Reviewer's report

**Title:** Prioritizing investments in innovations to protect women from the leading causes of maternal death

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**Reviewer:** julia walsh

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I would like to see the article published, but with changes, because it does describe the problems with trying to efficiently identify and prioritize interventions for further study in order to save lives of poor mothers and children.

Certainly poor populations need inexpensive innovations that can be used without the high tech infrastructure available in high income countries. The authors list many of the health system deficiencies that render the lifesaving interventions for mothers and neonates used in the US and Europe ineffective and inaccessible in poor countries. These health system deficiencies hinder the use of both existing, expensive interventions, but also hinder the introduction of new innovations. Poor mothers and neonates in suffer from health problems that may rarely occur among those with higher incomes. New technologies must be developed that are cheaper, easier to use and distribute, and have high efficacy for poor populations. However, resources to develop these new technologies are quite limited and priorities must be set.

**MAJOR COMPULSORY REVISIONS:**

1. The article presents results which are quite interesting and unexpected, but does not adequately explain how the results were obtained. For Phase 1, The criteria are listed and defined but then exactly how a technology was ranked as high, medium, or low is not explained. For example, for “Gap-filling potential for health” what was considered high, medium, or low? The authors state that prevention was ranked higher, but the other subcriteria are open to interpretation among health experts, namely ‘strength of available data’ and ‘percentage of cases that could be managed’. One only has to compare published review articles that purport to review the literature about a specific topic to realize that authors use different criteria for which articles to include in their review and how they rank the results, to perceive the variation in interpretation. Those interventions which are newly introduced and have not had time to have rigorous studies are the most likely to have great variation in interpretation. For example, the published literature on the use of mobile phones for health improvement in developing countries is filled with pilot studies. Certainly, even the most ethical scientists who have studied a particular intervention tend to rank their results much higher in strength of data and in how widely their intervention could be used compared with another scientist.

2. In addition, the article presents no information about the number, type, and expertise of the ‘medical experts’ involved in the ranking. What was the
confidence interval around the scores? What was the sensitivity analysis? With
the information in the material and methods, it is not possible to duplicate the
Phase 1 methodology because the definitions are certainly open to interpretation.
Even if it was possible to duplicate the methodology, would the results of this
priority ranking be the same done by a different group? I expect that it might
depend upon whom were the experts doing the ranking.

3. Some of the other criteria used in the Phase 1 ranking suffer from the same
problem: For example, among ‘Enabling factors’ how does one rank ‘Other
non-financial support’, ‘acceptability profile’, and ‘organizational capabilities’ as
high, medium or low? Among ‘Unique considerations’ how is an innovation
ranked on ‘System requirements’ that differentiate this from the ‘Distribution
System requirements’ under ‘Market Analysis’.

4. The article describes that in phase 2 of the assessment process they used the
MANDATE model and medical experts to assess potential health impact of new
technologies. It is unclear how estimation of health impact in phase 2 and the
ranking of innovations based on health impact differs from the criteria in Phase 1
of ‘Gap filling potential for health’ which also involves ranking based on ‘most
greatly reduce mortality’. If health impact is considered in the ranking for both
Phase 1 and Phase 2, then does this suggest double counting of this criteria?
Does this double counting affect the overall choice of priorities? However, since
health impact is so important, this double counting in Phases 1 and 2 may accord
greater weight to health impact which overall is reasonable. If health impact is not
given an extra weight in the scoring, then it should

5. It is unclear from the definition of ‘Gap-filling potential for health’ if this means
that the new innovation would be compared with the distribution of interventions
and deaths currently, or how this distribution varies in different parts of the world,
or to the future distribution of existing technologies. The health benefit of an
innovation varies in each of these scenarios. These new technologies will take
many years to wend their way through the many steps in development, clinical
testing, field trials, and distribution to achieve widespread usage. In the, for
example, ten years that it takes to proceed through these steps, the distribution
of other maternal and neonatal health interventions will have progressed, in most
countries economic growth will continue, markets will change, and poverty will
decline, and likely health systems will be stronger. In this future scenario, will the
ranking for ‘gap filling potential’ and the other criteria used in the process have
changed? Will Phase 2 estimates change? Will these technologies still be as
valuable as if they were introduced now? In ten years, some countries will have
minimally progressed, probably those in Subsaharan Africa which are
experiencing substantial civil strife and war, and then the new innovations may
still make the same improvement as today. The MANDATE model used in Phase
2 does allow estimation of health impact many into the future, but only number of
births changes and not delivery settings or penetration of technologies.

This brings in the different viewpoints about the importance of developing new
technologies versus improving usage of existing technologies and there are
different pots of money for each. Vaccines compared with other child survival
interventions are probably the easiest example to understand. In Uttar Pradesh,
India, only 40% of children are fully immunized with the minimum number of EPI recommended vaccines in the latest Unicef survey. If this level was raised to 95% the under-five mortality rate would be substantially lower. Deaths from vaccine preventable diseases would of course substantially decline, but also deaths from the other causes of child mortality would decline such as pneumonia, diarrhea, and malnutrition. A new technology for child survival introduced with a 95% vaccine coverage would save fewer lives than one introduced when only 40% are fully immunized.

6. Phase 2 estimates based on MANDATE are clear, but the authors also mention that medical experts were also used. Again the same problem as mentioned above with medical experts and their own vested interests or belief that their results are more important and credible than others.

In Conclusion, I would like to see this published but with a longer explanation and more supplementary appended data about the process and results.

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