Author's response to reviews

Title: Prevalence of thinness in children and adolescents in the Seychelles: comparison of two international growth references

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Author's response to reviews: see over
Response to the Reviewers (paper MS: 1134054800491522 - Prevalence of thinness in children and adolescents in the Seychelles: comparison of two international growth references)

We thank the reviewers for their comments. Answers to their queries appear below. We provide two versions of the MS: i) one version in tracking mode to show what has been revised and edited and ii) a version where all changes have been integrated.

Response to Reviewer 1

Reviewer: Maria Alice de Assis

Major Compulsory Revisions

ABSTRACT

1) Results: Please rephrase lines 2-3 to correct the information “The prevalence of the thinness categories tended to change according to age.” According to the results presented by authors, using the IS reference the prevalence of the thinness categories tended to change according to age for both sexes. Using the WHO reference this trend is confirmed only for girls.

We have reformulated the sentence as suggested by the Reviewer

2) Conclusion: I suggest delete the last phrase “Universal cut-offs...thinness categories”, as this statement cannot be concluded with the analysis and results of the present article. This phrase sounds like a suggestion not as a conclusion.

We agree with the Reviewer. This sentence was meant to put the findings in a broader perspective. This information appears in the discussion and has been deleted from the abstract.

METHODS AND POPULATION

3) The most important concern refers to the statistical methods used: to compare the prevalence of thinness using the WHO and IS references I suggest a concordance test, for example the kappa statistic. To evaluate the differences in prevalence between the categories of thinness, with the use of the different references, by chi square test or ICs, does not mean that the same children were classified in one of the categories using the two international references. So it is not possible to conclude that there were no differences between certain categories of thinness using the statistical tests described in this article.

We thank the Reviewer to raise this important issue but we respectfully disagree in some details with the Reviewer. The concern of the Reviewer would be valid if thinness was defined, for example, as weight for age (and sex) in one reference and BMI for age (and sex) in another reference. Because the IS and WHO definitions are based on the very same dimension, i.e. BMI by sex and age, a same prevalence of a thinness category along both the IS reference and the WHO reference necessarily implies that the same children are classified as thin for both references along the considered thinness category. Inversely, when the prevalence along IS or WHO differs, say prevalence is 5% with IS and 8% with WHO, this necessarily means that 5% of the same children are thin along both IS and WHO and an additional 3% are thin along the WHO reference. This is well apparent in the Figures. In this respect, a kappa statistic does not add much information, unlike for dimensions that are made of several indicators. For example, if we had compared different definition of the metabolic syndrome,
say ATP III and IDF, different children would be classified as having MS with each definition and a concordance statistic (such as kappa) would be useful.

4) Do the authors take into account the fact that the same child may have had an examination at different time points across 1998 and 2004?

Indeed a proportion of all children have been seen two times since children can be seen every 3-4 years along the surveillance system. We have added that “Because surveys take place every year in four grades and a same child can be seen at intervals of 3-4 years, observations among 33,340 children during 9 years correspond to observations in 19,764 different children”.

5) Last paragraph: In the results section (Figures 3 and 4) the authors commented the differences in prevalence of thinness using IS and WHO references. This description is lacking in the Methods section. Please, describe the statistical analysis used to access the differences in prevalence of thinness using IS and WHO references, across genders and ages.

No statistical test was used for estimating differences between prevalence along IS and WHO references. In our study, we have data on the entire population (of children) of the country. Hence, it is not a random sample of this population and estimates of variance cannot be determined in this situation. Furthermore, multiple testing (if we had random samples of the population) would be a problem because of the multitude of tests needed to assess for differences in all thinness categories in all age categories. Furthermore, testing for differences for categories with low or very low prevalence, which correspond to the lowest values of BMI, can be particularly sensitive to measurement errors in a few readings (misreporting, error in readings of height or weight) and differences in such instances should be taken with caution. Hence, we believe that the best analysis in the case of our study is to assess the overall patterns in these prevalences along sex and age. If our study and other studies in other populations consistently suggest specific differences, further studies should investigate these differences along specific hypothesis and an ad hoc pre-specified analysis plan.

6) If the authors choose to present the Figures 1 and 2 (whose figures I suggest to delete from the article), please describe why and how these figures are important to the article in the methods section.

We believe that these figures are useful. Our paper has no a priori hypothesis about what difference is expected between the two references as few previous data are available. The two figures show to the readers how the IS and WHO references classify thinness categories along sex and age in the population of Seychelles. The apparent patterns (e.g. difference along age) can inform specific hypothesis for future studies.

7) Please insert indications of the software used for data entering and statistical analyses, and the adopted level of statistical significance.

We have added in the MS that we used Stata 10 and reported 95% confidence intervals. See also our response to the point 5 above.

RESULTS

8) Third paragraph: It is not clear how the Figures 1 and 2 help to understand the findings of the article. I suggest delete these figures. If the authors chose to present these figure, please provide explanations in the methods section and appropriate comments in the results and discussion sections.
We believe that Figures 1 and 2 are useful for the reasons indicated on point 6 above.

9) Fourth paragraph: The authors state that “...no marked difference was observed with the second (6.7% vs. 21.4%) and third (1.2% vs. 2.0%) thinness categories with either cut-offs.” Please rephrase as the ICs are showing differences in the prevalence accessed by the IS and WHO references in the third thinness categories for girls, which influenced the differences showed for the total population (Table 2). Rephrase also the last line of the paragraph as the readers could see the ICs showing differences between sexes.

We have rephrased these sentences along the Reviewer suggestions.

DISCUSSION

10) The discussion section does not address adequately the objective and the results of the article. Firstly, the objective of the study is to compare the prevalence of three categories of thinness with the use of two international references, so the authors need to focus the discussion according to the objective.

We make the point that the two references (IS and WHO) gather, overall, fairly similar prevalences, particularly for second and third thinness categories.

11) Secondly, the application of an appropriate statistical method that allows for comparisons of agreement between the two references (e.g. the kappa statistic) could enrich the discussion.

As mentioned in point 5, we had no a priori hypothesis. The data are mostly descriptive. Furthermore, as mentioned in point 5, our data refer to the entire population and statistical tests may not to be informative in this case. Furthermore, as mentioned in Point 3 above, the kappa statistic would not have brought further insight in the interpretation of the data.

12) Thirdly, the authors need to discuss further the findings of the study, comparing the results with those of other African countries. I suggest to search studies in PUBMED showing the prevalence of thinness using at least one of the two references used in the present article. Besides the comparison or the reporting the findings of studies in other African countries, there is the possibility of making comparisons with studies in other developing countries.

As mentioned in the paper, we performed this analysis at the first place because there are very few data comparing these two references in populations of children and adolescents worldwide, and none in Africa to the best of our knowledge and after thorough review of all the literature published on this issue. Reasons for the scarcity of data was that the references have been published just a few years ago and also, perhaps, because emphasis on under-nutrition most often focuses on younger children (infants and children of preschool age).

13) First paragraph: I suggest to delete the paragraph because the first six lines repeated the description of IS and WHO references (described in the methods section). The remaining lines of this paragraph repeat the results described in the results section. An important question that was not evident in the discussion section (neither in the results section) refers to the high prevalence of thinness grade 1 using both references. I suggest discuss the findings and contextualizing its occurrence in a country in epidemiological transition, where undernutrition coexists with obesity (compare, for example the prevalence of thinness grade 1 with the prevalence of overweight found in Seychelles). I consider very important to discuss the differences found for the prevalence of grade 1 thinness between the IS and WHO: what could it mean for a public health service in Seychelles that uses both references and the need to do a screening of children classified as thinness? Does the
The present study presented data to conclude about the quality of the references used or further studies should be conducted to make recommendations (e.g., diagnostic criteria for BMI, using anthropometric measurements as reference or gold standard to access thinness such as skinfolds, DEXA, etc.).

The aim of our study was to compare how the prevalence of thinness categories differs according to IS or WHO reference and the first paragraph does state the main findings of the study that there is, overall little difference between these two references. We discuss later in the discussion that reference cut-offs such as IS or WHO thinness categories (based on statistical methods) are not necessarily related to clinical criteria. We also mention that no study has yet assessed the clinical significance of these thinness categories. Although this issue, i.e., how the thinness categories “predict” health outcomes, is not an aim of the paper, we mention that further studies are needed to address this key issue. Normative data allow comparing findings across population but do not tell about health outcomes in these populations. Hence, a first step is to compare how different reference data perform in populations (which we did in the Seychelles children and adolescents) and another distinct question will be to assess what this means (but this is another story), which will need prospective designs. These points are explicit from the discussion.

14) Finally, the question of the clinical value of the categories of thinness should be discussed in the context of the results found. The authors describe the issue of clinical value in general, without making the connection with the results.

Again, as mentioned in point 13 above, this study does not (and cannot) conclude or even suggest the clinical relevance of normative data, which would need prospective data. To date there are no prospective data linking the IS or WHO thinness categories in children and adolescents with health outcomes.

TABLES AND FIGURES

15) Table 1 – Please delete the last column referred to Overweight (including obesity) as it is not the objective of the article.

Table 1 provides some characteristics of the population under study. Although we do not infer on the significance of thinness categories (for reasons stated above) in our paper, it is important for readers to acknowledge that our findings on the prevalence of thinness categories in this study occur while the prevalence of overweight is high. We believe that this information is important to keep in mind when interpreting data. It will remain to see what would be the prevalence of thinness categories according to IS and WHO references in other populations where the prevalence of overweight is much lower (particularly in Africa). While mean BMI is commonly related to the prevalence of overweight in populations, it is not clear from the literature whether the mean BMI in a population also relates to the prevalence of thinness.

16) Table 2 – Please insert indications of the statistical test to access differences in prevalence of thinness.

Results are provided with 95 confidence intervals (as mentioned in the method section). Data come from the whole population (of children and adolescents) for which tests based on variance in the sample may not be informative (since our data do not come from a random sample from that population, but from the entire population) (see our response to point 5 above).

17) Figures 1 and 2 – Please delete these figures or clarify the importance in methods, results and discussion methods.
We believe that these figures provide important information for the reasons mentioned under point 8 above.

18) What the study adds. First phrase needs to be rephrased as readers could see differences when the ICs are interpreted.

We have rephrased the sentence.

19) Second phrase: rephrase adding … using IS references for both sexes, but only for girls, using the WHO references.

We thank the Reviewer for this suggestion and we have rephrased the sentence accordingly.

20) Last phrase: I suggest delete this phrase, as it sounds like a recommendation. This statement was not found with the analysis and results of the article.

We agree with the Reviewer that this statement is not a finding of our study. We believe however that this sentence is very important to remind readers, particularly those not too familiar with reference data, that they do not imply health outcomes. In other words, whatever the prevalence of thinness categories in this population, no inference can be made on the health status of this population. We made this point explicit in the discussion.

Minor Essential Revisions

ABSTRACT

Background: OK.

21) Methods: Please delete the first phrase which is repeated in the fourth line. In order to clarify, please rephrase the statement “as part of an annual national school-based survey, in 1998-2004”.

We have reworded the abstract to take into account the remarks of the Reviewer.

22) Conclusion: I suggest begin this topic focusing the comments on the high prevalence of thinness grade 1 using both references, and outlining the differences found between the references, then comment on findings about thinness grades 2 and 3.

We have reworded the conclusion according to the Reviewer’s comments.

BACKGROUND

23) The relevance of the article was outlined. In the third paragraph I suggest include comments and references about the problem of child undernutrition in African countries, because this is a real and still problem in Africa.

We have mentioned that under nutrition is a major public health problem in many countries in the first sentence of this section including an overall reference. However it is difficult to provide more information on the problem of undernutrition since no study has assessed longitudinally the (normative) thinness categories under study with health outcomes in children and adolescents. We have added a sentence to state that undernutrition is no longer considered a major problem in Seychelles, in contrast to the situation in many other countries in the region. This is indeed important because data in Seychelles may not necessarily represent the overall situation in Africa.
RESULTS

24) Second paragraph: I suggest delete the last column of Table 1, which is showing the prevalence of overweight (including obesity), because this is not the focus of the study. If the authors choose to keep the data in this column, they should write comments in the discussion section of the article; for example, comparing the prevalence of overweight (including obesity) with the prevalence of grade 1 thinness, and contextualizing similar findings in other countries with similar socioeconomic characteristics.

As mentioned in point 15, we think it is important to mention the overall high prevalence of overweight in children (Table 1) as a general characteristic of the population under study in order to contextualize our findings on thinness (i.e. the prevalence of thinness occurs in a country with a massive problem of overweight) and, in particular, to provide evidence that the situation in Seychelles, with regard to body weight, may be different as compared to other countries in the region.

25) Fifth paragraph: Figures 3 and 4 are not suitable for the purpose of the article (“comparison of two international growth references). I suggest that Figure 3 shows the prevalence of the categories of thinness for girls, using both references. Similarly, Figure 4 should show the prevalence of the categories of thinness for boys. It seems that authors presented results based on virtual interpretation of the figures 3 and 4, comparing the absolute prevalence without any statistical method. I suggest present these results based on statistic methods, for example, the construction of different graphs with the inclusion of the ICs in bars (or something else). The last phrase should be rephrased, because readers would see that differences occur for girls, using the WHO references.

As we have mentioned above, we believe that figures 3 and 4 are useful to show the actual distribution of BMI and how are thinness categories defined according to IS and WHO. These figures also illustrate, as we mentioned above, that prevalence for categories based on extreme (low) values is very sensitive to any outliers (whether real or erroneously reported/measured).

DISCUSSION

26) Second paragraph is also not in line with the results of the article, I suggest delete or rewrite the paragraph.

We have deleted the paragraph.

27) Last paragraph: I suggest rewriting the last sentence, since to compare the prevalence between populations is important to consider ethnic differences that might influence the categories of thinness, when using the BMI as an indicator.

We thank the Reviewer for this remark and we have reworded the sentence according to the Reviewer’s suggestion.

CONCLUSION

28) In the first line, I suggest to include comments on the high prevalence of thinness grade 1, using both references, and the differences between them, as well.

We have reworded the text according to the Reviewer’s comment.
Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Response to Reviewer 2

Reviewer: Mariano M Giachhi

- The question posed by the Authors is new and well defined;
- the methods are not well described, so that are not sufficient to replicate the work; it is necessary to describe the statistical analysis used, because it is without any support the affirmations as "marked" at page 6 paragraph 3 row 4 and "markedly" at page 6 paragraph 3 row 6, and so on;
- data are supposed to be sound and controlled because already published;
- generally graphics and tables adhere to the relevant standard with marginal error: i.e. in the table 1 the script 5.5 _+ 0.4 is better signed as 5.5 (0.4);
- Conclusion is too short compared with the discussion;
- the title and the abstract accurately convey what has been found
- the writing is acceptable

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report

1) We thank the Reviewer for her statement that “the question of this study is new and well defined”. As mentioned in the text, and in support to the Reviewer’s statement, most studies in children and adolescents (i.e. at an age above infancy) focus on overweight and little information is available on thinness in populations. Furthermore the question on thinness is new as the two standards to assess thinness in this study have been developed only a few years ago and considering that only very few studies have yet compared these two standards in populations. Hence, there is a need for studies like ours to examine how these new thinness standards perform in diverse populations.

2) Methods are not well described.

We had kept the methods section intentionally concise in view of keeping the text as short as possible. Furthermore, we believe that information provided was sufficient to allow replication of the study in other settings with respect to sampling, definition of thinness categories and underlying analysis of prevalence given in the paper. Following the reviewer’s suggestion we have further elaborated on some aspects of the methods and of the analysis performed in the revised version.

3) Notation in Table 1.

We have modified the table as suggested by the Reviewer.

4) Conclusion is too short compared to the discussion

We thank the Reviewer for her suggestion and we have extended the discussion to better reflect the main issues addressed in the discussion, also in agreement with remarks by Reviewer 1 on the same issue.
**Response to Reviewer 3**

Reviewer: Paula Ravasco

This manuscript in this form, does not add any pertinent or new knowledge.

1) **We respectfully disagree with the Reviewer. We would expect that dismissing a paper under the pretext that data are not new should be accompanied with appropriate evidence (and references) on other work that has addressed the question under study.**

   *As me mention in the paper, very few studies have addressed the question under study and none in the African region.*

   *Most studies on weight status in children and adolescents have focused on overweight and very little information is available on thinness in populations at the age considered in the study (5-17 years).*

   *The question on thinness is necessarily new because the two standards used to assess thinness in this study have been developed only a few years ago and therefore only very few studies have yet compared these two standards in populations. Hence, there is a need for studies like ours to examine how these new thinness standards perform in diverse populations. Several authors if this paper have extensive experience in anthropometric data and one co-author (Dr Bloessner) is a prominent expert in this field and has been working for many years (and still is) in the unit at WHO that deals with nutrition and anthropometric data in children, including development of the new reference on thinness.*

   *Of note both Reviewer 1 and Reviewer 2 mention that the study is of important in its field and Reviewer 2 states that “the question of this study is new and well defined”.*

   *Also, we have added a sentence stating that “It is interesting to note that no study defining thinness using the new IS or WHO cut offs was included in a recent review of 369 studies from76 different countries that examined the nutritional status of school aged children, including thinness (Food Nutr Bull. 2010;31:400-17). This further stresses the need for studies assessing the performance of the IS and WHO cut-offs for thinness in populations”.*

**Level of interest:** Reject as not of sufficient priority to merit publishing in this journal

**Quality of written English:** Not suitable for publication unless extensively edited

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:** I have no competing interests.