Author's response to reviews

Title: Is antenatal care preparing mothers to care for their newborns? A community-based cross-sectional study among lactating women in Masindi District, western Uganda

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Version: 2 Date: 28 November 2013

Author's response to reviews: see over
Response to Reviewers comments

Reviewer 3

Major Compulsory Revisions
Introduction

Comment -1)
The article does not represent the title.

Response:
We do recognize that the title does not adequately represent the body of the text. We have now changed the title to reflect better what is explained in the text. It now reads:
(page 1 lines 1-2)

Is antenatal care preparing mothers to care for their newborns? A community-based cross-sectional study among lactating women in Masindi District, western Uganda

Comment
The logical flow is missing. The reasons for neonatal deaths described in chaotic order. The authors jump from neonatal mortality to infant mortality without paragraph transition. The focus of the introduction is not specific and rational for the study is not justified.

Response
We have improved the flow in the introduction by reorganizing the paragraphs to give better meaning to the reader. We have also reorganized the reasons for neonatal deaths and included a comment on how neonatal death can be prevented. We have
deleted phrases related to child mortality and limited our introduction to neonatal mortality in order to focus our arguments. The rationale of the study has been strengthened with additional text. The entire section of introduction has been revised and now reads as follows: (page 4 and page 5 lines 1-11)

**Introduction**

Neonatal mortality has remained resistant to change [1-2]. Most causes of neonatal death are preventable and relate to cord care to decrease sepsis, temperature control and initiation of early breastfeeding which has the additional benefit of controlling hypothermia [3]. Good assisted deliveries can decrease delivery complications, stillbirth and early neonatal deaths [7]. Initiation of BCG and polio vaccination within the first four weeks after birth [4-6] can enhance neonatal survival.

One of the instruments to obtain reduction in neonatal mortality is Antenatal Care (ANC), where we now agree that the risk identification approach [8-10] is not the important reason. Rather, the preparation of pregnant women to become knowledgeable mothers [11] hence limiting the number of visits to four (at four, six, eight and nine months) [12] if no complications are anticipated [13-14]. ANC delivery should have as an important objective to inform and prepare women to care correctly for their newborn. Two mutually reinforcing interventions should be packaged and offered to pregnant women during ANC consultations. First, the more technical intervention which includes history taking, clinical examinations, laboratory investigations, treatment and assessment for referral [4]. Second, health education and counselling which entails dialogue that creates an interface between medical conditions and socially relevant issues regarding ANC such as promotion of healthy lifestyles among pregnant women, birth plans including preparation for unexpected events and preparation for parenting especially care for the newborn [15]. Throughout the ANC period information about physical and psychological preparation for the newborn is offered to pregnant women [5]. This process of communication is expected to progressively make the women better mothers.
Evidence in Asia indicates that information on newborn care practices offered to pregnant women and their families during ANC clinics leads to improved care practices (complete cord care, complete thermal care and initiation of breastfeeding within one hour) [16-17]. In order to achieve similar results, Focused ANC whereby pregnant women are encouraged to make at least four ANC consultations, has been widely promoted in Uganda.

In Uganda, the coverage of focused ANC services has been scaled up to all tiers of the healthcare system with the aim of increasing awareness about birth preparedness, promoting supervised delivery and improving newborn care practices. Today, about 48% of pregnant women make four ANC consultations or more while 57% seek delivery assistance from a health facility [18-19]. However, recent studies conducted in Uganda have reported sub-optimal newborn care practices [20-23] and stagnated neonatal mortality rates [24]. Moreover, little is known about the relationship between newborn care practices and attending four ANC consultations.

This study specifically assessed newborn care practices with regards to thermal care, cord care and newborn vaccination status among lactating women in Masindi district in Uganda and determined its relationship with adherence to four or more ANC consultations.

**Method**

**Comment**
The strength of the multi stage cluster sampling is generalizability. The description of the parish in terms of population and geography should be presented.

**Response**
The reason for multi-stage cluster sampling being generalizability has been corrected in the text in the methods section ‘study design and setting’. The parish has also been described in terms of population size (page 5 lines 19-23)

We will therefore describe them assuming the original administrative unit by June 2011, hence Masindi district. Cluster survey was preferred to allow for generalizability to the entire district. Parishes were
considered the sampling unit for this study. A parish in Uganda is a geographical area occupied by about 10,000 – 20,000 inhabitants.

Comment
The sample size was calculated based on home care practices but authors did not explain ‘what kind of home care practices’.

Response
In the section ‘sample size and data collection procedure’, we have included the actual reference from where the sample size was estimated. And also stated which aspect of newborn was considered (page 6 lines 20-22)

Sample size and data collection procedures

The sample size was estimated using a standard formula for cluster surveys [30]. The prevalence of good cord care practices in the region was estimated to be 42% based on similar studies conducted in eastern Uganda [25], design effect of 2 and sample error at 5%. This yielded 18.7 clusters with a minimum sample size of 748. Adjusted for 10% none response, 823 participants from 21 clusters needed to be recruited.

Comment
The reason for selecting mothers who had children age less than 5 months was not explained (why not mothers with less than 6 months).

Response
Here we considered age less than five years because a similar study in Uganda used a similar age limit and this has been justified in the text in the section ‘study design and setting’ (page 5 lines 15-16)

Study design and setting

In a cross sectional design, lactating women with babies aged less than five months in Masindi and Kiryandongo districts were visited in their homes from October to December 2011. Similar studies conducted in Uganda have used age limits of less than five months [25].

Comment
Data collection process was missing.

Response
We have described in detail how the data was processed under the section ‘data analysis’ on page 7 lines 14-26, page 8 lines 1-20

Data analysis

Each questionnaire was checked for completeness before entry into Epidata software version 3.02. Double data entry was carried out and the two data sets were validated in the same software to eliminate entry errors. Analysis was carried out in STATA version 10.0. Socio-demographic characteristics, reproductive health indicators and selected newborn care practices were displayed using descriptive statistics. The number of ANC consultations during the last pregnancy was considered the exposure variable of interest and was coded as sufficient ANC attendance=1 defined as having made four ANC consultations or more and insufficient ANC attendance=0 defined as 1 to 3 antenatal consultations. Composite variables were generated from primary responses using the egen command in stata to constitute our primary outcome variables of interest. Outcome variables included complete cord care (defined as - used clean instrument to tie the cord, used clean instrument to cut the cord and did not apply potentially harmful substance on the cord), complete thermal care (defined as - dried the newborn before the placenta or immediately after the placenta was delivered, wrapped the baby immediately the placenta was delivered and delayed bathing of the baby 24 hours or later after delivery) and complete newborn vaccination (a newborn baby who has received both tuberculosis and Polio zero vaccines routinely administered at birth). For purposes of our analysis we considered as complete cord care or complete thermal care if any three of the five possible responses were correct and complete newborn vaccination if any one of the two possible responses were correct.

Independent variables considered during analysis were age (grouped as adolescents 15-20 years or adults 20-32 years), parity (having the first baby or having two or more babies), and marital status (living with spouse or living alone), source of income (regular or irregular source of income), level of education (attained no education/primary level only or secondary/and higher education level) and place of
delivery (in health facility or delivered outside of health facility). The category ‘no education’ were
grouped together with ‘primary education’ because we did not consider any difference between the two
groups [31].

The chi-square test was used at the bivariate level of analysis. Independent variables with corresponding
$p$-values of 0.4 or less were fitted into a logistic regression model. Number of antenatal care
consultations was purposively maintained into the multi-variable model for each outcome variable of
interest even when their corresponding $p$-value was greater than the significant levels because this was
our primary exposure of interest. The `svyset` stata command was used to take care of the cluster effect
of our data collection technique whereby people from the same geographical location tend to provide
similar responses.

**Comment**
All outcome variables are self-reported variables, which should be acknowledged.

**Response**
We do acknowledge that all data obtained from the respondents were self-reported. In the section
‘strengths and limitations’ on page 16 lines 2-4 we do acknowledge this limitation

Creation of a binary outcome for ANC consultations means grouping together one and three ANC visits,
yet making three ANC visits is not necessarily equivalent to making one visit. We attempted to analyze
separately for one, two, three, four or more visits but could not establish any gradient (results not
shown). The data collected were self-reported some women could have offered incorrect information
due to recall bias. Direct observations could have mitigated this limitation in our study.

**Result**

**Comment**
Negative (eg. 25% mothers used unclean cloth) and mixed results (negative and positive) should not be presented.

**Response**
The negative phrases have been replaced. We now report on the positive results and consistently maintain them in the text under the heading ‘newborn care practices’ in the results section page 9 line 13-21

Newborn care practices

We examined newborn care practices among lactating women (table 2) with a specific focus on cord care, thermal care and newborn vaccination status. Three in four women (702/928) used clean material for tying the cord, 92.2% (856/928) used clean instruments for cutting the cord, while 28.4% (264/928) applied salty water/nothing on the cord. About three out of five (542/928) dried their baby before/soon after the placenta was delivered, half (451/928) wrapped the baby before the placenta was delivered and 12.1% (112/928) reported delayed bathing of their baby by 24 hours or more after birth. By the time of the interview 84.3% and 64.8% of the babies had received BCG and Polio 0 vaccines respectively. The desired newborn care practices were assessed to be 23.7% (220/928) for complete cord care, 6.1% (57/928) for complete thermal care and 65.8 %( 611/928) for complete newborn vaccination status.

Comment
The findings presented as ‘desired new-born care practice was observed …….’ is not correct, author did not use observation as a method.

Response
Indeed we did not make any observations in this study and this statement was a misrepresentation of what we wanted to communicate. The statement has been changed under the section newborn care practices on page 9 lines 19-21

By the time of the interview 84.3% and 64.8% of the babies had received BCG and Polio 0 vaccines respectively. The desired newborn care practices were assessed to be 23.7% (220/928) for complete cord care, 6.1% (57/928) for complete thermal care and 65.8 %( 611/928) for complete newborn vaccination status.

Comment
Presentation of the non-significant results (P value > 0.05) was unnecessary and confusing.
Response

We have removed the non-significant results from the text except for results for our primary exposure of interest (number of ANC consultations) which we have maintained throughout the results section.

Comment

Education was categorized into ‘none/primary’ and ‘secondary plus’, but combining no education and primary education could influence the direction of the result.

Response

We considered people who had no education to be similar to those who had primary education, for example those who dropped out in the first or second year of primary education are likely to be similar to those that never went at all to school. Other studies conducted among women of childbearing also used similar categorization of education. This justification is highlighted in the text by showing the reference from which we base our argument in section ‘data analysis’ page 8 lines 7-13.

Independent variables considered during analysis were age (grouped as adolescents 15-20 years or adults 20-32 years), parity (having the first baby or having two or more babies), and marital status (living with spouse or living alone), source of income (regular or irregular source of income), level of education (attained no education/primary level only or secondary/and higher education level) and place of delivery (in health facility or delivered outside of health facility). The category ‘no education’ were grouped together with ‘primary education’ because we did not consider any difference between the two groups [31].

Comment

In the method section, the exposure variable was identified as ‘sufficient ANC” but analysis was not done based on that, so the reason for presenting it was not clear.

Response

Throughout the bivariate and multi-level analysis, we maintained ‘sufficient ANC’ into the model even when their corresponding p-values were > 0.05 at the (please tables 3, 4 & 5 pages 23, 24 & 25)
Table 3: Complete cord care and demographic characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incomplete cord care n(%)</th>
<th>Complete cord care n(%)</th>
<th>UOR[95%CI]</th>
<th>p-value</th>
<th>aOR[95%CI]</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sufficient ANC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3 visits</td>
<td>389(76.4)</td>
<td>120(23.6)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;=4 visits</td>
<td>298(76.0)</td>
<td>94(24.0)</td>
<td>1.02[0.70-1.95]</td>
<td>0.902</td>
<td>0.96[0.65-1.41]</td>
<td>0.837</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>14-19 yrs.</td>
<td>139(79.4)</td>
<td>36(20.6)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-42 yrs.</td>
<td>569(75.6)</td>
<td>184(24.4)</td>
<td>1.25[0.80-1.95]</td>
<td>0.310</td>
<td>1.22[0.82-1.83]</td>
<td>0.313</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Not living with spouse</td>
<td>76(78.4)</td>
<td>21(21.7)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with spouse</td>
<td>632(76.1)</td>
<td>199(24.0)</td>
<td>1.14[0.74-1.76]</td>
<td>0.536</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Non or primary</td>
<td>620(79.9)</td>
<td>156(20.1)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary plus</td>
<td>88(57.9)</td>
<td>64(42.1)</td>
<td>2.89[1.72-4.45]</td>
<td>0.000</td>
<td>2.72[1.63-4.54]</td>
<td>0.001*</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two or more</td>
<td>566(76.4)</td>
<td>175(23.6)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First child</td>
<td>142(75.9)</td>
<td>45(24.1)</td>
<td>1.02[0.70-1.49]</td>
<td>0.906</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Place of delivery</strong></td>
<td></td>
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</tr>
<tr>
<td>Home</td>
<td>432(81.2)</td>
<td>100(18.8)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td>276(69.7)</td>
<td>120(30.3)</td>
<td>1.88[1.06-3.32]</td>
<td>0.032</td>
<td>1.54[0.84-2.81]</td>
<td>0.150</td>
</tr>
<tr>
<td><strong>Source of income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsistence farming</td>
<td>128(65.0)</td>
<td>69(35.0)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial farming/regular income</td>
<td>580(79.3)</td>
<td>151(20.7)</td>
<td>0.48[0.30-0.78]</td>
<td>0.005</td>
<td>0.54[0.32-0.90]</td>
<td>0.021*</td>
</tr>
</tbody>
</table>

** For initial inclusion in multivariable model; *p-is less than 0.05; UOR=unadjusted odds ratio; aOR=adjusted odds ration; (95%CI) Confidence Interval at 95%
Table 4: complete thermal care and demographic characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incomplete thermal care n(%)</th>
<th>Complete thermal care n(%)</th>
<th>UOR[95%CI]</th>
<th>p-value</th>
<th>aOR[95%CI]</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sufficient ANC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3 visits</td>
<td>481(94.5)</td>
<td>28(5.5)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;=4 visits</td>
<td>364(92.9)</td>
<td>28(7.1)</td>
<td>1.32[0.61-2.85]</td>
<td>0.458</td>
<td>1.07[0.50-2.30]</td>
<td>0.858</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-19 yrs.</td>
<td>161(92.0)</td>
<td>14(8.0)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-42 yrs.</td>
<td>710(94.3)</td>
<td>43(5.7)</td>
<td>0.70[0.43-1.12]</td>
<td>0.130</td>
<td>1.13[0.59-2.17]</td>
<td>0.696</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Not living with spouse</td>
<td>90(92.8)</td>
<td>7(7.2)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with spouse</td>
<td>781(94.0)</td>
<td>50(6.0)</td>
<td>0.82[0.29-2.30]</td>
<td>0.697</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>None/primary</td>
<td>733(94.5)</td>
<td>43(5.5)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary plus</td>
<td>138(90.8)</td>
<td>14(9.2)</td>
<td>1.73[0.89-3.32]</td>
<td>0.098</td>
<td>1.08[0.45-2.57]</td>
<td>0.857</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
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<tr>
<td>Two or more</td>
<td>704(95.0)</td>
<td>37(5.0)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having First child</td>
<td>167(89.3)</td>
<td>20(10.7)</td>
<td>2.28[1.50-3.47]</td>
<td>0.001</td>
<td>2.00[1.24-3.23]</td>
<td>0.007</td>
</tr>
<tr>
<td><strong>Place of delivery</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Home</td>
<td>516(97.0)</td>
<td>16(3.0)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td>355(89.7)</td>
<td>41(10.4)</td>
<td>3.72[2.34-5.93]</td>
<td>0.000</td>
<td>3.63[2.21-5.95]</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Subsistence farming</td>
<td>182(92.4)</td>
<td>15(7.6)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial farming/regular income</td>
<td>689(94.3)</td>
<td>43(5.8)</td>
<td>0.74[0.41-1.32]</td>
<td>0.291</td>
<td>0.95[0.53-1.71]</td>
<td>0.869</td>
</tr>
</tbody>
</table>

** For initial inclusion in multivariable model; *p-less than 0.05 UOR=unadjusted odds ratio; aOR=adjusted odds ration; (95%CI) Confidence Interval at 95%
Table 5: **Complete newborn vaccination and demographic characteristics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incomplete newborn vaccination n(%)</th>
<th>Complete newborn vaccination n(%)</th>
<th>UOR[95%CI]</th>
<th>p-value</th>
<th>aOR[95%CI]</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sufficient ANC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3 visits</td>
<td>191(37.5)</td>
<td>318(62.5)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;=4 visits</td>
<td>112(28.6)</td>
<td>280(71.4)</td>
<td>1.50[1.06-2.13]</td>
<td>0.024</td>
<td>1.34[0.91-1.99]</td>
<td>0.133</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-19 yrs.</td>
<td>65(37.1)</td>
<td>110(62.9)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-42 yrs.</td>
<td>252(33.5)</td>
<td>501(66.5)</td>
<td>1.17[0.91-1.52]</td>
<td>0.202</td>
<td>1.25[0.94-1.66]</td>
<td>0.115</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not living with spouse</td>
<td>31(32.0)</td>
<td>66(68.0)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with spouse</td>
<td>286(34.4)</td>
<td>545(65.6)</td>
<td>0.90[0.50-1.60]</td>
<td>0.695</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None/ Primary</td>
<td>280(36.1)</td>
<td>496(63.9)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary plus</td>
<td>37(24.3)</td>
<td>115(75.7)</td>
<td>1.75[1.29-2.38]</td>
<td>0.001</td>
<td>1.37[1.04-1.82]</td>
<td>0.029*</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
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<tr>
<td>Two or more</td>
<td>256(35.0)</td>
<td>482(65.1)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having First child</td>
<td>58(31.0)</td>
<td>129(69.0)</td>
<td>1.20[0.76-1.87]</td>
<td>0.417</td>
<td>1.37[0.72-2.61]</td>
<td>0.323</td>
</tr>
<tr>
<td><strong>Place of delivery</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>219(41.2)</td>
<td>313(58.8)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td>98(24.8)</td>
<td>298(75.2)</td>
<td>2.13[1.47-3.08]</td>
<td>0.000</td>
<td>1.84[1.23-2.75]</td>
<td>0.005*</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Subsistence farming</td>
<td>71(36.0)</td>
<td>126(64.0)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial farming/</td>
<td>246(33.7)</td>
<td>485(66.4)</td>
<td>1.11[0.72-1.72]</td>
<td>0.622</td>
<td></td>
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</tr>
</tbody>
</table>

** For initial inclusion in logistic model; * p-is less than 0.05; UOR=unadjusted odds ratio; aOR=adjusted odds ration; (95%CI) Confidence Interval at 95%

**Discussion**
The statements in the first paragraph are not based on the findings of the study. The results showed a better practice of neonatal care by those who delivered at the health facility. Those who delivered at the facility or attended ANC four time and more reported better neonatal care practice than those who were not. The question regarding quality of care is not evidence based. The discussion is repetition of the results and little bit misleading. There is no in depth analysis of the findings including policy and implementation implications.

**Response**
We have taken out the discussions related to the quality of care which we concede was not based on our results. Repetitions of the results in the discussion section have been removed. To better improve the depth of our discussion we have separately discussed each aspect of care (thermal care, cord care and newborn vaccination status). We have now included a forth section ‘policy implications’ which discusses implications of these findings towards the policy of ANC and its contribution towards newborn care. The discussion section on page 11 line 6-25, pages 12, 13, 14 & page 15 lines 1-2)
Our data confirm sub-optimal newborn care practices for cord, thermal and vaccination status of the newborn. Thermal care ranked least practiced followed by cord care. Newborn vaccination was relatively better practiced. Women who reported last delivery being at a health facility were more likely to report complete thermal care and complete newborn vaccination status. But health facility delivery was not a good predictor of complete cord care. Studies conducted in Bangladesh suggest increasing the number of skilled birth attendants as an effective strategy to increase safe delivery practices [32]. Indeed there is a general consensus that access to skilled attendants at delivery has multiple benefits for the mother-baby pair [33]. Studies conducted elsewhere show that women who delivered in health facilities were more likely to report the practice of recommended newborn care [32, 34]. Community interventions may help to reinforce recommended cord care practices to mitigate the problem of incomplete cord care identified in our study.

Cord care

From our results, the main determinant of complete cord care was application of potentially infectious substance on the cord. Majority of such substances are applied in the homes after discharge from a health facility and away from the supervision of a qualified health worker. Our results are comparable to Waiswa and others in eastern Uganda, where only 38% of the women [20] and in Bangladesh where 42.8% of the women were considered to have practised good cord care [32]. Elsewhere, application of substance on the cord was reported to face the greatest resistance to change [35-36]. Future cord care interventions should explore alternative substances that could be safely applied to the cord [37]. Women who had attained secondary education or more were more likely to report complete cord care. Similar studies conducted in Bangladesh found that secondary education was significantly associated with recommended newborn care practices including good cord care [34]. Women that were engaged in commercial farming or had a regular income, though counter-intuitive, were less likely to report
complete cord care. It is possible that women who are engaged in commercial farming and earning regular incomes are more often absent from their homes and thus less available for child care.

**Thermal care**

Less than one in ten of the mothers were judged to practice recommended thermal care. Our results are comparable to another study conducted in Bangladesh where 5.1% were judged to have complete thermal care [32]. In our study, early bathing of the baby within the first 24 hours following birth was the main driver for the low thermal care practices. In eastern Uganda, a similar study found that nearly all mothers had bathed their babies within the first 24 hours after delivery [20]. A set of interlinked procedures referred to as the “warm chain” suggest the provision of warmth to the newborn from the time of birth and throughout the neonatal period [6]. Delayed bathing is one component of the warm chain. A controlled study conducted in Uganda demonstrated that early bathing significantly lowered neonatal body temperatures even when bathed with warm water and later applied skin-to-skin warming for the baby [23]. Moreover the prevalence of hypothermia in one hospital set up in Uganda was shown to be as high as 80% of the babies observed within the first two hours following delivery [22]. Unfortunately, the practice of bathing the baby immediately after delivery [38] and delayed drying and wrapping [39] have also been encouraged by health workers based at the hospital. Another study that explored thermal care offered to newborns in Ghana suggests that interventions should be based on understanding of current behaviours and beliefs and must focus on messages and approaches in order to overcome barriers to behaviour change [40]. Indeed one study conducted in southern Uganda showed that most of the newborn care practices like thermal care are readily acceptable [21] by recently delivered women although other aspects of care like early bathing and application of substance to the cord are still resisted as they contravene societal cultural norms [41].

**Newborn vaccination status**
Newborn vaccination compared with cord and thermal care was better practiced. This may be in part due to the higher attention health workers accord to vaccination during prenatal care and immediate postnatal period [42]. Our results demonstrate that complete newborn vaccination status was significantly related to having health facility delivery and mother having secondary education or higher. This is in agreement with studies conducted elsewhere in Uganda [43-44] and in Kenya [45]. These studies further showed that children with several siblings were more likely to have untimely vaccinations. Our study showed positive relationship between women having their first baby and reporting complete newborn vaccination although our results were not statistically significant. This difference could have been as a result of studying different age groups. Their study enrolled children 10-23 months old while our study considered children less than five months old.

**Policy implications**

Consistently, adherence to four or more ANC visits did not show statistically significant relations with newborn care practices implying that ANC is not delivering on the desired newborn care practices. We expected that women who adhered to recommended four ANC consultations would report better newborn care practices compared to those non-adherent mothers. This finding raises important questions about the organization and offer of ANC education already highlighted in a separate study conducted in the same region [42]. It further has implications for implementing the policy guidelines suggested by WHO for a comprehensive mother-newborn care package [46-47], the policy on focused ANC and subsequently the practices newborn care.

WHO recommends at least four ANC consultations during pregnancy with a specific focus for every visit [4] hence focused ANC [48]. The focus of these visits are a comprehensive package that includes five main elements: 1) recognition and management of pregnancy related complications; 2) recognition and treatment of concurrent conditions; 3) screening for conditions and diseases; 4) preventive measures
like administration of tetanus toxoid and intermittent presumptive treatment of malaria; 5) advice and support to the woman and her family for healthy home behaviours and birth preparation plans, self care, recognition of danger signs, early care seeking, emotional and physical preparation for birth and care for the baby.

Clearly, the first four packages are clinically oriented requiring the input from skilled personnel like a midwife, but the fifth element which pertains to advice and support may not necessarily require such high level skills. We hypothesize that health workers in Masindi are more inclined to offer clinically oriented services at the expense of less technical services like health education [40, 49]. Even when some women made adequate contact with the health care system during pregnancy they remained inadequately prepared for newborn care also demonstrated in a separate paper [42]. Health workers could inadvertently ignore components of ANC that relate to advice and support to the mother and their family including immediate newborn care. For example, a study in western Kenya showed that provision of palpation and vaccination during antenatal care were over 90% while those who received health education were only 14.4% [50]. In eastern Uganda, mothers interviewed could not recall any information given to them on pregnancy or newborn care [40]. In a multi-country study [51] in Africa, less than 50% of the women reported they did not receive any educational information regarding danger signs in pregnancy leading to the delays in seeking for care in case of complications. Contrary to our findings, women who completed three or more prenatal visits in Bangladesh were more likely to report having practiced recommended newborn care [32]. Also in Bangladesh a study conducted among the ultra-poor populations suggests that specific subclass of people required a tailored educational intervention in order to attain a behaviour change in the uptake of pre-and post-natal services [52]. It is possible that health workers in Masindi do not consider these unique aspects of the women while offering information regarding newborn care.
Reviewer 2

Comment 1
Is the question posed by the authors well defined?: there is a disconnect between the title and what was studied.. it seems that they studied factors responsible for new born mortality but he title is about ANC..!!

Response
In this manuscript our aim was to assess newborn care practices in Masindi district and determine the relationship between newborn care practices with making four antenatal care consultations. We realize the disconnect between what we describe in the text and the title. For this reason we have altered the title to read on page 1 line 1-2

Is antenatal care preparing mothers to care for their newborns? A community-based cross-sectional study among lactating women in Masindi District, western Uganda

Comment 2
Are the methods appropriate and well described? Methods are well Described

Comment 3
Are the data sound?: It is not clear how question was done to achieve reliable data from participants…

Response
We relied on self-reporting from the women during the interviews. We have acknowledged this limitation in the section for 'strengths and limitations' on page 16 line 2-4

We attempted to analyze separately for one, two, three, four or more visits but could not establish any gradient (results not shown). The data collected were self-reported some women could have offered incorrect information due to recall bias. Direct observations could have mitigated this limitation in our study.

Comment 4
Does the manuscript adhere to the relevant standards for reporting and data deposition?: partially because it does not show clearly what question was studied and clear outcomes… important points should be identified clearly .. for
example is cord care a problem or just a proxy indicator of not delivering in health facility?

**Response**
We have included more details on what questions were studied. We have also included additional file 1 as an attachment to substantiate the questions that were put forward to the women. On page 7 lines 7-11 under the section ‘sample size and data collection procedures’

Where a household had two or more lactating women, only one was randomly enrolled. Data collected included socio-demographic characteristics, previous obstetric history and history of last pregnancy, immediate newborn care practices and immediate postnatal care-seeking practices in case of neonatal illness (see additional file 1). Three primary outcome variables were considered of interest- cord care, thermal care and newborn vaccination status. None of the eligible mothers contacted declined participation.

We further describe in detail the outcome variables of interest in the section for ‘data analysis’ page 7 lines 17-26, page 8 lines 1-13 & lines 15-20 under the same section of ‘data analysis’

Socio-demographic characteristics, reproductive health indicators and selected newborn care practices were displayed using descriptive statistics. The number of ANC consultations during the last pregnancy was considered the exposure variable of interest and was coded as sufficient ANC attendance=1 defined as having made four ANC consultations or more and insufficient ANC attendance=0 defined as 1 to 3 antenatal consultations. Composite variables were generated from primary responses using the *egen* command in stata to constitute our primary outcome variables of interest. Outcome variables included complete cord care (defined as - used clean instrument to tie the cord, used clean instrument to cut the cord and did not apply potentially harmful substance on the cord), complete thermal care (defined as - dried the newborn before the placenta or immediately after the placenta was delivered, wrapped the baby immediately the placenta was delivered and delayed bathing of the baby 24 hours or later after delivery) and complete newborn vaccination (a newborn baby who has received both tuberculosis and
Polio zero vaccines routinely administered at birth). For purposes of our analysis we considered as complete cord care or complete thermal care if any three of the five possible responses were correct and complete newborn vaccination if any one of the two possible responses were correct.

Independent variables considered during analysis were age (grouped as adolescents 15-20 years or adults 20-32 years), parity (having the first baby or having two or more babies), and marital status (living with spouse or living alone), source of income (regular or irregular source of income), level of education (attained no education/primary level only or secondary/hand higher education level) and place of delivery (in health facility or delivered outside of health facility). The category ‘no education’ were grouped together with ‘primary education’ because we did not consider any difference between the two groups [31].

The chi-square test was used at the bivariate level of analysis. Independent variables with corresponding \( p \)-values of 0.4 or less were fitted into a logistic regression model. Number of antenatal care consultations was purposively maintained into the multi-variable model for each outcome variable of interest even when their corresponding \( p \)-value was greater than the significant levels because this was our primary exposure of interest. The `svyset` stata command was used to take care of the cluster effect of our data collection technique whereby people from the same geographical location tend to provide similar responses.

**Comment 5** Are the discussion and conclusions well balanced and adequately supported by the data?:
**Comment 6** Are limitations of the work clearly stated?
**Comment 7** Do the authors clearly acknowledge any work upon which they are building, both published and unpublished? Yes

**Comment 8**
Do the title and abstract accurately convey what has been found?: No, Conclusion and most of discussion is about neonatal mortality and new born care and antenatal comes as one of the factors… so this disconnects title and the rest of manuscript..
Response
The title has now been revised. The introduction and abstract have been extensively revised to reflect the topic of newborn care and its relationship with making four antenatal care consultations. The title on page 1 lines 1-2 and ‘abstract’ on page 2 & page 3 lines 1-8 now reads:

Is antenatal care preparing mothers to care for their newborns? A community-based cross-sectional study among lactating women in Masindi District, western Uganda

Abstract

Introduction: Neonatal mortality has remained resistant to change in the wake of declining child mortality. Suboptimal newborn care practices are predisposing factors to neonatal mortality. Adherence to four ANC consultations is associated with improved newborn care practices like cord and thermal care for newborns. There is limited documentation of this evidence in sub-Saharan Africa where suboptimal newborn care practices has been widely reported.

Methods: Structured interviews were held with 928 women having children under-five months old at their homes in Masindi district, Uganda, from October to December 2011. Four or more ANC consultations (sufficient ANC) was considered the exposure variable. Three composite variables (complete cord care, complete thermal care and complete newborn vaccination status) were derived by combining related practices from a list of recommended newborn care practices. Logistic regression models were used to assess for associations.

Results: One in five women 220(23.7%) were assessed to practice complete cord care. Less than ten percent 57(6.1%) were considered to practice complete thermal care and 611(65.8%) were assessed to have complete newborn vaccination status. Multivariable logistic models did not demonstrate significant association between four or more ANC consultations and complete cord care, complete thermal care or complete newborn vaccination status. Secondary or higher education was associated with complete cord care [adjusted Odds Ratio (aOR): 2.72; 95%CI: 1.63-4.54] and complete newborn vaccination [aOR: 1.37; 95%CI: 1.04-1.82]. Women who reported health facility delivery were more likely
to report complete thermal care [aOR: 3.63; 95%CI: 2.21-5.95] and newborn vaccination [aOR: 1.84; 95%CI: 1.23-2.75], but not complete cord care. Having the first baby was associated with complete thermal care [aOR: 2.00; 95%CI: 1.24-3.23]. Women who engaged in commercial farming/had a regular income were less likely to report complete cord care [aOR: 0.54; 95%CI: 0.32-0.90].

**Conclusion:** Results confirm suboptimal newborn care practices in Masindi district. Despite being established policy, adherence to four or more ANC consultations was not associated with complete cord care, complete thermal care or complete newborn vaccination. This finding has important implications for the implementation of focused ANC to promote supervised institutional delivery and improve newborn care practices. Future ANC interventions should focus on addressing application of substance on the cord and early bathing of the baby during the immediate neonatal period.
While the ‘introduction’ in the main body on page 4 & page 5 lines 1-11 now read as:

Introduction

Neonatal mortality has remained resistant to change [1-2]. Most causes of neonatal death are preventable and relate to cord care to decrease sepsis, temperature control and initiation of early breastfeeding which has the additional benefit of controlling hypothermia [3]. Good assisted deliveries can decrease delivery complications, stillbirth and early neonatal deaths [7]. Initiation of BCG and polio vaccination within the first four weeks after birth [4-6] can enhance neonatal survival.

One of the instruments to obtain reduction in neonatal mortality is Antenatal Care (ANC), where we now agree that the risk identification approach [8-10] is not the important reason. Rather, the preparation of pregnant women to become knowledgeable mothers [11] hence limiting the number of visits to four (at four, six, eight and nine months) [12] if no complications are anticipated [13-14]. ANC delivery should have as an important objective to inform and prepare women to care correctly for their newborn. Two mutually reinforcing interventions should be packaged and offered to pregnant women during ANC consultations. First, the more technical intervention which includes history taking, clinical examinations, laboratory investigations, treatment and assessment for referral [4]. Second, health education and counselling which entails dialogue that creates an interface between medical conditions and socially relevant issues regarding ANC such as promotion of healthy lifestyles among pregnant women, birth plans including preparation for unexpected events and preparation for parenting especially care for the newborn [15]. Throughout the ANC period information about physical and psychological preparation for the newborn is offered to pregnant women [5]. This process of communication is expected to progressively make the women better mothers.

Evidence in Asia indicates that information on newborn care practices offered to pregnant women and their families during ANC clinics leads to improved care practices (complete cord care, complete thermal
care and initiation of breastfeeding within one hour) [16-17]. In order to achieve similar results, Focused ANC whereby pregnant women are encouraged to make at least four ANC consultations, has been widely promoted in Uganda.

In Uganda, the coverage of Focused ANC services has been scaled up to all tiers of the healthcare system with the aim of increasing awareness about birth preparedness, promoting supervised delivery and improving newborn care practices. Today, about 48% of pregnant women make four ANC consultations or more while 57% seek delivery assistance from a health facility [18-19]. However, recent studies conducted in Uganda have reported sub-optimal newborn care practices [20-23] and stagnated neonatal mortality rates [24]. Moreover, little is known about the relationship between newborn care practices and attending four ANC consultations.

This study specifically assessed newborn care practices with regards to thermal care, cord care and newborn vaccination status among lactating women in Masindi district in Uganda and determined its relationship with adherence to four or more ANC consultations.

Reviewer 1
Reviewer 1 did not make comments that needed our response