Reviewer's report

Title: Age-appropriate Vaccination Against Measles and DPT-3 in India - Closing the Gaps

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Reviewer: Anne Cockcroft

Reviewer's report:

This paper addresses an important topic. The methodology used poses some limitations for interpretation of the findings and these should be discussed. The authors need to undertake additional analysis of the data in order to support one of their conclusions.

Major compulsory revisions

1. The authors only analyse findings from the subset of children with vaccination cards. There is evidence that maternal recall is actually quite reliable, including for the actual age of immunisation. See for example: Gareaballah ET, Loevinsohn BP: Accuracy of mothers' reports about their children’s vaccination status. Bulletin of the World Health Organization 1989, 67:669-674. Some authors have reported maternal recall to be better than health cards (Goldman N, Pebley A: Health cards, maternal reports and the measurement of immunization coverage: the example of Guatemala. Soc Sci Med 1994, 38:1075-1089.) A study in India reported that vaccination cards were often incomplete or inaccurate (Ramakrishnan R, Rao TV, Sundaramoorthy L, Joshua V: Magnitude of recall bias in the estimation of immunization status and its determinants. Indian Pediatrics 1999, 36:881-885.)

If the data are available, I would urge the authors to analyse the findings about vaccination status and age at vaccination based on maternal recall among all mothers (with and without vaccination cards). This would also allow them to compare findings from maternal recall with those from vaccination cards. If these data are not available from the survey they have used, than they should discuss the limitations and potential biases resulting from their analysis of a selected minority (those whose mothers had vaccination cards) of the children in the survey.

2. The authors draw conclusions about the lack of training etc in Pulse Polio facilities, ICDS centres and health sub-centres based on the finding that 82% of vaccinated children who were vaccinated prematurely were vaccinated in these facilities. However, in order to draw conclusions about this, we need counterfactual evidence. What proportion of the children vaccinated at the correct age were vaccinated in these facilities? The authors do not provide this information, but Table 3, if I have understood it correctly, indicates that 78% of all the children with cards (who were vaccinated) were vaccinated in these same
facilities. Not very different from the 82% of children vaccinated early. The authors could produce a 2x2 table of time of vaccination (early vs appropriate) against place of vaccination (the three lower level facilities vs other facilities). They would then be able to test whether children vaccinated too early were significantly more likely to have been vaccinated in the low level facilities compared with children vaccinated at the appropriate age. And they would also be testing whether children vaccinated at other facilities were more likely to have been vaccinated at the appropriate age. As it stands, the authors cannot conclude much from their finding that children vaccinated early were mainly vaccinated at lower level health facilities, since it seems that most children are vaccinated in such facilities.

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

**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