Reviewer’s report

Title: Socio-demographic determinants and access equality to prenatal care in Italy

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Reviewer: Rosemary Korda

Reviewer’s report:

This project examines factors associated with inadequate perinatal care (in terms of frequency of use and timing). These factors include maternal characteristics, area-level deprivation and year of service. A strength of the project is the use of administrative perinatal records to ascertain individual-level exposures and outcomes. However, there are fundamental problems with the manuscript that would need addressed before it could be considered suitable for publication.

The background, rationale, research questions and discussion lack clarity. In particular:

1. Key concepts need to be clearly defined. This includes use of the terms:
   (a) "Access", which technically includes the opportunity to use health services (i.e. availability, affordability etc.) as well as realised access (i.e. use of services), with this paper examining the latter.
   (b) “Equality” and “access equality” ("equality in access"?). Conceptually, it is not clear exactly what this refers to – i.e. equality in relation to what? Does this refer to equality in use of services only in relation to the area-based deprivation index? Or also in relation to the individual socioeconomic characteristics, such as education and occupation? Or are differences in PNC in relation to any factors, including year, considered inequalities (this is not usually how the term is used in the health inequalities literature). Are equity and equality considered synonymous (both terms are used in the manuscript)? On several occasions, the term “access equality” is used, where the word “use” (or similar term) would appear to be more appropriate. For example, “In order to analyse the relationship between PNC access equality (Y ) and individual and contextual characteristics (X)” (first line, para 1 of Section 2.3) - should this not be” In order to analyse the relationship between inadequate PNC (Y ) and individual and contextual characteristics (X)”?

2. The research questions/objectives would benefit from some refining – they appear to be stated differently in different sections of the paper (e.g. compare last sentence of the Background in the Abstract to last para of Introduction). As stated at the end of the Introduction, the first objective is to quantify inequality in inadequate PNC (the main objective), and the second is to describe changes over time in inadequate use of PNC (i.e., this objective is not about equality per se, unless differences in use across year is classified as inequality – but see point 1b above). The paper might be better served if the paper stated only one
objective (the first one), while still including year as a variable of interest in the
analysis. If the second objective remained, the second part ("...and discuss the
possible factors...") would not normally be included. (Note, also, there appears to
be some confusion as to the interpretation of the results with respect to changes
over time – see point 10 below).

3. Given the international audience, readers would benefit from some information
in the Introduction on the health care system in Italy, i.e., How are PNC services
structured and funded? Are there out-of-pocket costs? etc. This information is
important for interpreting findings on inequalities in use.

4. The manuscript would benefit from restructuring. There are several places
where contents are in the wrong section. This includes:

(a) Introduction, para 4 – information on the deprivation index should be in the
Methods section.
(b) First sentence of Section 2.2 of Methods should be in the Introduction
(c) Descriptive statistics, currently in para 4 of Methods, should be in Results
section.
(d) There are several places in the Results where there is interpretation rather
just reporting of the results (e.g. end of para 4, para 6) – interpretation should be
in the Discussion section.

See also point 14 below.

5. As I understand it, a major exposure variable—the area-level deprivation
index—was created by the researchers for this study. Given this, more details
are required regarding the construction of the index, including variables included,
validation, range of scores etc.

6. Given the study is on inequality, it would have benefited from information on
household income. Were data available on this? If so, why was this not included?

7. Other terminology issues that require addressing:

(a) While the term "reference group" is used appropriately when describing the
exposure variables, its use is inappropriate when describing the outcome
variable (Section 2.2, para 1, points 1 and 2).

(b) This study examines associations between individual-level and areal-level
variables factors and use of PNC services, but is not a study of causality.
However, many times throughout the manuscript, terms are used suggesting
causality, which I believe should not be used (underlined), e.g. "socioeconomic
disadvantage (sed) affects access"; "Employment promoted adherence."; "the
effect of the deprivation index on LPV".

8. Regarding reporting of results, the proportion of women who did/did not have
#4 visits and who did/did not have their first visit by 12 weeks should be
presented, for the group as a whole, and in relation to the characteristics
examined. Moreover, when describing inequalities, the magnitude of the absolute
inequalities, not just relative inequalities, in use should be presented. Although
the actual numbers of women who did/did not have #4 visits and who did/did not have their first visit by 12 weeks are shown in Table 1, column rather than row percentages are given. Hence the overall proportion of women who had "adequate PNC" on either measure is not obvious, nor are the absolute differences in adequate PNC in relation to maternal characteristics. Although these differences are reported and discussed (in para 4 of Methods), it is the column rather than row percentages that are reported, whereas it should be the other way around. e.g. Rather than ".... women born outside of Europe, where the percentage was more than 35% when the number of visits was below 4, whereas it decreased to 15% when the standard guideline were followed," I suggest instead something like "... 17% of women without European citizenship had < 4 visits, compared to 5% for women with Italian citizenship."

9. There is currently no reporting of these proportions in relation to the deprivation index, a key exposure variable in Objective 1, nor in relation to year, which this is a key result relating to Objective 2. These should be reported, at least in the body of the text.

10. The Results (in Abstract) state "Interestingly, we showed an important reduction of the inequality of access to healthcare in recent years for both indicators." As reported, it appears there is confusion between changes over time in PNC (which was examined in this study, with results showing inadequate use decreasing over time) and changes in equality over time (which was not analysed in this study). It is possible this confusion arises because of terminology issues (as described above in point 1b) rather than interpretation of the data, but it is not clear. Note the reporting of these results in the main section of the results is different to how they were reported earlier, but the meaning is still unclear (first sentence of para 7).

11. Para 2 of Results: "Although the estimated odds ratio for the fourth quartile of sed is higher than those estimated for the other quartiles". However, Table 2 shows this is actually lower – i.e. lower odds of inadequate care with increasing deprivation, rather than the other way around.(Although, as pointed out, not significant, although maybe test for trend would be significant).

12. There are several times in the Results when referring to the magnitude of the inequality the term probability is used instead of odds (including last sentence of para 3; para 5; para 7), which should be corrected.

13. There is no formal testing of the coefficients across models (in tables 2 and 3), so commenting on the differences in the odds ratios across the two different models is not appropriate, as has been done in para 8 of Results.

14. Overall, the Discussion would benefit from restructuring. Currently the essential components, which include reporting of the main findings, the comparison of the findings with previous studies, strengths and weakness of the study, interpretation, and implications, are not clearly delineated.

15. The Discussion would benefit from a more comprehensive discussion of
potential confounding and interpretation of the deprivation index findings. Currently the discussion of individual versus area-level effects is difficult to follow. (For example, in para 4 in discussing the lack of area-level inequalities, the possibility that individual-level factors (such as perception of care) could explain these findings is raised, which, as written, does not appear to make sense).

16. Considerably more caution needs to be applied in interpreting the findings, which have on several occasions been over-interpreted (e.g. "Women with a lower level of schooling were generally less able to forecast investments in health care"; "The results can be explained from the fact that women during their first pregnancy are more motivated to follow guidelines...").

17. The findings need to be discussed in the context of how PNC services are delivered and funded. Particularly missing from the discussion is the role of charges, if any. How does household income come into play here for instance?

18. I suggest commenting on the overall level of adequate use (which I note is over 90% for both measures overall, and over 80% for the most disadvantaged groups ), and whether the absolute differences (inequalities) in use are of any 'clinical' significance.

19. Please also note:

(a) Further advice has been sought regarding the statistical review of the multi-level modelling, which is not commented on in this review.

(b) Given the above major revisions, more detailed comments on minor essential revisions, for example where the meaning is not clear, and discretionary revisions, have not been supplied in this review.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Not suitable for publication unless extensively edited

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests