

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Estimating the met need for Emergency Obstetric care (EmOC) services in three Payams of Torit County, South Sudan; a facility based retrospective cross-sectional study.
AUTHORS	Bayo, Pontius; Itua, Imose; Francis, Suzie; Boateng, Kofi; Tahir, Elijo; Abdulmumini, Usman

VERSION 1 – REVIEW

REVIEWER	Ngatho Mugo Sydney School of Public Health, Australia
REVIEW RETURNED	05-Sep-2017

GENERAL COMMENTS	<p>1. Is the research question or study objective clearly defined?</p> <p>The author needs to clearly define the objective of the study section p7-11. Please check this website for the definition of the met need for EmOC (https://www.measureevaluation.org/prh/rh_indicators/womens-health/sm/met-need-for-emoc)</p> <p>Please be consistent with the terms either use met need for EmOC Or met EmOC need see p.8, 37, 46, 3, 15, 26 and etc.</p> <p>2. Is the abstract accurate, balanced and complete?</p> <p>Abstract could be improved by remove subheading (setting & participant). E.g. This was a retrospective cross-sectional study conducted in four primary health care centers (PHCCs)..... please modify this section</p> <p>Please avoid beginning a sentence with a number that is not written out as indicated in P.44. Check the sentence P44-55 and considers editing this section.</p> <p>The author mention the met need was higher for urban compared to rural area p46. How did they stratify the study population? Why this figures was not included in the tables?</p> <p>Authors mention in p.48 {98.8% of complication were treated from hospital while the four PHCCs treated only 1.2%}. This statement is incorrect in the table 1 its {admission per facility}.</p>
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Why would the authors include the health facility {Kudo PHCC, Nyong PHCC, Lowoi PHCC since there was no record for the patient admission with EmOC?

It's seemed from table 1 that almost 99% of admission was recorded from the Torit Hospital only.

6. Are the outcomes clearly defined?

The outcome variables are not clear stated in p33,43 and author need to differentiate between the definition of outcome variables (met need for EmOC) and the steps of calculation of met need for EmOC.

Each term should be clearly defined

e.g

The primary outcome variables for this study is the met need for EmOC which was defined as the (The percent of all women with major direct obstetric compli-cations who are treated in a health facility providing emergency obstetric care (EmOC) in a given ref-erence period). Ref:

https://www.measureevaluation.org/prh/rh_indicators/womens-health/sm/met-need-for-emoc

The secondary outcome for this study was etc.

The outcome variables were calculated as..... etc.

The direct or major obstetric complication for this study consists of.....

It's not clear what the author meant by the different complication {in data collection section (p.46)}

Introduction:

This section lacks the logical flow of the ideas

Authors need to check this section also for disjoint/ complicated and long sentences {e.g. p 22-28, p.17-27.

P.61-17 (SDGs) emphasizing equitable development (of what)?

3. Is the study design appropriate to answer the research question?

This section should include details on the study facilities/ hospital Authors need to include details information about the study population/participants in the method section.

E.g the study participant consist of women aged between 14-49 who were admitted to the one of the health facility with direct or major obstetric complication between (date). A total of 254 women had direct or major obstetric complication out of 500 of delivery and etc.

It unclear whether data for this study was obtained from the an intervention study or through the admission of health facility record (see p10. E.g all admission record in maternity----- were review for intervention)???

What does authors mean by this sentence {p.20. information about the mode of end of pregnancy)?

	<p>What is the justification for the author not to exclude the health facility e.g {Kudo PHCC, Nyong PHCC, Lowoi PHCC} since these facility has (0%) admission for women with EmOC?</p> <p>Authors need to reassess the exclusion and inclusion criteria</p> <p>9. Do the results address the research question or objective? This section require major revisions</p> <p>Its not clear how the major obstetric complication variables were coded/categorized for result in table3. Explain such information in the statistical section</p> <p>In Table 3 its not clear and whether the author is:</p> <ol style="list-style-type: none"> 1. Comparing the characteristics of the patient with major obstetric complication (age vs parity) across the place of residence as mention in (p24-25) <p>OR</p> <ol style="list-style-type: none"> 2. Comparing the major obstetric complication cases across the place of residence as mention in (p41) <p>These 2 statements have different outcome/result. Please adjust the title or the result accordingly.</p> <p>It's also not clear whether the authors actually reviews 2466 and 352 of the patient admission record as mention {in p5 of the result section}?</p> <p>OR</p> <p>This number was estimated using the Crude rate for South Sudan as mention in p38-43 on sampling section)?</p> <p>11. Are the discussion and conclusions justified by the results?</p> <p>Over all revision to this section is need. Authors might need to consider discussing the main finding that is associated with the study outcome and give example from the available literature to support each finding.</p>
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REVIEWER	Hampus Holmer Faculty of Medicine, Lund University, Sweden
REVIEW RETURNED	07-Oct-2017

GENERAL COMMENTS	<p>My main concern is with the site selection. You chose to study only the 5 EmONC centers in Kudo, Nyong and Himodonge Payams, representing <1% of the South Sudanese population, and only 51% of Torit County. Indeed, you state that you wanted to investigate met need for EmONC in Torit County, but only addressed 51% of the population. I would recommend rewording the title and objective to reflect this, and explaining the selection and addressing the challenges this presents. (This is why I put 'No' for "Is the study design appropriate to answer the research question?" and "Do the results address the research question or objective?")</p>
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Relating to this, I wonder if patients from Himodonge and Kudo could also be seeking care elsewhere, adding to the met need there? This would be important to know for your main conclusion that met need for EmOC is very low in the rural area.

You reviewed 2466 patient admissions, but expected 2602 deliveries – does that mean that facility delivery was 95%? Or were 25% of the 2466 also from other payams (like the complications) – in which case coverage was 71%? Either way, one would think that 70-90% of complications would automatically present themselves if they're randomly distributed among women. Then the question is, why did the women who delivered in a facility not receive EmONC care if they were delivering in an EmONC facility?

The overall met need for EmONC of 65% is really quite good compared to data from other countries in the area (and the earlier study from South Sudan mentioned below) – and met need in Nyong with 88.67% is great.

It is interesting to note that the proportion of complications of the total number of admissions reviewed is so close to the expected 15% (352 complications to 2466 admissions \approx 14.3%).

Consider referring to the 2005 International Journal of Gynecology and Obstetrics paper "Availability and use of emergency obstetric services: Kenya, Rwanda, Southern Sudan, and Uganda" by Pearson and Shoo. They studied 7 facilities in Yambio and Rumbek districts in 2003 and found 0.6 and 1.5 % of deliveries happened in EmOC facilities, respectively. They further found that 2.1 and 5 % of expected obstetric complications were treated in EmOC facilities and a caesarean section rate of 0.1 % in both Yambio and Rumbek. Indeed, your findings indicate a better situation in parts of Torit.

Could you address why abortion makes up such a high proportion of all major obstetric complications (45.7%) – indeed it's 47 % in Yambio and 71% in Rumbek in the Pearson and Shoo paper, but appears to be lower in other East African countries.

It would be interesting to address the role of the PHCCs in referring patients on to the hospital – since they did not provide almost any interventions themselves, they may have assisted by identifying and transporting patients to the hospital. Did women in Nyong go straight to hospital or first to a PHCC for instance?

Specific comments

I believe the current term is "Emergency Obstetric and Neonatal Care (EmONC)", not EmOC.

In the National Bureau of Statistics report "Nyong" is called "Torit Payam" – which is correct? On page 6, row 19-20 you also cite its population as 47,071, whereas in the NBS report it is 47,253. You have the sum total right however.

page 4, row 8-9 – a quick calculation indicates that there were about 3,500 maternal deaths in South Sudan, not 1,500 (per World Bank DataBank there were in 2015: 12,230,730 inhabitants * 36 births per 1,000 people * 789 maternal deaths per 100,000 live births \approx 3,474 maternal deaths)

	<p>page 8 under "Ethical issues", please include the ethical approval number.</p> <p>References – most of your URL links are to an internal Liverpool website which I cannot open. Please use the official link (correct citations are downloadable to EndNote and other softwares using PubMed)</p>
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REVIEWER	Wit Wichaidit University at Buffalo, the State University of New York. Buffalo, New York, United States of America
REVIEW RETURNED	10-Oct-2017

GENERAL COMMENTS	<p>OVERALL COMMENT: The authors presented much-needed cross-sectional study on met needs of EmOC in South Sudan. Given the lack of publication from this region and the current political and socioeconomic context. The manuscript provides a valuable contribution to the literature and I urge the journal to seriously consider the manuscript for publication, albeit after a number of revisions. My comments are as follow:</p> <p>INTRODUCTION Page 4, First to third paragraphs (lines 5 thru 30): - Focus more on needs and met needs, particularly the definition and calculation of met needs.</p> <p>Page 4-5, fourth and fifth paragraphs (lines 32 of Page 4 thru line 26 of Page 5) - Explain why it is important to define whether a health facility is EmOC-Basic - Talk more about the public health implication of the study - The objective statement can be in a separate and independent paragraph at the end of this section. The phrase "Based on the focus of Sustainable Develop Goals (15)" can be deleted altogether.</p> <p>METHODS Sampling (Page 6, lines 37 thru 51) - State the assumption you made when you made sample size calculation (or move the assumptions from the back of the paragraph to the front. - Explain where you got the 15% incidence of major obstetric complication</p> <p>Data Collection (Page 7, lines 8 thru 37) - Specify who reviewed the admission records - Where the records in paper or in electronic format? In English or another language? - Did the data collector conduct any questionnaire interview?</p> <p>RESULTS Table 1 (Page 11, Line 34 thru Page 12, Line 34) - Why are there no CI estimates for #6 (Interventions for Treatment of the Complications) and #9 (Was the live newborn resuscitated?) - Also, any data on whether patients can be referred to another health facility?</p>
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	<p>DISCUSSION</p> <p>Page 15</p> <p>- Please comment on whether the low number of admitted cases in Himodonge and Kudo Payams could be due to the fact that the health facilities did not have the resources to admit the cases and the cases had to be referred elsewhere, whereas in Nyong that might not have been the scenario (because of location in urban areas with fewer constraints, connection to Torit State Hospital, etc.)</p> <p>Page 16</p> <p>- Discuss about the limitation and potential bias from using the crude birth rate of the entire South Sudan (36.1/1000 population) to estimate the number of pregnancies in the study area.</p> <p>- Page 16 Line 12: How many people are "several people" that were displaced by the Civil War? Please give an estimate to illustrate the extent of the displacement.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: NgathoMugo

Institution and Country: Sydney School of Public Health, Australia

Please state any competing interests: None declared

Please leave your comments for the authors below

Date: 5th September 2017

Reviewer's report

Title: Estimating the met need for Emergency Obstetric Care (EmOC) services in Torit County, South Sudan; a facility base retrospective cross-sectional study

1. Is the research question or study objective clearly defined?

The author needs to clearly define the objective of the study section p7-11.

Please check this website for the definition of the met need for EmOC

(https://www.measureevaluation.org/prh/rh_indicators/womens-health/sm/met-need-for-emoc)

Response: Thank for this comment. We have checked this site which has used "Monitoring Emergency Obstetric Care: a handbook. WHO, UNFPA, UNICEF, AMDD, 2009" as the main reference which we have also quoted extensively in our manuscript. The definitions and the data we have used is consistent with what is presented in both the above website and the source above. The objective of our study was to determine the 'met need' for EmOC in three Payams of Torit County in South Sudan by calculating the proportion of women with major direct obstetric complications in 2015 who were treated in EmOC facilities and to determine the burden of each complication.

Please be consistent with the terms either use met need for EmOC Or met EmOC need see p.8, 37, 46, 3, 15, 26 and etc.

Response: Thank you, this has been corrected- we have used "met need for EmOC"

2. Is the abstract accurate, balanced and complete?

Abstract could be improved by remove subheading (setting & participant). E.g.
This was a retrospective cross-sectional study conducted in four primary health care centers (PHCCs)..... please modify this section

Response: Thank you; we have modified this section but retained the sub-headings as these are required by the journal

Please avoid beginning a sentence with a number that is not written out as indicated in P.44.
Check the sentence P44-55 and considers editing this section.

Response: Thank you, this has been corrected

The author mention the met need was higher for urban compared to rural area p46. How did they stratify the study population? Why this figures was not included in the tables?

Response: Sorry, we have clarified on this; it is actually highest for NyongPayam – an urban area compared to the other two rural payams.

Authors mention in p.48 {98.8% of complication were treated from hospital while the four PHCCs treated only 1.2%}. This statement is incorrect in the table 1 its {admission per facility).

Response: We have corrected this statement now; all the complications were actually treated in two facilities.

Why would the authors include the health facility {Kudo PHCC, Nyong PHCC, Lowoi PHCC since there was no record for the patient admission with EmOC?

Response: We thought this was important because, by design, these facilities are meant to be at least basic EmOCcenters and perhaps it is critical for it be known that they are not been used for treatment of obstetric complications. This might raise the flag for another study to determine factors that make it so- quality of service, availability, access or cultural barriers etc.

It's seemed from table 1 that almost 99% of admission was recorded from the Torit Hospital only.

Response: This is true- especially for the obstetric complications. Torit state Hospital is the only hospital in Torit County so acting as the only comprehensive EmOC facility, but as we have discussed, the reason why other the facilities have not admitted patients with these complications probably requires further investigation.

6. Are the outcomes clearly defined?

The outcome variables are not clear stated in p33,43 and author need to differentiate between the definition of outcome variables (met need for EmOC) and the steps of calculation of met need for EmOC.Each term should be clearly definede.g

The primary outcome variables for this study is the met need for EmOC which was defined as the (The percent of all women with major direct obstetric compli-cations who are treated in a health facility providing emergency obstetric care (EmOC) in a given ref-erence period). Ref:

https://www.measureevaluation.org/prh/rh_indicators/womens-health/sm/met-need-for-emoc

The secondary outcome for this study was etc.

The outcome variables were calculated as..... etc.

Response: Thank you, we have re-written this section and clearly defined the outcome variable as well as the secondary variables.

The primary outcome in this study was the 'met need' for EmOC which was defined as the proportion of all women with major direct obstetric complications in the population treated in the health facilities between January 1st and December 31st 2015. The frequency of each complication and the appropriate interventions to treat them are reported as secondary outcomes.

Response: We have used the World Health Organization's definitions of major obstetric complications which we have indicated in both the introduction and data collection sections. These complications include hemorrhage (which can occur during antepartum, intrapartum or postpartum periods), prolonged obstructed labor, abortion complications, postpartum sepsis, severe pre-eclampsia/eclampsia, ruptured uterus and ectopic pregnancy

Comment: It's not clear what the author meant by the different complication {in data collection section (p.46)}

Response: We are sorry, this was not clear. It referred to each of the major direct obstetric complications, we have improved the writing and it is clearer now.

Introduction:

Comment: This section lacks the logical flow of the ideas

Response: We have re-written almost the entire section now.

Comment: Authors need to check this section also for disjoint/ complicated and long sentences (e.g. p 22-28, p.17-27.

Response: We have checked as advised and re-written this section.

P.61-17 (SDGs) emphasizing equitable development (of what)?

Response: We have deleted this sentence altogether as advised by one of the reviewers.

Comment: This section should include details on the study facilities/ hospital

Response: Thank you, we have added more details to this section

Comment: Authors need to include details information about the study population/participants in the method section.

E.g the study participant consist of women aged between 14-49 who were admitted to the one of the health facility with direct or major obstetric complication between (date). A total of 254 women had direct or major obstetric complication out of 500 of delivery and etc.

Response: We have modified this section; however, we did not select a particular age group to include in the study. Even though 14-49 may be the accepted reproductive age group, we did not use age as the basis to select the participants.

We also think the total number of women with major direct obstetric complications forms the basis of the main outcome of the study and is reported in the results section.

Comment: It unclear whether data for this study was obtained from an intervention study or through the admission of health facility record (see p10.E.g all admission record in maternity----- were review for intervention)???

Response: We have clarified this in the manuscript now; this was not an intervention study but the 'intervention talked about here are the treatment modalities used to manage the various complications

Comment: What does authors mean by this sentence {p.20. information about the mode of end of pregnancy)?

Response: We have also modified this and made it clearer; it actually refers to the pregnancy outcome at the end of that particular admission

Comment: What is the justification for the author not to exclude the health facility e.g {Kudo PHCC, Nyong PHCC, Lowoi PHCC} since these facility has (0%) admission for women with EmOC?

Response: We thought this was important because, by design, these facilities are meant to be at least basic EmOC centers and perhaps it is critical for it be known that they are not been used for treatment of obstetric complications. This might raise the flag for another study to determine factors that make it so- quality of service, availability, access or cultural barriers etc. We have included this in our discussion section as well

Comment: Authors need to reassess the exclusion and inclusion criteria

Response: We have now clarified this in the section for 'study population'
9. Do the results address the research question or objective?

Comment: This section require major revisions .Its not clear how the major obstetric complication variables were coded/categorized for result in table3. Explain such information in the statistical section

Response: In table 3, we have compared the characteristics of the patients with complications (age and parity) across the Payams of residence, and we have also stated it in the 'statistical analysis' section. The confusion was in the title of that table which we have corrected now.

Comment: In Table 3 its not clear and whether the author is:

1. Comparing the characteristics of the patient with major obstetric complication (age vs parity) across the place of residence as mention in (p24-25)

OR

2. Comparing the major obstetric complication cases across the place of residence as mention in (p41)

These 2 statements have different outcome/result. Please adjust the title or the result accordingly.

Response: We have modified the title of table 3; we are actually comparing the characteristics of patients across the Payams of residence.

Comment: It's also not clear whether the authors actually reviews 2466 and 352 of the patient admission record as mention {in p5 of the result section}?

OR

This number was estimated using the Crude rate for South Sudan as mention in p38-43 on sampling section}

Response: In the opening statement of the results section, we state that 2,466 admissions were reviewed, 352 were admissions for major direct obstetric complications. However, 98 of these were not included in the analysis because 90 cases were from outside study areas and 8 lacked information on residence.

The figures calculated from crude birth rate are quite different: 2,602 births were expected in the study area, from which 390 complications were expected. We have mentioned these figures in the methods sections and then summarized all in table 2 as we calculate the 'met need' for EmOC.

Comment: Are the discussion and conclusions justified by the results?

Over all revision to this section is need.

Authors might need to consider discussing the main finding that is associated with the study outcome and give example from the available literature to support each finding.

Response: We have improved the discussion section, we have tried to compare our results with other studies in the Country (though fairly older studies) and within the region.

Reviewer: 2

Reviewer Name: HampusHolmer

Institution and Country: Faculty of Medicine, Lund University, Sweden

Please state any competing interests: None declared

Please leave your comments for the authors below

Thank you for an interesting study and the opportunity to review!

Below are some general and specific comments.

General comments

My main concern is with the site selection. You chose to study only the 5 EmONC centers in Kudo, Nyong and HimodongePayams, representing <1% of the South Sudanese population, and only 51% of Torit County. Indeed, you state that you wanted to investigate met need for EmONC in Torit County, but only addressed 51% of the population. I would recommend rewording the title and objective to reflect this, and explaining the selection and addressing the challenges this presents. (This is why I put 'No' for "Is the study design appropriate to answer the research question?" and "Do the results address the research question or objective?")

Response: Thank you, we appreciate this deficiency and have modified the title of the article.

Comment: Relating to this, I wonder if patients from Himodonge and Kudo could also be seeking care elsewhere, adding to the met need there? This would be important to know for your main conclusion that met need for EmOC is very low in the rural area.

Response: South Sudan is diverse with sparse distribution of health facilities. For both payams, the other nearest health facility is Torit State Hospital which is included in this study. Except for the populations displaced by conflict and other social challenges like hunger to other distant locations (which we have discussed as a limitation), there are no other facilities where the populations can access care from.

Comment: You reviewed 2466 patient admissions, but expected 2602 deliveries – does that mean that facility delivery was 95%? Or were 25% of the 2466 also from other payams (like the complications) – in which case coverage was 71%? Either way, one would think that 70-90% of complications would automatically present themselves if they're randomly distributed among women. Then the question is, why did the women who delivered in a facility not receive EmONC care if they were delivering in an EmONC facility?

Response: Sorry, the 2,466 admissions were not admissions for only deliveries; these were all admissions including the gynecological cases, admissions for conditions in pregnancy that are not direct obstetric complications such as malaria in pregnancy etc. The records for all these -both gynecological and obstetric cases were stored together– and we had to review all of them. We have changed the term 'maternity wards' to 'obstetric and gynecological wards'- perhaps this is where the confusion is.

Comment: The overall met need for EmONC of 65% is really quite good compared to data from other countries in the area (and the earlier study from South Sudan mentioned below) – and met need in Nyong with 88.67% is great.

Response: We have now discussed this point further in the respective section. In Malindi district in Kenya, the unmet need for EmOC was reported as only 11% in 2008 and only 6% in 2009 (Echoka .E 2014), although there were significant limitations we have pointed out in our text. The study in South Sudan was in 2005 (more than a decade ago), even when the Country had not signed the comprehensive peace agreement. We think the difficulties in access could have been more that time than they are now.

Comment: It is interesting to note that the proportion of complications of the total number of admissions reviewed is so close to the expected 15% (352 complications to 2466 admissions ≈ 14.3%).

Response: As we have already explained above, the figure 2,466 is not only for deliveries. Consider referring to the 2005 International Journal of Gynecology and Obstetrics paper "Availability and use of emergency obstetric services: Kenya, Rwanda, Southern Sudan, and Uganda" by Pearson and Shoo. They studied 7 facilities in Yambio and Rumbek districts in 2003 and found 0.6 and 1.5 % of deliveries happened in EmOC facilities, respectively. They further found that 2.1 and 5 % of expected obstetric complications were treated in EmOC facilities and a caesarean section rate of 0.1 % in both Yambio and Rumbek. Indeed, your findings indicate a better situation in parts of Torit.

Response: We have now referred to this article in our discussion

Comment: Could you address why abortion makes up such a high proportion of all major obstetric complications (45.7%) – indeed it's 47 % in Yambio and 71% in Rumbek in the Pearson and Shoo paper, but appears to be lower in other East African countries.

Response: There is a lot of maternal febrile illness (particularly due to malaria) and anemia in South Sudan, which might explain the abortion cases. However, we did not focus on the causes of each of the complications in this particular study and did not want to speculate over this. We have now recommended this as a focus for another study

Comment: It would be interesting to address the role of the PHCCs in referring patients on to the hospital – since they did not provide almost any interventions themselves, they may have assisted by identifying and transporting patients to the hospital. Did women in Nyong go straight to hospital or first to a PHCC for instance?

Response: The referrals were looked at in this study; in table 1 item 7, there were only 2 patients referred to a higher center and these were from Torit state hospital to Juba-Teaching Hospital. We have now alluded to this point in our discussion

Specific comments

Comment: I believe the current term is "Emergency Obstetric and Neonatal Care (EmONC)", not EmOC.

Response: The 'N' in EmONC refers to neonatal resuscitation for birth asphyxia. Although we assessed this variable in this study (see table 1), it is not included as one of the direct major complications while calculating met need for EmOC. For purposes of consistency, we preferred to leave the 'N' out.

Comment: In the National Bureau of Statistics report "Nyong" is called "Torit Payam" – which is correct? On page 6, row 19-20 you also cite its population as 47,071, whereas in the NBS report it is 47,253. You have the sum total right however.

Response: Sorry, this was an error, we have corrected it

Comment: page 4, row 8-9 – a quick calculation indicates that there were about 3,500 maternal deaths in South Sudan, not 1,500 (per World Bank DataBank there were in 2015: 12,230,730 inhabitants * 36 births per 1,000 people * 789 maternal deaths per 100,000 live births ≈ 3,474 maternal deaths)

Response: Sorry, this was an error on our side, this figure was actually meant to be 3500 (and not 1500), we have corrected this error.

Comment: page 8 under "Ethical issues", please include the ethical approval number.

Response: The approvals did not have numbers

Comment: References – most of your URL links are to an internal Liverpool website which I cannot open.

Response: We have modified the references

Reviewer: 3

Reviewer Name: Wit Wichaidit

Institution and Country: University at Buffalo, the State University of New York. Buffalo, New York, United States of America

Please state any competing interests: None declared

Please leave your comments for the authors below

OVERALL COMMENT:

The authors presented much-needed cross-sectional study on met needs of EmOC in South Sudan. Given the lack of publication from this region and the current political and socioeconomic context. The manuscript provides a valuable contribution to the literature and I urge the journal to seriously consider the manuscript for publication, albeit after a number of revisions. My comments are as follow:

INTRODUCTION

Page 4, First to third paragraphs (lines 5 thru 30):

- Focus more on needs and met needs, particularly the definition and calculation of met needs.

Response: These paragraphs have been re-written as advised; we deleted the entire first paragraph Page 4-5, fourth and fifth paragraphs (lines 32 of Page 4 thru line 26 of Page 5)

- Explain why it is important to define whether a health facility is EmOC-Basic

Response: This explanation has now been included

- Talk more about the public health implication of the study

Response: The second last paragraph in the introduction section has stressed this point

- The objective statement can be in a separate and independent paragraph at the end of this section. The phrase "Based on the focus of Sustainable Develop Goals (15)" can be deleted altogether.

Response: This has been corrected as advised

METHODS

Sampling (Page 6, lines 37 thru 51)

- State the assumption you made when you made sample size calculation (or move the assumptions from the back of the paragraph to the front.

Response: We have modified this section stating the assumptions but not moved sentences too much to ensure the flow of information used in the formula is consistent

- Explain where you got the 15% incidence of major obstetric complication

Response: This has now been explained; it is an estimate by World Health Organization.

Data Collection (Page 7, lines 8 thru 37)

- Specify who reviewed the admission records

Response: This has now been specified as advised

- Where the records in paper or in electronic format? In English or another language?

Response: These have been clarified

- Did the data collector conduct any questionnaire interview?

Response: There were no questionnaire interviews conducted for the purpose of this study

RESULTS

Table 1 (Page 11, Line 34 thru Page 12, Line 34)

- Why are there no CI estimates for #6 (Interventions for Treatment of the Complications) and #9 (Was the live newborn resuscitated?)

Response: As indicated in Table 1, n is not equal to 254 (the sample for this analysis) for the interventions for treatment since some patients got more than one intervention, so we could not include the CIs for this item. However, we have now included the CI for item #9 but using the sample n= 112 (the number of the live neonates)

- Also, any data on whether patients can be referred to another health facility?

Response: Yes, this data is included in item 7 of table 1

DISCUSSION

Page 15

- Please comment on whether the low number of admitted cases in Himodonge and KudoPayams could be due to the fact that the health facilities did not have the resources to admit the cases and the cases had to be referred elsewhere, whereas in Nyong that might not have been the scenario (because of location in urban areas with fewer constraints, connection to Torit State Hospital, etc.)

Response: We have now improved this point in our discussion. Usually patients who are referred are in the admission records but these facilities did not have any admissions in their records for obstetric complications. There were only two referrals in this study (table 1, item 7) and these were from Torit state hospital to Juba teaching hospital.

Page 16

- Discuss about the limitation and potential bias from using the crude birth rate of the entire South Sudan (36.1/1000 population) to estimate the number of pregnancies in the study area.

Response: We have discussed this now as a limitation

- Page 16 Line 12: How many people are "several people" that were displaced by the Civil War? Please give an estimate to illustrate the extent of the displacement.

Response: We have also indicated figures in the text now.

VERSION 2 – REVIEW

REVIEWER	Wit Wichaidit University at Buffalo, The State University of New York, USA.
REVIEW RETURNED	07-Dec-2017

GENERAL COMMENTS	<p>General Comments:</p> <ul style="list-style-type: none">- The authors should be commended for a revision well done. I have minor comments and suggestions, mostly pertaining to the format and writing style of the article.- My general recommendation, if possible, is for the authors to carefully check for punctuation and spelling errors. <p>ABSTRACT</p> <p>In the Result section, change from "The commonest obstetric complications..." to "The most common obstetric complications...", and change "...the commonest interventions" to "the most common interventions".</p> <p>INTRODUCTION</p> <ul style="list-style-type: none">- Be careful of the punctuation marks. For example, the end of the sentence should not include a comma before a reference with no phrase afterward (e.g., change from "...and ectopic pregnancy, (2)." to "...and ectopic pregnancy (2)." Make these removals throughout the section.
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	<p>- Before the sentence "As such, evidence about met need for EmOC, nature of obstetric complications and associated interventions in Torit County are lacking...", mention in 1-2 sentences about Torit county in brief to give readers the context of the study setting.</p> <p>METHODS</p> <p>Sampling</p> <p>- Why did you need to do sample size calculation when you already included all facility admissions in the study area in your study, and the denominator for met needs was the estimated number of emergency obstetric complications in the area?</p> <p>Main outcome measures of study</p> <p>- Please consider whether this is actually how you calculate met needs: "The primary outcome in this study was the 'met need' for EmOC which was defined as the proportion of all women with major direct obstetric complications in the population treated in the health facilities between January 1st and December 31st 2015."</p> <p>- It's up to you, but I would write it as "The primary outcome of the study was the 'met need' for EmOC, defined as the proportion of women treated for major direct obstetric complication in the study area divided by the estimated number of women with major direct obstetric complication in the study area, between January 1st and December 31st, 2015."</p> <p>RESULTS, not "THE RESULTS"</p> <p>- Change from "therefore, included" to "therefore included"</p> <p>Descriptive information</p> <p>- Once again, "most common" not "commonest"</p> <p>DISCUSSION</p> <p>- In the first paragraph, for the sentence "The implication is that about 12% of women with obstetric complications who needed emergency care in these settings did not access it and this figure was very high in Kudo (83.56%) and Himodonge (75.41%) Payams." Is it 12% or is it actually 35%? The overall met need was 65%, right?</p> <p>- Also, for the last sentence "This is not to suggest that all those women who did not access care must have died but even if they survived, for them to do so without making contact with the healthcare system raises a big public health question.", it might be useful to talk about this in latter paragraph (with more details on the public health implication, beyond the fact that there is one). The first paragraph is to highlight the findings.</p> <p>- Paragraph 2: No comment. I just want to let the authors know that I highly appreciate the insight!</p> <p>- Paragraph 3 ("There are several factors..."): Personally, I feel that there is too much detail here, and some of the content actually spills over into Paragraph 4, and other parts of the content was redundant of Paragraph 4. Consider trimming down, revising, or removing Paragraph 3 altogether.</p>
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VERSION 2 – AUTHOR RESPONSE

Reviewer: 3

Reviewer Name: Wit Wichaidit

Institution and Country: University at Buffalo, The State University of New York, USA.

Please state any competing interests: None declared

Editorial Requirements:

- Please work to improve the quality of English throughout the manuscript, either with the help of a native speaking colleague or with the assistance of a professional copy editing agency.

Response: Thank you for the advise; the colleague- II, a native English speaking member of the team has read through and helped in making the necessary corrections.

Reviewer(s)' Comments to Author:

General Comments:

- The authors should be commended for a revision well done. I have minor comments and suggestions, mostly pertaining to the format and writing style of the article.
- My general recommendation, if possible, is for the authors to carefully check for punctuation and spelling errors.

Response: Thank you very much for your constructive comment. We have checked carefully the punctuation and spelling errors and corrected where necessary.

ABSTRACT

In the Result section, change from "The commonest obstetric complications..." to "The most common obstetric complications...", and change "...the commonest interventions" to "the most common interventions".

Response: Thank you for your comment. We have changed this throughout the document.

INTRODUCTION

- Be careful of the punctuation marks. For example, the end of the sentence should not include a comma before a reference with no phrase afterward (e.g., change from "...and ectopic pregnancy, (2)." to "...and ectopic pregnancy (2)." Make these removals throughout the section.

Response: We checked and removed these commas throughout the document.

- Before the sentence "As such, evidence about met need for EmOC, nature of obstetric complications and associated interventions in Torit County are lacking...", mention in 1-2 sentences about Torit county in brief to give readers the context of the study setting.

Response: Thank you very much for this comment; we have included this statement "Although it has been stated that at least 50% of the population in Torit County live within 5kms of a public health facility and at least 50% of the population are within one hour's walking time to the nearest public health facility, it is not clear if the people who really need the health care services are accessing it" to show the available information regarding access to health care services in Torit county.

METHODS

Sampling

- Why did you need to do sample size calculation when you already included all facility admissions in the study area in your study, and the denominator for met needs was the estimated number of emergency obstetric complications in the area?

Response: Thank you for this comment; although we have included all facility admissions (which is the requirement to calculate 'met need' for EmOC) we still had to calculate a sample size to show the minimum number that needed to be studied to show a significance of the result cognizant of the fact that access and utilization of services is actually low in South Sudan.

Main outcome measures of study

- Please consider whether this is actually how you calculate met needs: "The primary outcome in this study was the 'met need' for EmOC which was defined as the proportion of all women with major direct obstetric complications in the population treated in the health facilities between January 1st and December 31st 2015."

- It's up to you, but I would write it as "The primary outcome of the study was the 'met need' for EmOC, defined as the proportion of women treated for major direct obstetric complication in the study area divided by the estimated number of women with major direct obstetric complication in the study area, between January 1st and December 31st, 2015."

Response: Thank you for your comment. In the outcome measure section, we have simply defined the 'met need' and said how it is calculated in the analysis section. The 'met need' was calculated by dividing the number of women with major direct obstetric complications treated in the facilities in the study area between 1st January and 31st December 2015 by the total estimated number of complications in the same period (which was estimated to be 15% of the expected pregnancies).

RESULTS, not "THE RESULTS"

Response: We have changed this as advised

- Change from "therefore, included" to "therefore included"

Response: We have changed this as advised

Descriptive information

- Once again, "most common" not "commonest"

Response: Thank you for this correction; we have effected it to "most common" throughout the document

DISCUSSION

- In the first paragraph, for the sentence "The implication is that about 12% of women with obstetric complications who needed emergency care in these settings did not access it and this figure was very high in Kudo (83.56%) and Himodonge (75.41%) Payams." Is it 12% or is it actually 35%? The overall met need was 65%, right?

Response: Sorry about this, it was actually supposed to refer to the unmet need in Nyong payam but we have corrected it from 12% to 35% for the whole study setting.

- Also, for the last sentence "This is not to suggest that all those women who did not access care must have died but even if they survived, for them to do so without making contact with the healthcare system raises a big public health question.", it might be useful to talk about this in latter paragraph (with more details on the public health implication, beyond the fact that there is one). The first paragraph is to highlight the findings.

Response: Thank you for this comment, we have removed this sentence "This is not to suggest that all those women who did not access care must have died but even if they survived, for them to do so without making contact with the healthcare system raises a big public health question" from that section.

- Paragraph 2: No comment. I just want to let the authors know that I highly appreciate the insight!

Response: Thank you

- Paragraph 3 ("There are several factors..."): Personally, I feel that there is too much detail here, and some of the content actually spills over into Paragraph 4, and other parts of the content was redundant of Paragraph 4. Consider trimming down, revising, or removing Paragraph 3 altogether.

Response: Thank you very much for this comment, we have trimmed down paragraph 3 by removing the first two sentences and improved paragraph 4. We feel uncomfortable deleting it altogether as the main public health message we are passing to the stakeholders is discussed in those paragraphs

VERSION 3 – REVIEW

REVIEWER	Wit Wichaidit University at Buffalo, the State University of New York. United States of America.
REVIEW RETURNED	22-Dec-2017
GENERAL COMMENTS	The authors should be commended for a nicely made revision. I wish them happy holidays. Well done and congratulations.