Author's response to reviews

Title: Factors associated with data quality of the Routine Health Information System in Benin

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Author's response to reviews: see over
Dear editor, dear reviewers

Thanks you for your useful comments and suggestions on our manuscript. We have modified the manuscript accordingly and detailed corrections are listed in this response document point by point. We have highlighted the changes within the document by using the track changes mode in MS Word as recommended. We’ve uploaded the file with the others files.

The manuscript has been resubmitted to your journal. We look forward to your positive response.

Sincerely

Reviewer 1

Reviewer's report:
This is an interesting paper using a novel approach to assess the quality of RHIS data in Benin, and attempts to explore factors which may be associated with the data quality. As such, it has the potential to inform further development of RHIS data quality in Benin. However, some major revisions are needed.

Major compulsory revisions

Methods
The Methods would benefit from a more detailed description of the reports filled in by the health staff. The authors state these are periodic and are activity summary tables. However, I would be interested in how often these are filled in, the type of information contained in the reports, the number of data items per report etc. Is there only one type of report, or are there a number of different ones for different health programmes? Perhaps the authors can even provide details of how long it takes to complete a report. Also, are these reports used at the health facility level for any purpose? Or is there any feedback from the district level to the health facilities regarding performance or other issues?
Additionally, whose responsibility is it to fill in the reports? The authors mention that some staff who fill in reports are facility managers as well. How is the responsibility assigned? Is there only one such person per health facility? Is it always the same person who fills in the forms?

• We’ve added in the methods the requested clarifications in this section (see pages 4 and 5)

I also think it’s very important to clarify that the private health centres are also part of the RHIS (if that’s the case) and to what extent, at the start of the Methods. Often, in LMIC, the private health sector is not part of the RHIS, and the authors do mention in
the Discussion that the private sector is “not greatly involved in the RHIS”. However, private health centres were sampled in the study.

- **The private health centres are also part of RHIS.** We’ve completed the sentence in page 5. We mentioned in the discussion that “private sector is “not greatly involved in the RHIS” because all the private centers aren’t involved because there is a lot of illegal facilities and because the public sector is prioritized for resources dedicated to supervision and training.

The sampling description (pages 4-5) should probably include the actual numbers of health centres selected, and then within those the numbers of workers (if not just one per centre), and the number of data items in each batch.

- **We’ve added in the methods the details requested by the reviewer (see page 5).** The number of data items was variable depending on the type and number of reporting form filled by health worker. Moreover, we have used an equation independent from number of data items in each batch to estimate n and d*+1 (See Lemeshow 1991)

Perhaps a figure illustrating the sampling strategy may be helpful. How were the data items sampled from a batch? Were all the reports sent in the last 12 months compiled, and then the data items sampled from all those reports. Or was a report randomly selected and then data items sample from within that report? If the latter is true, then there would be some reports which were of lesser quality than others, biasing the results.

**All the reports sent in the last 12 months were compiled. In a batch, the data items were sampled randomly with a table of random numbers.**

We’ve added a paragraph to specify this aspect of methodology (see page 7 and 8)

The authors state in the Methods (page 4) that “computerisation” is still rudimentary in the health centres. Do the authors have details of the break-up of health centres with and without computers? Did the authors consider whether this may have had an effect on data quality?

- **There is no computer in the health facilities where this study has been carried out.** The computerization is linked with the health district level as we’ve explained it in the introduction and the methods

**Results**

In the first part of the results (page 8), the authors present the percentage of batches which were rejected due to poor data quality, as well as percentage of batches rejected based on the comprehensiveness criterion. What about the other criteria of reliability and accuracy?

- **We’ve completed this paragraph (page 9)**

Page 8: it would be useful to know the median number of samples prior to batch rejection for the sample overall. Also, is it possible to present these data for each of the criteria (comprehensiveness, reliability, accuracy)?
We’ve completed with a table (table 2) showing the median number of samples prior to batch rejection for the sample overall. Our database doesn’t give this information by criterion.

Figures 1 & 2: Why have the authors chosen only these two independent variables for the figures? Could perhaps all the results for each independent variable be presented in one figure (comprised of several small graphs) or table?

- We think also that pictures show differences better than numbers. The picture with all the survival curves is hard to read. That’s why we have chosen the two most interesting variables and have added the table for the others independent variable.

This would allow the reader to a quick visual summary of all the results (significant and not significant). Also, p-value would be useful on the figures.

- We’ve added the p value on the figures as recommended.

Focus group results, Page 10: it is stated that the health workers use “flowcharts”, however it is unclear what these are.

- These are guidelines for diagnosis and not flowcharts. We’ve corrected the sentence accordingly (see pages 11-12).

Discussion
The authors state that “In our study, perceived self-efficacy was association with the quality of the data, although the results should be viewed with caution from a statistical point of view”. I assume the authors are referring to the p-value being of borderline significance at 0.052. I think the language needs to be changed here as the phrase “caution from a statistical point of view” is vague and casts doubt on the statistical analysis.

- We’ve changed the sentence (page 13).

The authors state that the “private sector in Benin is not greatly involved in the RHIS” (page 12). This statement needs to be clarified. It seems from the study that the private facilities also report data. So why are they “not greatly involved”? This needs to be explained in the methods so the reader understands how the RHIS in Benin works and can read the results with this context in mind.

- We’ve clarified it in the paragraph context in the section methods.

In the sentence (page 12): “Moreover, since in our sample three-quarters of the health workers were from the public sector and 8 out of 10 of them were women, the relationship with data quality could be the result of a mistake”, I think the authors mean that the relationship could be due to confounding. Please revise this sentence, as saying that there could be a mistake casts doubt on the statistical analysis and results.

- We’ve reviewed this section.

The sample distribution should perhaps be presented with greater clarity and detail in Table 1, so that such differences are visible from the outset (e.g. have two columns, one for public and one for private facilities).
• We’ve amended table 1 as recommended

Page 11: the study results are compared to other studies of RHIS. Did these studies use similar methods to this study to make them comparable?

• The others studies didn’t use similar methods. We’ve specified it in the discussion. This can explain the differences (page 15).

Conclusion, second sentence, page 13: this sentence is unclear – could it please be revised.

• The sentence has been changed

Minor essential revisions
Introduction, page 3: Need the full form of JSI.

• Corrected (page 3)
Introduction, page 3: are the references cited for the PRISM framework correct (references 2 & 3)? The main PRISM reference by Aquil 2004 should be cited here (reference number 4 in the paper).

• The reference 2 and 3 are in correct place and we’ve added reference 4

Methods, page 6, line 4: LQAS is used without previously clarifying what the full-form of it is.

• Corrected (page 7)

Focus group results, page 10: it is stated that “health workers also seemed to be insufficiently qualified, as few had been trained and the training received had not always been appropriate”. I assume this means they did not receive RHIS training, but this need to be clarified in this sentence.

• Corrected (page 12)

Discussion, page 11, second para, first sentence: replace “routine health information system” with RHIS to be consistent throughout the paper.
Discussion, page 11: the term “healthcare pyramid level” is confusing, consider revising e.g. health facility level.

• Corrected (page 13)

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Declaration of competing interests:
I declare that I have no competing interests.
Reviewer 2

Reviewer's report
Title: Factors associated with data quality of the Routine Health Information System in Benin
Version: 1 Date: 14 February 2014
Reviewer: Marieke Verschuuren

Reviewer's report:
I felt that in general the article was well written, clearly structured and interesting. I do have however some suggestions for discretionary revisions, which in my opinion would improve the manuscript:

- Most importantly I miss in the discussion section a reflection on the policy implications of the findings of the study. The discussion now mainly focuses on how the findings compare to the results from similar studies in other countries. It would also be interesting to learn what the findings mean for the situation in Benin; what are the opportunities for improvement of the situation, what are the challenges? How is the political climate/opinion towards health information; are the policy makers at national level interested in health information, would they be willing to invest in improving the situation?

  - We’ve added a paragraph to deal with this part as recommended

- The methods section is a bit ‘tough’ to read. This could probably be improved by using bullets and/or tables (e.g. a table with the independent variables used).

  - We’ve reorganized this part by using bullets to limit the number of table in the article

- The definition of reliability is not clear to me: case correspondence with the case definition in the recommended terms of reference. Could this be elaborated a bit more, maybe (also) by adding an example?

  - Reliability has been checked by control of all the cases. The surveyor verify if all the cases reported, as for example “simple malaria”, correspond to case definition used in the guidelines book. If in the reporting form it was mentioned 5 cases for simple malaria, he checked every case reported in the register source: Does each case correspond to “fever + positive rapid diagnosis test” as recommended in national guidelines? If one reported case didn’t match with national definition used in the guidelines, we considered the data as non reliable (page 7)

- Please clarify whether the focus groups were held only with health workers that produced poor quality data? (clarify how the health workers were selected exactly for the focus groups).

  - Health workers were selected for focus group among all the health workers in charge of data collection in the municipalities involved in the study. They have been randomly selected among the volunteers which wanted to participate to the focus group (page 6)
- It is not clear to me why gender is a relevant variable. Apparently it is statistically significant, but what is the relevance? Did the researchers have some theory in advance why men would perform worse than women or vice versa?

  - This part has been removed with the new way of presentation (Univariate cox recommended by other reviewer) the pvalue is not significant

- In the conclusions, the sentence 'The results could be extensive (and...)' is not clear.
  - The sentence has been changed

**Level of interest**: An article of importance in its field  
**Quality of written English**: Acceptable  
**Statistical review**: Yes, but I do not feel adequately qualified to assess the statistics.  
**Declaration of competing interests**: I declare that I have no competing interests.
Reviewer 3
Reviewer’s report
Title: Factors associated with data quality of the Routine Health Information System in Benin
Version: 1 Date: 15 February 2014
Reviewer: Francoise Renard
Reviewer’s report:
Review of the manuscript “Factors associated with data quality of the routine information system in Benin”, Ahanhanzo & all.
This paper examines some of the human factors associated with the quality of the data of routine health information system. It is an important subject, since health indicators are key tools for health policy planning, and it is certainly appropriate to evaluate it in the context of developing countries, where resources are scarce and need to be used optimally.

However, this paper present important limitations for which we recommend major revisions.

Overall: the paper need to be reviewed for English, preferably by an English native speaker.

- The paper has been copy-edited by a team of experts (American Journal expert). We hope that this revised version will be appropriate for publication if it’s accepted.

Major revisions
Detailed comments.

Introduction
P3 &1 L6: the word “exactitude” used by Statistics Canada (in the cited reference) is defined as such: “Par exactitude des données statistiques, on entend la mesure dans laquelle l’information décrit bien le phénomène qu’elle doit mesurer.” This concept correspond to the validity and not to “accuracy”, this latter being more related to the precision, which is less important than validity for the quality of health information.

- This has been corrected

P3&2L3: “insufficient quality”: confusing since quality was defined just before as a set of 3 characteristics, including comprehensiveness;

- We’ve changed and now we’ve used poor quality instead of insufficient

P4&2: As the authors said, RHIS performance is affected by organizational, technical and behavioural factors. However, it should be specified which type(s) of factors this particular study intends to measure.

- We’ve completed the sentence at the end of introduction

Methods
P5&4 :“The techniques and tools used included a document review with a processing form to assess the quality of the data”. Not clear to me: what did they review, the summary reports compared to the individual records linked to it? How many items were on the documents?

- The surveyors compared data sampled on the reporting form with the register used in health facilities to record patient information. They used a processing form (evaluation form) to note their conclusion about data quality based on the 3 criteria.
- The number of items was variable depending on reporting form and activities concerned (example: outpatient care, maternity care, etc…)
- We’ve completed this part of the methods

It would be easier to understand with a little bit of information on the content; maybe the authors could provide the documents, and the evaluation form.

- We’ve provided for the reviewer an example of form (outpatient care) and a copy of the processing form

The method used (LQAS) is original, and, being cheap and parsimonious, well adapted to the context of resource limitation. However, the description of the method is not clear to me.

Unclear P6&2: “The quality of the data batch was assessed using the LQAS method with \( n=32 \) and \( d^*+1=3 \) (\( n \) size of the sample and \( d^*+1 \): maximum number of defective units expected per sample, \( N \) large, \( P_0=20\% \), \( N \) being the size of the batch and \( P_0 \) maximum proportion of defective units) [8-10].”

- We attempted to summarize this part of methodology because the main focus of the present paper was on factors identification. Moreover, we’ve submitted a paper on this part of the study related to our LQAS application.
- The principles, the methods for calculation of parameters and tables used are available in the methodological articles referenced "Lemeshow 1991 and Jutand 2000".
- We’ve completed this section to detail a bit more our methods and make it easier to understand

“Data comprehensiveness was defined as the “availability of the data across all of the documents in which it must be provided” for the twelve months. If the document had not been produced by the health worker, the data was considered incomplete.” Does this mean that the data was considered incomplete only if a document was lacking or if an item on a document was lacking?

- We’ve completed this part. Data is considered incomplete if it’s missing or if the document is lacking

Results:
In the section ‘univariate analysis’: this section should be totally reviewed. Results should be displayed in a table.
• We have completed the paper with a table to display findings of this section (table 2)
The association measure used is not specified, is it a hazard ratio?
The strength of association (hazard ratio, rate ratio or etc…) is not displayed, only the p value is presented, which is not a convenient way of displaying the results. From a low p value, we just know that there is a low probability of being wrong when claiming the results between groups are different. We don’t know nothing about the magnitude of the difference, which is the most important thing. An indicator of difference is however presented, this is the median number of samples prior to batch rejection; this latter is presented with confidence interval boundaries that are largely overlapping, which contrasts with the conclusions resulting from the low p values.

• As we used a comparison of survival curves, we used log rank test with its p value. We didn’t present CI for median number of samples before rejection but P25 and P75. To have an estimates of the strength of the association, we’ve completed our analysis using an univariate cox model and we’ve added in table 2 Hazard ratios with their CI 95%.

• P7,§2,L5: “There was no significant difference as concerns the average score for work engagement (p=0.06).” I would suggest more nuance, the 0.05 threshold is not amagic line, and results with a 0.06 p value should be regarded as almost significant , maybe the lack of significance is due to the small number. Once again, the strength of the association should be displayed, the p value being only an additional information.

• We’ve corrected the sentences to nuance the findings

It is a bit disappointing that no multivariate analysis has been performed. Of course the number are quite small but at least some variables could have been tested together;

• The constraints of our sample with the very low number in a group of dependant variable didn’t allow to proceed analysis with a multivariate analysis. As the number of independent variables in the model couldn’t exceed 10% of the size of the smaller group of the dependant variable; this size is too low in study to authorize us to use a multivariate model. We’ve specified it as a limit of our study.

• As we’ve explained it above, multivariate analysis especially cox regression couldn’t be carried out in our case

Discussion
Maybe one of the item to be discussed is the need for an evaluation of the pertinence, workload and added value of the items in the forms. A short form with pertinent items that health workers understand would certainly improve their compliance.

• We’ve added a part in this section to deal with this aspect
P12&1: don’t repeat the sentence you already cited above.

• corrected

P12&2I5: “moreover…..mistake”: I don’t understand why?

• We’ve removed this sentence.

P12&3L1: “organisational factors such as availability of resources were not associated with the quality of the data”?? This is not what comes out from the focus group ! they all say they have no time, they are interrupted by other tasks.

• corrected

Conclusions:
- Should be more limited: this study identified some of the factors…;

• corrected

- Would be good to repeat which factors were identified

• corrected

Level of interest: An article of importance in its field
Quality of written English: Needs some language corrections before being published
Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:
No conflict of interest.