General Comments and Recommendation

This study examines the relationships between mercury exposure using human biomarkers (primarily hair), health status indicators (hemoglobin, anthropometry), and vaccine response to 6 vaccines (immunoglobin levels, specific antibody levels). Both main effects and interactions are being examined. This is a very dense study and the report is quite rich and data perhaps somewhat difficult to follow because of the great amount of information included. The report should be of great interest to the readership of the journal and those working in this field as well. It is well written. The authors find that mercury levels in the hair of children in these areas in Peru, especially those that are from indigenous communities, are elevated and associated with decrements in antibody levels. They also report that malnutrition as a main effect decreases antibody levels and that mercury and malnutrition interact as well as to decrease specific antibody levels. There are also interesting increased levels of antibodies in some cases, for example, an interaction between mercury in hair and lower nutritional status that is associated with an increase in tetanus-specific antibodies. Can the authors speculate a bit more on the mechanism(s) behind an increase in antibody levels that can be attributed to higher levels of mercury exposure and/or greater malnutrition?

I am not asking the authors to find and include data on actual disease incidence and prevalence in children, but if there is any evidence that some of these select diseases, those for which these vaccines are meant to be protective, are elevated that would be very useful to include. If vaccine efficacy is negatively affected by mercury and/or malnutrition, one would expect their associated diseases to be more of problem where those conditions are more prevalent. Can the authors speculate a bit more on this if such data is not readily available? If such data is readily available and a greater incidence or prevalence of disease is not apparent, that needs to be discussed.

I recommend publication of this manuscript in IJERPH pending quite minor improvements and considerations.

Specific Comments

Results

Section 3.2.3. (and other relevant sections)-The text in this section (lines 376-379) does not seem to be consistent with what is in Figure 4 panel A. This figure indicates increased antibodies for 4 vaccines and no decreased antibodies. The text states there are decreased measles antibodies. If levels whether apparently increased or decreased are not significantly different, I suggest not reporting those as such. This approach in reporting results should be followed throughout. As clearly stated in the methods sections with respect to levels considered non-responsive, the authors should stay true to their statements.