**Author’s response to reviews**

**Title:** Physicians’ perceptions on the impact of telemedicine on recruitment and retention in underserved areas: a descriptive study in Senegal

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**Author’s response to reviews:**

Dear reviewers,

We are happy to inform you that we received your comments and would like to thank you for the quality of your work. You made very good comments and we are convinced that these comments will contribute to improve the quality of our paper. We tried to answer each of your comments and made changes in the text. We hope that our answers meet your expectations. Our responses are presented below:

I. Reviewer #1:

1) It would be a plus if more information could be added to the text: I agree.

   a) The research general objective: An objective section was added to the text.

   b) If the telemedicine was implemented in the country as a government intervention or as isolated initiatives: A sentence was added to the text about this comment.
c) If the respondents have had previous experiences with telemedicine: See Study design and participants. We added two sentences.

d) The interviewed physicians who work in Dakar have had experience working outside of Dakar (in underserved areas): We did not focus on that question.

e) How was the list of possible interviewees identified? National database, ministry of health: The Ministry of health provided the list of the 596 physicians working in public hospitals and 187 in district health. We added a sentence about that.

f) Is there a reason why the number of selected physicians working in public hospitals (5%) is higher than the physicians working in district health centres (16%)? This study was combined with another that focused on physicians’ beliefs. For this second study, we used the theory of planned behavior. It is recommended to include 30 participants when studying beliefs according to this theory. That’s why we selected 30 physicians by group.

g) The sequence in which the recruitment and retention factors mentioned by the participants are presented in the text should respect an order (such as importance or alphabetical…): The change is made

Also, some specific points could be reviewed

2) Page 5 of 28, line 24 - A keyword could be included to represent retention (e.g. recruitment and retention) and others (e.g. rural and remote areas; health services accessibility): We added the following key words: recruitment and retention, rural and remote areas, underserved areas and physicians’ perceptions.

3) Page 8 of 28, line 7 - "In Senegal, physicians are more numerous in Dakar, the national capital, than in other regions (1)". A ratio or a number to support this affirmation should be included: A ratio supporting that affirmation was provided.
4) Page 8 of 28, line 17 - "Despite these measures, the uneven distribution of physicians has worsened" a reference should be included to support this affirmation: A reference supporting this affirmation was included.

5) Page 8 of 28, line 31 - "Duplantie and colleagues demonstrated that telemedicine could have a positive impact on the individual, professional, organizational and educational factors that determine physicians' recruitment to and retention in underserved areas (5) Why was the impact positive? You should give examples: Some examples were included in the text.

6) Page 9 of 28, line 14 - "We used random sampling to purposive select 30 physicians among the 596 physicians working in public hospitals and 30 physicians among the 187 working in district health centres." It would be a plus if the number of physicians working in public hospitals and in district health centres be divided into physicians in Dakar and outside of Dakar (if possible by regions): We have the distribution of the physicians working in public hospitals and district health centres by region in the the table 2.

7) Page 18 of 28, line 36 - "The environmental factors that were mentioned by our participants are poor living conditions and the limited number of patients in underserved areas" - It is missing information about "the bad climatic conditions (n=2)". Yes, we added the missing information.

8) Page 19 of 28, line 4 - "The professional factors that were reported in this study are the lack of career advancement and professional development." This information differs from the results section "Professional factors highlighted by participants included the lack of professional development (n=2) and professional isolation (n=3)." : We made the correction.

9) Page 20 of 28, line 9 - "Finally, the identified economic factors inhibiting to underserved areas are low income and lack of incentives." It is missing information about "the lack of remoteness premium (n=11)" presented in the results section: Yes, we added the missing information.

10) Page 20 of 28, line 38 - "To address these factors, telemedicine should be paired up with other solutions." Instead of solutions, measures/interventions/initiatives should be used: We made the change.
11) Page 20 of 28, line 46 - "Telemedicine is not the only factor that determines physicians' recruitment to and retention in underserved areas, and identified those that our respondents considered to be among the most important ones." It is necessary to verify this sentence: We reworded this sentence.

12) Page 21 of 28, line 9 - "n: Nombre de participants" - should the word be Number instead? Yes, it is Number. We changed it.

II. Reviewer #2:

Title: the title is not well describing what the paper was about. The authors prefer "impact of telemedicine on physicians’ recruitment and intention in underserved areas…" Reading this title, one would expect the paper to be based on the impact of telemedicine interventions implemented in Senegal on physicians' retention and intention to stay working in underserved areas: We proposed another title, but what does the reviewer propose? To improve the quality of this paper, it will be better that he makes a concrete proposition of title.

The whole paper is bout eLearning. I didn't see anything about telemedicine. The title should be about eLearning: The whole paper is not about elearning. Don't forget that telemedicine includes teletraining and don’t confuse teletraining and elearning.

However, the whole paper is simply about physicians' perception on the effect of telemedicine on their intent to stay working in underserved areas. Find a better title suitting this paper: We proposed another title, but what does the reviewer propose? We need concrete proposition to better improve this paper. This comment is too vague.

The running title says "perception of Senegal's physicians on telemedicine". This is also not suitting what the authors have done in the paper: We proposed another title, but what does the reviewer propose?

The corresponding author mentioned he has PhD and on the first page of the paper. However, on the cover letter of this submission, the same author mentioned he is a PhD candidate. I feel this is
a serious misuse of titles which the author haven't achieved so far. This should be corrected: That was a mistake. I am now a PhD in Population Health. I am sorry about that. I could send my diploma if needed.

Abstract: The bold conclusion they have drawn from this paper is not right and not according to the title and results. "All the physicians surveyed agreed, but with different emphasis, that telemedicine is not the only factor that determines recruitment and retention...." I didn't read anything about perception in this conclusion: We changed the conclusion.

Introduction: the introduction section is very shallow and it is not based on sound arguments. This is one of the main flaws of this paper. This part should be developed with more arguments. How telemedicine could influence physicians' intent to stay working in underserved areas. How telemedicine would improve motivation of physicians, facilitate professional integration, improves knowledge management, access to specialist knowledge and improvement of consultations as well as medical care efficiency needs to be well argued. Authors should also provide a better argument what this study will provide to the existing knowledge base, and find a better justification of why this study is important: We introduced new sentences and made other changes.

"Several studies have demonstrated its positive impact on physicians' recruitment and retention (4, 5). Gagnon and colleagues reported positive findings in nine of the 13 studies included in their literature review (6). Dolea and colleagues found similar results (7)" What are these similar results? It is not clear: We deleted this sentence.

"This study explores their perceptions and the factors influencing their perception." This is not clear: Why is it unclear? This comment is not very helpful for us. We however made some changes.

Methods: The authors mentioned "....random sampling to purposive select...." This is a qualitative study, how can you combine random sampling with purposive sampling? Radom sampling is a probability sampling method while purposive is a non-probability sampling method: We deleted purposive from the sentence.
In addition, the authors have selected 30 physicians in each level of facility (Public hospitals and district health centres) while these two facilities have different number of physicians. How do you fix this number to 30 each? Why not 5, 10, or 20 or less or more? Normally, in qualitative studies, you interview potential respondents until you reach the level of "saturation". Besides that, the numbers are not based on proportional allocation. This is also reflected in the results section: This study was combined with another study that focused on physicians’ beliefs. For this second study, we used the theory of planned behavior. This theory recommends to include 30 participants when studying individuals’ beliefs. That’s why we selected 30 physicians by group.

The authors mentioned they use "interview schedule" as a data collection tool. What is interview schedule? We mean interview guide. We changed schedule by guide.

The interview questions displayed in table 1 are superficial and are not arranged according to level of difficulty. Ordering of the questions should have been from general questions (Q#4) to specific questions as in number 1 and 2 and 3. Q#1 and Q#4 are leading questions: Why should we arrange our questions according to level of difficulty when we need specific answers? Our Q#2 is related to Q#1 and Q#4 to Q#3. Q#2 have to follow Q#1 as Q#4 have to follow Q#3. It doesn’t make sense to ask Q#2 before Q#1 and Q#4 before Q#3. Concerning Q#5, it should come after Q#3 et Q#4.

The Duplantie and colleagues framework should have been clearly described in the methods section: It is not a framework. It is a classification and the different classes are mentioned in the text. See the reference.

Results: The arbitrary selection of physicians in the sample is reflected in Table 2 of the results section. There are no GPs working in public hospitals represented in the sample. The selection of participants is not systematic; it is rather haphazard: Most of the physicians working in public hospitals are specialist physicians. GPs are really rare in Senegal public hospitals. It is easier to meet trainee physicians than GPs in Senegal public hospitals.

Another major problem is that the physicians working outside Dakar are underrepresented in the sample, while the study is about recruitment and intention to stay in underserved areas. A physician working in Dakar would describe the situation as a physician working outside Dakar: That is not really true. The physicians working in district health centres are more numerous.
outside-Dakar than in Dakar (see Table 2). The reason is simple. Most of the district health centres are outside-Dakar. Most of the physicians working in public hospitals work in Dakar, because most of the public hospitals are in Dakar.

Table 2 is not linked with the text: Please see the sentence before the table 2.

Positive Perceptions: please revise the statement from line 36 to 46, page 9 "Finally……..experts". It is very confusing: we did it.

The paper has a mix-up of eLearning with telemedicine. The paper is about elearning not about telemedicine. This is reflected in the results for example: "Of course, it could retain us because we don't need to travel to Dakar to learn" (Male specialist physician: Don’t confuse teletraining and elearning. Telemedicine include teletraining. Here, we are talking about teletraining which involves at least an expert (usually from Dakar) and a physician (from Outside-Dakar).

Overall the results are superficial as they are based on a superficial interview questions: Our questions are may be superficial, but our results are very important for Senegal Health System which felt to equitably distribute its physicians. Our results can guide telemedicine strategies in Senegal. For example, they tell Senegal’s health authorities to not use telemedicine alone and to combine it with other interventions to better recruit and retain physicians in underserved areas. This is very important for us. It is also important to know that 60% of our respondents thought that telemedicine could have an impact on their recruitment and retention. The reasons why it could have an impact on their recruitment and retention are equally known.

Discussion. Overall the discussion is better than the other subtopics and it discussed the results very well: Thanks.

Line 29- 31, page 17 "They coincide with the results of the authors who stated that isolation, fatigue and stress at work can prevent physicians' retention (5)." This is not right: I deleted this sentence.

Also rephrase the next statement from line 31 to 37: It was rephrased.
Conclusion: The conclusion is nothing new. It is very superficial and there is nothing surprising new finding: Our conclusion is maybe nothing new, but it is adapted to our study, which shows that the majority of the interviewed physicians had a positive perception about the impact of telemedicine on their recruitment and retention in underserved areas. This is very important because we have here the first information on the perceptions of Senegal’s physicians about the impact of telemedicine on their recruitment and retention in underserved areas. We have also the information that telemedicine is not the only factor that determines the decision of Senegal’s physicians to work and stay in underserved areas. Finally, we have the first list of the other factors that determine the decision of these physicians to work and stay in underserved. We suggest that telemedicine should be used with caution as a means to recruit and retain physicians in underserved areas and we propose to combine it with other recruitment and retention strategies. This study, its results and its conclusions are very important for us, Senegal Health System and Senegalese people who are suffering from the misdistribution of physicians and the lack of adapted telemedicine system.

Everyone in the field would reach the same conclusion without doing this study. The authors should also provide a more substantial outlook of their study results: Maybe, but it is better to study and our study is providing the first information on the perceptions of Senegalese physicians on the impact of telemedicine on their recruitment and retention in underserved areas. Nobody focused on these questions before. We modified our conclusion.

Declarations:

List of abbreviations line 9 is in French, please change that to English if you are publishing your article in English: I changed it.

If you also have only 2 abbreviations, there is no need to have a list of abbreviation section: I deleted the list of abbreviations.

Authors' contributions needs to be revised. Please see the Vancouver authorship rule to write authors contribution. The co-authors (who are the co-authors). Mention the name of authors with initials: I mentioned the name of authors with their initials specifying the lead author (Birama Apho Ly) and co-authors (Ronald Labonté, Ivy Lynn Bourgeault and Mbayang Ndiaye Niang).
The paper needs to be proofread by a native English speaker for inappropriate use of words, outstanding grammatical and punctuation errors: We forgot two French words in the text, but two of us (Ronald Labonté and Ivy Lynn Bourgeault) are native English speakers. Five other English speakers revised this paper during my thesis defense last year at the University of Ottawa. Additionally, an editor revised it.