Reviewer’s report

Title: Current and potential role of grain legumes on protein and micronutrient adequacy of the diet of rural Ghanaian infants and young children: using linear programming

Version: 0 Date: 19 Nov 2018

Reviewer: Lisa-Anne Elvidge Munene

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Nutrition Journal

Current and potential role of grain legumes on protein and micronutrient adequacy of the diet of rural Ghanaian infants and young children: using linear programming.

I want to commend the authors on a well-designed and thorough study that no doubt provides important information to help resolve critical nutrition issues among rural Ghanaian infants and children.

The authors use an old but increasingly popular (in the field of nutrition) statistical technique (linear programming) to help solve a complex nutritional problem.

This methodology leads the authors to conclude, that although an increase in grain legumes on top of the current rural Ghanaian diet did help with micronutrient inadequacies, it did not solve them. Thus, suggesting that other interventions are also needed.

My relevant experience for this review is mostly in the use of linear programming to devise FBRs, therefore, I will focus my comments on this section.

From this perspective, I would recommend that this study be published and have found no major concerns during my review. My comments and feed-back are minor and for consideration only.

Tables are clear, well-designed and for the most part well referenced (see comment re: cost in Additional file D)

General suggestions:

If word count permits, I would suggest creating a limitations section to the paper. Some limitations are mentioned already but are not explicitly identified as such. For example:

* line 425: If I understand correctly, prevalence of stunting in your groups did not correlate with insufficient EAA intake. Could this be an issue with estimates of EAA intake? Over-reporting? Possible role of inadequate energy? Micronutrient intakes? A limitations section could provide possible explanations
Please indicate how daily costs were obtained or estimated. This information could simply be referenced in Additional file D.

What was set as the objective function in linear programming? Was it to minimize deviation from current diets? I suggest you include this information in the manuscript.

Minor suggestions:

The second sentence in the Abstract (background) should be modified to improve clarity. Suggestion: “They offer the largest potential benefits in emerging economies where future food demand is increasing and both under nutrition and overweight co-exist.”

Line 201: Why were fortified foods excluded?

Line 205: Why was the 5th and 95th percentile selected? I assume this is because this is often seen in the literature; however, it is rarely explained. Being explicit and describing why this was chosen is recommended.

Line 210: For more clarity, suggest listing in a table the final nutrient constraints used in the linear modelling program. Why were EARs not used? Or rather, why wasn't 70% of the RNI used as the actual constraint in the model vs 100% of the RNIs?

Line 219: I liked the author's use of a 5% bioavailability for iron. However, a reference is required for this. Why 5%? Line 220 provides a reference for zinc bioavailability.

Line 222: How were diets deemed realistic?

Why in additional file G are nutrients below 100% of RNI highlighted? I thought your target was 70% of RNI to be at least consistent with an EAR (line 236).

Thank you for the opportunity to review! I hope that the next steps of this research involve testing additional interventions to improve micronutrient adequacy among infants and children in rural Ghana.

Level of interest
Please indicate how interesting you found the manuscript:

An article of importance in its field

**Quality of written English**
Please indicate the quality of language in the manuscript:

Acceptable

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