Reviewer's report

Title: Country Characteristics and Acute Diarrhea in Children from Developing Nations: A Multilevel Study

Version: 5  Date: 28 April 2015

Reviewer: Rachel Burke

Reviewer's report:

Reviewer Comments

Major Essential Revisions

1. Suggest consulting with a statistician before resubmitting to any journal. While presentation of interaction terms is clearer, some ORs still appear that shouldn’t. Need to also take this into account when discussing results in Discussion (unless you just report for the level 1 analysis). You may want to simplify your model?
   a. E.g., in Table 3, we see an OR for “No maternal education”; however, this term is involved in an interaction, and so the OR presented is probably for the effect of “no maternal education” where GDP = high income, Inequality = 0, and HealthExpenditure = low, depending on how your reference levels were set up and coded. It really shouldn’t be presented alone, at least not without commentary.
   b. E.g., in Table 4, labels are unclear. I think that the first set of OR is for “The effect of no maternal education and low country income on pediatric diarrhea”. However, this is a little unclear from the current title. Similarly, is the second set of ORs, “The effect of household wealth index (1-unit change) and low country income on pediatric diarrhea”?
   c. In table 4, it’s also unclear why you chose to present just statistically significant interactions. It makes it hard to see the whole story – are these ORs really different from each other? I also think that you might be using the wrong test for these p-values? I suspect that you need a likelihood ratio to test the dummy terms together (giving, e.g., one p value for “low” through “high” health expenditure and high inequalities)

2. Should justify this Discussion sentence with some data: “In richer countries lack of maternal education and household poverty were not as important as they were in poorer countries”

3. In Discussion, OR are interpreted as relative risk; however, this is not correct as diarrhea is not a rare outcome. Need to reword as “had XX% higher odds” vs. “were XX% more likely” throughout

Minor Essential Revisions

1. Justify choice of level 2 models
2. Add references for IOR, MOR, and ICC to Methods
3. Please clarify what is meant by “measured using residual files and reliability estimates”

4. The following text in Results should be placed in Methods instead:
   “Differences were deemed to be significant with P-value less than 0.05. The large sample size allowed us to find small differences with narrow 95% confidence intervals.”

5. Should note in text that Urban residence no longer significant once you adjust for country-level variables

6. Please clarify Results paragraph beginning with: “The variables that presented statistically significant between-countries variances”

7. Discussion: Not clear to this reviewer that health expenditure is not associated with diarrhea after taking into account interactions. Please justify.

8. Table 2:
   a. Move P-value column all the way right (following CI columns)
   b. Add empty row below “Underweight”; name row “Infant birth weight”
   c. Add empty row below “Age of mother (years)”; name row “Maternal education”
   d. Add empty row under “Country”; name row “Country-level income”
   e. Add empty row under “Inequality”; name row “Country-level health expenditure”

9. Table 3:
   a. Same comments as Table 2 on new rows
   b. Bold or otherwise indicate significant results
   c. Duration of breastfeeding is stated as significant in the text, but this is not reflected in the table. Please reconcile. Also please state units for this variable (months?)

Minor Discretionary Revisions
1. Table 2: Would suggest changing OR and CI to three decimal points since CI are so narrow

Minor Issues not for Publication
1. Under Methods and all tables, Level 1 Data, replace “no weighted” with “not weighed”

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.
Declaration of competing interests:

I declare that I have no competing interests