Reviewer's report

Title: Estimating the Contribution of Disparities within Developing Countries to Global Inequalities in Under-Five Mortality

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Reviewer: Laura Dwyer-Lindgren

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Discretionary Revisions:
1) Though most readers are likely familiar with the Millennium Development Goals, it may be worth including a brief description where they are mentioned in the introduction.

2) Along the same lines, I think it would be helpful to briefly describe what a wealth index is.

3) In the methods section second paragraph when describing how the country datasets were combined I think it would be sufficient to keep just the sentence that says ‘The pooled U5MR obtained using these weights is a weighted average of country-specific under-five mortality rates, with weights representing the proportion of country births in the overall number of births’ and remove the three previous sentences. I found the first part of the description hard to follow, but the weighted average description is, I think, sufficient on its own.

4) In the third paragraph of the results section table 2 is carefully explained. I think it might be unnecessary however to copy the numbers from the table into this paragraph (i.e. the number of births, deaths, the U5MR in developed countries)—in my opinion the table itself is a helpful and sufficient way to present this information.

5) In the discussion section the authors are careful to acknowledge that the 10% threshold for ‘best-off’ is arbitrary, which is appropriate. I think the provided justification for that threshold (that it fits easily with our decimal system) is not very convincing, however. I would recommend removing this justification—I think it’s simply unnecessary given your sensitivity analysis and care in cautioning that any threshold is arbitrary.

6) In the discussion section, I think the second limitation is largely unrelated to the purpose of the paper, which is to describe what proportion of the mortality gap is explained by within-country differentials, not to explain why these within-country differentials exist or how they may be modified. I don’t think it’s necessary to caution that a sudden decline in under-5 mortality is unlikely because your paper doesn’t suggest that it is. What may be more appropriate is to caution that while you’re examining between- and within-country differentials in under-5 mortality you’re not making claims about what is causing those
differentials.

Minor Essential Revisions:
1) U5MR should be clearly defined in the background section.

2) What constitutes ‘developed’ and ‘developing’ should be clearly defined in the background section. Further, in the method section where the 67 DHS surveys selected are described it might be helpful to say what proportion of the ‘developing’ world’s under-5 population these 67 countries represent.

3) In the results section ‘Table 1b’ is referenced but the provided table 1 does not appear to be split into a part A and part B. Similarly, in table 2 ‘box 1’ is referenced, but this seems to mean the last line of table 1, not a separate box.

4) This is a minor point, but three different sources of country-level U5MR are referenced: IGME 2012 (citation 11 in the background section), IGME 2010 (citation 16 in the discussion), and the World Bank World Development Indicators (citation 15 in the methods). For consistency the same source should be used throughout, if possible. In particular, there shouldn’t be any reason to use more than one version of the IGME estimates.

Major Compulsory Revisions:
1) My main concern with this analysis is that it seems to confuse within-country inequalities and within-region inequalities. If the authors are interested particularly with within-country inequalities than all steps of the analysis should be carried out on the country-level. In particular, the assessment of U5MR for the ‘best-off’ should take place at the country-level: i.e., a country-specific ‘best-off’ U5MR should be used to calculate counterfactual deaths for the purposes of estimating the reduced mortality gap. The fact that it currently doesn’t has some counterintuitive implications, in particular, that the ‘best-off’ U5MR is higher than the U5MR reported by the entirety of some countries: there are 18 countries in supplemental table 1 where the U5MR in 2007 is less than 44.1 (the level calculated from the pooled data for the top decile). This means that the calculations for estimating the reduced mortality gap currently assumes that mortality actually increases in a substantial number of countries. Alternatively, if the authors are interested in considering within-region inequalities rather than within-country inequalities than the pooled ‘best-off’ U5MR makes sense, but it should be made from the ‘best-off’ overall in the developing region, not the ‘best-off’ from each country individually: what it means to be in the top decile will depend on what country you’re currently considering, and also the reference date of the survey since not all surveys considered occurred at the same time. To do this would require constructing wealth indices from the DHS that are comparable across survey, unlike the ones that are currently provided in the DHS datasets (see, for example:
http://www.iussp.org/sites/default/files/event_call_for_papers/ComparativeWealth-DRAFT-IUSSP.pdf and
2) In the background the authors compare the ‘burden’ of under-5 deaths by comparing the absolute numbers of deaths in developed and developing countries. Similarly, in the conclusion the authors state that “Approximately six million more under-give deaths occur in developing countries than in developed countries every year.” This comparison is misleading, particularly as phrased in the conclusions section, given the size of the under-5 population in the developing versus the developed world. This comparison should be made with rates, not absolute numbers.

3) The methods for analyzing the birth history data should be more explicit. In particular, when you say that the approach is ‘similar to the procedure implemented by DHS’ you should state explicitly in what ways it differs.

4) The authors should acknowledge limitations imposed by the DHS data. Both the birth history data used to collect U5MR and the asset data used to construct the wealth indices are subject to error. Further, since the survey date varies and the world development indicators may take into account other data besides the DHS, there is sometimes a large difference between the U5MR from the DHS and the U5MR in 2007 from the world development indicators (for example, Brazil, Kazakhstan, Kyrgyzstan, and Niger), which draws into question the calculation of the ‘reduced mortality gap’ which relies on the comparison between these two sources.

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

**Quality of written English:** Acceptable

**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