Author's response to reviews

Title: The prevalence of underweight, overweight, obesity and associated risk factors among school-going adolescents in seven African countries

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Author's response to reviews: see over
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Editorial Board, BMC Public Health

RE: Resubmission of “The prevalence of underweight, overweight, obesity and associated risk factors among school-going adolescents in seven African countries” manuscript for review by BMC Public Health.

We would like to resubmit the above-named paper to BMC Public Health. We have revised the manuscript in order to address the comments provided by the reviewers. Most of the revisions were minor clarifications and grammar changes. One significant change is the addition of an analysis examining whether the risk factors examined had heterogeneous effects across the countries examined. Other significant additions are an additional graph and table that were requested by the reviewers. We have attached our responses to the reviewer comments to this letter as requested.

We have added to the ethics section as requested by the editor. We added two references to the survey documentation from the WHO about the availability of the data for public use and the protocol for doing so. We hope this will satisfy the editor’s request for more information on the ethics. Our research ethics board at the University of Manitoba considers publically available, such as these, to be exempt from their approval due to them being in the public domain (see the following link for some details: http://umanitoba.ca/faculties/medicine/ethics/2085.html). These types of public data are covered under the somewhat vague description of the bottom part of that link if the data were acquired from an ethically cleared project. As a WHO project, the GSHS will have been cleared by the WHO ethics committee, in collaboration with the local government, before it was conducted. I hope this information satisfies your requirement.

All authors contributed to the project and can take responsibility for its contents. We have no conflicts of interest to declare.

I will function as the corresponding author and can be reached at the address below or by e-mail (Jason_Randall@cpe.umanitoba.ca). Thank you in advance for your consideration of this submission.

If there are any further requirements, please do not hesitate to contact me.

Respectfully submitted,

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Response to reviewers

Reviewer's report

Title: The prevalence of underweight, overweight, obesity and associated risk factors among school-going adolescents in seven African countries

Version: 2 Date: 3 January 2014

Reviewer: Haleama Al Sabbah

Reviewer's report:

Major Compulsory Revisions

- Abstract

1- Add the sample size, age groups and the percentages by sex

Sample size, age groups and percentages by sex added to abstract. (n=23496; 11-16+ year olds; 53.6% male).

2- The method should be re-written in more professional and scientific way

Please refer to comments below.

3- Add the software name and version used to analyze the data

Software added to both abstract and main document (Stata).

4- The level of significance and confidence interval

Alpha = 0.05 and 95% CI. Added to abstract

5- The criteria used to classify the students weight status

Added to abstract and main document (WHO BMI- for-age) using standard deviations from reference median.

6- Introduction

The first three lines of the last paragraph (the purpose of the study) should complete the previous paragraph (The significance of this study), while the rest of the paragraph should be revised and moved under the measures in the method section. “This survey collects self reported data on school going children to assess key behavioral risk and protective factors [34]. Unlike adults, Body Mass Index (BMI) cut offs for different weight status in children and adolescents vary with........etc”.

This point is noted and corrected as suggested. Some references were added to the introduction in order to give scientific backing for the risk factors identified in the analysis.
- Methods

1- Language used in each country and is the questionnaire reliable and valid in all countries and for all ages of the target groups? This needs more explanation.

The language used for each country was the language of class instruction; English, French, or Arabic. The questionnaires was developed jointly by the WHO and CDC and has good face validity. The questionnaire was pilot tested to examine whether there would be issued in understanding and answering the questions by the various groups of students. The questions are also very similar to commonly asked questions in large North American survey. However we cannot find any specific statistics on the validity and reliability of the GSHS in the targeted countries. There is one study, already mentioned in the limitations section, which assessed the reliability of the measure in another setting.

We’ve added information about the language of administration to the survey.

2- What is the percentage of non-respondents? And the students who refused to participate in this study? The provided website didn't provide enough information and there is contradictory information regarding the age group? It mentioned that in the GSHS the target group was from 13-17 years old and not from 11-16?

The response rate varied between 85% and 100% for schools and 73% and 98% for students.

This information has been added to the article.

The data on response rate is contained in the country fact sheets on the website.

You are correct that the target age for students was 13-17 and this has been corrected.

This error has been corrected in the article.

3- Statistical analysis

There is a critical problem in writing this section and needs to be written in more scientific way. The first paragraph is too long and not clear The statistical analysis didn't mention which software they used to analyze the data? The statistical test? The significance and the confidence interval? How did the students Parental consent obtained? Needs more details-

We’ve added the software into the methods section. I’ve also included information on the statistical test used and the confidence intervals and significance level used. The first paragraph has been broken up into two paragraphs and some additional detail has been added to clarify the analysis.

We cannot find any specific details about how parental consent was obtained. Protocols for the study mention that a letter or permission form was sent to a parents prior to the survey being conducted but the GSHS documentation is a bit sparse in this area.

Results
1- **The number and percentage of students for each age group and sex should be included**

The average age and SD, and the gender proportion were provided by country in Table 2. I have changed the age data to be by group rather than as a mean. Percent that identified as Male is also provided in a table.

2- **The titles for tables are not complete and missing some information e.g: the prevalence and the confidence interval?**

We've added more to the subheadings in the tables to better describe the statistics being depicted.

**Minor Essential Revisions**

- **Abstract**

1- **The Abstract is too long, the background needs to be shorter**

Although the abstract is still within the word limit for this journal (350 words), this point was addressed by making the background shorter. The sample size (n=23,496) and the percentage of males (53.6%) added as suggested.

2- **The confounding factors that have been controlled when analyzing the data**

These have been added to the abstract.

3- **The conclusion: As the main objective of this study was to understand the associated risk factors for obesity, overweight and underweight and the study found no significant associations from the available data, then what is the recommendation? What other factors still need to be investigated?**

An addition on recommendations was added, for the need to have prospective longitudinal studies; looking at other factors such as early life exposures, genetics, etc. Additionally, a suggestion was added recommending to perhaps having questions on the GSHS that specifically address differences in regional lifestyles, culture and diets.

- **Introduction**

1- **In the second paragraph of the introduction “…..In Africa, the estimated prevalence of childhood overweight or obesity increased from 4% in 1990 to 7% in 2011...”**

Do you mean “overweight and obesity” combined? If it’s overweight or obesity then what is the percentage each?

For the most part, there is paucity of recent and accurate estimates of overweight or obesity in Africa. In this instance the referenced study identifies overweight alone prevalence to have increased 4-7%. An earlier study estimated the rates to be 8.4% and 1.9% for combined and obesity alone respectively. This information was added to the introduction section in our manuscript.
Methods

1- The method section should be started by the study design, the settings and then the population and sampling.

A sentence on the study design was added to the start of the methods section.

2- Under the sample “...aged 11-16 in these countries...” add “years old” after 16

This change has been made.

3- Under the methods- sample, the data has been collected during four years period and not at the same time as mentioned: “A total of 25815 students were surveyed in these countries between 2006 and 2010”, this will make the comparison too difficult, As cross-sectional should be conducted at the same point of time in order to be able to assess the prevalence rate, during four years period a lot of changes can happen? This needs more clarifications and explanation.

Each countries survey was done over the period of a few months. However the year of survey administration varied by country. While there is some potential for prevalence to change over time, it seems unlikely that there would be enough change over a 4 year period to warrant concern for the results of this analysis.

4- There is no need for table 1, just need to mention the main measures and how did you code each of them under the measures.

We feel the table is more effective at conveying this information clearly and without devoting a substantial portion of text. If the editor/journal would prefer a textual description we can accommodate this request.

Results

1- It’s not clear puberty has been controlled which affect the adolescents weight status

Weight status uses age and gender-specific cut-offs.

2- Problem in analyzing the data and mixing all age groups and both males and females in the analysis overweight was more prevalent among younger (#12) adolescents and decreased with age 10-12 years is the period of puberty for girls

Age and gender were entered into the regression model as categorical variables. This should control for the effect of age, and by extension the occurrence of puberty. The adjusted prevalence of the weight statuses was age-standardized to remove the effect of different age distributions among the countries.

Reviewer’s report

Title: The prevalence of underweight, overweight, obesity and associated risk factors among school-going adolescents in seven African countries
This study examines the prevalences of underweight, overweight, and obesity. Moreover, the study examines determinants of underweight, overweight and obesity. The study design is cross-sectional and variables are derived from a representative school-based survey among 11-16 year olds in seven African countries. The authors state, that this is the first study assessing and comparing rates of both underweight, overweight and obesity among young school-aged children in African countries. It is an important public health issue to monitor prevalence of weight status in the developing world, and examine potential risk factors, and the topic of this paper is therefore of relevance for a public health journal. However, there are a number of issues that need to be addressed before I will recommend publication of this manuscript. Underneath I have given my comments for the authors to consider.

Major Compulsory revisions:

Abstract

• Please add the age-range for the population sample.

Sample size, age groups and percentages by sex added to abstract. (n=23496; 11-16 year olds; 53.6% male).

• Please state the method for categorizing weight status (WHO growth reference).

This has been added to abstract and main document (WHO BMI-for-age) using standard deviations from reference median.

• You state that obesity rates are relatively low. I don’t agree with this. I find an obesity rate near 10 very high and suggest that you omit “relatively low” from this sentence.

Point noted and corrected. The reference to “relatively low” has been removed.

Introduction

• The last section from “this survey collects..... to the end of introduction should be removed to the Methods section – you may incorporate this section into your Measures and response coding section.

This point is noted and was corrected as suggested.

• You have to make scientific justification of the risk factors you choose to examine in you analyses. Please find relevant references for each risk factor.
Some references were added to the introduction in order to give scientific backing for the risk factors identified in the analyses.

Methods

Sample:

• The authors state that, “A total of 25815 students were surveyed in these countries between 2006 and 2010”. I suggest that you specify that this number refers to the seven African countries in your study.

This change has been made.

• I suggest that you inform readers about the drop-outs from this survey, such as; how many of the invited schools that chose to participate. This is important information when considering the validity of your results.

The response rate varied between 85% and 100% for schools and 73% and 98% for students. I’ve added this information to the article.

Measures and response coding:

• In the sentence: “Height and weight were used to code individuals as being underweight, overweight or normal weight, rather than using the variables included in the GSHS datasets.” I don’t understand what the variables included in dataset are. I suggest that you omit that since calculating BMI from height and weight is the right way to do it anyway.

This change has been made.

• You list potential risk factors for the tree weight status’. However, I suggest that you consider incorporating socio-economic status since this is a very strong predictor of weight status.

Unfortunately there is no measure for SES in these data.

Statistical analysis:

• Why not present an obesity graph?

This has been added.

• Please include what statistical software you used.

This has been added
• In the sentence: “Logistic regression reporting odds ratios (ORs) was used to determine the relationship between potential risk/causal factors and being over/under-weight or obese”. I suggest that you omit the word causal. Since this a cross-sectional study, no conclusion on causality can be made.

This has been changed as suggested.

Results

Sample:

• I suggest that you present the distribution of the risk factors in a table to make it transparent to the readers how large the proportions are.

We have added the proportions requested in a new table (Table 2 in current version).

• In the sentence “Average age varied significantly from 13.2 in Egypt to 15.2 in Benin” I suggest that you omit the word “significantly”, since you are not presenting any testing of significance for differences.

This change has been made.

Adjusted rates of underweight, overweight and obesity

• I suggest that you start this paragraph by this sentence instead: “Due to variations in age and sex among the countries, age-adjusted prevalences of being underweight, overweight, and obese stratified by sex is presented for each country in Table 3”. And then list up the different results.

Change “Obese” to obesity” in table 3. And state what the numbers in parentheses indicate.

These changes have been made.

• In the sentence: “Females have a slightly higher prevalence of being overweight for every age group in four of the countries, exceptions being Egypt and Malawi”.

You must mean five countries and not four. Next, I suggest that you omit the word “slightly”. At least in Mauritania and Ghana the female overweight rate is much greater than the male.

Yes, this has been corrected.

• Obesity: I think it is wrong to state that rates are close to zero. That goes for only 2-4 estimates.

That sentence has been removed.

• In the text for graph 1; again, I would delete the word “slightly”

This word has been deleted.

• I miss a graph for obesity. Why have this not been presented?
We’ve added a graph for obesity.

Risk factors for unhealthy weight

- In the analysis, you have to use a multilevel model to take into account the possible large differences in associations between countries.

Using multilevel regression is not suggested when there are so few categories in the highest level. 10 clusters is considered the minimum needed, though some statistics recommend having at least 20. Having too few clusters makes the variance parameter unstable.

We do agree that exploring the impact of community level factors on underweight, overweight and obesity will be interesting. However, the focus of the present study is to investigate the individual level factors and how they relate to the outcome variables. In our estimation and consistent with our consultation with experienced Statisticians, adding a multilevel model will change the focus of the present data although it is unlikely to change the present estimates nor the conclusions reached. For this reason we have maintain the present analysis.

However, in order to assess the occurrence of heterogeneous effects across the countries we added an additional analysis. We created interaction variables between country and the risk factors. We then tested the heterogeneity of the associations among the countries, using a post-estimation Wald test, after running the logistic regression. For most factors there was no heterogeneity detected. However the instances where heterogeneity appears to be occurring are now described in a new section of the results.

- Generally, I find the analyses unclear. I would be a great help to see all prevalences (also categories of the risk factors) in a table, for each country separately. It seems that the countries are so different from each other that it must be made explicit to the reader how the risk factors and associations to weight status are for each country.

We have added a table that breaks down the proportion of risk factors found in each country. We feel like we have addressed the issue of different associations with risk factors by testing for heterogeneity of effects as mentioned in the previous comment above. Presenting a table with every combination of country and risk factor would turn into a wall of text. This would lead to difficulty seeing the big picture and would also lead to a severe issue with Type I errors, due to the sheer number of combinations that would occur.

Discussion

- Overall, I miss a discussion of the difference between countries – some are north-African and with high obesity rates – others are from the more central part of Africa. You may find very different associations between risk factors and weight status between these countries.

A section was added discussing our results which show a tendency for a north to south gradient in prevalence rates with the north having higher rates. The discussion was further discussed in the context
of heterogeneous results in our risk factors suggesting differences in factors at play regionally. Additionally, previous literature suggests the possibility of culture, diet and nutrition transition as possible causes of the differences.

• You state that other factors than the given risk factors that you have examined may contribute to weight status. E.g. genetics or early exposures are of very large importance and cannot be measured, so in order to understand mechanisms behind weight development we also need large prospective and longitudinal studies.

An addition on recommendations was made: the need to have prospective longitudinal studies; looking at other factors such as early life exposures, genetics, etc. Additionally, a suggestion was added recommending to perhaps having questions on the GSHS that specifically address differences in regional lifestyles, culture and diets.