Reviewer’s report

Title: Use of antenatal care services in Kassala, eastern Sudan

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Reviewer: Maria Regina Torloni

Reviewer’s report:

This study aimed to investigate the coverage of antenatal care and factors associated with inadequacy of ANC in a region of Sudan. The title and abstract are adequate and the objectives of this study are clear and well defined. The study design is correct (cross-sectional survey) to answer the authors’ questions. However, there are essential details missing in Methods (see below). And although the number of participants was large (900 women), it is troubling that the data presented in Results is not sound, since apparently a substantial number of the participants have missing data on the variables considered by the authors as risk factors for antenatal care inadequacy (Table 1). Therefore, due to the lack of adequate data in Results, the Discussion and Conclusion may not be correct.

Minor Essential Revisions:
1. Abstract, Results: The form of presenting OR and 95% CI needs to be corrected and standardized.

Major Compulsory Revisions:
Methods- the following essential information is lacking and needs to be provided:
1. details on the selection of the households that participated in the survey (cluster randomization? other method?). How was sample size calculated? Why was this number (900 participants) considered adequate for this survey?

2. details on the questionnaires: who created them? how many questions? what main domains were covered? what kind of questions: multiple choice, semi-structured, open, more than one answer possible? Since the journal offers space, a copy of this questionnaire could be provided for the reader. How were the questionnaires answered (orally or written)? If oral, how were privacy issues dealt with?

3. women pregnant (> 14 weeks) at interview: how was gestational age ascertained? last menstrual period?

4. what was considered “antenatal care inadequacy” : a definition and reference are needed in this section of the paper. Although in Discussion, the authors elaborate on differences in the existing definitions, they do not actually state what was the definition they used in this study.

Results:
5. How many women were invited to participate in the survey and refused? In other words, what do these 900 women who participated in the survey represent, considering the total number of eligible women?

6. How many of the 900 participants had been pregnant during the last year? And what was the obstetric outcome of these previously pregnant participants: how many had ended in miscarriage or preterm delivery < 28 weeks? This information is important, since it would be impossible for these last two groups to have had 4 or + antenatal visits, due to short duration of pregnancy. If the number of women in these 2 groups is large, this could lead to incorrect conclusions, such as overestimation of antenatal care inadequacy.

7. Similarly, how many of the 900 participants were actually pregnant (>14 weeks) at the time of the interview? And what was the gestational age distribution of this group of women? This information is also important, since it would be impossible for 2nd trimester pregnant women to have had 4 or + antenatal visits, due to their gestational age. If the number of pregnant women < 3rd trimester is large, this could lead to incorrect conclusions, such as overestimation of antenatal care inadequacy.

8. Table 1. There is missing information regarding Rural Residence for 600 participants, since the addition of the 4 columns should be 900 but it is actually 300 (37 +167 + 47 + 49).

The same occurs for Lady (? Maternal) education (total =526, missing information for 324 participants) and also for Husband education (total=488, missing information for 412 participants).

This large number of participants with missing information in the variables selected by the authors as important factors associated with adequacy of antenatal care coverage is a serious problem. This invalidates any results presented on Table 2 and therefore the 2nd objective of their study (“identify factors associated with inadequacy of antenatal care in Kassala, eastern Sudan.”)

Discussion

9. The authors aimed to investigate antenatal care coverage in a specific geographical area of Sudan. Yet in their 1st sentence they refer to “poor utilization of antenatal care”, which implies that services were available to all women but were underused, which is probably not what they meant. In the 2nd sentence, they refer to “poor antenatal care” (referring to a previous study), suggesting that the quality of antenatal care provided was inadequate, which probably was not what they meant.

10. The authors do not mention the limitations of their study in Discussion.

11. The authors do not clarify or give any justification why they selected these 5 specific socio-demographic variables (age, parity, maternal and paternal education and rural residence) as the only risk factors for inadequacy of
antenatal coverage. Although they mention that the vast majority of women delivering in Sudan are married, was this information in fact collected in the questionnaire? And what about maternal and paternal employment, or per capita income of the household or the number of persons living in the household or available infrastructure (such as water, sewer, electricity and transportation) or distance of the residence to the nearest facility offering antenatal care services, etc.? All these variables could also affect antenatal care coverage and their exclusion should have been justified in Discussion.

**Level of interest:** An article of limited interest

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.