Reviewer’s report

Title: Long Run Height and Education Implications of Early Life Growth Faltering: A Synthetic Panel Analysis of 425 Birth Cohorts in 21 Low- and Middle-Income Countries

Version: 0 Date: 25 Apr 2019

Reviewer: Ida Monfared

Reviewer's report:

This study defines 425 regional cohorts across 21 countries and links the childhood cohort average growth characteristics to the characteristics of adults in the same region (cohort) after 21 years. The aim of the study is to investigate the association between average under-5 HAZ with adults height and their educational attainment in the same cohort.

In terms of the relationship between childhood HAZ and adult height the study conclusions are in line with extensive body of work in this field. In terms of the association with the educational attainment, however, the study needs to elaborate more before reaching conclusions (as indicated below) and the overall assumptions behind the models are yet incomplete.

Major amendments:

1. In the section Background, the study has built its rationales on studies of extreme historic cases such as war and famine. However, there is a large body of recent work on this topic in the context of low- and middle-income countries that could help with making the argument more relevant (e.g. see Georgiadi & Pennyc, 2017; de Onis, 2017) and take the opportunity to support the rationales behind the covariates used in the study model (e.g. why living in urban areas or having electricity in early childhood matter to development in adulthood).

2. Moreover, the study misses to refer to some other covariates that through literature were found to be important though are not included in this study (as such are fathers education and its effect on child growth (Moestue & Huttly, 2008) and cultural factors, e.g. premature marriage among young women in LMICs that can affect educational attainment (Delprato et al., 2015)).

3. Although the inclusion of various countries adds to the richness of the study, this aggregation brings considerable heterogeneity as the settings across countries within the time-period of 21 years can widely vary both in terms of factors affecting adult height (climate, environment, intervention programmes, etc.) and educational attainment (school
availability and quality). Although this was acknowledged in the study limitations, taking average over a range of countries might have had a noticeable effect on findings. If breakdown by country is not possible, could perhaps clustering by sub-region help with the noise issue?

4. Furthermore, some countries in the study sample experienced major shocks (Rwanda 1994) that makes their conditions exceptional to the rest. It is worth it to test whether or not include/exclusion of Rwanda's cohort makes any difference.

5. There are some evidence arguing that stunted children might catch up with height-growth under right conditions and this is equally possible to catch up with cognitive abilities following environmental improvement. This needs to be referred to as part of the study limitations.

6. For both height growth and schooling, there are fundamental differences between genders, thus, the results need to be stratified by gender and not given across the full sample (column 2 in Table 2 does not mean much).

7. Column 1 in both Tables 2 and 3 does not provide meaningful information as the model is not adjusted at all, thus, could be removed.

8. Table 2, similar to Table 3, the results should be presented before and after accounting for cluster/country fixed-effect.

9. Table 2, the association between maternal education at childhood and adult height in men is significant but negative so it needs to be explained? This is also the case for the log-income for both genders.

10. Table 3 (and Table A3), as noted above, the results need to be stratified by gender as the pathway between childhood conditions and educational attainment can be entirely different between genders.

Minor amendments:

1. Line 9, in section Method, I think it helps to clarify that by historic it means 1987-1993 surveys, 21 years prior to 2006-2014.

2. Line 96, add reference to this assumption as to why population-level growth faltering cannot be fully observed before age 2.
3. Lines 114-5, need amending as the study did not use the highest educational grade but (maximum?) years of schooling as an indicator for educational attainment (according to the definition provided in Table A1).

4. Figure 1, y-axis in both panels, does it show the count or as it indicates, the frequency/distribution? Frequency of 5000 is strange. Also, survey years and data source need to be added to the figure caption. The figure also needs further interpretation within the context.

5. Line 155, note that although the gender distribution in the adult sample is said to be almost even (54% female), in the results presented in Table 2, the number of observations for women is 10 times more than of those for men.

6. Line 171, instead of highest grade attained should be said years of schooling.

7. Line 180, how was it assumed that association is necessarily linear?

8. Lines 177-8, cannot claim a strong association when it is not found to be significant. Are the follow up figures based on the results presented in Table 3 as they show different figures?

9. Table 2, in the table title, change "Childhood Height" to "Under-5 HAZ" as HAZ is not the same as height per se.

10. Line 200, cannot make the claim while the results were not found to be significant as it was also mentioned later in lines 211-12.

11. Line 207, rephrase.

12. Table A2, provide observations count per country.

13. Figure A3C, misses the range 95% interval.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**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.

No

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