survey, we only requested respondents to provide information on their major occupation and did not collect information on potential secondary occupation. Therefore the Reviewer might find some difficulty in the classification of occupation in women. In revised Table 1, we have tried to clearly define the occupation in women.

**21. Most of the correlations are poor and although p values are significant the inferences are not robust. Please reduce the variables assessed and report only the significant variables.**

**22. I would suggest use of a non-parametric test for correlation assessment. Spearman's or Kendall's test should be more appropriate.**

Please see our detailed response for these two comments after Reviewer's concern #7 above.

**Discussion:**

**23. The first paragraph should be focused on the main findings of the study.**

We have attempted to avoid repeating the Results again and thus the Discussion in the revised manuscript begins with the statement "The present study is the first to conduct a detailed analysis of the relationship between KAP/health literacy and cardiovascular health in a semi-urban setting near Kathmandu". We then continue discussing each of our main issues as separate subheadings and hope that this makes for an enhanced reading experience and clear presentation:

*Cardiovascular risk factors are abundant in the study population*

*Knowledge of cardiovascular health is limited*

*Inappropriate attitude toward cardiovascular health*

*Attempts for better cardiovascular health practice/behavior*

*Influence of gender*

*Effect of other socio-demographic variables on KAP*

*Prompted vs. unprompted responses*

*Comparison between levels of knowledge, attitude, and practice towards cardiovascular disease*

**24. High prevalence of CVD risk factors should be compared to studies in Nepal (hypertension, alcohol and smoking data are available), India, Pakistan and Bangladesh. Maybe use a single source, such as, WHO publication on NCD risk factors.**

To directly address the Reviewers concerns, we have added new text in the Discussion under the subheading "Cardiovascular risk factors are abundant in the study population". Numbers have been obtained from the WHO-database "Global Health Observatory Data Repository/World Health Statistics: Risk factors".

Discussion, pages 18-19, lines 21-27 and 1-2, respectively:

*Our respondents showed a high burden of behavioral and biological risk factors. While the prevalence of tobacco smoking was similar to the national average, the alcohol consumption was lower.<sup>42</sup> National figures on tobacco smoking and alcohol consumption for Bangladesh, Nepal, India and Pakistan show that current smoking of any tobacco product (age-standardized rate, both sexes) is 24%, 32%, 15% and 20%, respectively.<sup>19</sup> The total adult (recorded and unrecorded) per capita consumption of pure alcohol according to WHO-available projected estimates for 2008 indicates that consumption in Bangladesh, Nepal, India and Pakistan is 0.17, 2.42, 2.69, 0.05 litres of pure alcohol, respectively, over a calendar year.<sup>19</sup> Numbers have been increasing in these countries over the last years.<sup>19</sup>*

Discussion, page 19, lines 7-9:

*The 2008 national reported age-standardized level of hypertension in Nepal is similar to levels in Bangladesh but lower than in Pakistan (38.6% and 39.5%, respectively) and higher than in India (35.2%).<sup>44</sup>*

**25. Knowledge assessment should compare the present study with low income countries in South Asia and Africa. There is no point comparing the study results with highly developed countries.**

**26. Attitude and practice assessment should be compared to studies in low income countries.**

Already in the original manuscript, we tried whenever possible to use references that are relevant to the context we used for our study. In the lack thereof, we also used references that describe for

example methodological issues with KAP-assessment in other populations, even if those are from developed countries. This was done as we feel that it demonstrates the challenge of making such determinations and the methodological trustworthiness of, for example, prompted- and unprompted answers. To address the Reviewer's concern, the revised manuscript has been expanded in the Discussion, for example in the "Influence of gender" section, with several references that are relevant to our context.

**27. Socioeconomic variables are important confounders of KAP. This should be discussed in greater details.**

In the revised manuscript on page 21 the "Effect of other socio-demographic variables on KAP" is discussed in a separate section of the Discussion. We have maintained the length as it is and not expanded that section as Reviewers have also commented that the Discussion should not be too long which has posed a challenge when simultaneously aiming to address the Reviewer's concerns.

**28. Discussion on gender- and age-related correlates for KAP is also important and should be enhanced.**

We agree that these are important issues. Given our study limitations as listed in the revised Discussion (see also comment #29 below) it is difficult to make too many generalizations relating to either gender or age. While we have used gender- and age-stratification when possible in the Results, these data should be interpreted in the context of the current study which has oversampled women and has a limited span in terms of age as most of the respondents in our study site are in the range of 25-59 years and the age groups 60-64 and 70-74 years represent only around 1-2% of the total population. To address the Reviewer's concern, we have modified the paragraph on "Influence of gender" in the Discussion and added more references that relate to gender and KAP.

Discussion, page 21, lines 7-17:

*Although females were unintentionally oversampled, our analysis includes a gender-wise stratification and we present data separately whenever we observed marked gender differences. In our study, more men than women smoked tobacco or drank alcohol. The prevalence of hypertension and self-reported diabetes was similar in both groups. On the other hand, low physical activity and obesity were higher in the women. Although men had better knowledge of heart disease, their attitude was similar to those reported by women. However, more women than men strongly agreed that their health was ultimately determined by God or a higher power. Female gender is usually significantly related to good knowledge of cardiovascular disease.<sup>52</sup> One major factor for the gender discrepancy in our study is that more women (33.2%) than men (11.8%) lacked formal education, which in itself is alarming. In fact, illiteracy is one of the main risk factors along with behavioral factors in rural/urban Asian Indian women.<sup>53</sup>*

**29. There should be a separate section on study limitations.**

We fully agree with the Reviewer and have addressed the Reviewer's concern by adding a separate section with its own heading at the end of the Discussion in the revised manuscript.

Discussion, page 23, lines 1-9:

*Study limitations*

*Females were unintentionally oversampled (72.7%) although the male:female ratio of the study population is 1:1.15.<sup>20</sup> Women were more likely to be available in the households when enumerators visited as most of the females in our study were housewives. The age-range is limited to 25-59 years as the age groups 60-64 and 70-74 years only constitute 1-2% of the total JD-HDSS population. Most of the respondents belonged to the caste/ethnic groups Brahmin, Chhetri, and Newar which are not representative of all caste/ethnic groups in Nepal. Further, respondents' and interviewers' mood as well as place and time of interview may influence the study and a recall bias may occur when questions are asked about history of CVD risk factors.*

## VERSION 2 – REVIEW

<b>REVIEWER</b>	Limbu, Yuba SG National Heart Centre, Kathmandu
<b>REVIEW RETURNED</b>	02-Oct-2013

<b>GENERAL COMMENTS</b>	After revision of manuscript; bmjopen-2013-002976.R1- Cardiovascular health knowledge, attitude, and practice/behavior in an urbanizing community of Nepal: a population-based cross sectional study from Jhaukhel-Duwakot Health Demographic Surveillance Site, my opinion is that the manuscript is acceptable for the publication consideration.
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<b>REVIEWER</b>	Dr Rajeev Gupta Department of Medicine I declare that I have no conflict of interest relevant to this article.
<b>REVIEW RETURNED</b>	15-Aug-2013

- The reviewer completed the checklist but made no further comments.