PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Double burden of malnutrition among Indian school children and its measurement: A cross-sectional study in a single school Short title: Measuring double burden of malnutrition
AUTHORS	Daga, Subhashchandra; Mhatre, Sameer; Kasbe, Abhiram; DSouza, Eric

VERSION 1 – REVIEW

REVIEWER	Reviewer name: Dr Rachel Hilliam Institution and Country: The Open University Competing interests: None
REVIEW RETURNED	27-Apr-2019

GENERAL COMMENTS	I found the topic of this paper very interesting and I'm sure it is an area where others would welcome the additional insights which this study brings. However I have some concerns about the statistics in this paper. I would suggest that authors go and talk to a statistician about appropriate ways to both analyse the data collected and understand way some of the techniques that have been used are not appropriate for this particular data set. z-scores measure how many standard deviations the value (be that the MUAC or BMI) is from the reference. This means that the z-score is essentially normalised and the variability with the cohort has been taken into account. This means carrying out a two sample test on the z-scores makes little sense. Any two sample test, be that parametric or as is the case here non-parametric, essentially tests to see if the difference between the two groups is due to the variability between the groups rather than the variability within the group. By calculating the z-scores you have already accounted for the variability. I am also concerned about the use of ANOVA in the supplementary material, tables 1 and 2. The one-way ANOVA is looking for evidence to reject the null hypothesis that the BMI or MUAC is the same across all the age categories. It is inevitable that it will differ in at least one category given the number of categories that you have. This is not an appropriate test in this situation. In Table 3 you have used Pearson correlation. Again I'm not sure this is appropriate since Pearson test for a linear relationship. Would you expect the relationship with BMI etc to be linear? Tables 5 & 6 are not well presented. Perhaps a histogram would be better in this instance. A chi-square test is not appropriate for the data in tables 5 & 6 of the supplementary material as some of the cells have small observed

	counts for this test to be valid. You will either need to combine the categories (if this makes clinical sense) or carry out a different test. The data set is large and therefore it should be relatively straight forward with the help of a statistician to analyse this data more robustly. Once this is done it will be an interesting addition to the literature.

REVIEWER	Reviewer name: Collins John Institution and Country: University of Jos Nigeria Competing interests: None
REVIEW RETURNED	04-May-2019

GENERAL COMMENTS	Thank you for asking me to review the paper titled “Double burden of malnutrition among Indian school children” Efforts are commendable. However I have some concerns. Title: This suggests simply a narrative of the double burden of malnutrition among the population selected. However, the abstract and main content indicates that the authors desire to check or assess the utility of MUAC in determination of nutritional status beyond undernutrition. This is not captured in the title or the short title. Abstract 1. Page 3, line 45 subtitle intervention or measurements? Is anthropometric measurements here been referred to as an intervention? Change the subtitle to measurements 2. Some statements appear incomplete in page 4, line 6 ….MUAC were identified the three groups.. Which groups are referred to? No prior reference to any three groups 3. Result Please clarify page 4, line 34. Why were absolute figures for MUAC rather than percents reported here as was for BMI? 4. Conclusion Page 4, Line 49 …MUAC were significantly correlated… There is no result in the abstract to back this conclusion Main paper Page 10, line 35….which anthro variable did MUAC positively correlate with? Table 1 Use of Mann-Whitney test. This test assumes that the distribution is not normal. Is this applicable for height and weight in your study? Clarify how 2.44E-07 is significant Table 5 Cumulative percentage not necessary but if you must use it, the row 3 should be 4.0% and not 3.9%. Same applies in row 5 etc Also in table 6 Table 7 Are the values reported in the same population? Do you mean that the 136 children with pre-obese are the same as the 135 with MUAC z-score in pre-obese state? Table 1 How many table 1 do you have? Page 33 What does this table represent? What is been compared? There is no incremental rise in IQR or mean BMI. Each age has unique IQR and BMI Table 3

	Why are ages in years not uniformly arranged? Same in table 4

VERSION 1 – AUTHOR RESPONSE

1. Z-scores measure how many standard deviations the value (be that the MUAC or BMI) is from the reference. This means that the z-score is essentially normalized and the variability with the cohort has been taken into account. This means carrying out a two sample test on the z-scores makes little sense. Any two sample test, be that parametric or as is the case here non-parametric, essentially tests to see if the difference between the two groups is due to the variability between the groups rather than the variability within the group. By calculating the z-scores you have already accounted for the variability.

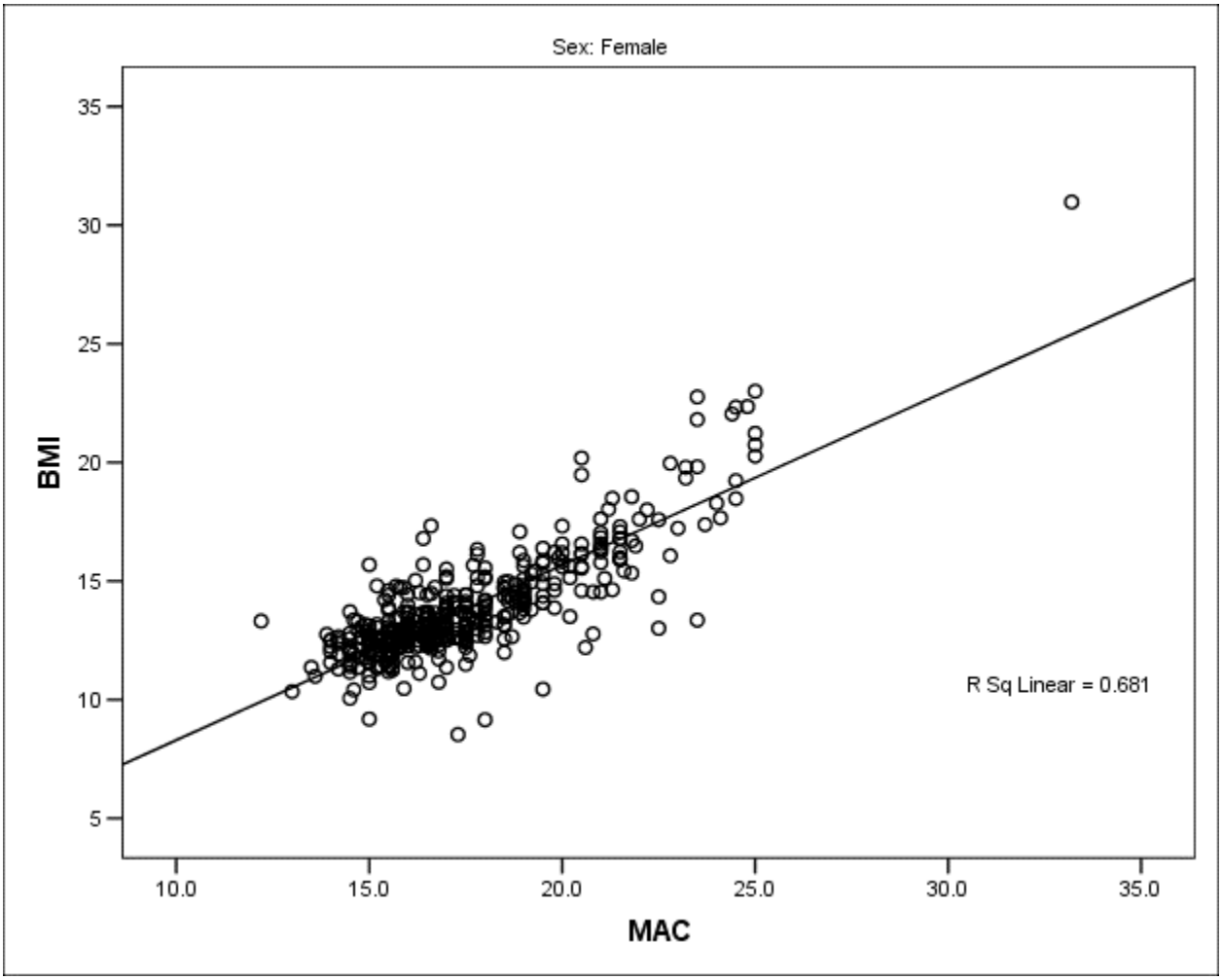
   The authors agree. The z-score comparisons are removed.

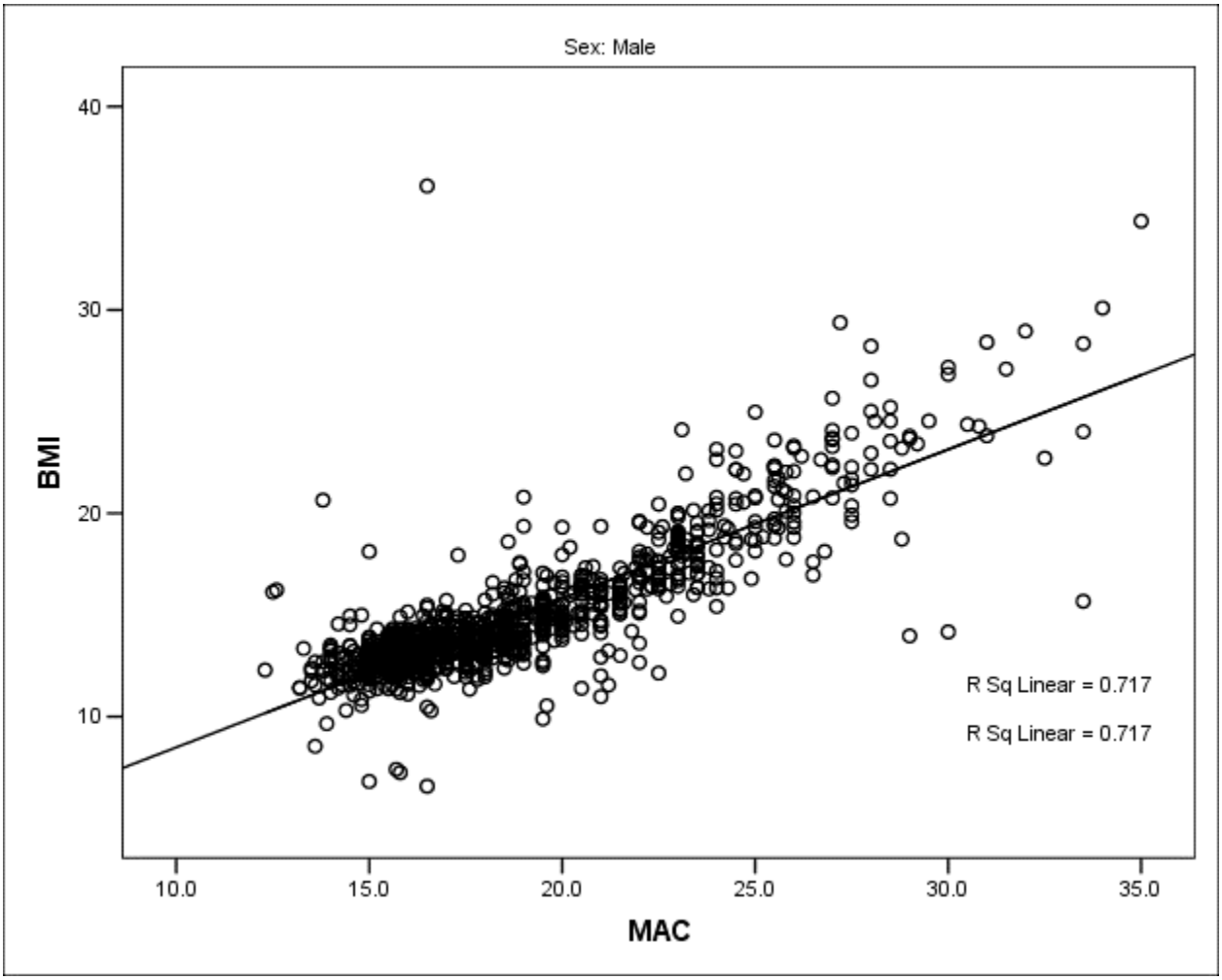
2. I am also concerned about the use of ANOVA in the supplementary material, tables 1 and 2. The one-way ANOVA is looking for evidence to reject the null hypothesis that the BMI or MUAC is the same across all the age categories. It is inevitable that it will differ in at least one category given the number of categories that you have. This is not an appropriate test in this situation.

   The authors agree. However, the tables were created for getting insight into homogeneous subsets within the age-range and not to reject the null hypothesis. 14 sub-categories of age are an inappropriate number for ANOVA. Hence, Post Hoc tests, too were not represented in the material.

3. In Table 3 you have used Pearson correlation. Again I'm not sure this is appropriate since Pearson test for a linear relationship. Would you expect the relationship with BMI etc to be linear?

   Linearity between MUAC and BMI, separately among girls and boys, was visually assessed using scatter plot and, it appeared to be linear. Only after this assessment, Pearson's Correlation was applied. Scatter plots are presented here-


Sex: Female
BMI
MAC
R Sq Linear = 0.681
35
30
25
20
15
10
5
10.0
15.0
20.0
25.0
30.0
35.0



4. Tables 5 & 6 are not well presented. Perhaps a histogram would be better in this instance. The Authors agree.

   Histogram is added.

5. A chi-square test is not appropriate for the data in tables 5 & 6 of the supplementary material as some of the cells have small observed counts for this test to be valid. You will either need to combine the categories (if this makes clinical sense) or carry out a different test.

   Chi-Square test was applied to pooled data. The original Chi-Square table was forwarded by mistake. The error is rectified.

Prof. Collins John (Reviewer 2)

1. Title: This suggests simply a narrative of the double burden of malnutrition among the population selected. However, the abstract and main content indicates that the authors

desire to check or assess the utility of MUAC in determination of nutritional status beyond undernutrition. This is not captured in the title or the short title.

The title is changed.

2. Abstract
   1. Page 3, line 45 subtitle intervention or measurements? Is anthropometric measurements here been referred to as an intervention? Change the subtitle to measurements.

The subtitle is changed.

3. Some statements appear incomplete in page 4, line 6
   ….MUAC were identified the three groups..
   Which groups are referred to? No prior reference to any three groups.

   Now, the earlier sentence refers to three groups.

4. Result
   Please clarify page 4, line 34. Why were absolute figures for MUAC rather than percents reported here as was for BMI?

   Correction made.

5. Conclusion
   Page 4, Line 49
   …MUAC were significantly correlated…
   There is no result in the abstract to back this conclusion.

   Changes made to make the point.

6. Main paper
   Page 10, line 35….which anthro variable did MUAC positively correlate with? MUAC positively correlated with weight, height and BMI in girls and boys (Table 3 and 4).

7. Use of Mann-Whitney test.
   This test assumes that the distribution is not normal. Is this applicable for height and weight in your study?

8. Shapiro-Wilk test for normality showed data to be non-normal. Hence Mann-Whitney test was applied.

9. Clarify how 2.44E-07 is significant.

10. 2.44E-07 is nothing but 2.44 X 10 raised to power of -07. Thus, its 0.000000244, which is less than 0.05. Hence it is significant.

11. Table 5.
    Cumulative percentage not necessary but if you must use it, the row 3 should be 4.0% and not 3.9%. Same applies in row 5 etc Also in table 6.

    Cumulative percentage is deleted.

9. Table 7
    Are the values reported in the same population? Do you mean that the 136 children with pre-obese are the same as the 135 with MUAC z-score in pre-obese state?

10. Yes. Unlike other categories, the divergence was not much.

11. Table 1
    How many table 1 do you have? Page 33
    What does this table represent? What is been compared?
    There is no incremental rise in IQR or mean BMI. Each age has unique IQR and BMI.

12. The tables in the manuscript and the supplementary file are serially numbered and the anomaly is removed.

13. Table 3
    why are ages in years not uniformly arranged? Same in table 4.

    Ages were arranged on basis of homogeneous subsets by the software to make it easy to know the subsets. Hence, ages were not uniformly arranged.

VERSION 2 – REVIEW

REVIEWER	Reviewer name: Rachel Hilliam Institution and Country: The Open University Competing interests: None
REVIEW RETURNED	15-Oct-2019

GENERAL COMMENTS	This paper is much improved and is an interesting read. I still have a couple of places where the statistics are not clear and even potentially not correct. It would be helpful in Tables 7&8 to highlight which rows represent the different definitions, eg MAM etc, this would help the reader significantly. However I am slightly concerned about these tables as some of the cells have a low observed count, this means that the chi-squared test is not appropriate. It appears that the rows have been combined to compute the p-values, but the resulting table is not given, therefore it is not possible to tell if rows that are in different clinical categories eg MAM and SAM have been combined to compute this statistic. Either the tables should be presented without any chi-square analysis or it should be clear what the analysis has been performed on. Also relating to those tables in the results section you state that

	"MAUC was positively correlated with weight,..." and refer to tables 7 & 8. These tables show association (from the chi-squared) not correlation. I think you want to refer to Tables 1 & 2. You should be careful interpreting the p-values for pearson correlation when you sample is large. It is the correlation coefficient that tells you how well the variables are correlated here, not the value of the p-value. For example the correlation coefficient in table 1 is 0.385, quite a small positive correlation, however the p-value is appox zero. If you do not understand the reasons for this you need to talk to a statistician. A minor point is that figures 1 & 2 who the distribution of the z-scores and not the distribution of the the variables, BMI etc. This is not a problem but it should be made clear in the second sentence of the results section that it is the distribution of the z-scores. Thank you for the resubmission

VERSION 2 – AUTHOR RESPONSE

Please find the revision where the tables are cited in the text and are placed where they are cited.