Reviewer's report

Title: ABSOLUTE INCOME IS A BETTER PREDICTOR OF COVERAGE BY SKILLED BIRTH ATTENDANCE THAN RELATIVE WEALTH QUINTILES IN A MULTICOUNTRY ANALYSIS: COMPARISON OF 100 LOW- AND MIDDLE-INCOME COUNTRIES

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Reviewer: Shea Rutstein

Reviewer's report:

Review of "Household income and coverage with skilled birth attendance: an analysis of cross-sectional surveys in 100 low and middle-income countries"

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This manuscript is quite interesting and well done. However, there are two areas of concern that could be improved: definition of skilled birth attendance and discussion and conclusions about relative wealth versus "absolute" income.

1. The definition of SBA is too broad by including country-recognized cadres such as auxiliary midwife, auxiliary nurse, community health worker, etc. How were these additional SBAs determined for each country? I think place of delivery (hospital, health center, clinic, doctor's office) is a better measure for safe deliveries.

2. Relative wealth index versus absolute income:

a. As described by the paper, absolute household income is determined using three sources of information: World Bank estimates of GDP, national income inequality, and wealth index quintiles for each survey. As I understand it, the WB estimate gives the national income per household level adjusted for consumption share, population size, and mean number of persons per household; the national income inequality assigns a percentage of that income to household wealth quintiles, and the household wealth index assigns the quintile household income (consumption?) to all households determined to be in that quintile. If this procedure is correct, please spell it out in more detail. If not, then give more details about how the household income is calculated for each household.
b. Why are wealth quintiles used for assigning household income rather than single percentiles or individual wealth scores? Household size varies by wealth quintile (and score), can this variation be incorporated in the calculation rather than the overall mean number of household members? Should the number of adult equivalents be used instead of the number of members of all ages? Since the analysis is limited to households where a birth occurred in the three years prior to the survey, which is likely to be different by wealth quintile (i.e. fertility varies by quintile), shouldn't it also be taken into account in calculating the household income (consumption)?

c. The analysis compares a relative measure to an absolute. It is wrong to use a measure of economic status that is relative to a specific country at a specific time for cross-country and cross-temporal analyses. For example, the highest quintile in some countries may have the same economic situation as the lowest quintile in other countries (e.g. Malawi versus Armenia). The economic situation may have dramatically changed over time even within a single country (e.g. Peru and Zimbabwe).

d. Survey-specific intercepts are left out of the cross-country analyses. I believe including them would substantially affect the analyses by lowering the effect of absolute income and increasing the effects of the relative wealth quintiles. Why were they left out?

e. There are other survey-only wealth measures suitable for cross-country and cross-temporal analyses, such as the Comparative Wealth Index (Rutstein, Shea O., and Sarah Staveteig. 2014. Making the Demographic and Health Surveys Wealth Index Comparable. DHS Methodological Reports No. 9. Rockville, Maryland, USA: ICF International) and the Harmonized Asset Index (Staveteig, Sarah and Lindsay Mallick. 2014. Intertemporal Comparisons of Wealth with DHS Data: A Harmonized Asset Index Approach. DHS Methodological Reports No. 15. Rockville, Maryland, USA: ICF International). Other comparative approaches include "Estimating the absolute wealth of households" (D. Hrushka, D. Gerkey & C. Hadley, Bull World Health Organ 2015;93:483-490), which uses the Gini coefficient for the overall distribution.

f. Model 5 of the analysis includes both relative wealth and absolute income for within country analysis. However, the absolute income also incorporates wealth quintile, which is included as a separate factor. What is the level of collinearity between the two factors? Is it too high to include both and that is why there is basically no change in the R-squared from the single
factor models?
g. The discussion and results sections imply that absolute income can predict better than relative wealth quintile. This conclusion is possibly true for cross-country results without survey-specific control but does not seem so for within country results. Moreover, the discussions imply that differences in income only affect the demand for safe births and ignores the effects of differences and improvements that national income has on the provision of services, which may be the reason for the very great dispersion of SBA coverage at the same income level seen in Figure 1.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.
No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.
No

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.
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