Reviewer's report

Title: Health behaviour modelling for prenatal diagnosis in Australia: A geodemographic framework for health service utilisation and policy development

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Reviewer: Babak Khoshnood

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General
This article assesses the geodemographic characteristics of women in relation to their uptake of prenatal diagnosis and examines the relation between uptake of prenatal diagnosis with birth prevalence of Down syndrome. The article is generally well written and provides useful, previously unavailable data. In particular, use of a GIS with lifestyle segmentation classifications provides an interesting example of an alternative approach for describing the distribution and patterns of prenatal diagnosis use in the population.

The main conclusions of the study result from a generally valid analysis and presentation of the data. Shortcomings of the paper are for the most part not of major importance and/or in general can be rectified in a revised version of the manuscript. The main intention of the following comments is to improve the final version of the manuscript.

I do have one general and relatively important reservation regarding the manuscript, however. The analysis does not take into account, simultaneously, individual socioeconomic and segment geodemographic characteristics into account as one may do for example in a multi-level analysis. Therefore, the findings regarding segment geodemographic characteristics cannot disentangle the effects of individual-level socioeconomic (compositional) factors from those related to the (segment-level) geodemographic characteristics of place of residence. In other words, the analysis, while interesting and informative, may be regarded as an “ecologic analysis” with the usual caveats and limits of this type of analysis.

The authors do implicitly acknowledge this point in certain parts of the manuscript (particularly in Discussion). Nonetheless, I think this point should be clearly and more explicitly stated and included as part of the conclusion, and mentioned in the section on limits of the study.

Specific Comments/Questions:

1. The authors note that “… studies are reporting unchanged live birth prevalence of DS or suggest that a substantial proportion of cases with DS continue to result in a birth” (page 4). I think it is more accurate to say that the extent to which the increasing availability of prenatal screening and diagnostic techniques has resulted in changes in the birth prevalence of Down syndrome has been variable across studies/countries (see for example Dolk H et al, 2005). Moreover, another study not cited in the manuscript showed a significant decline in the live birth prevalence of Down syndrome over time (in relation to increases in prenatal diagnosis of DS) despite consistent trends towards delayed childbearing, which have resulted in an increase in total prevalence of Down syndrome (Khoshnood et al, BJOG 2004). This decline is accentuated when changes in maternal age distribution are taken into account.

2. In the Introduction, it would be helpful to include a more detailed description of the prenatal screening and diagnosis policy in Victoria (this is done in part in the Methods section, page 5); in
particular, more information regarding the tests done routinely and reimbursement of prenatal screening tests would be helpful in the Introduction section. Did I understand correctly that all women have free/reimbursed access to prenatal screening regardless of age, with access to prenatal diagnosis contingent on the result of screening for younger women? Or is this only the case for women in the public sector? Could you please clarify this point and include it in the Introduction. It would also be helpful to note at least for the overall population what percentage of births is in the public vs. private sector (Methods section / Results).

3. The authors note that women in rural areas usually have to travel to a metropolitan center to have a prenatal diagnostic test. Is this also true for prenatal screening (measurement of nuchal translucency and/or maternal serum screening)?

4. The aim of the study as stated in the Introduction “investigate a range of sociodemographic characteristics of women who have prenatal diagnosis in Victoria” is a bit vague and needs clarification. Also, the secondary aim as stated “test the applicability of consumer modeling techniques in the analysis of health data…” does not appear to be entirely consistent with what the authors have actually done; i.e., describe the geodemographic characteristics of women who uptake prenatal diagnosis using an a priori-defined classification scheme rather than test their method/classification in a formal way (e.g., vis-à-vis a particular outcome or an alternative approach/classification, etc.).

5. It would be helpful to note whether birth defect surveillance by the Register is done using an active or passive (by notification) ascertainment. Are pregnancy terminations after 20 weeks of gestation allowed in Victoria/registered in the Birth Defects Register?

6. The description of Geodemographic segments (page 6) is a bit of a “black box”; in particular, it is difficult for the readers to understand precisely or even in terms of general principles what the “58 geodemographic lifestyle segments” represent and how they are constructed. A few lines describing the general principles for constructing these segments and choices made regarding their number would be helpful. Also, to what extent the socioeconomic gradients noted for the segments may be subject to uncertainty/classification error (say in terms of ranking of segments)?

7. In page 7, the authors note “expected rates of DS at term were assigned to each birth”. I was not sure what this meant; did the authors mean “assigned to each maternal age group”?

8. There was apparently a change in the likelihood of a DS case being born in a public vs. private hospital (page 8) in 1998 (same likelihood) vs. in 2002 (more likely in public hospital). What may be an explanation for this change?

9. In page 8, the authors note differences in prenatal diagnosis rates across the segments; can they also provide maternal age-adjusted rates as well – or alternatively present/comment on the age-specific prenatal diagnosis rates in more detail (rather than for < 37 vs. > 37 groups only)?

10. Page 9: While electing to comment on segments with more than 20% variation from state average is a reasonable approach for describing the variations, characterizing these segments as “extreme” does not seem in general quite justified/accurate given the uncertainties in the modeling approach and data limitations.

11. The Discussion includes much of the information that could be included in the Results (or Methods) section.

12. Page 10, second paragraph: The description of the marked peak in the uptake rate by younger women in “High Rise Rentals” (a lower socioeconomic rank) was not very clear to me. In particular, the large proportion of residents born overseas and the skew towards the 20-34 year age group are
not obvious explanations for the high uptake rate observed unless the authors can provide additional information.

13. Page 11, first paragraph, last sentence – What does “individual opportunity” refer to here?

14. The extent to which uptake of prenatal diagnosis (say amniocentesis rates) may correlate with (live) birth prevalence of Down syndrome depends in part on the strategy for prenatal screening/diagnosis and the extent to which women may use amniocentesis with or without consideration of screening results (Khoshnood et al, Am J Obstet Gyn 2003). If a significant proportion of relatively low risk women (say those 30-34 or 35-37 years of age with a higher socioeconomic status) decide to have amniocentesis without (or irrespective of ) screening results (in order to minimize the uncertainty associated with screening results), all else equal, a given level of amniocentesis use (prenatal diagnosis uptake) will have a lesser impact on birth prevalence of Down syndrome than the situation where a more “rational” strategy for prenatal diagnosis is adopted (Egan 2003, Haddow, 1993). I think a comment on this point would be helpful as a possible explanation for variations in the relation of uptake of prenatal diagnosis with birth prevalence of Down syndrome across different segments (Figures 3 and 4).

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

Quality of written English: Acceptable

Statistical review: No