Reviewer’s report

Title: Hypertension education and adherence in South Africa: a cost-effectiveness analysis of community health workers

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Reviewer: Jeremy Sussman

Reviewer’s report:

This is a very nice paper about an important topic. It seems to be setting the authors up well for a hopefully useful intervention. The paper was generally clear, the purpose was obvious, and the concepts are important.

Major compulsory revisions:

1. More sensitivity analyses are needed. While I hate to criticize a very good model that has already been used in publication multiple times, my biggest problems were with the two major assumptions that relied on US-based data. The CVD prediction tool was based on old Framingham scores. While this is likely the best available, multiple studies have shown that Framingham is consistently mis-calibrated outside of the US, in part due to Framingham's slightly unusual dependent variable. (See D’agostino Jama 2001, where they recalibrate the score every time and Brindle BMJ 2003. ) Similarly, the rate of survival is from ISIS-2, a study that bears mixed resemblance to MI in South Africa. These limitations are not acknowledged or analyzed in sensitivity analyses.

Because of data limitations like this, I think the paper focuses too much on the mean estimated cost-effectiveness, a number that is rarely meaningful and certainly not here, and not enough on understanding the reliability of those numbers. I think a tornado diagram would be in order, or perhaps a probabilistic sensitivity analysis, so would using more meaningful values for the ranges chosen for these analyses. The estimates of the cost of an MI vary 15%, for example, which seems very optimistic. My point in saying this is not that I don't believe the results, but I think when data is as uncertain as much of this is, it is more important to see where the CEA could be wrong than to look at the take-home value. Especially considering this is in preparation for a project, not evaluation of one that's been done, it is good to see where it may go wrong.

Minor essential revisions:

1. The background section does not flow well. The last sentence of the first paragraph doesn't really make sense to me - I'm not sure what awareness and adherence mean together. The long second and third paragraphs shift between the rise of NCD’s to the use to primary care to CHW’s to infectious disease that I found confusing. Maybe it would help to separate this into a paragraph about NCDs (both WHO and then S.A.), then a paragraph specifically about CHWs. (“One proposed way to address the problems caused by NCDs is
CHWs... There is experience with CHWs in infectious disease”, etc.)

2. Improve the labeling of the figures, which are not fully-understandable without the text and are missing things like dollar signs.

3. Is the turn at the 0-point in both figures really correct? Isn't the point that at < $4/PY the CHW is cost-saving, so the area below 0 on the y-axis should be blue, not red?

Discretionary revisions:

3. It's unclear to me why the paper and project focus on blood pressure instead of cardiovascular risk, which these authors have convincingly shown would be a more effective way of modeling this work. It's particularly relevant because the predictive capacity of blood pressure (and hence the value of treatment) is likely to be far worse in real-world practice with CHW’s than in the Framingham model, where the blood pressures were measured multiple times in a much more controlled setting.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**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