

## PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

### ARTICLE DETAILS

#### Title (Provisional)

SERVICE AVAILABILITY AND READINESS TO PROVIDE MATERNAL AND NEWBORN HEALTHCARE SERVICES IN KILIMANJARO REGION, TANZANIA: A CROSS SECTIONAL STUDY

#### Authors

Kimario, Agathon Avelin; Mahmoud, Ashraf; Thomas, Jonaviva A.; Mallilah, Bernardine P.; Mlay, Pendo S.; Olomi, Gaudensia; Mmbaga, Blandina

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### VERSION 1 - REVIEW

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<b>Reviewer</b>	<b>1</b>
<b>Name</b>	<b>Mathai, Matthews</b>
<b>Affiliation</b>	
<b>Date</b>	<b>26-Mar-2024</b>
<b>COI</b>	<b>I have no competing interests</b>

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The study reports on "readiness" of facilities to provide basic and emergency obstetric care, but not on the "availability" of these services as stated in the title. Availability of medicines, commodities, guidelines, trained staff, etc inform on the potential of health facilities to provide essential and emergency care i.e. "service readiness". However "service availability" should be documented by data on the performance of essential and emergency obstetric care functions. The criteria for designating health facilities as "basic" or "comprehensive" emergency care facilities are defined by the demonstrated performance of "signal functions". Reporting that facilities are ready to provide services without reporting how well they function has limited practical value.

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<b>Reviewer</b>	<b>2</b>
<b>Name</b>	<b>Ekenna , Adanma</b>
<b>Affiliation</b>	<b>University of Nigeria Teaching Hospital</b>
<b>Date</b>	<b>14-Apr-2024</b>

**COI** **None declared.**

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A well-written manuscript filling an important gap in the literature. Here are a few comments.

Could the authors include the total number of facilities in the sampling frame for completeness?

On the tables, it may be useful to include the number of the facilities on the heading of each column e.g., Regional hospital, n=1.

A word needs to be said about the ethical considerations in this study.

Is the reader to assume that once the items are identified as available that they are functional or valid? Could this be a limitation? Can this be addressed in the discussion?

The study limitations should be highlighted.

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<b>Reviewer</b>	<b>3</b>
<b>Name</b>	<b>Dinis, Aneth</b>
<b>Affiliation</b>	<b>University of Washington</b>
<b>Date</b>	<b>17-Apr-2024</b>
<b>COI</b>	<b>I have no competing interests</b>

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This manuscript reports the assessment of service availability and readiness in MCNH services in 37 health facilities in Tanzania. I enjoy reading this work, and I have the following comments and suggestions:

Please use continuous line numbering throughout the document to facilitate reference. The current numbering system forces the reviewer to also reference the page/ section.

Abstract

Please add the period in which the service availability and readiness were assessed in your objectives.

Introduction

In line 39, the United Nations target relative to EmONC is mentioned. What was Tanzania's status regarding this target before your assessment was made?

The maternal and neonatal mortality rates from the Sub-Saharan region are well stated, but it would be important to mention the data from Tanzania as well.

In line 43, it is stated that the government has launched several programs to lower maternal and newborn mortality. When were these programs launched?

In line 47, it is mentioned that a “recent nationwide survey revealed...” Please add the exact year this survey was conducted.

## Methods

In the sampling session, please add information about the total number of health centers and dispensaries available in all seven districts where the 37 health facilities were selected.

Line 10- dependent variables: Explain in detail how service availability and service readiness to provide basic and comprehensive emergency obstetric and newborn care are defined and composed. This needs to include the items and functions included in each outcome and how those items and functions were selected.

Line 43-48: It mentions that data collection was executed around availability and readiness. However, it's unclear what the physical presence of delivery services means when it refers to availability. Please clarify how many and type of items were selected to describe availability.

Data analysis lines 21-23: “The analysis focused on service availability, examining the physical presence of services and service readiness, assessing the availability of essential inputs(tracer items).” Please describe how this examination was made and what tracer items are referred to. Additionally, explain in detail how mean scores were calculated.

General observation of methods: there is a need to add more information about how availability and readiness are defined by explaining the number and type of items included in each category. As we know, the SARA tool provides a vast list of items, and it's unclear how items were selected and how the mean scores were calculated. This information is crucial for the reader to understand how SARA was used in this case and how this study can be replicated.

## Results

The abstract and study area sections mention seven districts of the Kilimanjaro region. I expected seven district hospitals, but the results cite 8 district hospitals. Why is that?

Table 1: I suggest adding information about whether your facilities meet the criteria for BEmONC and CEmONC. In other words, it's important to know if the facilities included in your sample( dispensaries, health centers, district hospitals, and Regional hospitals) have the required criteria to provide BEmONC or CEmONC before your assessment.

I am a bit confused about the inclusion of maternal/newborn deaths review and routine user fees as characteristics of the facilities. What is the national policy about user fees in public hospitals in Tanzania? Is maternal/newborn death review required to happen in all types of health facilities?

To better understand the study setting, it would be interesting to see in Table 1 the mean number of antenatal visits, deliveries, maternity and postpartum beds, and maternal and child nurses or physicians.

Please standardize how the numbers are presented in the tables. Table 2 only presents absolute numbers, while Tables 3 and 4 show the number and the percentage.

Lines 6-8 on page 11, mention that the majority of the signal functions were available, and it is summarized in the supplemental table. These signal functions were not described in your methods, and the reader might not understand your results. Please describe EmONC and BEmONC in your methods section.

Table 3: Specify the type of trained staff that is been reported.

The equipment and supplies presented in Tables 2 and 3 are similar. That raises confusion about the definition of availability and readiness. In both (availability and readiness) does it include the functionality of this equipment? Were these items counted in each service where they are supposed to be or just verified the existence of at least one item in the entire facility to be considered available? Please clarify all these questions in the methods section.

Line 37- Facility readiness to provide BEmONC

It's not clear how these readiness scores were calculated. Please clarify in the analysis section.

Table 4 reports that there is 100% of trained staff in CEmONC, but in page 14, lines 10-14 it is declared that staff receiving training is low. How the 100% in table 4 was estimated? How the numbers reported in lines 10-14 were estimated? Please clarify these questions in your analysis section.

Discussion

The execution of maternal and newborn health reviews is highlighted in the beginning the discussion( lines 6-20). I am confused if this data is considered availability or readiness because it was described as characteristic of the study sites. I suggest focusing the discussion of the results on service availability and readiness, as this is the focus of this paper.

Lines 22-27 say that this study highlighted that training regarding maternal and newborn health care is still inadequate. However, Tables 3 and 4 suggest the opposite: most staff are trained. Please clarify these inconsistencies.

A general observation about the discussion: I have the impression that the discussion it is not well aligned with the results presented. I suggest focusing the discussion on what was found about service availability and readiness to provide basic and comprehensive emergency obstetric and newborn care as a package and not discussing single items.

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## **VERSION 1 - AUTHOR RESPONSE**

### **Specific Responses:**

**Reviewer #1:**

**Comment 1:** The study reports on "readiness" of facilities to provide basic and emergency obstetric care, but not on the "availability" of these services as stated in the title. Availability of medicines, commodities, guidelines, trained staff, etc. inform on the potential of health facilities to provide essential and emergency care i.e., "service readiness". However, "service availability" should be documented by data on the performance of essential and emergency obstetric care functions. The criteria for designating health facilities as "basic" or "comprehensive" emergency care facilities are defined by the demonstrated performance of "signal functions". Reporting that facilities are ready to provide services without reporting how well they function has limited practical value.

*We appreciate the valuable suggestion provided by the reviewer **however** our study reports on both the readiness of facilities to provide basic and emergency obstetric care and the availability of these services with the results on availability been shown in the supplementary document in a tabulated manner comprising of signal functions.*

*In the light of the above comment, we have modified the results sub-section entitled “EmONC signal functions performed in health facilities” to “**Availability of BEmONC and CEmONC provided by health facilities**” which is available in the supplemental file.*

*In our study, service availability was defined as the physical presence of maternal and neonatal health services or the reach of the health facilities that can provide BEmONC and CEmONC services as outlined in **page 6, line 154 to 157**, however regarding documentation of data on performance of essential and emergency obstetric care functions has been reported on the service readiness sub-section on Table 3 on **page 14***

**Comment 2:** Reporting that facilities are ready to provide services without reporting how well they function has limited practical value.

*This comment has been addressed earlier as per the response provided in the previous Comment 1 from Reviewer 1.*

## **Reviewer #2:**

**Comment 1:** Could the authors include the total number of facilities in the sampling frame for completeness?

*We appreciate the valuable suggestion provided by the reviewer. The number of total facilities had already been included in the title SAMPLING found in **page 5 line 120 to 124** and the paragraph reads as “A total of 37 health facilities were included in the study, comprising 1 regional hospital, two selected health centers and two dispensaries from each district with high utilization of delivery services, along with all district hospitals that is 1 district hospital for each district except for Moshi DC which has 2 district designated hospital (DDH).” Together with explanation on the sampling frame that is found on similar **page 5 line 126 to 128** and it reads as “The sampling frame exclusively included public health facilities providing basic maternal, newborn and child healthcare across the region whereas of 2021 the region had 1 regional hospital, 8 district hospitals, 31 health centers and 205 dispensaries.”*

**Comment 2:** On the tables, it may be useful to include the number of the facilities on the heading of each column e.g., regional hospital, n=1.

*We appreciate the valuable suggestion provided by the reviewer. We have included the number of facilities on the sub-headings within columns of the tables in both main manuscript document together with the supplemental file.*

**Comment 3:** A word needs to be said about the ethical considerations in this study.

*We appreciate the valuable suggestion provided by the reviewer. We have stated our ethical considerations in the ethics statement as per the response to the editor’s comment 2.*

**Comment 4:** Is the reader to assume that once the items are identified as available that they are functional or valid? Could this be a limitation? Can this be addressed in the discussion?

*Thank you for providing this constructive feedback. The following addition has been added at the **Strength and limitation section** of our manuscript from page 20, lines 391 - 406.*

*“This study was done in all levels of the health facilities within the Kilimanjaro region from representatives of dispensaries and health facilities, all districts district designated hospitals and a regional hospital. The sample size and scope limit the generalizability of the results for the dispensaries and health facilities as was confined to some public health facilities in the region, which may only be representative of some healthcare facilities in Tanzania. Although the study reports on the availability of BEmONC and CEmONC, the findings are limited by the lack of information on whether the reported items were fully functional or valid during the study period. Without this additional context, the findings on the availability of these critical services may not accurately reflect the actual capacity of the healthcare facilities surveyed. Despite these limitations, the study still provides valuable insights into the availability and readiness of maternal and neonatal health services in Kilimanjaro region's public health facilities. For instance, it highlights the need for improved infrastructure and equipment in some facilities. Future studies should employ longitudinal designs and expand the sample to improve generalizability and further enhance our understanding of these factors and their impact on maternal and neonatal health outcomes. The findings from this study remain relevant and valuable for policymakers and healthcare professionals seeking to improve maternal and newborn healthcare in the region”.*

**Comment 5:** The study limitations should be highlighted.

*Thank you for providing this constructive feedback. We have highlighted our study limitations in the strength and limitation section as per the response above provided to the reviewer 2, comment 4.*

### **Reviewer #3:**

**Comment 1:** Please use continuous line numbering throughout the document to facilitate reference. The current numbering system forces the reviewer to also reference the page/section.

*We appreciate the valuable suggestion provided by the reviewer. We have formatted our manuscript and used continuous numbering system as recommended by the reviewer.*

### **Abstract**

**Comment 2:** Please add the period in which the service availability and readiness were assessed in your objectives.

*We appreciate the valuable suggestion provided by the reviewer. We have incorporated the time period in the objective part of the abstract and it appears as below in page 1, lines 19 to 21:*

*“ To assess service availability and readiness of health facilities to provide maternal and newborn care in Kilimanjaro region, northern Tanzania; a study conducted between August to October 2022”.*

**Comment 3:** Introduction: In line 39, the United Nations target relative to EmONC is mentioned. What was Tanzania's status regarding this target before your assessment was made?

*We appreciate the valuable suggestion provided by the reviewer. We have incorporated the following addition in page3, lines 90 to 92 that reads*

*“..... and as of 2015, 40% of all 25 regions in Tanzania had attained or exceeded the recommended number of 5 BEmONC facilities and 76% of all the regions had at least one CEmONC facilities all being per 500,000 population”. AND a reference number 10 has been added*

**Comment 4:** The maternal and neonatal mortality rates from the Sub-Saharan region are well stated, but it would be important to mention the data from Tanzania as well.

*We appreciate the valuable suggestion provided by the reviewer. We have incorporated the following addition in page 3, lines 75 to 76 and it reads as*

*“ As of 2015 TDHS data, maternal and neonatal mortality rates were reported to be 556 per 100,000 live births and 25 per 1,000 live births respectively”. AND a reference number 5 has been added*



**Comment 5:** In line 43, it is stated that the government has launched several programs to lower maternal and newborn mortality. When were these programs launched?

*We appreciate the valuable suggestion provided by the reviewer. We have incorporated the following addition in page 4, lines 95 to 97.*

*“..... as in 1975 The extended program of Immunization (EPI) was initiated and in 2016-2020 The national roadmap strategic plan to Improve Reproductive, Maternal, Newborn, Child and*

*adolescent Health was initiated ”. AND a reference number 11 has been added*

**Comment 6:** In line 47, it is mentioned that a “recent nationwide survey revealed....” Please add the exact year this survey was conducted.

*We appreciate the valuable suggestion provided by the reviewer. The paragraph has been omitted since it does not fit to address the introduction part of our study as it talked about data which were found post our study.*

## **Methods**

**Comment 7:** In the sampling session, please add information about the total number of health centers and dispensaries available in all seven districts where the 37 health facilities were selected.

*We appreciate the valuable suggestion provided by the reviewer. The number of total facilities had already been included in the title SAMPLING found in **page 5 line 120 to 123** and the paragraph reads as “A total of 37 health facilities were included in the study, comprising 1 regional hospital, two selected health centers and two dispensaries from each district with high utilization of delivery services, along with all district hospitals that is 1 district hospital for each district except for Moshi DC which has 2 district designated hospital (DDH)”. Together with explanation on the sampling frame that is found on similar **page 5 line 126 to 128** and it reads as “The sampling frame exclusively included public health facilities providing basic maternal, newborn and child healthcare across the region whereas of 2021 the region had 1 regional hospital, 8 district hospitals, 31 health centers and 205 dispensaries.”*

**Comment 8:** Line 10- dependent variables: Explain in detail how service availability and service readiness to provide basic and comprehensive emergency obstetric and newborn care are defined and composed. This needs to include the items and functions included in each outcome and how those items and functions were selected.

*We appreciate the valuable suggestion provided by the reviewer. We have made the following addition to the methods section page 6, lines 154 - 210 as follows.*

*Service availability refers to the physical presence of health services or the reach of the health facilities that can provide such services (WHO, 2015) and for the purpose of this study, service availability was defined as the physical presence of maternal and neonatal health services or the reach of the health facilities that can provide BEmONC and CEmONC services.*

*Service readiness refers to the capacity of health facilities to deliver or provide the health services offered (WHO, 2015) and for the purpose of this study, service readiness was defined as the capacity of health facilities to provide or deliver BEmONC and CEmONC services.*

*'BEmONC services availability' in this study was measured based on whether the following seven signal functions had ever been carried out by providers as part of their work within facility at least once during the past 3 months: 'parental administration of antibiotic', 'parental administration of oxytocic', 'parental administration of anticonvulsants', 'assisted vaginal delivery', 'manual removal of placenta', 'manual removal of retained products of conception' and 'neonatal resuscitation'.*

*'BEmONC services readiness' in this study was measured based on the availability and functioning of supportive items categorized into three domains (groups): the first domain was staff training which had two indicators—the presence of guidelines and at least one staff who had received any formal or structured in-service training related to the services offered in the last 24 months preceding the assessment. The second domain was diagnostic equipment which had 11 indicators, which were presence of 'emergency transport', 'sterilization equipment', 'examination light', 'delivery pack', 'suction apparatus', 'manual vacuum extractor', 'vacuum aspirator or D&C kit', 'neonatal bag and mask', 'delivery bed', 'partograph' and 'gloves.' The third domain was basic medicine and commodities which had 11 indicators containing essential medicines for delivery and newborn, that were, 'injectable antibiotic', 'injectable uterotonic', 'injectable magnesium sulfate', 'injectable diazepam', 'intravenous fluids', 'skin disinfectant', 'antibiotic eye ointment', '4% chlorhexidine', 'injectable gentamicin', 'injectable ceftriaxone' and 'amoxicillin suspension'.*

*The BEmONC service readiness was obtained as a composite score by adding the presence of each indicator, with equal weight given to each of the domains and each of the indicators within the domains. As the expected target is 100%, each domain accounted for 33.3% (100%/3) of the total score. The proportion of each indicator within the domain equaled to 33.3% divided by the number of indicators in that domain.*

*The BEmONC service readiness score for each facility was calculated by adding the proportions. Given that the readiness score is a relative measurement, then facilities that scored 50% or more were considered to be ready or willing to provide BEmONC services than those scored less than 50% in BEmONC readiness score.*

*'CEmONC services availability' was measured based on whether the nine signal functions of the CEmONC services (seven BEmONC functions plus caesarean section and blood transfusion) had ever been carried out by the providers.*

*CEmONC services readiness was measured based on the availability and functioning of supportive items categorized into four domains (groups): the first domain was staff training which had four indicators—the presence of guidelines for CEmONC, staff trained in CEmONC, staff trained in surgery, and staff trained in anesthesia. The second domain was equipment which had four indicators, that were the presence of 'anesthesia equipment', 'resuscitation table', 'incubator', and 'oxygen.' The third domain was diagnostics which had two indicators, that were the presence of 'blood typing,' and 'cross-match testing.' The fourth domain was medicines and commodities which had five indicators containing essential medicines for delivery and newborn, that were, 'Blood supply sufficiency,' 'Blood supply safety,' 'Lidocaine 5%', 'injectable epinephrine,' and 'atropine'.*

*The CEmONC service readiness was obtained as a composite score by adding the presence of each indicator, with equal weight given to each of the domains and each of the indicators within the domains. As the expected target is 100%, each domain accounted for 25 % (100%/4) of the total score. The proportion of each indicator within the domain was equal to 25 % divided by the number of indicators in that domain.*

*The CEmONC service readiness score for each facility was then calculated by adding the proportions. Given that the readiness score is a relative measurement, then facilities that scored 50% or more were considered to be ready or willing to provide CEmONC services than those scored less than 50% in CEmONC readiness score.*

**Comment 9:** Line 43-48: It mentions that data collection was executed around availability and readiness. However, it's unclear what the physical presence of delivery services means when it refers to availability. Please clarify how many and type of items were selected to describe availability.

*We appreciate the valuable suggestion provided by the reviewer. As addressed in the above response to Reviewer 3, Comment 8; the physical presence of delivery services when addressing BEmONC service availability was accounted based on whether the following seven signal functions had ever been carried out by providers as part of their work within facility at least once during the past 3 months: 'parental administration of antibiotic', 'parental administration of oxytocic', 'parental administration of anticonvulsants', 'assisted vaginal delivery', 'manual removal of placenta', 'manual removal of retained products of conception' and 'neonatal resuscitation'.*

*Also, the physical presence of delivery services when addressing CEmONC service availability was accounted based on whether the nine signal functions of the CEmONC services (seven BEmONC functions plus caesarean section and blood transfusion) had ever been carried out by the providers.*

**Comment 10:** Data analysis lines 21-23: "The analysis focused on service availability, examining the physical presence of services and service readiness, assessing the availability of essential inputs (tracer items)." Please describe how this examination was made and what tracer items are referred to. Additionally, explain in detail how mean scores were calculated.

*We appreciate the valuable suggestion provided by the reviewer. As per the WHO SARA Manual & Tool, the examination of physical presence of services availability and service readiness assessing the availability of essential inputs (tracer items) was made by visiting all the 37 health facilities in Kilimanjaro region and involved interview with the facility in-charge and involved the observation of all the items that were asked together with assessing if they are functional or not.*

*The tracer items being referred were based on the availability and functioning of supportive items categorized into four domains which are i) staff training, ii) Equipments, iii) Diagnostics and iv) Medicine and commodities*

*As explained above the mean scores for CEmONC service readiness was obtained as a composite score by adding the presence of each indicator, with equal weight given to each of the domains and each of the indicators within the domains. As the expected target is 100%, each domain accounted for 25 % (100%/4) of the total score. The proportion of each indicator within the domain was equal to 25 % divided by the number of indicators in that domain. The CEmONC service readiness score for each facility was then calculated by adding the proportions. Given that the readiness score is a relative measurement, then facilities that scored 50% or more were considered to be ready or willing to provide CEmONC services than those scored less than 50% in CEmONC readiness score.*

**Comment 11:** General observation of methods: there is a need to add more information about how availability and readiness are defined by explaining the number and type of items included in each category. As we know, the SARA tool provides a vast list of items, and it's unclear how items were selected and how the mean scores were calculated. This information is crucial for the reader to understand how SARA was used in this case and how this study can be replicated.

*We appreciate the valuable suggestion provided by the reviewer. All information has been added when responding to the Reviewer 3, Comment 8 to 10 above.*

## **Results**

**Comment 12:** The abstract and study area sections mention seven districts of the Kilimanjaro region. I expected seven district hospitals, but the results cite 8 district hospitals. Why is that?

*Thank you for the comment. We have addressed this and added a paragraph in the methodology section page **page 5 line 120 to 123** that denotes “A total of 37 health facilities were included in the study, comprising 1 regional hospital, two selected health centers and two dispensaries from each district with high utilization of delivery services, along with all district hospitals that is 1 district hospital for each district except for Moshi DC which has 2 district designated hospitals .”*

**Comment 13:** Table 1: I suggest adding information about whether your facilities meet the criteria for BEmONC and CEmONC. In other words, it's important to know if the facilities included in your sample (dispensaries, health centers, district hospitals, and Regional hospitals) have the required criteria to provide BEmONC or CEmONC before your assessment.

*Thank you for the comment. We have addressed this and added a paragraph in the methodology section page 5, lines 139 – 141 that says “In accordance to the health system guidelines, all hospitals, dispensaries and health centers are required to provide delivery services, including BEmONC services. In addition, all district, regional, and tertiary or referral hospitals are required to provide CEmONC services”.*

**Comment 14:** I am a bit confused about the inclusion of maternal/newborn deaths review and routine user fees as characteristics of the facilities. What is the national policy about user fees in public hospitals in Tanzania?

*Thank you for the comment. We have addressed this and added a paragraph in the methodology section page 4, lines 145 - 147 that says “In accordance to the government national cost-sharing policy guidelines, children under the age of five years and pregnant women are eligible for exemptions from user charges for basic services” with a reference made available in number 15*

**Comment 15:** Is maternal/newborn death review required to happen in all types of health facilities?

*Thank you for the comment. We have addressed this and added a paragraph in the methodology section page 5, lines 142 - 143 that says “Facilities providing childbirth services in Tanzania are expected to have a multi-disciplinary MDSR committee to review all maternal deaths”. With a reference made available in number 14*

**Comment 16:** To better understand the study setting, it would be interesting to see in Table 1 the mean number of antenatal visits, deliveries, maternity and postpartum beds, and maternal and child nurses or physicians.

*Thank you for the constructive feedback. Although, our study did not report on the mean number of antenatal visits, deliveries, maternity and postpartum beds, or the number of maternal and child nurses or physicians, we will incorporate this suggestion when evaluating the quality of care for maternal and newborn services in health facilities for future studies.*

**Comment 17:** Please standardize how the numbers are presented in the tables. Table 2 only presents absolute numbers, while Tables 3 and 4 show the number and the percentage.

*Thank you for the comment. We have addressed this and have added the percentage to table 2 as well.*

**Comment 18:** Lines 6-8 on page 11, mention that the majority of the signal functions were available, and it is summarized in the supplemental table. These signal functions were not described in your methods, and the reader might not understand your results. Please describe EmONC and BEmONC in your methods section.

*Thank you for the comment. We have addressed this and added a paragraph in the methodology section page 6, lines 161 - 167 that says 'BEmONC services availability' in this study was measured based on whether the following seven signal functions had ever been carried out by providers as part of their work within facility at least once during the past 3 months: 'parental administration of antibiotic', 'parental administration of oxytocic', 'parental administration of anticonvulsants', 'assisted vaginal delivery', 'manual removal of placenta', 'manual removal of retained products of conception' and 'neonatal resuscitation'.*

**Comment 19:** Table 3: Specify the type of trained staff that is been reported.

*Revision: Thank you for the comment. We have addressed this and added a text on table 3 that says "Availability of staff trained in BEmONC"*

**Comment 20:** The equipment and supplies presented in Tables 2 and 3 are similar. That raises confusion about the definition of availability and readiness. In both (availability and readiness) does it include the functionality of this equipment? Were these items counted in each service where they are supposed to be or just verified the existence of at least one item in the entire facility to be considered available? Please clarify all these questions in the methods section.

*Thank you for the comment. Pertaining this comment, it has been addressed while responding to the methodology comment which is the eighth comment of reviewer number 3 to avoid repetition.*

**Comment 21:** Line 37- Facility readiness to provide BEmONC. It's not clear how these readiness scores were calculated. Please clarify in the analysis section.

*Thank you for the comment. We have addressed this and added the paragraph on the analysis section page 7, lines 181 - 185 that says: The BEmONC service readiness was obtained as a composite score by adding the presence of each indicator, with equal weight given to each of the domains and each of the indicators within the domains. As the expected target is 100%, each domain accounted for 33.3% (100%/3) of the total score. The proportion of each indicator within the domain equaled to 33.3% divided by the number of indicators in that*

*domain.*

**Comment 22:** Table 4 reports that there is 100% of trained staff in CEmONC, but in page 14, lines 10-14 it is declared that staff receiving training is low. How the 100% in table 4 was estimated? How the numbers reported in lines 10-14 were estimated? Please clarify these questions in your analysis section.

*Thank you for the constructive comment. This comment has been discussed in detail in Reviewer 3, Comment 24 below.*

## **Discussion**

**Comment 23:** The execution of maternal and newborn health reviews is highlighted in the beginning of the discussion( lines 6-20). I am confused if this data is considered availability or readiness because it was described as characteristic of the study sites. I suggest focusing the discussion of the results on service availability and readiness, as this is the focus of this paper.

*Thank you for providing this constructive feedback. Kindly see Reviewer 3 Comment 25 as this has been addressed in detail.*



**Comment 24:** Lines 22-27 say that this study highlighted that training regarding maternal and newborn health care is still inadequate. However, Tables 3 and 4 suggest the opposite: most staff are trained. Please **clarify** these inconsistencies.

*Thank you for pointing out the apparent inconsistency between the statement in lines 22-27 which is currently from number 37 to 44 and the data presented in Tables 3 and 4. We appreciate you highlighting this, as it allows us to clarify and provide a more nuanced interpretation of the findings.*

*You are correct that Tables 3 and 4 suggest a relatively high proportion of staff have received training in BEmONC and CEmONC. However, the statement in lines 37- 44 refers explicitly to recent training received by birth attendants within the past two years, a more relevant indicator of their current preparedness and competency in managing maternal and neonatal health issues effectively.*

*The data presented in **Figure 1** shows that only 29.8%, 54.1%, and 32.4% of birth attendants across all 37 health facilities received training regarding BEmONC& CEmONC, ANC, and Integrated Management of Neonatal and Childhood Illnesses (IMNCI) within the past two years, respectively. These relatively low percentages support the statement that recent training is still inadequate, despite the higher overall proportions of staff having received training at some point during their careers, as captured in Tables 3 and 4.*

*Both sets of results are essential in understanding healthcare providers' overall training landscape and preparedness. While Tables 3 and 4 provide a broader picture of the training received by staff, Figure 1 offers a more specific and timely assessment of recent training, which is crucial for ensuring that birth attendants are up-to-date and well-equipped to handle maternal and neonatal emergencies effectively.*

*In summary, the statement in lines 37-44 is not necessarily inconsistent with Tables 3 and 4 but rather highlights a specific aspect of recent training that is particularly relevant for evaluating the current readiness of birth attendants to provide high-quality maternal and newborn care services. Both the career-long training and the recent training contribute valuable insights and should be considered together to understand the training needs and gaps in this context comprehensively.*

**Comment 25:** A general observation about the discussion: I have the impression that the discussion is not well aligned with the results presented. I suggest focusing the discussion on what was found about service availability and readiness to provide basic and comprehensive emergency obstetric and newborn care as a package and not discussing single items.

*Thank you for providing this constructive feedback. The discussion section has been rewritten with addition of paragraph 1 in page 18 line 323 to line 329.*

*This study has found that, generally, all health facilities are moving in a positive direction in the provision of basic and comprehensive maternal and newborn care. However, a major finding has underscored the urgent need to address inadequate service readiness, particularly at lower-level facilities such as dispensaries and health centres. Our study has pinpointed these facilities often lack the essential equipment and supplies required to deliver basic maternal and newborn care services effectively. A similar pattern emerged in district hospitals, where the provision of comprehensive maternal and newborn care services faces urgent challenges.*

*This study has shown that the availability of parenteral administration of anticonvulsants (magnesium sulphate), antibiotics as well as removal of retained products of conception are still challenging in the dispensaries. As a result, the provision of BEmONC services is compromised in these low-level facilities, which serve most of the population in the Kilimanjaro region. Similar findings have been reported in another low-resource setting in Papua New Guinea, where more than half of the participating lower-level facilities could not provide the BEmONC services (16). It is crucial to address the deficiencies in BEmONC services, as these are critical components in managing significant perinatal conditions such as neonatal sepsis and eclampsia/pre-eclampsia, which are leading causes of maternal and neonatal death(17). Despite an improvement in BEmONC availability at low-level facilities from the year 2015 to 2020, as reported by the government, with readiness score increasing from 13% to 51% in dispensaries and from 28% to 76% in health centres, much emphasis is still needed at low-level health facilities to strengthen obstetric and newborn health service provision. This research found variable readiness for BEmONC provision among different types of facilities, as low-level facilities (dispensaries/health centres) continue to show alarmingly low scores. Strengthening the quality of services at these facilities becomes a pressing need.*

*Tracer items, which represent essential components of healthcare services, were assessed in the regional and district hospitals. We found that all tracer items were present in the regional hospital. However, some district hospitals needed more staff trained in anaesthesia, anaesthesia equipment, and incubators. These findings are consistent with a study conducted in Unguja, where only one out of the five surveyed hospitals had anaesthesia equipment, and more incubators were needed in the district hospitals. The same study in Unguja also reported that caesarean sections were only performed in the regional hospital, with the lack of anaesthetists cited as the reason for non-performance in district hospitals(1). The shortage of anaesthesia staff and equipment may be attributed to a shortage of anaesthesia workforce at*

*different levels of care in the country (18). Caesarean section is an essential component of comprehensive emergency obstetric and newborn care, and it is directly linked to the prevention of maternal and neonatal mortality by addressing direct obstetric complications (19). Adequate availability of trained staff and functioning anaesthesia equipment is necessary to ensure the provision of caesarean sections and manage obstetric emergencies effectively.*

*While service availability and readiness offer insights into the level of services provided, the actual quality of maternal and newborn care remains poorly understood. Thorough reviews of maternal and neonatal deaths can provide valuable information on the underlying causes, potential gaps in care, and areas for improvement. Moreover, evaluating the training received by care providers within the past six months to two years can reveal their preparedness and competency in managing maternal and neonatal health issues effectively. On one hand, our study shows that most health facilities do not conduct regular maternal and newborn health reviews, a practice that is crucial for identifying and addressing gaps in care. As only 59.5% of all the facilities were reported to conduct the reviews per recommended guidelines, there is a clear need for improvement in this area. These findings are consistent with other studies whereby a study that assessed the conduct of maternal and perinatal death reviews in Uganda showed that only 34.8% of healthcare workers had ever participated in the death reviews. This may be attributed to health workers not being aware of the death review process, ineffective formation and training of death review committee members, and inadequate support supervision (20). Also, blame culture may account for low death reviews where the reviews end up blaming health workers instead of trying to understand the cause and how to avoid it in the future (21). On the other hand, our findings show that training regarding maternal and newborn health care is still inadequate, a factor that significantly impacts the quality of care provided. As only 29.8%, 54.1%, and 32.4% of all birth attendants in all 37 health facilities received training within the past two years regarding BEmONC and CEmONC, ANC, and IMNCI respectively, there is a clear need for improvement in this area. These findings are consistent with other studies, which showed that only 32.1% of health workers had correct knowledge of MNC, 57.7% of major components of ANC, 39.4% of danger signs of pregnancy, and 54% of postnatal health problems (22) and in another study done in Ethiopia, only 37.7% and 32.8% of Obstetric care providers were knowledgeable and had skills to manage the third stage of labour respectively (23). The low level of training might be attributed to less priority in health care budget allocation or misallocation of budget aimed at improving the knowledge and skills of birth attendants to tackle maternal and neonatal emergencies.*

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## **VERSION 2 - REVIEW**

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<b>Reviewer</b>	<b>3</b>
<b>Name</b>	<b>Dinis, Aneth</b>
<b>Affiliation</b>	<b>University of Washington</b>

**Date** 30-Jul-2024

**COI** No competing interests

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**Review comments for the manuscript:** *Service Availability And Readiness To Provide Maternal And Newborn Healthcare Services In Kilimanjaro Region, Tanzania: A Cross-Sectional Study*

I enjoy reading your work. Bellow, I present some comments about the edited document.

### **Abstract**

Results: The information about revising maternal deaths in line 38 is repeated in lines 41-42.

Conclusion: Focus your conclusions on the results of primary outcomes (availability and readiness); after that, you can add other findings.

### **Introduction**

In line 77, clarify what TDHS means. Improve the writing of that added sentence (line 77-78).

In lines 93 and 94, the terms BEmONC and CEmONC are introduced, but their significance is not specified. I suggest adding the significance of the terms in line 91, like this “.....comprehensive EmONC (CEmONC)facility and four basic EmONC (BEmONC) facilities...”

Line 93 says,”... the recommended number of 5 BEmONC.....” but line 91 says that the recommended number of basic EmONC is 4. Please correct the data discrepancy.

Regarding the information added in lines 92-94 I suggest writing it in a way that makes evident the existing gaps in BEmOCNC and CEmONC, to reinforce the justification of your study.

Lines 109-110: Make sure to use the short terms of concepts(CEmONC, BEmONC) after you introduce them in lines 91-94.

### **Methods**

Add citation in the sentence added in line 138-139.

What health system guidelines are referred to in line 150? What does MDSR mean in line 154?

The data collection tool needs to be described before the variables. Put the information on lines 231-244 before the study variables.

Dependent variables:

Be assertive in your definitions to avoid confusion. For instance, summarize the information given for service availability. Now is written as follows: **Service availability**

refers to the physical presence of health services or the reach of the health facilities that can provide such services (WHO, 2015) and for the purpose of this study, service availability was defined as the physical presence of maternal and neonatal health services or the reach of the health facilities that can provide BEmONC and CEmONC services.

BEmONC services availability' in this study was measured based on whether the following seven signal functions had ever been carried out by providers as part of their work within facility at least once during the past 3 months: 'parental administration of antibiotic', 'parental administration of oxytocin', 'parental administration of anticonvulsants', 'assisted vaginal delivery', 'manual removal of placenta', 'manual removal of retained products of conception' and 'neonatal resuscitation'.... “

Just provide a concise definition of your 4 main outcomes: BEmONC service availability, BEmONC service readiness, CEmONC service availability, and CEmONC service readiness.

You can include the number of functions and of domains in the definitions and, to make the reading smoother I suggest including a table with the functions in each outcome, for example:

BEmONC		CEmONC	
Service availability	Service readiness	Service availability	Service readiness
1. Parenteral administration of antibiotic			
2. Parenteral administration of oxytocin			
3.			
4. ....etc.			

When explaining how the scores were estimated, please provide the information on the sample of facilities used to estimate that score. For instance, what is the number of facilities used to estimate BEmONC service readiness compared with CEmONC service readiness ( I am assuming that not all 37 facilities were used for CEmONC, for example)?

In line 200-202 there is this information : “Given that the readiness score is a relative measurement, then facilities that scored 50% or more were considered to be ready or willing to provide BEmONC services than those scored less than 50% in BEmONC readiness score.”

This interpretation is problematic. As you stated, if every item in your list of functions has equal weight, a well-prepared facility should have all the items to be considered ready. Moreover, according to your interpretation above, you are saying that a facility

with 49% and 51% are classified differently (not ready and ready) and between 51% and 98% (these are both ready). This kind of interpretation minimizes the importance of essential equipment/functions to save the lives of women and children. For instance, a facility that has 51% but lacks intravenous fluid or IV antibiotics is not prepared for an emergency. I suggest interpreting the scores as they are (how many facilities have 100%) or defining some realistic categories that can help to note differences in the resource availability and readiness of facilities. The same observation goes to line 221-223.

Independent variables: Clarify the type of variables. For example, the type of facility seems to be categorical (dispensary, health center, district, and regional hospital) – clarify the reference category. The same for other listed variables: what type of variable is facility infrastructure, etc.?

Was any statistical model used with the dependent and independent variables? If yes please clarify in your methods.

### **Results**

Tables 2, 3, and 4 have many details but do not provide information about the final results of your four main outcomes. For instance, table 2 displays the availability of each item for BEmONC but does not say anything about the mean scores estimated for each domain and overall score. This makes it difficult for the reader to understand your results. Based on the current tables, it's challenging to understand the level of availability and readiness in your sample because it only presented proportions per indicator. I suggest putting detailed tables as supplements and presenting the final results of each main outcome as composite scores for each of the domains and overall scores.

In the figure( not enumerated, file image) about the staff level, it is described that only 29.8% of staff received training in BEmONC and CEmONC; this is inconsistent with the number presented in Tables 3 and 4.

### **Discussion**

Because the results are presented in terms of individual item proportions and not as composite scores of each domain/outcome, it is difficult to align the findings with your conclusions in the discussion.

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## **VERSION 2 - AUTHOR RESPONSE**

### **Specific Responses:**

#### **Reviewer #3:**

Dr. Aneth Dinis, University of Washington, Ministry of Health of Mozambique

#### **Comment 1**

Results: The information about revising maternal deaths in line 38 is repeated in lines 41-42.

Conclusion: Focus your conclusions on the results of primary outcomes (availability and readiness); after that, you can add other findings.

*We appreciate the valuable suggestion provided by the reviewer, we have removed the repetition in line 38 and thus information regarding availability and readiness have come first before the findings on maternal deaths review and training for the past two years and it is available from **line 37 to 43** and **it reads as** “ A total of 37 facilities were enrolled that included 14 dispensaries, 14 health centers, 8 district hospitals and 1 regional hospital. The study highlights that majority of the signal function were available in all levels of health facilities with overall readiness score in BEmONC and CEmONC being 83% and 98.87%, respectively. However the study reports that 40.5% of health facilities do not conduct deaths reviews and similarly on-job trainings regarding maternal and newborn health care were low as only 29.8% of all healthcare workers in the region received training for the past two years.”*

## **Comment 2**

### Introduction

In line 77, clarify what TDHS means. Improve the writing of that added sentence (line 77-78).

*We appreciate the valuable suggestion provided by the reviewer, The word TDHS has been clarified and the sentence has been improved and available from **line 74 to 77** and **it reads as** “ According to Tanzania Demographic and Health Survey (TDHS) data of 2015, maternal and neonatal mortality rates were reported to be 556 per 100,000 live births and 25 per 1,000 live births, respectively (5) which were still high implying that achieving the SDG target in these countries is possible but requires exceptional dedication and additional efforts.”*

## **Comment 3**

In lines 93 and 94, the terms BEmONC and CEmONC are introduced, but their significance is not specified. I suggest adding the significance of the terms in line 91, like this “.....comprehensive EmONC (CEmONC)facility and four basic EmONC (BEmONC) facilities...”

Line 93 says,”... the recommended number of 5 BEmONC.....” but line 91 says that the recommended number of basic EmONC is 4. Please correct the data discrepancy.

Regarding the information added in lines 92-94 I suggest writing it in a way that makes evident the existing gaps in BEmONC and CEmONC, to reinforce the justification of your study.

*We appreciate the valuable suggestion provided by the reviewer, we have added the significance of BEmONC and CEmONC and we have removed the discrepancy in the number of basic EmONC also we have added a sentence and a reference number 8 to reinforce the justification of our study and available from **line 88 to 94** and **it reads as** "The United Nations (UNs) recommends at least one comprehensive EmONC (CEmONC) facility and four basic EmONC (BEmONC) facilities per 500,000 population (1) to enhance maternal and newborn health by ensuring timely access to essential emergency care services and as of 2015, 40% of all the regions in Tanzania had attained or exceeded the recommended number of 4 BEmONC facilities and 76% of all the regions had at least one CEmONC facility per 500,000 population (10) however their ability to carry out essential emergency care services was still inadequate(8)"*

#### **Comment 4**

Lines 109-110: Make sure to use the short terms of concepts(CEmONC, BEmONC) after you introduce them in lines 91-94.

*We appreciate the valuable suggestion provided by the reviewer, we have eliminated the long forms and included the short term of concepts which are BEmONC and CEmONC.*

#### **Comment 5**

Add citation in the sentence added in line 138-139.

What health system guidelines are referred to in line 150? What does MDSR mean in line 154?

*We appreciate the valuable suggestion provided by the reviewer, reference 10 has been added to line 138 to 139 and health system guidelines referred to the National Road Map Strategic Plan to improve Reproductive, Maternal, Newborn, Child and Adolescent Health also known as "One plan III" and MDSR means Maternal Deaths Surveillance and Response and the paragraph are available from **line 140 to 146** and **reads as** "In accordance to the National*



*Road Map Strategic Plan to improve Reproductive, Maternal, Newborn, Child and Adolescent Health also known as “One plan III” , all dispensaries and health centers are required to provide delivery services, including BEmONC services while all district, regional, and tertiary or referral hospitals are required to provide CEmONC services(10). Furthermore, Facilities providing childbirth services in Tanzania are expected to have a multi-disciplinary Maternal Deaths Surveillance and Response (MDSR) committee to review all maternal deaths” (14).”*

#### **Comment 6**

The data collection tool needs to be described before the variables. Put the information on lines 231-244 before the study variables.

*We appreciate the valuable suggestion provided by the reviewer; we have kept the information regarding Data collection tool before Study Variables.*

#### **Comment 7**

Dependent variables:

Be assertive in your definitions to avoid confusion. For instance, summarize the information given for service availability. Now is written as follows: Service availability refers to the physical presence of health services or the reach of the health facilities that can provide such services (WHO, 2015) and for the purpose of this study, service availability was defined as the physical presence of maternal and neonatal health services or the reach of the health facilities that can provide BEmONC and CEmONC services.

BEmONC services availability’ in this study was measured based on whether the following seven signal functions had ever been carried out by providers as part of their work within facility at least once during the past 3 months: ‘parental administration of antibiotic’, ‘parental administration of oxytocin’, ‘parental administration of anticonvulsants’, ‘assisted vaginal delivery’, ‘manual removal of placenta’, ‘manual removal of retained products of conception’ and ‘neonatal resuscitation’ .... “

Just provide a concise definition of your 4 main outcomes: BEmONC service availability, BEmONC service readiness, CEmONC service availability, and CEmONC service readiness.

You can include the number of functions and of domains in the definitions and, to make the reading smoother I suggest including a table with the functions in each outcome, for example:

BEmONC	CEmONC
Service availability	Service readiness
Service readiness	Service availability
Service availability	Service readiness
1. Parenteral administration of antibiotic	
2. Parenteral administration of oxytocin	
3.	
4. ....etc.	

*We appreciate the valuable suggestion provided by the reviewer and we have modified the definitions of Service Availability and readiness by removing the WHO definition and precisely remained with the definitions specifically concerned with this study **HOWEVER** we have not included the information regarding the function in each outcome in a table format because of journal strict policies in the number of tables to be included in the manuscript as the number of tables currently are maximum for our manuscript.*

*Currently the service availability and readiness definitions are available from **line 171 to 174** and read as “Service availability refers to the physical presence of maternal and neonatal health services or the reach of the health facilities that can provide BEmONC and CEmONC services while Service readiness refers to the capacity of health facilities to provide or deliver BEmONC and CEmONC services.”*

### **Comment 8**

When explaining how the scores were estimated, please provide the information on the sample of facilities used to estimate that score. For instance, what is the number of facilities used to estimate BEmONC service readiness compared with CEmONC service readiness ( I am assuming that not all 37 facilities were used for CEmONC, for example)?

*We appreciate the valuable suggestion provided by the reviewer, we have added the information on the sample of facilities used to estimate BEmONC readiness from **line 181 to 185** and it reads as “ BEmONC services readiness was assessed from all 14 dispensaries and 14 health centers and*

*was measured based on the availability and functioning of supportive items categorized into three domains (groups): the first domain was staff training which had two indicators—the presence of guidelines and at least one staff who had received any formal or structured in-service training related to the services offered in the last 24 months preceding the assessment.”*

*Also we have added the information on the sample of facilities used to estimate CEmONC readiness from line 207 to line 211 and it reads as “ CEmONC services readiness was assessed from all 8 district hospitals and 1 regional hospital and was measured based on the availability and functioning of supportive items categorized into four domains (groups): the first domain was staff training which had four indicators—the presence of guidelines for CEmONC, staff trained in CEmONC, staff trained in surgery, and staff trained in anesthesia.”*

*Furthermore, the information regarding how the facilities should carry out either BEmONC or CEmONC functions was previously explained from line 140 to 143 and it reads as “In accordance to the National Road Map Strategic Plan to improve Reproductive, Maternal, Newborn, Child and Adolescent Health also known as “One plan III” , all dispensaries and health centers are required to provide delivery services, including BEmONC services while all district, regional, and tertiary or referral hospitals are required to provide CEmONC services(10).”*

## **Comment 9**

In line 200-202 there is this information : “Given that the readiness score is a relative measurement, then facilities that scored 50% or more were considered to be ready or willing to provide BEmONC services than those scored less than 50% in BEmONC readiness score.”

This interpretation is problematic. As you stated, if every item in your list of functions has equal weight, a well-prepared facility should have all the items to be considered ready. Moreover, according to your interpretation above, you are saying that a facility with 49% and 51% are classified differently (not ready and ready) and between 51% and 98% (these are

both ready). This kind of interpretation minimizes the importance of essential equipment/functions to save the lives of women and children. For instance, a facility that has 51% but lacks intravenous fluid or IV antibiotics is not prepared for an emergency. I suggest interpreting the scores as they are (how many facilities have 100%) or defining some realistic categories that can help to note differences in the resource availability and readiness of facilities.

The same observation goes to line 221-223.

*We appreciate the valuable suggestion provided by the reviewer, the 50% cut point in the WHO'S Service Availability and Readiness Assessment (SARA) is utilized to define a facility's readiness to provide Emergency Obstetric and Newborn Care (EmONC) as it reflects a critical threshold. This benchmark indicates that at least half of the essential components such as trained staff, equipment and medication are present, ensuring a minimum standard of care. It effectively balances feasibility and comprehensiveness allowing for consistent comparison across facilities while highlighting those that are adequately prepared to handle emergencies. Further information on why 50% was used can be obtained from WHO SARA Tool that is available at: [https://cdn.who.int/media/docs/default-source/service-availability-and-readinessassessment\(sara\)/sara\\_reference\\_manual\\_chapter3.pdf](https://cdn.who.int/media/docs/default-source/service-availability-and-readinessassessment(sara)/sara_reference_manual_chapter3.pdf)*

## **Comment 10**

Independent variables: Clarify the type of variables. For example, the type of facility seems to be categorical (dispensary, health center, district, and regional hospital) – clarify the reference category. The same for other listed variables: what type of variable is facility infrastructure, etc.?

*We appreciate the insightful suggestion provided by the reviewer. In response, we have explicitly clarified that all independent variables in our study, including the type of facility (dispensary, health center, district hospital and regional hospital) are categorical. The reference category for comparison is the dispensary level. This clarification has been added to the section on independent variables **from line 227 to 233**. Additionally, we have ensured that our variables such as facility infrastructure are appropriately defined as categorical and the reference category is now clearly specified in the manuscript to improve clarity and interpretability.*

### **Comment 11**

Was any statistical model used with the dependent and independent variables? If yes please clarify in your methods.

*We appreciate the valuable suggestion provided by the reviewer, but there was no any statistical model used because our study was purely descriptive study hence only composite scores was used to calculate the service readiness.*

### **Comment 12**

Results

Tables 2, 3, and 4 have many details but do not provide information about the final results of your four main outcomes. For instance, table 2 displays the availability of each item for BEmONC but does not say anything about the mean scores estimated for each domain and overall score. This makes it difficult for the reader to understand your results. Based on the current tables, it's challenging to understand the level of availability and readiness in your sample because it only presented proportions per indicator. I suggest putting detailed tables as supplements and presenting the final results of each main outcome as composite scores for each of the domains and overall scores.

*We appreciate the valuable suggestion provided by the reviewer, we have worked on the comment by removing table 2 from the main document and kept it in the supplement file and brought supplement figure which was previously in the supplemental files and it is currently named figure in the main text which speaks about the final results of Service readiness.*

*Table 2 which was talking about "Availability of equipment and medicines/commodities for basic delivery services" in the main document, currently it is in the supplemental file as table 1*

### **Comment 13**

In the figure( not enumerated, file image) about the staff level, it is described that only 29.8% of staff received training in BEmONC and CEmONC; this is inconsistent with the number presented in Tables 3 and 4.

*We appreciate the valuable suggestion provided by the reviewer, thank you for pointing out the apparent inconsistency between the two statements. We appreciate you highlighting this, as it allows us to clarify and provide a more nuanced interpretation of the findings.*

*You are correct that previously Tables 3 and 4 which are currently table 2 and 3 suggest a relatively high proportion of staff have received training in BEmONC and CEmONC. However, 29.8% in Image Figure refers explicitly to recent training received by health workers within the past two years, a more relevant indicator of their current preparedness and competency in managing maternal and neonatal health issues effectively.*

*The data presented in **Image Figure** shows that only 29.8%, 54.1%, and 32.4% of birth attendants across all 37 health facilities received training regarding BEmONC& CEmONC, ANC, and Integrated Management of Neonatal and Childhood Illnesses (IMNCI) within the past two years, respectively. These relatively low percentages support the statement that recent training is still inadequate, despite the higher overall proportions of staff having received training at some point during their careers, as captured in Tables 2 and 3.*

*Both sets of results are essential in understanding healthcare providers' overall training landscape and preparedness. While Tables 2 and 3 provide a broader picture of the training received by staff, Figure 1 offers a more specific and timely assessment of recent training, which is crucial for ensuring that birth attendants are up-to-date and well-equipped to handle maternal and neonatal emergencies effectively. Also we have modified the content in table 2 and 3 regarding trained staff in BEmONC and CEmONC and **it now reads** “Availability of trained staff in BEmONC at any career stage” and “ Trained staff in CEmONC at any career stage” respectively.*

*In summary, 29.8% data is not necessarily in consistent with Tables 2 and 3 but rather highlights a specific aspect of recent training that is particularly relevant for evaluating the current readiness of birth attendants to provide high-quality maternal and newborn care services. Both the career-long training and the recent training contribute valuable insights and should be considered together to understand the training needs and gaps in this context comprehensively.*

#### **Comment 14**

##### **Discussion**

Because the results are presented in terms of individual item proportions and not as composite scores of each domain/outcome, it is difficult to align the findings with your conclusions in the discussion.

*We appreciate the valuable suggestion provided by the reviewer and we have already addressed this in comment 12 by replacing previously table 2 which was explaining on individual item proportions with the figure that explains on Percentage score of the three domains of readiness to provide basic emergency obstetric and newborn care services which is composite score of the outcome.*

**Comment 15**

Reviewer: 3

If you have selected 'Yes' above, please provide details of any competing interests.: No competing interests

*None of the Authors has any competing interest*