Reviewer's report

Title: Bowel disorders and its spatial trend in Manitoba, Canada

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Reviewer: Al Ozonoff

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This manuscript presents results from the application of four different focused cluster detection methods to a spatial data set of aggregated counts of bowel disorders from the region of Manitoba, Canada 2001-2010. The paper is well-written and the methods are accurately described. However it is unclear whether the focus of the paper is on the spatial analysis of bowel disorder or on the methodological comparison of the various methods. Detailed comments follow.

MAJOR COMMENTS

1) The stated purpose of the paper is “to examine geographical variation in the number of people diagnosed as having a bowel disorder in Manitoba, Canada.” Later in the background section the authors state “This paper is centered around the focused cluster detection methods.” The methods, results, and discussion all reflect these disparate aims and divided focus. The next several comments are related to this main issue.

2) Providing the technical and mathematical details of each of the four cluster detection methods is not especially helpful. If the primary goal of the paper is to present the results of spatial analysis, then citations to the appropriate references are all that is needed. If on the other hand the focus is methodological, then the authors should refer back to this information and/or draw some conclusions from the technical aspects of the methods rather than simply include for the sake of completeness. It is not clear how this material is intended to help the reader understand the work presented. Most of the material starting with “Methods: Circular spatial scan statistic” through “Frequentist approach using MLE” can be safely removed or drastically summarized. The final paragraph of the methods section is of more interest and if expanded greatly could form the basis for a methodological comparison of the four methods. For example, what are the practical differences (from the perspective of a spatial analyst or epidemiologist) in the CSS versus FSS? What are the effects of moving from Bayesian to MLE based mapping methods for cluster detection? When would each method be most appropriate? These are points that could be discussed more clearly, and if this discussion referred back to the mathematical details of the methods then (and only then!) would this material be helpful and good to include in the main text. As an alternative the material could be relocated to an appendix since its purpose seems to be purely for reference.
3) None of the methodological points above are explored, but likewise the spatial analysis is not developed clearly enough to stand on its own. For example which of the several analyses presented should be considered most reliable or most informative? Since there is substantial agreement between methods, can we draw conclusions about the spatial epidemiology of the disease? No discussion around reporting biases, incomplete data, spatial confounders, or other sources of bias are provided as context to the results from the spatial analysis. All told there is very little in-depth study of the results from spatial analysis. Importantly, there are few acknowledgements or discussion of the study limitations.

4) Table 1 provides the basis for an interesting comparison of clusters detected using the various methods, but the discussion and methodological connections (see notes above) are absent or very brief. Table 2 is very short and does not seem to contain enough information to justify its own table. Figure 1 is interpreted by the author with a very short statement of explanation, but most readers will not interpret the residuals as easily as the author so this Figure is not especially helpful. It could be easily replaced with a brief sentence such as ‘The deviance residuals showed no evidence of poor model fit.’ Having said that, there is an unusual pattern of residuals near the lower-left of the figure which is not remarked upon. Since the authors have brought attention to this issue, please explain why the residuals on the left side of this figure demonstrate a distinctively different pattern from those on the right side. Such behavior may sometimes be an indication of poor model fit! Finally Figures 2 and 3 are very similar and seem to offer nearly redundant information. Given that there is little information to be gained from the large and sparsely populated northern region, it might be easier to visualize important details in the south by omitting the northern regions when displaying several maps on one page. In fact since there is no evidence of great spatial variation in the north, focusing the entire study on the more variable southern districts might allow for more detailed maps and figures.

MINOR COMMENTS

5) The abstract background reports that “between 2% and 18%... and 50% of the people in nursing homes are affected by bowel disorders.” However in the main text background this statistic is repeated nearly verbatim in reference to bowel incontinence (a specific subset of bowel disorders). The authors should clarify.

6) Methods bottom p5: “The number of people with bowel disorders... is the focus of this study” suggest change ‘focus’ -> ‘primary outcome measure’

7) Methods bottom p5: If the centroids are not determined by geographic center then how are they determined?

8) Results p11: The paragraph describing the deviance residual (and how/why it is used) should be moved to its own subsection of Methods.

Level of interest:An article of limited interest
Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests.