# Review of: "The durability of long-lasting insecticidal nets treated with and without piperonyl butoxide (PBO) in Uganda."

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Potential competing interests: The author(s) declared that no potential competing interests exist.

This is an important study looking at the durability (textile and bio-efficacy) of PBO treated nets. These nets have been recommended by WHO since 2017 and distributed widely since across Africa. While they have been shown to be effective up to 25 months against malaria outcomes, little is known about their long lasting entomological bio-efficacy and textile durability in operational condition. Congratulations to the authors and research team for all the work and reporting on those important results. The assessment of the relationship between bio-efficacy and chemical content is really interesting and would simplify follow up of nets if there was a direct link.

Find below some comments on the manuscript that I hope are constructive:

There is a missed opportunity to discuss the results in light of the RCT's, this could be expanded in the discussion. The study also reports results up to 25 months the duration of the RCTs if there was data available for a full 3 years this will provide the evidence we are lacking on the effective lifespan of PBO nets.

**The statistical analysis**

This section might need some revision to better describe what has been done.

· What are the outcomes and variables of interest? What are the comparators? For each outcome what model is used (mortality, hole surface etc.)?

· Was the clustered design of the study incorporated in the analysis?

· Most of the statistical analysis is focusing on changes in bio-efficacy and PBO/insecticides contents over time, not sure this is always relevant especially for chemical contents. Some descriptive analysis reporting concentration (sd) and reduction in contents compared to new nets would be enough.

**Results**

Please indicate the number of nets assessed at each time point for holes, chemical analysis and bio-efficacy as well as number of mosquitoes tested for the bio-efficacy. This can be added after each of the proportions. As all your results are in figures there is no indication on how many nets of each type where effectively followed or mosquitoes tested.

**Bio-efficacy**

· The authors only presented the results against susceptible strain up to 12 months. It would be important to include the 25 months also to see how the effect wears off in time and between net products.

· The author seems only to compare reduction of bio-efficacy over time for each of the products. Comparison should also be done for each time point between the different PBO nets and their counterpart without PBO and also between

PBO nets type and relate to the findings of the RCT. Mortality/kd with cone and wire ball assays could be combined for the Olyset plus and compared to result in permanet 3.0.

**Discussion**

This statement is not supported by the data: e.g. “Both Olyset Plus and PermaNet 3.0 tested demonstrated superior bioefficacy against the pyrethroid-resistant strain than their pyrethroid-only equivalents.” The 95%CI in the figure 4 looking at kd and mortality for Olyset plus and Olyset net seems to overlap each other. There is also no statistical analysis presented comparing PBO nets and standard nets.

The lack of differences between textile integrity (hole surface, torn nets..) between products need to be discussed and compared to other studies. The limitation of using retrospective cross sectional survey to assess net fabric integrity would also need to be included as it could explain this lack of difference. (WHO-VCTEG. Estimating functional survival of long-lasting insecticidal nets from field data. 2013 11-13 September) 2013.