Reviewer’s report

Title: The gravitational force of mental health services: Distance decay effects in a rural Swiss service area

Version: 0 Date: 18 Jun 2017

Reviewer: Guttorm Raknes

Reviewer's report:

Thank you for the opportunity to review this interesting and mainly well written paper on distance decay in Swiss mental health services.

The authors have examined the association between distance by public transport to the nearest mental health facility and the utilization of the services. The main finding is that increasing distance was negatively associated with the use of outpatient services, but inpatient utilization rates did not show any significant correlation with distance. The authors conclude this calls for decentralized outpatient mental health clinics.

The study is based on a material of impressive size and apparent completeness and robustness. It confirms previous findings on distance decay, but in it is particularly interesting to see the difference between out- and inpatient care.

There are some major points that have to be addressed before this manuscript can be accepted:

1) More consciousness on study design. As far as I can interpret, this is an ecological cross sectional study. This should be stated in the title, or at least in the abstract. This also means that the reporting should be in accordance with the STROBE checklist for cross sectional studies. Several items are not covered sufficiently.

In addition, limitations to ecological cross sectional design should be discussed. This includes causality and the ecological fallacy.

2) Statistical methods

a) Stratification of continuous data. I think it would strengthen the results if the municipalities were not stratified, and non-parametric tests were omitted. The high quality of the data should allow for regression analyses on non-stratified data. I understand there will be units with very few observations, and that pooling is tempting.
b) Poisson. An important point is that these are number of observations per time unit, and thus Poisson distribution apply. When using Poisson-based methods, lack of observations will be accounted for, and the estimates will be more precise. The statistical analyses assume normal distribution, and if the authors should at least explain why Poisson distribution was not applied.

c) Exponential regression. I understand linear regression is basis for the analyses. For distance decay, negative exponential regression is most common. Figure 3a show nice negative exponential curves. After an approximate reading of the curve, and quick and dirty trendline analysis in Excel, I found that the outpatient rate (y) could be predicted by distance x from the following formula 
\[ y = 1.0057 \times e^{-0.0028x}, \quad R^2 = 0.96. \] Such analyses combined with continuous data would be interesting.

d) Lack of effect sizes. The results of analyses are thoroughly presented, but it is difficult for the reader to interpret the relevance. One honourable exception is that it is mentioned that more than 20 minutes distance translates into a more than 50% reduction in outpatient caseload. But what does \( \beta = -0.372 \) mean in terms of clinical or practical relevance? The formula above means that for each minute of longer distance, the outpatient attendance rate drops by 2.8%.

3) The manuscript could have been better structured. Preferably according to the STROBE checklist: https://www.strobe-statement.org/fileadmin/Strobe/uploads/checklists/STROBE_checklist_v4_cross-sectional.pdf

The discussion part needs tightening up, this is a recommended tool for better discussion sections: http://cancer.dartmouth.edu/documents/pdf/effective_discussions.pdf

5) Table and figure captions are insufficient. It should be possible to read tables and figures independently from the text. What, where, when? Explain B, SE, \( \beta \) in table text.

Details:

Introduction: OK
Methods:

Describe design: Ecological cross sectional

Outcomes should be reported more explicitly and precisely.

Were there any missing data, if so, how were they handled?

Results:

Present missing if applicable. See major comments.

Table 1: A short description of the ICD-10 codes should have been added, e.g. F3=affective disorders.

Figure 1 and 2: It seems a bit strange that some of the municipalities with the longest geographical distances have shorter travel times than municipalities closer to the hospital. Is this correct? Why? Express trains? Patients go to closer hospitals in neighboring regions?

More information in caption needed. Number of patients included?

Figure 3 a & b: Is it possible to present non-stratified data? I would be a good idea with error bars, e.g. 95% confidence intervals. Why were results of F0 and F1 omitted in Fig 3a? Consider using clinical terms instead of codes ("Affective disorders", not F3). Vertical lines should be deleted, if any, horizontal lines are better.

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

No

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

Yes

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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