Author's response to reviews

Title: Algorithms for converting estimates of child malnutrition based on the NCHS reference into estimates based on the WHO Child Growth Standards

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Author's response to reviews: see over
Dear Editor,

MS: 9484443961644377

We are pleased to resubmit a revised version of the manuscript "Algorithms for converting estimates of child malnutrition based on the NCHS reference into estimates based on the WHO Child Growth Standards", together with a point-by-point response to the reviewers' comments.

We look forward to hearing from you.

Sincerely,

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Response to the reviewers' comments:

Reviewer: Jana Vignerova

This reviewer states that she has no comments on the algorithms and presentation of the present manuscript.

The point raised regarding the high prevalence of underweight at age 0-6 months and its potential impact on breastfeeding is not the focus of the present paper. This aspect was documented in a paper we published in 2006 in *Public Health Nutrition* (cited in the present manuscript as ref #6) comparing estimates of malnutrition based on the new WHO standards and the old NCHS reference. The earlier paper included a figure (Fig. 2) that contained the information the reviewer is suggesting be added to this paper, i.e., using data from one country to demonstrate the difference in the estimates of underweight between the WHO and NCHS curves, with a breakdown by age groups. Since this aspect of the growth standards was presented and discussed in the earlier paper and is not the focus of the present manuscript, we do not feel any revision in this regard is warranted.
Reviewer: Michelle Lampl

1. Clarification of how the present study overcomes the barriers encountered in a similar report in 2006

The paper published in 2006 (cited as ref #6) and the present manuscript are significantly different. The 2006 paper used data from three samples to document the differences in the rates of malnutrition based on the WHO standards and the NCHS reference, and it discussed their implications for child health programmes. The present manuscript provides algorithms with which to convert global estimates of child malnutrition based on the NCHS reference to those based on the new WHO standards. These algorithms have been developed for application where raw data are not available (which is the case for many surveys conducted prior to 1980) to produce comparable estimates of trends in child malnutrition.

The “impossible barriers” mentioned by the reviewer were overcome by the large amount of empirical information (i.e., more than 250 national/regional prevalence estimates) from which the current algorithms were derived. These data were not available in 2006 when the earlier paper was published given the time it took to reanalyze this large number of datasets. In addition, the empirical approach to these “barriers” was validated in the current manuscript.

2. Statistical rigor

2a. The 95% CI not containing the ‘0’ is equivalent to statistical significance at the 5% level. Nevertheless, as suggested, we have reworded the last sentence of para 3 to read: “As shown in Table 1, among all the parameter estimates of the model, only the intercept from the wasting algorithm is not significant; the others, intercepts and slopes, are all significant at the 5% level, with their 95% CIs not including ‘0’.”

Also, the reviewer mentions that there is an implication in the abstract that all variables were significant. We did not find such implication.

2b. Any judgment of the observed scatter plots is highly subjective. Alternative non-linear models could be fitted and their fitness could be compared to the current linear models by using some statistical criteria such as AIC or BIC. However, such non-linear models are likely to be more sensitive (and therefore less robust) to the data sample given (e.g., a few outliers will be more influential compared to the linear model). Furthermore, more than 90% (R-square) of the variability was explained by the current simple linear models, with high predictability indicated by their validations having an average difference (observed vs. predicted) of less than 0.5%! We do not feel that more sophisticated models offer much, if any, improvement over these results. This was also demonstrated in a previous paper by de Onis et al., 1998 (ref #11). Therefore, for the sake of simplicity and robustness, we prefer the simple linear regression models on the logit scale. Finally, as a bonus, the odds ratios could also be approximated based on these simple models.

3c. We feel that the 95% CIs are more informative than p-values, in terms of the effect of magnitude and its precision; and the p-values are a bit redundant. However, consistent with the reviewer's comment we have added a footnote to Table 1 indicating the parameter estimates with p-values < 0.05.
3. Writing: As suggested by the reviewer, the first paragraph of the manuscript has been rewritten.

II. Minor essentials that may benefit the reader

1 and 2. The discussion already includes a number of sentences (see the penultimate paragraph) describing the results presented in Table 3. Following the reviewer's suggestion, we have completed the original text with the following sentence: "For stunting, this difference is almost negligible given that stunting rates are above 20% in most developing countries.".