Author's response to reviews

Title: A bibliometric analysis of childhood immunisation research productivity in Africa since the onset of the Expanded Programme on Immunisation in 1974

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Author's response to reviews: see over
Dear Editor,

It is certainly wonderful news that most of the reviewers have now found our manuscript to be worthy of publication.

In the following pages we provide a point-by-point response to the reviewer. We have put the comments in bold, with a response below each comment.

We would like to thank you in advance for your consideration.

Sincerely,

Charles Wiysonge, For Authors
Reviewer: Sheng T Luo

The revised manuscript has improved and addressed some points raised before. But I still have a few questions for the authors.

Reply: Thanks for the compliments. We have addressed the specific issues raised below

1. In Figure 1 of the supplement, what is k in the x-axis? And y-axis is proportion, but a proportion of what? The figure does not make sense to me. Also, the proposed negative binomial model still had a poor fit, indicating that the proposed model was a bad choice.

Reply: The figure was generated with Stata ‘nbvargr’ routine written Philip B. Ender UCLA, Office of Academic Computing (http://www.ats.ucla.edu/stat/stata/ado/analysis/nbvargr.hlp.htm).

nbvargr graphs the observed proportions along with the poisson and negative binomial probabilities for a count type variable. The y-axis is the predicted proportion of the count variable computed using an estimate of the Poisson mean. K (or x-axis) is the mean of the count variable.

We believe like George Edward Pelham Box, that "essentially, all models are wrong, but some are useful". We are not deluded that any model will perfectly fit or predict the real-life or empirical data collected. The scientific method is basically one of creating, verifying, and modifying models of the world. The goal of the scientific method is therefore to simplify and explain the complexity and confusion of the world. The goal of the scientist is to create simple (parsimonious) models that have a great deal of explanatory power. In most cases, however, simple yet powerful models are not available and we must
decide at what point the gain in the explanatory power of the model no longer warrants the additional complexity of the model.

Agreed, there are other fancy models that we could have used. Such as zero-truncated count models, since our data have no zeros. In this revision, we have now tested more models - zero-truncated Poisson and zero-truncated negative binomial regression models. We have now used Bayesian Deviation Information Criteria (DIC) to formally compare the models, since graphs of predicted count are subjective.

We would like to point out that, though zero-truncated negative binomial model produced the lowest DIC, it is not really much better than the negative binomial model previously reported and did not change the magnitude and direction of our results materially. We have now reported findings from the zero-truncated negative binomial. We hope you find this acceptable.

What’s new?

Methods section

“We used the Bayesian Deviation Information Criterion (DIC) to compare different count regression models. The most parsimonious model can be identified as the one with the lowest DIC. Univariable zero-truncated negative binomial regression analyses were used to investigate the bivariate relationship between each country-level factor (listed above) and total research productivity. Multivariable zero truncated negative binomial regression analyses were carried out.

Results

“As Table 4 shows, zero-truncated negative binomial regression provided the best fit to the data because DIC was lowest, so we reported the results from the zero-truncated negative binomial regression (Table 5).”
Table 4:
Bayesian Deviation Information Criterion (DIC) for the models considered

<table>
<thead>
<tr>
<th>Model</th>
<th>DIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poisson</td>
<td>1133.21</td>
</tr>
<tr>
<td>Zero truncated Poisson</td>
<td>1132.64</td>
</tr>
<tr>
<td>Negative binomial</td>
<td>372.21</td>
</tr>
<tr>
<td>Zero truncated negative binomial</td>
<td>367.21</td>
</tr>
</tbody>
</table>

2. To answer my original comment 6 about the unit in the 4th paragraph of on page 5, the authors have changed the sentence to “Each percentage point increase in private expenditure on health increased...”. It seems to me that the private expenditure is a dollar amount (or log dollar amount), which was also confirmed in the Test 2 in the supplement. Why is it that the authors claimed it as “each percentage point” instead of as “each unit increase in log dollar amount”?

Reply: This has been changed to “each unit increase in log dollar”?

3. To answer my original comment 7, the authors claimed that 53 countries on the African continent was a small sample size to make some covariates statistically significant. Considering only five covariates were included in the final model, n=53 is NOT a small sample size at all. Moreover, the findings reported here were conflicting against the literature. Based on these facts, I have some suspicion on the validity of the findings in this manuscript.

Reply: We have now removed our suggestion that the lack of association with some factors may have resulted from the sample size; which (in any case) was large enough to find significant differences if they existed.
However, we are surprised that no single conflicting reference was given or cited to support this claim by the reviewer. In fact, the truth is contrary to the claim made by the reviewer. It would have been better to cite any previous bibliometric analysis of immunisation research from Africa or other continents that our results are conflicting with. For example, Uthman [1] examined determinants of HIV research productivity in sub-Saharan Africa and found that only private expenditure on health (0.60, p = .040), number of people living with HIV (beta-coefficient [\( \beta \)] = 0.51, p = .001), number of indexed journals (0.59, p = .001), and total expenditure on health (1.01, p = .017) remained significantly associated with HIV publications when all factors were controlled for statistically.

In addition, Rahman and colleague have reported two other bibliometric analyses that examined factors associated with research productivity[2,3]. These two studies examined biomedical research generally and not subject specific. These studies did not specifically examine African countries research productivity, but all countries of the world [3] and Asian countries [2]. The authors used multiple linear regressions and did not consider using more appropriate count regression models [2,3]. And finally out-of-pocket expenditure on health was not included in their models [2,3].

We would like to point out that we are not confusing "absence of evidence" as "evidence of absence". Though we did not find statistically significant associations between some of the variables, nowhere in the whole manuscript did we assert that these variables which are not statistically significant were not important from a public health perspective. For example, we did not say that country’s GDP is not important in increasing country research productivity.

On a final note, people that are really familiar with the literature and health issues in low- and middle-income countries such those of sub-Saharan Africa will know that public spending on health is very low and the poorest people in these countries are spending large chunks of their meager household budgets in out-
of-pocket payments for health services. Though, the vaccines are bought using public funds, a preponderance of the mothers have to travel, register, and treat their children out of their pockets.

References

Thank you.