Reviewer's report

Title: Determinants of non-utilization of child immunization in Pakistan: Evidence from Demographic and Health Survey

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Reviewer: Hajo Zeeb

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Major:
1. The title wording “Determinants” should rather be “Factors associated...”
2. The NIPS report in the chapter on child health (Ref.16) contains very much of the basic and stratified information reported here.
3. It is unclear on what argument your categorization of anything less than 12 doses of vaccines is based? It seems to be a more administrative than scientific argument. At least I would expect a discussion whether there are good data indicating that having less than 12 (for example 11) doses really increases disease risks. Did you do sensitivity analyses on other cut-offs?
4. How where the data regarding immunization collected in the DHS? Did mothers have to show immunization cards? This is a core issue and needs to be explained in detail.
5. Model selection: authors are talking of “all significantly associated variables” that were entered into the multivariate model: which significance level was used? Why were known factors (based on the literature) not entered a priori? Were the variables adjusted, or rather the association between the independent and the dependent variable. Earlier, the authors mention 14 independent variables, among them mother’s age and education. Under statistical analysis you mention that some of these were used for adjustment. However, in a usual multiple logistic model, the associations between specific independent and the dependent variable are adjusted for all other independent variables included in the model. This seems not to be clear, or at least ill-stated.
6. How was multicollinearity assessed, and what was eliminated?
7. Please explain why the total number analysed here differs from numbers given in the report (ref 16) (n = 1522)
8. Discussion: education is singled out in the first para, why? It was used as an adjustment variable in the multivariate analysis, so obviously you considered it being a confounder and not an independent variable you were interested to study ?! The explanation for the effect of education appears simplistic.
9. The authors should also discuss the period to which their data relate: What has happened since 2005/2006? Are there any more recent data relevant for this discussion? Have the DHS findings been taken up by policy?
Minor:

Background:

10. Sentence beginning with In Pakistan, the health department: UNICEF does not fund the WHO guidelines, please review sentence.

11. The 198 cases of polio are global cases in 2011, and Pakistan’s numbers are given for 2012. Better report data for the same year. What is meant by: so far? Please state: By end October 2013, xx cases were reported. Wording: measles have played havoc??

12. The reported number of measles deaths given for Pakistan: how reliable are these figures? Again: do not use “so far”, since it is unclear when this paper will be published.

13. Unclear: what is meant by “fully immunized children who have received specific vaccines”? Are there fully immunized children who have received unspecific vaccines?

14. Many studies have tried…? Did they succeed? What are factors known to be associated with full childhood immunization? There are excellent papers giving information on this topic.

15. Childhood immunization does not protect against all childhood diseases, but against some major ones. Wording: .. prevents millions of disabilities? Certainly there are not only scientists, but many practitioners subscribing to the benefit of vaccinations.

16. The statement that lower socioeconomic groups resist immunization may be true for some developing countries, but not for some rich countries where the better off do not take up vaccination.

17. The reasons why immunization is not taken up can be described better, for example by talking about low risk perception. If you mention very few studies in Pakistan, please give references. Is there any reason why factors associated with low immunization uptake should be different in Pakistan as compared to other countries? You are not making a strong case for this study.

Methods:

18. Age of last child: in the methods you state that children had to be between 12 and 23 months of age. There are no data on actual age of children included. Looking at the immunization schedule, any child aged 13 months would likely be categorized as “incompletely vaccinated” as it has not received measles 2. How did you deal with this?

19. Results:

20. Sentence on birth order is unclear: which group had a higher proportion of incomplete immunization?

21. Grammar and spelling in this section needs urgent attention (e.g.three fourth?)

22. Table 2 contains either missing or incorrect sums, as individual cells do not
add up to the total \( n \) in many instances.

23. Table 2: it seems awkward to use “incomplete immunization” as overall column label and have the no (i.e. the fully immunized) in the first subcolumn. Consider switching.

24. Table 3 also contains errors, missing commas etc.

Discussion:

25. The discussion picks up most of the relevant findings, but could be more closely linked to the literature on the topic. It might make sense to discuss or highlight coverage for individual vaccines; e.g. for Polio, which was at or above 90% across Pakistan according to the DHS.

26. Limitation: what is meant by the sentence .. had no information on the particular doze of the vaccination? My impression was that you could very well differentiate the doses, since your basic categorization used number of doses (max.12)? Only here you mention the nature of the data, i.e. self report. I really wonder whether self report is appropriate for assessing complete 12 dose vaccination. Are there data to support the validity?

**Level of interest:** An article of limited interest

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

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests