Reviewer's report

Title: Utilization of delivery care for rural women in China: does the New Cooperative Medical Scheme (NCMS) make a difference? A population-based cross-sectional study

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Reviewer: Manuela De Allegri

Reviewer's report:

This paper addresses a very interesting and relevant topic, i.e. how health insurance can facilitate access to services and specifically to professional assistance at birth. I would recommend this paper for publication, but only after a number of important methodological weaknesses are taken into account.

Major revisions:

1. The authors differentiate between insured and non-insured women on the basis of whether the person has obtained reimbursement for the delivery services or not. This is not an adequate indication since the literature (see in particular the work by Ranson et al. on the SEWA experience in India) has clearly shown that in schemes which use ex-post reimbursement, many insured people do not claim the reimbursement they are entitled to. It would be advisable to use the insurance status declared during the interview process.

2. In addition, if the specific aim is to assess the impact of NCMS on facility-based delivery and relative out of pocket payment, then women with other insurance coverage should be excluded from the analysis or constitute a group of its own. Methodological decisions ought to be coherent with the research question.

3. The analysis of the data is very weak. Controlling for a few demographic characteristics when comparing women with NCMS and women with no NCMS is not sufficient to take into account the problem of self-selection, i.e. the fact that women with NCMS are likely to differ in a number of both observable and non-observable characteristics from women with no NCMS. Differences in utilization and in expenditure are likely to be the product of this underlying difference (self-selection into the scheme, since the scheme is voluntary). The authors should look into models that can control for this self-selection, for example models using Heckman correction estimates or propensity score analysis.

4. The results are presented in a very confusing manner. Odds ratios are presented in tables which also display simple percentage distributions. I find it appropriate to indicate a p-value for the percentage distributions, but not an odds ratio derived from a regression model. The reader is confused and cannot really understand what the OR refers to. I would suggest adding a table with the complete results of the regression models. The reader may be interested to see...
the effect of the other variables included in the model.

5. The sampling procedures are not clear. First, more information is needed on the overall number of townships and villages in the area and the proportion sampled. And then, how can the authors be sure that they have managed to include all women who had given birth during the given time period when the identification of the women was dependent upon doctors and maternity care workers? Is there any possibility that women had been pregnant and not come in contact at all with healthcare personnel? If this is possible, then the sampling procedures might have left out a number of women. This should be discussed openly.

6. The schemes benefit packages and reimbursement modalities need to be explained in more detail for the reader to be able to understand the results. For instance, the finding that insured women (although as said above, I have some doubts on the accuracy of the classification as insured) had lower out of pocket spending even before considering the insurance reimbursement appears surprising. To fully judge the finding, the reader needs to know: are providers informed upon registration that a woman is insured and therefore are forced to charge less? Or is the difference due to the fact that insured women are more aware of their rights and less likely to be induced into consuming additional services or being charged more? Or yet again, is part of the delivery cost directly covered by the NCMS scheme? I know that it is impossible to ascertain retrospectively whether insured women received fewer services than non-insured ones, but a number of other relevant information on the schemes and their procedures can be given to allow the reader to contextualize the findings. Lower spending remains especially surprising given the longer (especially before delivery) length of stay. Could it be due to the fact that insured women plan their delivery and ask to have it induced to minimize the potential risk of complications (although I am not sure that induced delivery reduces this risk)?

Minor comments:

1. The whole issue of distance is excluded in the model and therefore in the discussion. In would like the authors to motivate their decision. Otherwise, the reader may easily deduce, like I did, that the absence of difference in utilization patterns across levels of care may be due to distance. Furthermore, the literature on health insurance is clear: the further people live from facilities, the less likely to enroll. I am surprised to see that distance was not included in the models at any stage.

2. The authors need to provide a conversion rate into US dollars for the local currency.

3. The entire discussion on CS on page 8 is too long and too distant from the results presented in the paper. It is enough to state once that insurance status does not appear to have induced an increase in the rate of CS utilization, although the overall rate of CS remains higher than what recommended by the WHO.

4. It is not clear whether the question on perception of out of pocket payment for insured women refers to what they had to pay for the services in total (including
the part reimbursed) or just what they were left to pay after the insurance reimbursed them.
5. Some language editing would be beneficial, but is not essential.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

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.