Author's response to reviews

Title: Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, North West of Ethiopia: A community - based cross sectional study Alemayehu Shimeka, Fekadu Mazengia and Solomon Meseret

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Author's response to reviews: see over
Dear Dr. Luwei Pearson,

Thanks for the comment,

We found the inclusion of MMR data from EDHS 2011 report important indicator of the status of maternal health in the country in recent time. Hence, accordingly we have included the figure in the revised manuscript.

Dear Dr. Rose Mpembeni

We would like to acknowledge for the valuable comments and on time review of our manuscript entitled **Institutional delivery service utilization and associated factors among mothers in Sekela District, North West of Ethiopia: A community-based cross sectional study.**

We found them important for the betterment of the paper. We responded one by one for the concerns/questions you raised in the following way with red texts being our responses for the comments:

**Minor Essential Revisions:**

1. **Abstract:**
   
   Well written but few areas need to be reinforced. Eg:
   
   **Introduction:** It should be clear that increasing attendance by skilled attendants throughout pregnancy is the key intervention to reducing maternal mortality and not institutional delivery services alone. This should be spelt out clearly because in areas with constraints of Human resource for health, deliveries can be conducted even by unskilled attendants!!

   Your comment is absolutely right. Increased attendance by skilled attendants throughout pregnancy is the key intervention. Hence, we have included the role of increased Anti natal care (ANC) follow up in the reduction of maternal mortality and the promotion of maternal health in the introduction section of the abstract and the main body of the manuscript.

   **Methods:** What methods of analysis were used to analyse qualitative data?

   We actually intended to use the complementary mixed methods in which we would like to corroborate the findings of the quantitative part with the qualitative part of the research. But from your last comment we (authors) have agreed to consider the quantitative findings only in this manuscript and develop another manuscript using the qualitative data. Therefore, we have eliminated the qualitative part throughout the manuscript.

   **Results:** Some statements need to be qualified: Eg variables like Residence of mothers—does this have to do with distance to facilities? Knowledge of mothers on what?
Residence of mothers in this research does mean whether the mother is Urban or Rural dweller. We opt to include this variable because health facilities are located in urban areas of the country and they are not as such available and easily accessible for mothers from most rural part of Ethiopia. Hence, we used the variable as proximal variable to assess distance/access from/to facilities.

2. Background:
Well written but should be reinforced with information about maternal health services in Ethiopia. How is the Health System in Ethiopia like?

Ethiopian health service delivery structure is a four-tier system. This includes Primary Health Care Unit (PHCU), district hospital, zonal hospital and specialized hospital. The PHCU includes one health center and five health posts. Each health post provides services to 5,000 people and staffed by health extension workers. One health center serves a total 25,000 people and lead by health officer. The PHCU provides comprehensive, integrated and community-based preventive and basic curative services. District hospital functions as a referral and training center for ten PHCUs. Zonal hospitals provide specialist services and training while specialized hospitals provide comprehensive specialist services, and in some instances serve as centers for research and post basic training. Maternal health services are given in health centers and hospital level; but not in health posts. [A Country Status Report on Health and Poverty. Volume II: Main Report. July 2005]

According to the policy, who is allowed to conduct deliveries?

Only a midwife, nurse, doctor and Health officers are allowed to conduct delivery. But health extension workers are not allowed to conduct delivery.

At what level of health facilities can women get delivery care services? Etc

The level of health facilities that mothers can give birth are health centers and hospitals but not health posts by the current policy. Now special training is being given to health extension workers to conduct delivery.

3. Study Design and period:
The information on the study area is too brief. One would expect to learn about the health system in Sekela Woreda. For example authors are mentioning the numbers of Health centres and Health posts, do all these provide delivery care?

What about availability of Health care providers?
The total numbers of health workers including health extension workers are 119 but there are only two midwives in the district and health extension workers are not allowed to conduct delivery by the current policy.

Are there only 2 midwives for the whole woreda?
Yes, only two midwifes in the entire district (Woreda)

If so what other cadres of health care providers provide delivery care?

They can provide, of 119 health care providers in the Woreda 47 of them provide delivery care; the rest of them are lab technicians, pharmacy technicians, sanitary technicians and HEWs.

What about other health indicators from the study area?

Eg accessibility to the health facilities, prevalence of FP etc.

Regarding accessibility as to the definition of the government, health centers should be available within 10km radius to the population, but in this district this requirement in not met, some health posts are being developed to health centers and new health centers are being constructed.

According to the district health report of 2010, the prevalence of any method of family planning methods in the district is 37%

4. Sample size Calculation:
Currently there are computer programs which are used to calculate sample sizes, so a manual sample size formular need not to be shown in the publication. Just a mention of how the sample size was calculated or the program used and the inputs you used to calculate the sample size and any assumptions you made.

As it could be seen in the edited manuscript we have made the necessary corrections. We used Epi_ Info version 2000 statistical package for calculating the required sample size. We briefly explained the software used, the inputs and the assumptions used in the calculation in the edited manuscript.

Design effect should be accounted for where cluster sampling technique is employed. In this study, Authors mention the sampling technique to be multistage sampling. Was this multistage cluster sampling or just multistage sampling technique? Also on pg 5 the authors mention dividing the study area into 2 Strata? Was this stratified sampling? This needs to be clarified

Why a design effect of 2? Need explanation and reference!

The sampling technique used for the inclusion of participants in the sample was multistage cluster sampling. We mentioned the study area was divided into two strata to mean the study population exists in two similar clusters/in this case which we explained as strata/. Now we have learned that we incorrectly used the term which could really
bring confusion. Accordingly, we have made corrections on the way we explained the sampling procedure used. This could be seen in the edited manuscript.

Regarding the design effect,
Sample size calculations for estimating proportions typically involve making the assumption of independence among sampling units. Lack of independence that is introduced when a clustered sampling design is employed can be adjusted by inflating the variance estimate. The design effect (DE) or variance inflation factor, is defined as the variance of the sampling design compared with simple random sampling.

As you mentioned design effect was considered as the sampling technique used was multistage cluster sampling. And this was done to minimize the sampling error which would arise because of using this sampling design as compared to the corresponding simple random sampling (SRS) which is more theoretical. Hence, we considered a design effect of 2 to increase the sample size to reduce the sampling variability due to the use of cluster sampling and thereby increasing the precision of the estimates.

We put 2 references regarding the use of a design effect of 2 in the method section of the edited manuscript. For simplicity, the reference that we used is:

1. Geoffrey TF: Practical sample size calculations for surveillance and diagnostic investigations. [http://vdi.sagepub.com/content/21/1/3.full.pdf+html](http://vdi.sagepub.com/content/21/1/3.full.pdf+html)

5. Data processing and Analysis:
What was the need of doing double data entry for just 10% of the questionnaires? Explain how this was useful in checking for data quality.

The purpose of double data entry was to check whether there were data entry errors such as implausible values, incorrectly filled values, e.g., entering 33 instead of 3. Because of the interest of time and effort we did the data check on only 10% of the questionnaires, just a sample. Our plan was if significant number of errors were observed, we would reenter the whole data. Luckily the errors were minimal during the double data entry.

In data analysis you used both binary and multiple Logistic regressions. This should be mentioned in this section
We have explained both binary and multiple logistic regressions in data processing and analysis section of the edited manuscript in recognizant of your comment.

What variables did you consider to be confounding which you therefore controlled for?
The variables controlled in the multiple logistic regression analysis were Place of residence, Age of the mother, Educational status of mother, ANC visit during last pregnancy, and Knowledge of mother as it could be seen from Table 6 of the manuscript.

6. Results:
In the third paragraph, Authors mentioned the distribution of time taken to the health facility and family size and referred to Table 1 but are not shown in Table 1:

We have made corrections accordingly. Hence, as it could be seen in Table 1 we included time and family size variables distribution.

Institutional Delivery Care utilization: The quotations from the qualitative study shows the reasons for home deliveries and therefore not in the right place. This information should be presented to support information given in Fig. 3.

Owing to your comment of removing the qualitative part, we left the comment unaddressed.

Fig 1: Will transmit a better message if it will show the delivery attendant rather than place of delivery since as mentioned above assistance by skilled attendant is the recommended intervention.

Fig 1 includes the place of delivery and skilled attendants' information. In this regard, yes, as you mentioned it is important to emphasize on skilled attendant to make it more informative. But place of delivery is either home or health institution. In addition, health institution delivery is used to mean delivery attended by skilled attendants at the health care institutions. And skilled home delivery is not supported by the current policy of the country, only those who are well to do and educated would call health care providers to attend delivery in home. That is why only few mothers attended by skilled health workers at home.

Table 2: The variable- Ever visit health facilities during pregnancy: This should be specified that it is due to illness or any other reason not related to the pregnancy. This is because as it appears now it should include ANC visits and hence should have a higher percentage than just ANC visits.

Ever visit health facilities during pregnancy is to mean ANC visit during previous pregnancy so corrected as ANC visit during previous pregnancy

Fig 3 showing reasons for home deliveries- Use of number of mothers who reported a particular reason is not proper. Percentages make more sense than numbers.

Yes, percentages make more sense, so we have converted it to percentages.
Factors Associated with Institutional Delivery service Utilization: Knowledge and attitude of mothers are shown to be significant predictors of Institutional Delivery Service Utilization. How were they assessed and analysed? Be specific about knowledge- it was knowledge on what?

A sort of questions on knowledge of ANC and delivery services were asked and mean score was taken as a cut of point to categorize mothers as knowledgeable and not knowledgeable. Similarly, questions on the attitude to use these services were asked and mean score was calculated then mothers categorized as having favorable and unfavorable attitude. Therefore knowledge was operationally defined as knowledgeable (mean score and above) and not knowledgeable (less than mean score); while attitude, favorable attitude (mean score and above), unfavorable attitude (less than mean score).

7. Discussion: Too much repetition of results in the discussion

We have tried to make corrections according to comments

Discretionary Revisions
1. The manuscript title is too long and this is because of many words used for the study area. The Authors should look for few words which can tell where the study was conducted.

We have tried to reduce the words which are actually used to further explain the study area. And we believe the current title could serve the same information regarding the description of the study area as the previous title.

2. Most of the data used in the manuscript is quantitative data- the input from qualitative data is minimum. Authors may consider using only quantitative data in this manuscript and develop another manuscript using the qualitative information.

Authors considered the comment given regarding the qualitative data and the plan is to prepare another manuscript which could complement the current findings.