Reviewer's report

Title: A framework for the improved use of routine health system data to evaluate national malaria control programs: evidence from Zambia

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Reviewer: Abdisalan M Noor

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The study by Dr Bennett and colleagues used the Zambia HMIS for 2009-2011 and explanatory information from a number of household surveys and programmatic data to assess the associations of ITN coverage with changing malaria incidence in Zambia. The study shows that ownership of 1 ITN per household was associated with overall 27% reduction in clinical incidence. The Framework developed by the authors is a useful formal approach towards assessing the impact of malaria interventions on disease burden. The approach is easily adopted for other countries in Africa where the reporting rate is reasonably high and where sufficient data on intervention coverage exists. My comments are as follows:

1) It is not clear to me why reporting rate and testing rates are included as dummy variables in the regression if they were used in the process of imputation of missing case data. Were they used in the imputation?

2). It is not clear also whether the authors have adjusted the clinical cases using the test positivity rate (TPR) at each health facility so that their overall case load per facility per month is = confirmed cases + (unconfirmed cases adjusted for TPR of the month). If this was not done, then chances are that where TPR is low, the authors will primarily be looking at the effect of ITN on fever burden as opposed to malaria burden.

3) The authors adjust for treatment seeking rate but this usually a measure of access and not necessarily use of effective medication. I think the proportion of fevers treated with appropriate antimalarial drugs is equally important. I am aware that harmonizing this variable across clinically vs parasitologically diagnosed cases is tricky without information from surveys on whether febrile cases were tested for malaria before treatment.

3). The authors have used the MAP 2010 estimates of PfPR 2-10 to classify the country by malaria endemicity class. They also found interaction between ITN coverage and these endemicity classification. I think there are a number of issues when using these 2010 estimates to determine effect of ITN coverage. The transmission maps reflect the effect of intervention coverage up to 2010 in Zambia. However because the HMIS data used starts from the year 2009 the impact of these problem on the models may not be great. Of more importance is that in developing the 2010 MAP products a climatic covariates similar to those used in the regression analysis were used. This creates a potential problem of
circularity.

4) The authors could have modeled ITN use in the same way they modeled ITN ownership as the former has a direct relationship with observed changes in incidence. Any reason why this was not done?

**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 no competing interest