Author's response to reviews

Title: Mapping human resources for eye health in sub-Saharan Africa: current progress towards VISION 2020

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Author's response to reviews:

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Dear Editor,

We thank the Reviewers and Editorial team for the time and effort they have spent reviewing our manuscript, “Mapping human resources for eye health in sub-Saharan Africa: current progress towards VISION 2020” (MS: 5830160861201195).

Please find attached two versions of our revised manuscript, one with tracked changes, the other clean. Below, please also find our point-by-point response to each of the Reviewers’ comments, which we hope satisfy and balance everyone’s concerns with this piece of work.

Please do not hesitate to get in touch with further queries.

Sincerely,

Jen Palmer & Karl Blanchet (on behalf of the authors)

Authors’ response to reviewer comments

AU: Authors’ response in bold.

Reviewer 1
Reviewer: Serge Resnikoff
Reviewer’s report:
Major issues requiring attention
1. Title: the current title “Mapping human resources for eye health in
sub-Saharan Africa: current progress towards VISION 2020" suggests that the study reports data from all sub-Saharan African countries, while in fact the paper presents and analyses data from only 21 countries, out of 48. In addition, the 21 countries that are presented are mainly English speaking, while francophone and especially lusophone countries are under represented. It is therefore strongly recommended to amend the title accordingly, e.g. “Mapping human resources for eye health in 21 sub-Saharan African countries: current progress towards VISION 2020”. Reference should be made to the sample rather than to sub-Saharan Africa throughout the text, including in the abstract.

AU: We thank the reviewer for this suggestion and have amended the title accordingly. We also now discuss the data and findings more explicitly in terms of the deficiency in data from Francophone Africa (see first paragraph of Results and fourth paragraph of the Discussion). Please note that we discuss our findings in terms of sample size in detail in the 6th paragraph of the Discussion.

2. Page 10: “National-level eye health services data was collected […] in all 33 countries of sub-Saharan Africa with more than 4 million population as of the year 2010, as well as in 3 countries less than 4 million population where research collaborations already existed (Botswana, Gambia, Guinea-Bissau).” The rationale for this selection needs to be clarified and explained as it has a major impact on the generalization of observations to the entire sub-Saharan African region. Why there was no attempt to collect data in all 48 sub-Saharan countries?

AU: Following the experience of earlier HReH studies reviewed in the Introduction, we anticipated that accessing and verifying the quality of reported data would be challenging, and so decided a priori to focus (and limit) our efforts to the most important countries in sub-Saharan Africa –i.e., those with the biggest populations and therefore the greatest need for eye care services. We have added a sentence to the first paragraph of the Methods section to this effect.

3. Page 11-12: “In our analyses, we collected and reported separate data on all three cadres and in some cases combined cataract surgeons with ophthalmologists in a new ‘surgeons’ category to highlight human resource needs associated with cataract surgical performance.” This aggregation is highly questionable as in many countries only a fraction of ophthalmologists are actually performing cataract surgery. Combining these two categories would lead to a major overestimate of existing resources in some countries. Only the fraction of ophthalmologists actually trained to perform cataract surgery should be combined with “cataract surgeons” to reflect the surgical resources.

AU: We discuss this problem in more detail in our second companion paper and refer readers there in our Discussion. Throughout the paper we also present data for ophthalmologists and cataract surgeons both individually and together so that readers can make this distinction according to preference, and hope that both of these provisions are sufficient to address the conceptual challenges of analysing both HReH and CSR target progress and the associations between them.
Minor issues

1. Abstract. “Development of human resources for eye health (HReH) is a major focus of the Global Action Plan 2014–2019 to reduce the prevalence of avoidable visual impairment by 25% by the year 2020.” This should read “Development of human resources for eye health [...] by 25% by the year 2019”.

AU: We thank the reviewer for identifying this error and have made the suggested change.


AU: This correction has been made.

3. Page 7: “Cataract is also the leading cause of blindness, accounting for 50% of morbidity [3].” Please note that the WHO Action Plan [3] refers to Vision Impairment, not to blindness, and according to this Action Plan cataract is responsible for 33% of Global Vision Impairment. In addition, the Action Plan does not refer to morbidity. Rewording is recommended.

AU: This sentence on blindness has been removed.

4. Page 7: “Target annual cataract surgical rates (CSR) are calculated based on the prevalence of cataract blindness and severe visual impairment [...] to respond to different visual thresholds of need [16].” This is still very much debated. Recommend saying that «It has been suggested that target annual cataract CSR could be calculated based on the prevalence of cataract blindness and severe visual impairment [...] etc.”

AU: Fuller discussion of this debate has been added to the Introduction, following some additional suggestions by Reviewer 4.

5. Page 8: “Refractive errors can be corrected in a convenient, cost-effective manner by a wide range of personnel such as optometrists, ophthalmic assistants, opticians and other cadres [2]” Please note that Reference 2 (WHO Action Plan) is a secondary source for cost-effectiveness of optometrists, ophthalmic assistants, opticians and other cadres in correcting refractive errors. As this is of critical importance, a primary source should be referenced.

AU: A primary source (Fricke et al 2012) has been added. See also new sentences added to the end of this paragraph to explain the 20 per million ratio.

6. Page 11: “(iv) cataract surgeons (non-physician ophthalmic practitioners additionally trained in cataract surgery)”. Please note that some cataract surgeons are physicians. For example, this is the case in Madagascar where
MDs are specifically trained to do cataract surgery. Their training is actually very similar to the West African DO.

AU: We thank the reviewer for pointing this out and have added a statement to qualify this definition in the Methods section.

7. Page 12: “Similarly, optometrists and mid-level refractionists were combined in some instances in the analyses as a new ‘refractionists’ category.” What about the OCOs and Ophthalmic Nurses who in some places are trained to perform refraction? This should be mentioned in the discussion.

AU: A qualifying statement addressing this limitation has been added to the Methods section. We would like to draw the reviewer’s attention to an existing statement in the Discussion: “Optometrists are worryingly scarce in Francophone countries […], with ophthalmic cadres likely being diverted to do refraction work”.

8. Page 13: “Analyses of the eye health human resources workforce of individual countries are available in Additional file 3 and on the IAPB website.” Please provide the link to the corresponding page on the IAPB website.

AU: This link is not yet available—it will go live when this paper is published. We have therefore amended this sentence to read “will be made available”.

9. Page 21: “Optometrists are worryingly scarce in Francophone countries (maximum ratio 0.8 compared to the 20.0 target), with ophthalmic cadres likely being diverted to do refraction work.” Please note that typically, in Francophone countries “Techniciens Supérieurs en Ophtalmologie” are trained to perform refraction as part of any eye examination.

AU: In our analyses, Techniciens Supérieurs en Ophtalmologie were classified as ophthalmic nurses rather than refractionists and a clarifying statement has now been added to the Methods section.

10. Page 23: “The creation of a new intermediate cadre, cataract surgeons, to compensate for the concentration of ophthalmologists in urban areas may be one solution.” What are the data in this paper that are supporting this conclusion? Or is this one option among others that the authors recommend to test in the future?

AU: We see this option as one among many possible HReH strategies. We would like to refer the reviewer to our discussion of literature on retention & task-shifting and suggested policies on supply- vs demand-based HReH polices as well as to our second companion paper which discusses task-shifting between cataract surgeons and ophthalmologists.

11. Page 26 to 28: References
   · Please provide links accessing the following sources: 1, 2, 4, 5, 9, 14, 22, 25 and 26.
   · Please check the link provided for reference number 28 as it does not lead to any document.
- Please use the final version of reference number 3, rather than the draft version.

AU: The reference formatting has been adapted to allow URLs associated with these documents. Original reference 28 has been removed, as per Reviewer 4’s comment. Reference 3 has been updated.

Reviewer 2
Reviewer: Matthew Pearce

Minor revisions
1. Background paragraph 2, sentence one missing period.
AU: This has been added.

2. Table 2 – total refractionists – are these numbers correct? A large rounding error? They add to 103%.
AU: This is not a rounding error, rather, it is an outcome of the way data was included in the study; please see Table Note.

Discretionary revisions:
3. Background first and second sentence seem awkwardly worded.
AU: The second sentence has been adapted.

4. While this is a descriptive study, the authors draw the reader’s attention to a number of areas that might explain the reason for HReH shortages in the region (Background - end of paragraph 2). They state that filling these knowledge gaps would assist with the development of appropriate HReH strategies. It would be beneficial for the author’s to clearly specify best next steps to meet these knowledge gaps generally and address their recognized HReH shortages specifically. That is, it would be beneficial to draw the reader’s attention back to the need to determine why HReH shortages exist rather than just knowing that they do.

AU: We have attempted to raise questions surrounding country-specific research and possible options for next steps to understand reasons behind HReH shortages in both the present and companion manuscript Discussions, but are hesitant to generalise about the best solutions for the region since our data suggested there is such variation in the situation across countries. Our donor (Sightsavers) is, however, also working with co-authors at AVRI/IAPB-Africa to write a policy-oriented third companion piece to this study.

5. Consider moving explanation of “country mean” and “country median” up to “available information on HReh in Sub-Saharan Africa”
AU: A reference to the Methods section has been added here

6. In the first paragraph of the Multi-country comparisons section the authors
describe the categorization and mapping of surgeon and OCOs/nurse practitioner-population ratios. This does not seem to be referenced again outside of its use in the creation of figure 4. It could be condensed and moved to form a legend for figure 4.

AU: Following Reviewer 4’s suggestion, we have added more detail to this paragraph and retained it in the Methods section.

7. In the “HReH distribution by country” section, “Surgeons” subsection it might be beneficial to mention what percentage of the sample population Nigeria, Sudan and Ethiopia form.

AU: We hope that interested readers will see the Additional files to calculate statistics such as these.

8. In the “Refractionists” subsection a brief explanation of why Nigeria is thought to be the largest employer of optometrists would be beneficial. This is especially important as the paper generalizes to the region and states that optometric/refractionist human resources are most scarce while noting that the country with the most optometrists employed is not included in the count.

AU: At the reviewer’s suggestion, we have added the phrase, “based on analysis of partial data provided”.

Reviewer 3
Reviewer: Murthy Gudlavalleti
Reviewer’s report:
Minor revisions
1. Abstract Background line 3: Replace small work force with ‘density of work force is lower’. Same on Page 6 of the Introduction

AU: We have added a phrase about density to the Introduction but feel the term ‘small’ is still appropriate.

2. Keywords should be aligned to MeSH so that article can be accurately indexed

AU: MeSH terms have been added.

3. Paragraph 1 on Page 9 is sending out conflicting messages – On the one hand the authors say that ¾ of VISION2020 targets have been achieved and the very next sentence states that an increase of 2/3 is required. Authors should rephrase to avoid conflicting messages.

AU: This sentence has been amended; see also response to Reviewer 4, comment #9.

4. It will be advisable that the authors include a table to show what the VISION2020 recommendation for different cadres is, so that authors can read the manuscript in that context.
AU: We would like to draw the reviewer’s attention to Table 7, where we have attempted to do this.

5. In the methodology it should be clarified:
- How many questionnaires were sent out
- What proportion responded
- Are there differences between those who did and did not respond
- How was data sent by coordinators validated? Were any visits made to corroborate the findings?

AU: Similar comments were made by Reviewer 4; clarifications have been made to both the Methods and Results sections to address these comments.

6. Page 15 line 2 of the para on surgeons: There is no sample here so suggest rewording it as 2/3 of the ophthalmologists in the countries covered.

AU: With respect, we do define the data we collected on these 21 countries as ‘a sample’, acceptable in broad public health terms.

7. Suggest removing the term ‘sample’ everywhere as it is not actually a sample in its true sense.

AU: See above.

8. The term “Vision2020 targets” is not appropriate because it is a recommendation based on anticipated work load and ground realities on current availability. It should therefore be viewed as the minimum required rather than as the target which then connotes that nothing more is required. Suggest that authors modify this accordingly.

AU: In the spirit of this and several of Reviewer 4’s comments we have added discussion of the concept of each target into the Introduction. We have, however, decided to maintain the use of the term in this manuscript since this a term employed explicitly in VISION 2020 literature (e.g., see Action Plan 2006-11).

9. Page 15, last line: It is not ‘population studied’ as the manuscript is based on reported data so suggest this be modified accordingly.

AU: This sentence has been modified.

10. There are issues with the method of data collection which need to be highlighted as limitations in the discussion. This includes the complete dependence on the key informants for the data collected, lack of verification of accuracy of data etc

AU: We have tried to discuss the limitations of the data collection process throughout the Discussion and have added statements about work that could be done in-country to verify data reported here from one point in time, and the
inappropriateness of relying on a few key informants to obtain data on refractionists, especially.

Reviewer 4
Reviewer: Susan Lewallen
Reviewer’s report:
Major issues requiring attention include:
1. Pg 6 para 1. The authors refer to the 2014-19 Global Action plan with the goal of “reduction...by 25% by 2019”. This is very different from the VISION2020 goal elimination of avoidable blindness by 2020. They refer to both plans/initiatives throughout the paper. Which is the agreed upon goal now by WHO and NGOs; or is there one? This needs explanation.

AU: At the reviewer’s suggestion, we have amended the text to discuss these two different documents and associated goals more explicitly in the paper.

2. Page 7 para 1. I can’t confirm the targets that are supposed to be described in reference 2 as the citation is inadequate. In all references the authors need to provide enough information to allow the reader to find the specific document (or website) easily. Many references in this paper (e.g., 1-4, 6,9,22 etc) do not allow that Page 7 para 2. Can the authors provide a clear explanation of the way that the CSR targets (2000-3000 for Africa) they use have been estimated? Also clarify whether these targets are required to eliminate cataract blindness or to eliminate visual impairment at some VA level. This is an important point since the CSR target is the usual basis for estimation of manpower needs. While it may be beyond the scope of this paper to estimate target CSR in SSA the authors should provide the reader with background on how CSR “targets” have been estimated and how new data impact these and how they might vary on the continent. (see Lewallen et all, Ophthalmic Epi 2012)

AU: We have added substantially more information on this topic in the Introduction and clarified the references, we thank the reviewer for emphasising the importance of this dimension in our arguments.

3. Page 7 para 2 description of factors affecting CSR needs to be corrected: CSR targets are based on the estimated incidence of visually impairing cataract in those over age 50; incidence may be estimated by using prevalence of visually impairing cataract in those over age 50 and mean life expectancy. This then has to be adjusted for percent of population over age 50 to get a target CSR. )

AU: We have removed some of the detail on calculation of cataract incidence (and replaced this with two citations for interested readers) in favour of a larger debate on the acceptance of CSR targets in response to the reviewer’s request above.

4. Page 7 para 2. Why are two papers from Latin America (17,18) used to support a statement about CRS targets in SSA?
AU: We have replaced these references with the Lewallen et al 2013 model on cataract incidence in Africa.

5. Page 7 para 2. The authors state: “Surgical programmes can achieve this with…four surgeons per million population.” The reference for this is (19). Interestingly this same reference (19), in another graphic (figure 6), suggests that at least two surgeons per million are required - half the number suggested in the graphic (Fig 4) the authors quoted. The authors should explain how these targets were estimated; was any systematically gathered evidence used to inform them? It seems very inefficient to suggest that a surgeon only does surgery one day per week.

AU: We agree that there is this discrepancy in this reference (Cook & Qureshi 2005) and have tried to interpret their statements in relation to other VISION 2020 literature from that time cited in the next sentence (since these authors were active contributors to V2020 policy work at this time). A qualifying statement about the evidence base for this has also been added.

6. Related to #5 above: throughout this work, and key to aim ii, is an assumption that the targets suggested by the VISION2020 initiative for numbers of HRcH required are reasonable. These were proposed at the inception of VISION2020, based on several assumptions. The authors should explain where the targets came from and whether there is evidence that they are “correct”. The authors have not referenced a paper with evidence-based estimates for CSR targets for Africa. (Lewallen et al, Ophthalmic Epi, 2012).

AU: We agree with the authors and believe the above changes address this wider critique (including reference to the suggested paper).

7. Pg 8 top of page. VISION 2020 targets usually provided per million population (average “district” size). The authors refer here to a district of 100,000; a citation that can be easily accessed is needed here too.

AU: Another reference has been added.

8. Pg 8 para 2. “A global target of 20 refractionists per million has been chosen.” This needs a citation or an explanation of how the estimate was made.

AU: We have added new sentences to the end of this paragraph to explain the 20 refractionists per million ratio with additional, more explicit citations.

9. Page 9 para 1. Please check math. If (in 2006) 2210 ophthalmologists comprised ¾ of those needed, then the additional needed would be 736, not 1487.

AU: We thank the reviewers for their identification of an error here. Using 720.9 million as the 2006 study population denominator, the correct value is

\[
720,921,000 \times 4.0/1,000,000 - 2,210 = 674 \text{ (30% of 2,210)}
\]

The text has been amended.

10. Page 9. It is unclear if the information on ophthalmic nurses refers to nurses
who have undergone a formal (degree) training in ophthalmic nursing or to nurses who have had on-the-job training and have been functioning as ophthalmic nurses (often for many years). To ignore this latter group would miss a large portion of the HReH workforce.

AU: Data was not systematically collected on this type of nurse for consistency’s sake; a statement to this effect has been added.

11. Ref 28— if this is a personal communication then it should be noted and left as such without additional citations

AU: The statement “publicly available database currently under development [28]” has been removed.

12. Sudan was included in the review. Sudan is not considered part of SSA (by WHO or any other group) and should not be included. On table 5, removing Sudan (the outlier with 8.8 per million population) will likely change some of the findings.

AU: While not classified as such by WHO, Sudan is sometimes included as part of SSA in other UN categories. At the time of study design (2010/2011), we were unsure if separate (2008-11) data would be available for South Sudan specifically, which we considered important to include in the sample, if possible, so approached both government Ministries. Since we eventually received and were able to distinguish data for both new countries, we decided to include both in this paper, for interest’s sake. All raw data used in this study are available in an Additional File submitted with this manuscript, so other authors are free to calculate new statistics (e.g., practitioner medians or pooled ratios) for a differently configured sample of countries in future research, as we did using the VISION 2020 HReH Working Group 2006 survey data.

13. What specifically was done to “verify the quality of reported data”? (page 10)

AU: This statement has been replaced with more specific detail.

14. It appears that data needed for calculation CSR for each country was collected for only the year 2011. CSR can vary from one year to another (especially in small countries). How much annual variation is there in published CSRs for African countries? Are those for 2011 “typical”? The CSR in Gambia dropped precipitously in following years yet the manpower remained constant.

AU: We thank the reviewer for this observation. Unfortunately we were unable to examine this idea using the resources available. (It was difficult enough to get one year of CSR figures including the private sector and didn’t feel able to request more years, to be able to look at these figures over time.) We have added a phrase in the paper’s Discussion, encouraging individual countries to contextualise these figures by examining statistics over time.

15. On page 12 the authors state that data for Malawi and Zambia could not be obtained and that the Etyaale data set was used. Did the CSR figures in the Etyaale data set match those provided by the other countries included in this
assessment? Some verification would be helpful.

AU: We did try to examine this. We found that CSR reported by informants in this study (mainly for years 2010 and 2011) and CSR in the IAPB database (years not systematically provided, most countries last updated 2008) varied for each country by an average of 122 surgeries per million population (range 2-610), or by an average of 22% of our figures. We could not assess whether the IAPB database included data for all sectors (including private), as our study attempted to do. Although we felt this represented substantial variation from our figures, according to our ‘traffic light’ rating in the individual country profiles (using one-third of the target as a boundary to mark progress, i.e. above or below 500 surgeries per million), using the IAPB database, the CSR figure would have changed the classification for only one country (Benin: 550 in our database, 431 in IAPB). We have added two sentences to clarify this point in the Methods section.

16. Page 13 para 4; Please explain why these particular boundaries were selected (1/4 the V2020 targets? The Asian targets? etc)

AU: We tried to follow the Resnikoff et al 2012 study global ophthalmologist mapping protocol and have added a statement to this effect.

17. There is inconsistency in the use of the term “cataract surgeon.” Page 7 defines these as non physician practitioners- However on page 15 DR Congo is reported as one of the largest employers of “cataracts surgeons” and on page 17 it is noted that DR Congo and Madagascar have the largest number of cataract surgeons working in the private sector. Neither country allows non physician cataract surgeons. (Madagascar has a large number of “physician cataract surgeons” who do not go through the long training required by the system there to be called an “ophthalmologist” but do spend 2-3 years specializing in ophthalmology.) This leaves the reader confused by the definition used in other parts of the text and in the Tables.

AU: We have added a statement to qualify this definition.

18. Authors should compare their findings on productivity to two other papers from African countries reporting productivity of non physician cataract surgeons, (Courtright et al 2007 and Habtamu et al 2013.

AU: We have explored surgical productivity (with reference to the suggested literature) in our second, companion paper and refer readers there, in the Discussion.

19. Page 23- top. It is interesting that, although most African countries have prevention of blindness or eye health committees at national level (often with a national eye coordinator), 15 years into the VISION2020 initiative, it is so difficult to get the basic data sought by the authors. Could the authors comment on this? How did the countries from which they could get no data differ from the 58% of countries from which they did get data?

AU: We thank the reviewer for her observation and have incorporated a version
of her statement into our existing discussion of data collection difficulties (final paragraph of Discussion). We have also added more detail on the reasons for exclusion of some countries from this study and what linguistic category they came from (beginning of the Results section). More investigation on this topic is probably needed to be able to draw conclusions to sufficiently explain our experience with non-response – since most countries simply didn’t submit data after emails and phone calls (only 3 countries were excluded because data provided were insufficient). This may simply be a limitation of a desk-based approach.

20. The inclusion of very few Francophone countries and no Lusophone countries means that the findings are a representation of Anglophone Africa, not all of SSA.

AU: We agree with the reviewer; we have tried to highlight this limitation more strongly in the discussion of our analysis of linguistic trends. We also note differences from our sample compared to larger earlier surveys in the Discussion.

21. The authors find that, as a region, Africa is ¾ of the way towards meeting the HR “requirements” for surgeons – yet the CSR is only ¼ of the target. Obviously there’s a discrepancy somewhere. Perhaps productivity is more important than numbers? The authors touch on this when they describe the low productivity but this key issue deserves more discussion than it is given.

AU: Again, we thank the reviewer for her observation and have included this type of statement in our Discussion. We explore and discuss the relationship between surgeon HReH ratios and CSR in much greater detail in our 2nd paper from this study and refer the reviewer (and reader) there.

22. Table 7 needs references for the columns referring to HReH targets and the 2006 survey.

AU: These references have been added as a footnote to this table.

23. The second to the last line on page 23 on cataract surgeons seems to ignore the previous research on the topic; cataract surgeons are “not new” and the evidence regarding acceptance and productivity across Africa needs to be considered before making such a suggestion.

AU: Although the cataract surgeon cadre has been in existence in some countries (such as the Gambia) for decades, as a whole, we do consider the cadre relatively “new” in most countries that have adopted it; elsewhere this cadre might yet be adopted. We discuss this idea more fully in our second paper where we also reference cataract surgeon literature. We have tried to be cautious in our recommendation by using the phrase “may be one solution”, and the substitution of one term in that sentence.

24. What was the reason for doing the correlation with “geographic size” as on Table 6? It would seem more relevant to do a correlation with population density.
AU: This could be examined in future. We examined correlations with both geographic and population size and, without finding strong associations with either variable (except for one HReH cadre, nurses), felt further analysis of population density was not essential.

25. On table 7 please include the reference for the columns and include the number of countries in each of the surveys.

AU: We have added references to the surveys in a footnote to the table. We decided not to add the number of countries included in each survey because this ‘n’ varied for each practitioner category, within each survey. We discussed this in the paper’s Introduction and have noted that country n’s varied between each in the table footnote.

Minor issues:
There are a few typos and punctuation errors.
AU: Some errors have been identified and corrected.