Reviewer’s report

Title: Severely malnourished children with a low weight-for-height have a higher mortality than those with a low mid-upper-arm-circumference: I. Empirical data demonstrates Simpson's paradox

Version: 1 Date: 20 Dec 2017

Reviewer: Geraldine Lo Siou

Reviewer's report:

Manuscript I

The reviewer would like to see a flowchart of the study design. The reviewer understands that data used in this manuscripts come from three sources (IPFs, OTPs, and SFCs). However it will be helpful to know the details.

For examples, the number of children who were re-classified as SAM and abstracted from the SFC database (Line 166), or the number of children who were excluded (e.g., did not meet at least one of the criteria for SAM (Lines 177-179), errors of recording (Lines 179-181), children from SFC who were recorded as being transferred to an OTP or IPF if the data from the receiving treatment facility were available (Lines 202-204), children from OTP who were recorded as being transferred to an IPF if the corresponding IPF data were available (Lines 204-205)), or the number of children who were transferred to other facilities from IPF (Line 206). These are just examples, please provide all necessary details so the reviewer can have a clear picture of the study design.

Lines 166-167: Please confirm that all three datasets (IPFs, OTPs, and SFCs) are independent to each other.

Line 187: Please add the number of children who were assigned an age according to their height.
Line 191-192: Please add the number of children who were assigned a sex at random.

Line 230: The reviewer would like to know the reason why the authors used the Marascuilo procedure to adjust for multiple comparisons as opposed to using False Discovery Rate (FDR)-controlling procedures? In addition, the assumption of the Chi-square test is that the expected value in each cell is greater than 5. Please confirm that this assumption was always met each time Chi-square tests were conducted.

Table 2: The totals number of children in "all patients aged 6 to 60m" for the 7 diagnostic categories do not match with the total number of children in Table S1. For example, in Table 2, there are 7191 children in M-muac; whereas in Table S1, there are 8860 in M-muac. Please provide an explanation as to why the n are different in both tables.

Tables 3a and 3b: In order to fully interpret the results in these tables, it is important to complement the p-value results with the following:
- Effect sizes for chi-square test (e.g., Cramer's V)
- 95% confidence intervals (some -but not all- 95% confidence intervals were presented in Figures 1, 2 and 3)
- Numeric values for p-values ≥0.05 (as opposed to 'ns')

Table 5: Minor typo in last footnote: did the authors meant "Criterion Y identifies more deaths than criterion X, but when the children with both criteria are included criterion X appears to have higher case fatality rate" instead of "Criterion Y identifies more deaths than criterion X, but when the children with both criteria are included criterion Y appears to have higher case fatality rate" (as currently written in manuscript).
Table S1: Only 4 diagnostic categories (M-muac, M-whz, M-Both, Kwash) are presented in Table S1. The reviewer would like to know why the other 3 diagnostic categories (K-muac, K-whz, K-Both) are not presented.

Figure 3: The reviewer does not understand what the Y-axis in Figure 3 represents. For example, according to Table 2, the RR for M-whz (all patients, 6 to 60m) is 2.6 and the odd ratio should be 2.61; however in figure 3, it seems the red bar (All) for M-whz is showing 4? Please explain what the Y-axis represents in Figure 3.

Manuscript II

Lines 115-118: The reviewer is confused as to whether the groups S-muac, S-whz, S-Both are mutually exclusive or not?

Line 123: The reviewer would like to know the reason why the authors used the Marascuilo procedure to adjust for multiple comparisons as opposed to using False Discovery Rate (FDR)-controlling procedures?

Lines 123-124: The reviewer would like to know whether it was possible to conduct Fisher's Exact tests in the case where there were fewer than 5 children in any expected category.
Tables 2 and 3: In order to fully interpret the results in these tables, it is important to complement the p-value results with the following:

- Effect sizes for chi-square test (e.g., Cramer's V)
- 95% confidence intervals (some -but not all- 95% confidence intervals were presented in Figures 1, 2 and 3)
- Numeric values for p-values ≥0.05 (as opposed to 'ns')

Manuscript III

Methods: the reviewer suggests adding the formula for the calculation of the proportion of the total expected deaths of SAM children either in the text (Method section) or as a footnote under all tables.

Line 231: The reviewer does not understand where the percentage 92% in "92% of deaths will occur in S-whz children who will remain unidentified in the community" comes from. Please explain.

All tables: The reviewer suggests changing the wording as follows: Red<25%, dark pink: 25%-
<50%, Light pink: 50%-%75%, Green: 75%-%90%, Blue: ≥90%.

Level of interest

Please indicate how interesting you found the manuscript:

An article whose findings are important to those with closely related research interests
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Please indicate the quality of language in the manuscript:

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