Author’s response to reviews

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

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Author’s response to reviews:

Please refer to attached supplemental file, where we have responded to each comment in bold red text.

Responses to Reviewer Comments

Submission 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

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Editor Comments:

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Reviewer Reports:

Bernice N Harris, MMed (Reviewer 1):

Well written with a few minor language errors ie line 4 and 8 present tense instead of past and line 173 or instead of of, amongst others.

Thank you for catching these - we have corrected these language errors and have reviewed the text for other similar grammatical mistakes.
The background and introduction is sufficient to understand the context. The supplementary material is necessary to understand the way the panel was constructed.

Thank you!

The methods and results are easy to follow and the statistics seem sound and correctly interpreted and presented but additional review may be necessary.

Thank you! We welcome additional review of our methods and statistics from the other referees.

The discussion and conclusions are appropriate and substantiated and stick to the results.

Thank you!

The limitations are well described.

Thank you!

The authors correctly use the Vancouver referencing method.

Thank you!

Tae-Young Pak, Ph.D. (Reviewer 2):

This study uses a pooled Demographic and Health Surveys (DHS) data to evaluate associations between exposure to early life growth faltering and adult height and education outcomes. The authors find that early childhood growth is a major predictor of height outcomes but has had limited influence on education outcomes. The study touches upon an interesting question and is based on a sound empirical framework.

Thank you for your kind comments!

I only have a few comments:

The authors need to clarify the following sentence on page 5, "Cohorts are defined as children who are born in a region or province of a country in a given year."

We have clarified this sentence with an example as follows (page 5):

Birth cohorts are defined as all children who are born in a given region or province of a country, as defined by the DHS, in a given year (e.g. all children born in 2002 in Barisal region, Bangladesh).

The standard errors may need to be clustered at both age and country levels using two-way clustering.
Currently, we cluster the standard errors at the country-region-birth cohort level, which jointly takes into account year of birth and country level. To confirm, we run a sensitivity analysis where we cluster our standard errors using two-way clustering by year of birth and country levels (Tables A4 and A5 in the Supplemental Materials section). We find that our results are robust to this alternate clustering specification.

In terms of interpretation of coefficient estimates (tables 2 and 3), the readers may benefit from percent increase interpretation based on back-of-the-envelope calculation (compared to the sample mean of y). This will give a more intuitive description of effect size.

Thank you for this suggestion. We have now also expressed these changes in terms of standard deviations in the revised manuscript.

Iftikhar Ahmed Charan, PhD Scholar (Reviewer 3):

Dear Editor

The paper under review is timely document in that there is a tremendous interest in research involving Long run implication of early life growth faltering. The technical facts of this research work are correct, complete and clear. In conclusion, the ideas contained in this manuscript might be of interest to the Long run implication of early life growth faltering, 425 Birth Cohorts in 21 Low- and Middle-Income Countries. He/she can also work to improve the flow of writing that would make it interesting and worth reading twice.

If there is any question concerning this review, please don't hesitate to contact me.

Thanks.

Thank you! We have carefully edited the manuscript again to improve the flow of the writing and the content in the text.

Vincent Ibworo (Reviewer 4):

MANUSCRIPT REVIEW

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

Summary

This study provides good incites and information that can be used to further analyze the long term effects of growth faltering with the aim of providing targeted solutions.
Major issues

The title should be made more specific and in line with the results e.g. Long Run Height and Education Implication of Early Life growth Faltering. Long term implication of early life growth faltering is wide yet the study focuses on height and education only.

We have changed the title to “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.”

Minor issues

Be consisted in the use of terminologies, the study has identified height and education and not general outcomes as seen in the discussion section 199.

We have clarified this sentence as follows (p. 10):

In this study, we construct a synthetic panel using data from 425 birth cohorts across 126 regions in 21 LMICs to evaluate the relationships between early life growth faltering and adult human capital outcomes, namely height and educational attainment.

Include genetic influence as a study limitation.

We have added the role of regional genetic variations as an unobservable confounder as follows (p. 12):

Even though we control for several socioeconomic factors at the cohort and region level, we cannot rule out residual confounding through other unobservable regional factors, including regional genetic variation, that are correlated with both childhood growth and adult height and educational outcomes.

Start the name in capital letter in the reference section, check reference number 1 and 20.

We follow the author’s preference for her last name spelling (Dr. Mercedes de Onis).

Other comments

These findings can form a basis for further study on the long term implication of stunting on genetically predisposed tall individuals.

Thank you!

Anil Kumar Sah, MPH (Reviewer 5):
Please include all comments for the authors in this box rather than uploading your report as an attachment. Please only upload as attachments annotated versions of manuscripts, graphs, supporting materials or other aspects of your report which cannot be included in a text format.

Please overwrite this text when adding your comments to the authors.

Overall the manuscript is poorly written. The present English language quality is not enough good and needs to be improved.

We have taken the suggestions of the referee and the other referees in improving the presentation of our study and have done our best to improve the writing.

Reference is not support, so Author has better to use reference management software. This manuscript needs substantial revision.

Thank you for this suggestion. All of our references are embedded in the text using the Vancouver citation style guide and the Zotero reference management software.

Abstract Section:

Q1. Author has better to mention few sentences which support title and objective.

We make the link to the title and objective as follows:

We estimated the associations between exposure to early life growth faltering at the population level and adult height and education outcomes in a sample of 21 low- and middle-income countries.

Q2. What are the study method, data collection techniques and tools?

We have done our best to summarize the methods in the revised Abstract and Methods sections. In the Abstract, we now write:

We conducted a synthetic panel analysis of 425 birth cohorts from 27 pooled Demographic and Health Surveys (DHS) that were conducted between 2006 and 2014. Data from historic DHS survey rounds were used to compute average height-for-age z-scores at the province-birth-year level. Cohort measures of early life growth were then linked to adult height and educational attainment measures collected on individuals from the same cohorts in subsequent (more recent) DHS survey rounds. The primary exposure of interest was population-level early life growth (region-birth year average HAZ) and growth faltering (region-birth year stunting prevalence). Multivariable linear regression models were used to estimate the associations between adult outcomes and population-level measures of early life linear growth.

Q3. What do you mean larger associations for men than for women?
Apologies for the lack of clarity. We find that the association between childhood HAZ and adult height is larger for men than for women. On page 9, we note:

When running a stratified analysis by sex (Table 2, columns 3 and 4), we find larger associations for men, with an estimated increase of 2.92 cm in adult male height for each additional unit increase in childhood HAZ, and an estimated 1.88 cm increase in adult female height for each additional unit increase in childhood HAZ.

Q4. How is your study result showing association between early childhood height and adult educational (0.269, 95% CI: [-0.68 - 1.22])?

Apologies for the lack of clarity – these results based on multi-variable linear regressions – we now describe this on page 9:

Table 3 shows our multivariable results for adult educational attainment. In unadjusted cross-sectional models, relatively large associations were found between childhood HAZ and highest grade attained (Table 3, column 1). In unadjusted models, each unit increase in childhood HAZ was associated with an additional 2.7 years of schooling. When we control for country of residence, as well as childhood and adult characteristics (Table 3, Column 2) the estimated coefficient declines substantially to an estimated 0.27 grades per unit increase of average HAZ, and is no longer statistically significant.

Q4. How is your findings supported conclusion?

As per our results section, we state that we do indeed find a correlation between childhood height at the region-cohort level and adult height, but we find inconclusive evidence that cohort-level childhood height is associated with increased educational attainment:

In fully adjusted models, each unit increase in cohort childhood HAZ was associated with a 2.0 cm [95% CI: 1.09 – 2.9] increase in adult height, with larger associations for men than for women. Evidence for the association between early childhood height and adult educational attainment was found to be inconclusive (0.269, 95% CI: [-0.68 – 1.22]).

This is re-stated in our discussion and conclusions section:

While early childhood linear growth at the cohort level appears to be highly predictive of adult height, the empirical association between early life growth and adult educational attainment seems weak and heterogeneous across countries.

Q5. Why did you registered in clinical trial registry, Justify?

Even though the study consists of secondary analyses of de-identified and publicly available cross-sectional data, we nevertheless thought it necessary to register our analysis plan at a study registry (we registered the study as an observational study but within a registry that happens to primarily cater to experimental studies). To this same point, we also received an official IRB
determination of human subjects exemption from the institutional review board at Harvard University (protocol number IRB16-0515) even when only de-identified data were obtained from the DHS survey program.

Key words:

You should write alphabetical order.

We have re-ordered the keywords in alphabetical order as suggested.

Introduction Section

Q1. References are manually done but you have better to use software?

All of our citations and references were handled by the Zotero reference management software.

Q2. Background should write in sequences (Broad to narrow).

We have aimed to do so in our background section.

Methodology Section

Q1. We don't find study design and setting

Our study design is described on pages 5-6 as follows:

This study constructs a synthetic panel of cohorts to assess the long-run association between childhood stunting and adult height and educational attainment. All data used in this study come from the DHS, which are nationally- and sub-nationally representative household surveys that provide information on a wide range of indicators in the areas of population, maternal and child health, and nutrition. More than 300 DHS surveys have been collected in over 90 countries since 1984 (25). To construct our synthetic panel, we use data from historic DHS survey rounds to compute average height-for-age z-scores at the birth cohort level. Birth cohorts are defined as all children who are born in a given region or province of a country, as defined by the DHS, in a given year (e.g. all children born in 2002 in Barisal region, Bangladesh). We then link our computed cohort measures of early life growth to adult height and educational attainment measures that are collected on individuals from the same cohorts in subsequent DHS survey rounds.

Our sample and setting is described on pages 7-8 as follows:

…our final analytic sample is comprised of 104,359 adult records representing 425 birth cohorts and across 27 DHS surveys that were conducted between 2006 and 2014 in 21 LMICs.
Q2. Is your study required data collection technique/tools or not, justify?

As we mention in the Data Availability section:

All data that are used for this study are available for free download after registering with the DHS Program at [http://dhsprogram.com/data/](http://dhsprogram.com/data/)

Q3. Make clear about sampling frame?

Our sampling frame is described from pages 5-6 in the Methods section, and we describe our final sample on pages 7-8 as follows:

…our final analytic sample is comprised of 104,359 adult records representing 425 birth cohorts and across 27 DHS surveys that were conducted between 2006 and 2014 in 21 LMICs. Adult height was available for a total subsample of 33,998 adults across 26 DHS surveys. Figure A1 in the Supplemental Materials further illustrates the process by which the analytic samples were constructed from the original DHS data. Table A2 in the Supplemental Materials presents a list of the countries and birth cohorts that are included in the final analytic sample, and Figure A2 in the Supplemental Materials presents a map of the countries that are included in the final sample.

Q4. How did you maintain quality, ethical issue regarding your study, clarify?

We refer the reviewer to our Ethics Approval and Consent to Participate statement in the Declarations section:

Only de-identified data were obtained from the DHS survey program. This study therefore obtained a human subjects exemption from the institutional review board at Harvard University (protocol number IRB16-0515). This research was conducted without patient or public involvement. Patients and the public were not directly involved in the development of the research question, outcome measures, or study design. Patients did not contribute to the interpretation of the results or to the writing or editing of this document.

Result Section

Q1. It's unclear; you had better to provide country wise.

While it is technically feasible to disaggregate our analyses by country, due to the relatively small number of provinces and regions in each country and the relatively small sample sizes at the country level, we found there to not be enough variation and statistical power to be able to make inferences at the country level. For these reasons, a disaggregated analysis would not be possible due to the limitations in our data.

Q2. Result should be clearly mentioned about association with CI Value.
Thank you for this suggestion. We have added 95 percent confidence intervals for each of our presented estimates in the Results section.

Discussion Section

Q1. You have mentioned in objective association but in discussion relationship (Correlation), Please justify.

We define associations as correlations (or conditional correlations) between our variables of interest and use this language to be clear about not being able to infer causal relationships from the results presented. We discuss this limitation in detail in the paper.

Q2. Correlate with finding

We have done our best to align our text with the main findings in the table.

Q3. Limitation of study should be mentioned in this section?

We discuss the study limitations on page 12 as follows:

The study presented has several limitations. First, despite the large dataset that was used for this study and the relatively large number of birth cohorts that were analyzed, the statistical power of the study is somewhat limited due to the population-level aggregation of the child growth data. Most countries in our sample have fewer than 10 regions, which results in somewhat noisy statistical inference once we include county-specific fixed effects and regional controls. A second concern with the study presented is the potential of regional confounders. Even though we control for several socioeconomic factors at the cohort and region level, we cannot rule out residual confounding through other unobservable regional factors, including regional genetic variation, that are correlated with both childhood growth and adult height and educational outcomes. Finally, our main model rests on the assumption that young adults still live in the region they were born in, which is likely to be true for the majority of the respondents in our sample; however, we cannot completely rule out concerns of migration. Given that migration most typically occurs from less developed rural areas to more developed urban places, it is possible that our estimated associations underestimate the true causal effect of childhood height because some of the rural children who are stunted in childhood would appear in adult urban samples. If it is the case that migration is selective in that the most talented (and tallest) children from the poorest areas migrate to areas with more educational opportunities, then our presented associations would likely be larger than the true causal impact of early life adversity on adult outcomes.

Conclusion Section

Q1. Limitation should mention in discussion section
Please see previous paragraphs for our discussion of study limitations in the revised manuscript.

Q2. Add a few sentences about recommendation based on conclusion.

Our main recommendation is to strengthen the evidence base on this topic. As we write in the revised manuscript:

Overall, the results in this study suggest that early life growth experiences are highly predictive of adult height, but not as much for educational attainment. Further research is needed to better identify the long run health and human capital consequences of early life growth and development.

Q1. Language is not good, so you should revisit.

We have improved the language in the text where necessary.

Ida Monfared (Reviewer 6):

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 Georgiadis & 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).

We have followed the reviewer’s suggestion and have added the following text and references to the Background (page 4):
A significant body of work has suggested that that stunting may be largely irreversible after the first 1,000 days from conception to a child’s second birthday, leading to an intergenerational cycle of poor growth and development (19,20). However, other studies have also shown evidence of “catch-up growth” in adolescence following early-life stunting (21), and even in the absence of interventions (22).

We have also justified our choice of covariates in the Methods section as follows (page 7):

Our adult- and child-level covariates aim to capture key determinants of child growth and development that have been identified in the literature, particularly maternal education, place of residence, socioeconomic status, and exposure to poverty (26).

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)).

We have run a sensitivity analysis in which we include father’s education as a covariate in our main height and education specifications. Findings from this sensitivity analysis (Tables A6 and A7) show that our original model estimates do not change significantly after including father’s education as a covariate.

Unfortunately, we do not have data on premature marriage among young women and are unable to include this covariate in our analysis.

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?

We refer to our response to the previous reviewer. While it is technically feasible to disaggregate our analyses by country, due to the relatively small number of provinces and regions in each country and the relatively small sample sizes at the country level, we found there to not be enough variation and statistical power to be able to make inferences at the country level. For these reasons, a disaggregated analysis would not be possible due to the limitations in our data.
Given that the region/province is the largest administrative unit within a country, the clustering by a higher order unit would imply that data be clustered at the country level, which in turn would imply a significant loss of variation in the sample in terms of the units of exposure (i.e. clustering at the country level would reduce the number of cohorts from 425 country-region-birth cohorts to 75 country-birth cohorts). The next most disaggregated administrative level after the region would be the enumeration area, and conducting analyses at this level would theoretically give us more sample and variation. However, due to resampling of enumeration areas each time a DHS survey is administered in a country, the same enumeration areas are not necessarily selected in each wave and therefore cannot be linked across time for the same country.

For these reasons, we aimed to find a balance by conducting our analysis and calculating our childhood exposures of growth at the country-region-birth cohort level.

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.

We have run a sensitivity analysis where we exclude Rwanda’s cohorts (Tables A8 and A9), and we find that our main results are robust to the exclusion of these data.

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.

We have included the following text in the study limitations (page 13):

In addition, our data does not allow us to examine catch up growth in height over time for the same children, nor do we have measures of changes in children’s cognitive development over time, which would allow us to make more extensive inferences on the potential lasting impacts of early life deficits in spite of later-life improvements.

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).

As a point of comparison, column 2 of Table 2 presents the full sample, while columns 3 and 4 present results that are stratified across gender.
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.

We have removed Column 1 from Tables 2 and 3. We have also adjusted the main text to remove discussion of unadjusted estimates.

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

Our apologies for the confusion on our column labels – we already account for cluster and country fixed effects as the reviewer recommends, but our column headings did not reflect this adjustment. We have simplified the columns to be as follows:

For analyses with adult height as the outcome:

Column 1: Estimates for the full pooled sample of countries, adjusted for covariates and controlling for country fixed effects, with standard errors clustered at the country-region-survey level.

Columns 2 and 3: Stratified estimates by gender, adjusted for covariates and controlling for country fixed effects, with standard errors clustered at the country-region-survey level.

For analyses with adult educational attainment as the outcome:

Column 1: Estimates for the full pooled sample of countries, adjusted for covariates and controlling for country fixed effects, with standard errors clustered at the country-region-survey level.

Column 2: Estimates for the full pooled sample of countries, adjusted for covariates and adult height and controlling for country fixed effects, with standard errors clustered at the country-region-survey level.

Columns 3 and 4: Stratified estimates by gender, adjusted for covariates and controlling for country fixed effects, with standard errors clustered at the country-region-survey level.

Our footnotes on each table also describe the adjustments that were made.

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.
Thank you for highlighting this. The negative association appears only in the subsample of women, and not in the sample overall. We do not have a good explanation for this: it is possible that there were some regions with high maternal education but low adult height outcomes conditional on the other covariates, but it is also possible that this result may just be a chance finding.

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.

We have added columns 3 and 4 which present results that are stratified across gender for both Tables 3 and A3.

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.

We have clarified this point in the abstract.

2. Line 96, add reference to this assumption as to why population-level growth faltering cannot be fully observed before age 2.

We have added the study by Victora et al (2010) as a reference.

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).

We have amended this text to indicate that our educational attainment outcome was defined as years of schooling, as per our definition 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.

Thank you for this suggestion. We have amended the y-axes to indicate percentages as opposed to frequencies. We have added survey years and DHS data sources to the figure caption. Our caption now reads:
The figure shows the average cohort-level HAZ as well the proportion of children under 5 who are stunted (HAZ < -2) across 425 cohorts and in 126 sub-national regions across 27 DHS surveys that were conducted between 2006 and 2014 in 21 LMICs.

We have also modified the main text describing the figure as follows:

Figure 1 shows the empirical distribution of average childhood height-for-ages for our full analytic sample of 425 birth cohorts. The average cohort HAZ in childhood was -1.53 (bottom panel), and average cohort stunting rate in childhood was 37.9 percent.

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.

We have noted this point in the text (page 9) as follows:

The average age among adults in our sample was 23.5 years (Table 1, top panel), and a slightly larger proportion of adults in the full analytic sample were women (53.8 percent). With this said, a much larger proportion of adults for whom we have height data are women (N = 30,414, or 89.4 percent of the analytic sample for adult height) compared to men (N = 3,584, or 10.6 percent of the analytic sample for adult height).

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

Thank you for this correction – we have changed the text as suggested.

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

Since we are running linear models and are not including quadratic exposure terms in our model, we would interpret our coefficient estimates as linear associations between our explanatory variables and outcomes. However, to avoid confusion (since we did not use the word “linear” anywhere else to describe our coefficient estimates), we have removed the word “linear” in the text. Our text now reads (page 10):

In terms of the childhood covariates that are included, educational attainment in adulthood appears to increase with the average maternal education in childhood and appears to be strongly and positively associated with urban residence in adulthood; in contrast, the relationship between educational attainment in adulthood and urban residence share in childhood displays a strong negative association.

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?
We apologize for the confusion in our explanation. Lines 177-8 refer to the coefficient of the association between adult height and years of schooling, which is strongly significant as seen in Table 3, Column 2. We have clarified the text as follows (page 10):

Interestingly, this association becomes inverted when we control for adult height (Table 3, Column 2). Our adult height variable in this model displays strong positive associations with educational outcomes; on average, we estimate that an additional inch (2.5 cm) of adult height is associated with about 0.2 additional years of schooling attained.

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

We have changed the titles in Tables 2 and 3 to “Cohort Average Under-5 HAZ”. We have also modified the titles in our tables in the Supplemental Materials section.

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.

We have made the text consistent by changing line 200 as follows (page 11)

Our results suggest that early life growth at the population level is highly predictive of adult height but is not significantly associated with educational attainment.

11. Line 207, rephrase.

We have rephrased our text as follows (page 11):

Given that the average adult in our sample was exposed to substantial growth faltering in childhood, and given that global stunting rates have declined substantially over the past 20 years (33), our findings imply that we may see substantial improvements in adult height in the LMICs that were examined in the coming decades.

12. Table A2, provide observations count per country.

We have added the number of observations per country and survey year in Table A2.

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

Since maternal education is averaged across the country’s regions, it does not display any variation within a given cohort (country-region). The legend for the 95 percent confidence interval was left in error and has been fixed.