Reviewer’s report

Title: The long-term effects of adolescent pregnancies in a community in Northern Ghana on subsequent pregnancies and births of the young mothers

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Reviewer: Maureen Norton

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Comments on: The long-term effects of adolescent pregnancies in Northern Ghana on subsequent pregnancies and births of the young mothers

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The authors examine an important question: are subsequent pregnancies of adolescents whose first pregnancy occurred at under age 19, more likely to be associated with adverse outcomes, compared to subsequent pregnancies of women whose first pregnancy occurred after age 19?

I congratulate the authors on tackling this important question. I believe that there are ways to strengthen the paper. Addressing some of the questions and issues noted below may require major revisions, and some minor revisions. Apologies if I misinterpreted some aspects of the paper or missed some points.

Questions. Some questions include the following.

* The paper states (p.6), "women … who could not afford to visit a hospital … were offered a free consultation..." and "thus, only women with actual health complaints were considered in the study." How do the authors address concerns that women who have poorer health than the general population make up the sample and thus may bias the outcomes? For example, one study found that women who had recurrent stillbirth had a two-fold incidence of diabetes and hypertensive disorder compared to those who experienced their first stillbirth (Samueloff et al 1993 http://europepmc.org/abstract/med/8277486 ) How do the authors account for concerns about the possible poor health of sample subjects, and its influence on pregnancy outcomes?

* Many adolescents have subsequent, short interval births as adolescents. I could not find in the paper an indication as to whether the subsequent births the authors analyze occur as adolescent births, which are associated with higher risk, or if the subsequent births occurred to young adults. For example, a first birth (always high risk) could occur at age 14, and a second birth at age 15. The second birth at age 15 would also be associated with higher risk because it too is an adolescent birth. It would also be a short interval birth. Thus, if some of the subsequent births are both adolescent births and short interval births (reflecting two risk factors) this would help explain the higher incidence of adverse outcomes in Group 1. The 2014 Ghana DHS (p. 66) notes that 52.4 percent of births to women aged 20-29 are births that occur at intervals less than 36 months apart. (No data are available for aged 15-19 or younger ages.)
Spacing Technical Consultation recommended that, after a live birth, the time to attempt the next pregnancy should be 24 months, or almost three years/36 months between births.) Thus short interval births are prevalent in Ghana. Could the authors clarify the ages at which the subsequent pregnancies occurred, and whether they are adolescent, short-interval births, thus reflecting two risk factors, and helping to explain the higher incidence of adverse outcomes in Group 1? Or, did first pregnancies occur as adolescents, and subsequent pregnancies occured as young adults? Clarifying these factors will advance understanding of the dynamics and possible causes of adverse outcomes in Group1.

* The WHO Technical Consultation on Birth Spacing also recommended that, after a miscarriage or induced abortion, that women should wait at least six months before conceiving again to reduce the risk of adverse maternal and perinatal outcomes in the next pregnancy. The authors state that they gathered data on abortions. It is unclear if they gathered data on the timing of pregnancies after the abortions (in addition to the number of pregnancies). If they did, they might be able to analyze the extent to which pregnancies occurred less than six months after abortions, and thus possibly also contributed to adverse pregnancy outcomes in Group 1.

* The paper does not explicitly state the factors for which it controlled. It does note that socioeconomic conditions and parity in Age Group 1 and Age Group 2 are roughly similar. In analyzing adolescent outcomes, some studies adjust for as many as 16 factors (e.g., Conde-Agudelo et al 2005 http://www.sciencedirect.com/science/article/pii/S000293780401779X). How would the authors address concerns that the adverse outcomes we see in Group 1 may be due, for example, to other factors such as short birth intervals, poor antenatal care, rising rates of cesarean section in some countries, or other factors? Could the authors state explicitly how they adjusted for confounding factors?

* Related to the adjustment issue above, the paper states (p.7) that data were gathered on the number of pregnancies (gravidity) and number of children (parity) each woman had. It also notes that there was no significant difference between Age Group 1 (<19) and Age Group 2 (>19) with respect to the number of children (3.7 vs 4.1). No information was provided on gravidity. How do the authors address the concern that gravidity could be higher in the Age Group 1 (<19) and thus bias the findings in some way?

* Studies have found that adverse pregnancy outcomes are found largely in younger adolescents ( Althabe 2015 https://reproductive-health-journal.biomedcentral.com/articles/10.1186/1742-4755-12-S2-S8; Conde-Agudelo et al 2005 http://www.sciencedirect.com/science/article/pii/S000293780401779X ) Should Age Group 1 focus on younger adolescents (< age 16) rather than adolescents under age 19?

Clarifications. Could the authors clarify the following points?

* Abortion discussion (p.9) - are the authors referring to induced or spontaneous abortion? Or are both types included in this category?
* Infant death. The abstract refers to the loss of a newborn, while the text (p 9) refers to the loss of an infant, and Figure 2C refers to child mortality. Could the authors clarify?

* The authors state (p 7) that they gathered data on premature births, perineal ruptures and other birth complications, yet these outcomes were not considered in the paper. Could the authors clarify?

Thank you for the opportunity to review this interesting paper, and best wishes to the authors as they pursue their research.

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