Author’s response to reviews

Title: A space-time analysis of recurrent malnutrition-related hospitalisations in Kilifi, Kenya for children under-5 years.

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Author’s response to reviews:

Response to Reviewers: We would like to thank the reviewers for careful and thorough reading of this manuscript and for the thoughtful comments and constructive comments, which help to improve the quality of this manuscript. We further appreciate the reviewers’ considerable and detailed feedback. Our response follows (the reviewer’s comments are in italics).

Reviewer #1:

General comments: In general, the paper is interesting, and the use of registry data to try to understand underlying contributing factors is a novel and promising approach. If the paper is meant to attract non-statisticians with nutrition background, I think it needs to spell out the interpretation and translate the results a bit more. Also, the method section is lacking detail. I have tried to identify places where I got lost or could not connect the numbers, but it might also be considered to include a co-author with non-statistical background to integrate the non-statistical readers perspective a bit better. As I am not a statistician, I probably have more questions than answers and solutions. Please apologize for my ignorance, but I will probably reflect the nutrition community reader quite well.

Reply

We thank the reviewer for their comments – they have been very useful. Based on his/her comments, it is evident that our explanation was very not clear in the original manuscript and that some adjustment to content and flow of the manuscript are required to make improve the manuscripts merits and readability

In regards to the target audience, we are trying to target both readers that have a nutrition background and also statisticians with interest in utilizing registry data to understand nutrition patterns. Additionally, we have our paper reviewed by a non-statistician (acknowledged) and gave their feedback which we have incorporated. We have also included Kilifi on the title of our manuscript since the analysis focuses on Kilifi county. Importantly, as suggested by the reviewer, we have reviewed carefully the entire manuscript, as per the revisions below;
C#1 Abstract (p1)

L 36-52 Result and conclusion is not coherent with main paper. For example, the main conclusion does not mention the hotspots around the smaller health facilities as explicitly as the conclusion in the abstract. Please align.

Reply;

The abstract has been aligned as recommended by the reviewer

C#2 L 55 Keywords: oedema appears twice. As oedema plays a very silent role in the paper I would not even include it as a keyword.

Reply

As suggested by the reviewer, we have excluded the word oedema on the key words

C#3 Methods (p3)

L 34-40, study participants: Why are single admissions not included as a control if you want to identify time and space with increased risk for multiple admissions? I may be wrong, but would it not make sense to look at all admissions with associated malnutrition and compare single admissions with multiple admissions?

Reply

It might be important to compare the re-occurring admissions with the single admissions, but with regard to the main aim of the manuscript, we want to show the importance of including spatial-temporal parameters in understanding where the burden of malnutrition readmission.

C#4 a) L 46-60: Definition of malnutrition is moderate acute malnutrition (WHZ<-2) or presence of oedema (which indicates severe acute malnutrition). Would it be possible to distinguish between degrees of malnutrition in the analyses?

Reply

As the reviewer has suggested, it is possible to distinguish between degrees of malnutrition.

C#4 b) It is mentioned that child level variables, including socio-demographic and anthropometric are included in the analyses, but I do not see the results of these analyses presented. Socio-demographic variables should be specified. Which variables are included apart from sex and child age?
Reply:

Based on this comment it is evident that we did not clearly state the child level variables in the manuscript. We have indicated that on Table 1 and Table 2. As per the data that was recorded on the registry, age, gender and location were the social demographic variables available.

C#5 L 53: wall mounted scale, I would call it a stadiometer (please specify brand and model)  
(p4)  
Reply  
The text has been revised as suggested

C#6 L1: LRTI and CSF, write out  
Reply:  
The acronyms have been written out as suggested

C#6 L2: malaria and fever or meningitis is confusing. I would write "positive malaria test (specify test) with fever, or meningitis"  
Reply:  
The text has been revised as suggested

C#7 L6: EVI needs to be spelled out and explained.  
Reply:  
The text has been revised as suggested

C#8 L21-23: The sentence "The data quality checks on the clinical measurements are implemented ensure values entered into the system are within the expected range" is a bit unclear and grammatically not correct. It is not clear for me what is meant.  
(p5)  
Reply
The sentence has been corrected to read: “Data quality checks on clinical measurements are implemented to ensure values entered into the system are within the expected biological range.”

C#9 L 31: The definition of the outcome is not clear for me. Counts of malnutrition related admissions. How is it on individual level? Is the outcome binary for each subject? Malnutrition associated at one or more of the multiple admissions? How will it be categorised if there is no malnutrition at the first admission, but the child comes back two months later with a malnutrition associated admission? This might be an interesting group, by the way.

(p7)

Reply

To address the reviewer’s concern, we have added detail to the Outcome and Explanatory Variables section to clearly explain the outcome. We agree with the reviewer on the interesting group but this focus is beyond the scope of the current manuscript.

C#10 L 8 It is confusing that you refer to table 1, but the 76% of admissions being malnutrition related and the 74% being malaria admissions cannot be found in the table. I may be not be reading the table correct, but it confuses me and makes me confused about what is presented in the table. I think the table description could be a bit clearer as well.

Reply

As the reviewer has pointed out, we have added further explanation on table 1 on the results sections. Additionally, we have included the explanation of the %within and %between on the caption.

C#11 L 5-10 Write out INLA and MCMC, and specify that they are R packages. Also WinBUGS need to be specified, is it a programme, it needs more specification (origin).

(p8)

Reply:

As suggested by the reviewer, we have included the full names for MCMC and INLA. Additionally we have also included the references.

C#12 L 49. The age of the child disappears. Is it not a contributing factor just like child sex and others? I would expect child age to be related to child vulnerability and thereby readmissions.

(p9)
Reply:

As per reviewer suggested, it might be true that age has an effect, but since age is included in defining malnutrition outcomes, we left it out as a predictor in our model. Additionally, on our negative binomial and Poisson family model, age was used as the exposure time variable.

C#14 L 41 "(RR=1.07 (Cr.I=1.02-1.12) as shown in Table 2". I do not find that information in Table 2. In fact I don't find anything on duration of admission in any of the tables

Reply:

As the reviewer pointed out, we have not mentioned anywhere on duration of admission. This sentence has been removed since the variable was identified to be correlated with Total Number of Admissions, therefore it was excluded in the analysis.

C#15 Discussion (p10)

L30 "in the community under 5's". I would write "in children below five years"

Reply

The text has been revised as suggested

C#16 L 37-38. "Severe diseases, days of admission and rainfall were identified as factors associated with malnutrition readmission from our model". The definition of severe disease is not clear to me - is it number of severe co-morbidities, or is it severity of comorbidity? I think it should be explained better in the method section. Also days of admission, I don't see it presented in the models in Table 2, and rainfall is not significant.

Reply

As the reviewer suggested we have stated clearly that the environmental factors were not significantly associated with malnutrition readmission. Additionally we have added explanation on the severe disease variable on L147-149 of the manuscript.

C#17 L42-43. Enhanced Vegetation Index (EVI) should be explained earlier, in the method section. I believe it was not. Please check.

Reply

EVI was explained as suggested on L153 of the manuscript.
Table 1:
I do not understand the column Between N (% between; % within). An explanation in the text would be useful?

Would 1 decimal for percentages not suffice? Please be consistent with the number of decimals
Severe diseases 0, 1, 2, 3 needs more explanation. Is it co-diagnoses or number of admissions?

Definition of YES and NO for all variables is needed in footnotes Malnut Kid - please write out and specify definition in footnotes Menegitits should be Meningitis LRTI and CSF spell out or explain in footnotes Blood culture and CSF culture needs to be explained in footnotes. Does YES mean that data are available, or does it mean a positive test result?

Age-profile of the children is not presented? Severity of malnutrition? Other socio-economic information?

Reply

As per the reviewer comments, we have reduced the number of decimal places to 1 for the percentages. Additionally which is an important observation, we have include the explanation of the different variables used on Table 1 and also included the explanation for between and within percentages. We have also include age profile data.

The figure caption now reads

Table 1: Panel characteristics of the study population (Child Level Variables) for the period between 2002 and 2015:

NB: YES means positive test result for a given test. Malnutrition (YES) – WHZ<-2 or Oedema, Severe anemia (YES)- Hemoglobin ≤5g/dl, Hypoglycaemia (YES) - Blood glucose < 3.0 mmol/l, Malaria (YES) – parasite by microscopy fever, Meningitis (YES)- Final discharge diagnosis of meningitis; LRTI (Yes) – presence of Lower respiratory tract infections - Cerebrospinal fluid. 1 - one-way tabulation of counts of between and within individuals in repeated admissions data (panel data)

C#19 Table 2:

Not clear from table what the outcome variable is. Also, the variables in the table are not self-explaining. Individual level and general variables are not clearly separated. I understand sex and severe disease to be individual level, and EVI, Rainfall and Total number of admissions to be context-related. Would improve reader-friendliness to group and add leading group headings.
Would also be useful to indicate unit of the variables (rainfall fx - mm per month or what?), and a column indicating n for categorical variables.

Reply

The reviewer specifically the inclusion of N on Table 2, as these were the results of the model and we had already included the N values on Table 1, we chose not to repeat the same information on this table. For the outcome, we have included the explanation on the Outcome and Explanatory Variables section. We have also included the sub heading’s on the table as the reviewer suggested.

C#20 Figure 1:

I would intuitively expect the shape of the enlarged map section of Kilifi county to look like the red Kilifi county at the larger map as a sub section. It does not.

Reply

The figure has been updated

C#21 Figure 3: Would be nice with units to the scales and axes (hot-cold - what is the unit?). Would also be nice to add a year to the 1-11, i.e. 2002, 2003, 2004 etc. if this is what is it. And maybe n admissions in the different years.

Reply

We have indicated on the caption of figure 3B: (Temporal Variation of malnutrition readmissions) indicating its variation of hotspot and cold spots of readmissions to the hospital and the scale included on the legend. For the yearly hotspot variation over time has been shown on Appendix 5: Shifting hotspots and coldspots from 2002-2015.

C#22 I am a bit puzzled with the hot- and cold spots. How can the overall model have clear red spots in south, when most of the temporal plots have cold spots on the same location? It is not logical to me. I would expect to find similar patterns, not opposite. How can it become an overall hotspot, if it is cold spots in most of the years?

Reply

Maybe it was not clear on the caption of figure but we have updated to show that the temporal graphs are for readmission. The temporal graph shows the shift of hotspots by the number of readmissions. As observed on the graphs, there is a shift of hotspots within the areas on the south from readmission 1 to 11, we think the overall model averages the overall shift.
Reviewer #4

Research Square (Reviewer 4): "STATISTICAL REVIEWER ASSESSMENT:

Is the study design appropriate for the research question (considering whether the analyzed population accurately reflects the design and whether you see any problems with control/comparison groups, e.g., likely confounders)?

Yes - overall design, population, and control groups are appropriate

Are methodologies adequate and well implemented (considering whether assumptions are addressed and whether analyses are robust)?

Yes - methodologies are adequate and well implemented, assumptions are addressed, analysis is robust

Are the analyses adequately communicated (considering whether reporting details are adequate and whether figures and tables are well labeled and described)?

Yes - important reporting details are present, analyses are adequately communicated, figures and tables are well labeled and described

Does the interpretation accurately reflect the analyses without overstatement (considering whether limitations/bias are acknowledged and whether accurate descriptors, e.g., 'significant', are used)?

Yes - interpretation accurately reflects analyses, limitations/bias are acknowledged, accurate descriptors are used

Could an appropriately REVISED version of this work represent a statistically sound contribution?

Yes - current version has sound statistics

STATISTICAL REVIEWER COMMENTS:

This is well-designed study, applied sound statistical, econometrics and spatial methods and well-written interpretation and discussion.
The authors have done very well in all aspects in terms of discussion on the methodology and their justifications. The statistical tools are appropriate and the results were interesting.

Response to Reviewer #4

We appreciate the feedback from the reviewer. We thank the reviewer for their compliments about the comprehensiveness and value of our statistical approaches and results. We further appreciate the reviewer’s feedback.