Reviewer’s report

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

Version: 0 Date: 15 Jul 2018

Reviewer: Pernille Kæstel

Reviewer’s report:

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.

There are no page numbers, and line numbers are not running, but per page. I have added page numbers in my version and hope my comments can be located.

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.

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.

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?

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? 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?

L 53: wall mounted scale, I would call it a stadiometer (please specify brand and model)

(p4)

L1: LRTI and CSF, write out

L2: malaria and fever or meningitis is confusing. I would write "positive malaria test (specify test) with fever, or meningitis"

L6: EVI needs to be spelled out and explained.

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)

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)

L8 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.

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)

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.
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.

Discussion (p10)

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

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.

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

TABLES AND FIGURES

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?

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.

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.

Figure 2: Nice and clear

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.

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?

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Unable to assess

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Unable to assess

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review
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Please indicate the quality of language in the manuscript:

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