Author’s response to reviews

Title: How useful are registered birth statistics for health and social policy? A global systematic assessment of the availability and quality of birth registration data.

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Author’s response to reviews:

To the esteemed reviewers of our manuscript How useful are registered birth statistics for health and social policy? A global systematic assessment of the availability and quality of birth registration data,

On behalf of Dr. Tim Adair, Dr. Alan D Lopez and myself, we wish to thank you both for your thoughtful and constructive reviews. We have made every effort to respond to your suggestions and criticisms, and we believe the manuscript has benefited meaningfully from your input. Although the underlying analysis and motivation for this manuscript remain the same, we submit this new version with substantial revisions throughout.

Cordially,

David E Phillips, PhD

Responses to reviewer comments below and highlighted in the attached file

Reviewer #1:

This is an interesting and well-written paper, proposing one approach to assessing the completeness and quality of birth registration data. The background and methods are comprehensive, the Results well-described, and the Tables and Figures appropriate. There are, however, weaknesses in the Discussion, Conclusion and Abstract in terms of under-emphasizing the two major caveats to the proposed approach: the calculation of completeness based on a denominator from annual estimates of total births produced by the United Nations Population Division (p.7, line 42); and the reliance on publically available data - in other words, essentially reflecting the availability of data rather than completeness. Whilst these limitations are
mentioned, their significance and the consequent need for cautious interpretation warrants greater emphasis.

In country-years where data are available we assume that all registered births are included in the public data. We have added a new paragraph in the Methods section and a sentence to the Discussion section to highlight this assumption. To the extent that that assumption is defensible, we find it defensible to consider the reported-to-estimated birth ratio a valid measure of registration completeness. We have edited the discussion section to make reference to this as a limitation as well.

However, we agree with the reviewer that this assumption is indefensible when discussing global “completeness”, which is also a matter of availability, as the reviewer notes. We have made revisions to every mention of “completeness” that are impacted by availability in any way, instead referring to these numbers as “availability”, or “the proportion of estimated births represented by available data”. Places where this has been corrected are listed below:

• Page 2 (Abstract), paragraph 1, sentence 2
• Page 2 (Abstract), paragraph 2, sentence 2
• Page 2 (Abstract), paragraph 3, sentences 1 and 3
• Page 7 (Methods), paragraph 2 (new paragraph)
• Page 10 (Results), paragraph 2, sentence 2 and 3
• Page 10 (Results), Figure 1 title
• Page 10 (Results), paragraph 3, sentence 2 deleted
• Page 10 (Results), paragraph 4, sentence 1
• Page 12 (Discussion), paragraph 2, sentences 1 and 4
• Page 12 (Discussion), paragraph 3, sentences 2 and 3
• Page 12 (Discussion), paragraph 4, sentence 1
• Page 13 (Discussion), paragraph 1, sentences 1, 2-4 (inserted), 7 and 8
• Page 13 (Discussion), paragraph 2, sentence 1 and 2
• Page 13 (Discussion), paragraph 3, sentence 2 and 4
For example, whilst the article acknowledges the methodological and empirical uncertainties in the UNPD estimates, the option of calculating ratios between these estimates and those from their database could have been explored, so highlighting the imprecision in both sources.

We agree that incorporating some measure of uncertainty into the estimates of completeness would be desirable. Unfortunately, the UNPD estimates of total births by age and sex do not include estimates of uncertainty intervals. While other publications of the UNDP include estimates from alternative methods, those do not include age/sex-specific estimates that we need to perform the analyses. Therefore, we unfortunately did not have the ability to make comparisons that highlight the imprecision in both sources, and chose to strictly focus on an assessment of the reported data, without assessing the quality of the estimates.

Similarly, the absence of public availability of birth registration data does not necessarily equate to lack of availability for health and social policy-making.

This concern is well noted, and we have added a reference to this fact in the Conclusion section.

The article would benefit from a more balanced presentation of these limitations, so generating both further research on other approaches - beyond this one - for ascertaining completeness, and further calls for greater public availability of data.

We have added two sentences to the conclusion section so that it addresses the implications of these limitations first, as well as a sentence to the abstract. We also believe many of the added caveats and limitations (noted above) included throughout the text further address this concern.

Minor comments:

1. The abstract needs to make clearer reference to how the paper addresses the first part of the paper title "How useful are registered birth statistics for health and social policy?"

We have revised the final sentence of the abstract to refer to the target stakeholders in the context of target-setting for birth registration strengthening.

2. P 9, line 60 "missingness" is not a real word

We have corrected each occurrence of “missingness” to “missing data”.

Reviewer #2:

The authors write about birth registration completeness and include it as component of the VSPI-B measure but the characteristic to which they are referring is, in fact, publicly available
registered birth data. As stated in the methods section, "[i]t is important to note that these are the data that are publicly available. Most, if not all, countries are likely to have some form of a birth registration system, but in many countries these data are not published." It is therefore erroneous to present the VSPI-B as measuring birth registration completeness when instead this element is the public availability of data on registered births.

We agree with this concern. In an effort to interpret the meaning of these results more correctly and clearly, we have made a number of substantive revisions throughout the text. In summary, we have made clearer the distinction between completeness and availability, by more-properly caveating which of the two quantities is under discussion at any given time. The list of modifications that address this are as follows:

- Page 2 (Abstract), paragraph 1, sentence 2
- Page 2 (Abstract), paragraph 2, sentence 2
- Page 2 (Abstract), paragraph 3, sentences 1 and 3
- Page 7 (Methods), paragraph 2 (new paragraph)
- Page 10 (Results), paragraph 2, sentence 2 and 3
- Page 10 (Results), Figure 1 title
- Page 10 (Results), paragraph 3, sentence 2 deleted
- Page 10 (Results), paragraph 4, sentence 1
- Page 12 (Discussion), paragraph 2, sentences 1 and 4
- Page 12 (Discussion), paragraph 3, sentences 2 and 3
- Page 12 (Discussion), paragraph 4, sentence 1
- Page 13 (Discussion), paragraph 1, sentences 1, 2-4 (inserted), 7 and 8
- Page 13 (Discussion), paragraph 2, sentence 1 and 2
- Page 13 (Discussion), paragraph 3, sentence 2 and 4

We do believe however that when data are available for a given country-year, it is reasonable to discuss the fraction of estimated deaths as completeness. This is based on the assumption that reported data reflect the entire birth registry, or that no registered births are withheld from the public release. We have also clarified this assumption in both the Methods section (by adding a new paragraph) and Discussion section (by adding a new sentence about limitations).
Our inability to quantitatively distinguish between completeness and availability also impacts the construction of the VSPI-B, as the reviewer correctly notes. We have added a further mention of data availability in the results section (Page 9, paragraph 4, sentence 1) to emphasize the appropriate interpretation of the VSPI-B. We have also ensured that “observed” VSPI-B values (i.e. values unaffected by data availability) are displayed prominently, for example in the figures in Additional File 1.

In the discussion, the authors state, "…these findings imply that approximately 74 million births per year occur in countries whose system do not systematically register them (or at least do not release the aggregate records).” There is a big difference between birth registration and the public availability of birth registration data! The authors should thoroughly reassess this element and its presentation throughout the manuscript and correct it to publicly available registered birth data or another comparable description.

We thank the reviewer for this suggestion. Following from the previous response, we have modified all references to global “completeness” so that they refer to global availability, or the percentage of births represented in publicly available data. We have also removed some content (Page 10, paragraph 3, sentence 2) which over-interprets this percentage as completeness. Now, all figures and numbers which are in any way impacted by data availability are noted as a description of data availability, and the term completeness is reserved only for analysis of available data.

In addition, the authors should consider mentioning the growing discussion on open data practices for evidence-based policy making. This goes along with the second point.

We thank the reviewer for this suggestion. We have added a new paragraph to the conclusion section which highlights the relevance of data availability to the entire manuscript, and suggests its implications for open data as well.

Another substantial concern is the author's presentation of the value of this database. The authors state in the abstract conclusion that , "[t]his objective and low-cost approach to assessing the performance of birth registration systems can be helpful to monitor country progress to improve birth registration..." but do not explain how such a database could achieve such a task. The authors mentioned other inflated statements such as, "[t]his index quantifies the extent to which registered and available birth data are useful for guiding public policy” when nothing is mentioned on how policy makers use evidence in policymaking.

We have added new content to the Abstract, Introduction and Conclusions to ensure that the applications of this work are thoroughly explained. In the Introduction, (page 5, paragraph 2), we now specify examples of the ways in which this work may help monitoring (facilitation of goal-setting and identification of data quality aspects that require attention). In the Conclusion, (paragraph 2), we make reference to the international comparability of this approach, which we expect to aid efforts to improve registration in the context of multilateral, bilateral and philanthropic investment in CRVS strengthening.
In addition, we have removed the specific phrases “useful for guiding public policy” and “public policy utility” from the Methods section, in an effort to describe the VSPI-B more plainly as an index of the accuracy of data, reserving references to public policy utility for the Introduction, Discussion and Conclusions sections. We have included citations in those sections to other work which specifically explores policy utility of the VSPI.

Additionally, the authors state that, "[w]e expect that the birth registration database, and our findings and framework for assessing its utility, will be of immediate use by both countries and development partners to inform national fertility policies and programs..." Again, the authors present no evidence in the background or conclusions on policymaker use of evidence in developing policy.

We believe that the absence of a comprehensive, internationally-comparable database of birth registration records is a barrier to the effective measurement and tracking of performance in the effort to improve CRVS systems worldwide. To this end, we have revised the last sentence on page 6 so that it excludes the reference to fertility policies per se and focuses on the data required to measure performance. We believe this is in complement to page 3, paragraph 2, which discusses the data gaps.

The authors should also rethink whether to mention policy makers as those benefitting, as they are privy to unpublished government data. It is stakeholders outside the government who are limited by current data availability.

We agree that this unpublished data may limit the within-country utility of this work. To that end, we have included the following revisions:

- Page 5, paragraph 2, sentence 5: Emphasized the usefulness of this work for tracking performance between countries
- Page 13, paragraph 3, sentence 4: Added a comment regarding the consequences of data availability concerns for where these results may be most useful
- Page 14, paragraph 2, sentence 2: Added a sentence acknowledging the additional data that may be available within-country.

The authors should consider rephrasing of the value of the database and also include supporting evidence. For example, the authors state, "[w]e implicitly assume that complete, accurate and recent information about maternal age, newborn sex, birthweight and birth order will provide the essential intelligence requires by policy about the distribution and trends of fertility for..." Assumptions are insufficient! Please provide evidence for the value of data for policymaking and resource allocation.

We agree with this assessment. Similarly, to the suggestion above, we have revised the Methods section so that it excludes references regarding how useful this metric may or may not be for public policy, and strictly refer to it in objective terms of measuring accuracy in the specific
fertility characteristics which it is designed to measure. Because of that, this sentence now regards these indicators simply as useful for describing fertility patterns. Note, however, that there remains one reference to policy in the Methods section, in which we explain our thought process for selecting certain indicators. The rationale for that is provided in the Introduction and Discussion sections.

The authors need to take more care in the phrasing of another element of the VSPI-B, the birth order of the child. The authors state birth order, which is a non-core item in the UNSD Principles and Recommendations, and includes live births and fetal deaths. If the authors are referring to birth order of only live births, then this element should be stated as 'live birth order.' However, in the Data sub-section within the Methods section, the authors describe this element as the number of registered live births specified by age of mother. Children born alive to mother during her entire life is altogether a different data element in the UNSD Principles and Recommendations and is limited to only live births. The authors mix these two different elements which differ in terms of data value (core/not core) and components (live births only versus all births). The authors should be clear on the element used in the composite measure and its presentation throughout the manuscript.

We used live birth order throughout the analysis. We have revised every mention of the indicator “birth order” to specify that it refers to livebirths specifically.

Countries in table 1 should be aggregated by regions as they are mentioned in the results section.

We thank the reviewer for this suggestion. A column for “Region” has been added.

The authors mentions in the discussion that, "…a number of large countries have not made birth certificate records available in the public domain…" The authors should change the sentence to mention registered birth data. In the current sentence it appears the authors are interested in publicly available birth certificates, which is not recommended as it can lead to identity theft and human trafficking.

This has been corrected.

The authors should avoid using parenthesis. Either include the parenthetical phrase in the sentence or exclude it.

We have attempted to correct this such that phrases which offer an addition statistic, example, or alternate definition are in parentheses, and phrases which can be rephrased as part of the sentence are structured in that way.