Reviewer’s report

Title: The safety of Canadian rural maternity services: A multi-jurisdictional cohort analysis

Version: 2  Date: 26 February 2015

Reviewer: Maria Pia Fantini

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Major Compulsory Revisions

1. I think that the expression “safety of Canadian rural maternity services” (Ln. 1, P. 1; Ln. 122-124, P. 6) is not appropriate, as the authors have examined only the impact of organizational and geographical characteristics of rural services on newborn outcomes, without taking into account the metropolitan birth data. I suggest rephrasing these sentences accordingly.

2. In the Background section, the authors should explain the characteristics of rural maternity care in Canada and, especially, in the three provinces studied, and highlight which requirements rural facilities should have to provide good care.

3. The debate on the relationship between small units and maternal and perinatal outcomes should be further addressed in the Background, because the authors have mainly mentioned and described studies with positive results. Moreover, I suggest expanding the concept mentioned in Ln 75-76, P. 4.

4. Are the service level categories mutually exclusive? I guess not because, if they were, all catchments belonging to levels #4 to #8 (Table 1) should be less than one hour from the nearest maternity services. Moreover, the distance and type of service can independently influence the outcomes; for this reason, I suggest including in the logistic regression models two different variables for each catchment: one related to the distance (reference category: nearest maternity service < 1 hour) and the other related to the type of service provided (reference category: maternity services provided by obstetricians).

5. The expression “[...] comparison of logistic regression effect estimates” is unclear (Ln. 53-54, P. 2; Ln. 182-183, P. 8). Do the authors mean that data were pooled in a single logistic regression analysis? Moreover: how the authors handle this “pooled analysis”? Did they use clustered sandwich estimators to control for possible intraclass correlation of observations within the three provinces? Or did they include the provinces as dummy variables in the regression model?

6. Another concern about dependency of observations. It is not clear whether the authors analyzed the mothers (as reported in Table 2) or the singleton births (Ln. 192-193, P. 8). If the unit of analysis is the birth, the assumption of independence between observation does not hold because a mother can give birth more than
once during the study period, and the estimates from logistic regression are biased. In this case, the authors should rerun all analysis by including, for each mother, only the first birth occurred in the period April 1, 2003 to March 31, 2008. Alternatively, they may analyze all births and build hierarchical regression models where births are nested into mothers.

7. When the authors present the results (paragraphs “neonatal outcomes” and “intervention rates”), they should specify that the reference category is service level #8, i.e., maternity services provided by obstetricians. Without this specification, interpretation of results is difficult.

8. In Tables 4, 5, 6 and 7 the authors report the number of expected events (columns “N (adjusted)”). However, these figures are extremely high, and often coincide with the number of births reported in Table 2. Please recalculate; or explain what “N (adjusted)” stands for.

9. The adjusted OR for perinatal mortality in service level #2 of Nova Scotia is extremely high (Table 4); is it due to the small number of births observed in that level? Please consider not presenting that figure.

10. The authors describe, in the Results section, only the odds ratios of Figure 1. However, there are some differences between provinces for the same service level (i.e., service level #5 in Alberta and British Columbia [Tables 5 and 7]). The authors could comment these differences in the Discussion, and recommend further investigation with local audits.

11. Please address, among the limitations of the study, the lack of information about the actual place of delivery. The implied assumption is that the mother delivers in the nearest facility: in this way, the attribution of outcomes to the proper service level is uncertain.

12. Please delete or rephrase the final sentence “We need more of them” (Ln. 267, P. 11). It sounds promotional, and a bit demagogic.

Minor Essential Revisions

13. The third paragraph of the Introduction section (Ln. 100-120, P. 5-6) is quite long. I suggest shortening some phrases and removing detailed figures (i.e., odds ratios and confidence intervals).

14. Please add previous C-section among variables for adjustment (Ln. 180-181, P. 8).

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.
Declaration of competing interests:

I declare that I have no competing interests.