Reviewer's report

Title: Event-Level Association between Alcohol Use at Last Sex and Unprotected Sex: Evidence from National Population-Based Surveys in sub-Saharan Africa

Version: 1 Date: 16 January 2013

Reviewer: Penny Cook

Reviewer's report:

This paper investigates the link between risky sexual behaviour and alcohol use. While there is a large body of research suggesting a link between the two, the authors comment that it is often assumed that link is causal. This paper adds a useful contribution to the literature by analysing event level data from large representative health surveys. It finds the relationship between sexual risk and alcohol is more complex than might have been assumed. This paper is useful and relevant, but I would like to seek clarification about the analysis methods and the potential bias (as a result of the large number of missing cases) before it is clear whether it is suitable for publication.

To improve the paper, I would recommend more clarity around the statistical methods. Specifically:

Major Compulsory Revisions

1. I am confused by the modelling. If the paper used 'binomial generalised linear models' (p 7), wouldn't that have generated relative risks? It looks as if a logistic regression was used rather than a binomial model. Please clarify how odds ratios were generated by a binomial model.

2. Also, regardless whether it was a binomial or logistic regression that was used, shouldn’t there be more than one category for the interaction between partner type and drunkenness? I would have expected a reference category (e.g. not drunk and steady partner) compared to the other three possibilities [(drunk, steady); (not drunk, casual) (drunk, casual)]. The same would go for the HIV test.

3. The other issue about model building that requires clarification is why only those two modifying variables were included as interactions: I would have thought that ‘knows condom can prevent’ and extra-relationship partners would be suitable to investigate as modifiers. Were all possible interactions investigated and dropped if they did not add useful information to the model?

4. The implication is that wealth index is a continuous variable. Is that justified (is there a linear relationship with the outcome?). I got the impression from table 1 that it was categorised in 5 groups; if this is the case, shouldn’t it be treated as a categorical variable? Or is the categorised variable assumed to be linear, and thus the odds ratio refers to a move between categories, for example from ‘poorest’ to ‘poorer’.
5. In the limitations, there is no mention of the missing cases. A large proportion of cases (more than one third) were missing either HIV test results or data on condom use. What analysis if any was carried out to compare the included and excluded cases? What bias could have been introduced to the study?

Minor Essential Revisions

6. Table 3: I assume that ‘AOR’ at the top of table 3 are ‘adjusted odds ratios’, as mentioned in the text. This should be defined as a footnote, as should the meaning of the bold text (significance). Please make the table self-explanatory. The STROBE guidelines suggest presenting unadjusted estimates as well as adjusted estimates.

7. Page 11. Limitations: the self-report of drunkenness is stated to be a weakness compared to alcohol intake. I am not sure I agree this is a particular limitation. Alcohol quantity measures do not necessarily represent an ‘objective level of intoxication’. Additionally, the report of partners’ status might be more objective if using ‘drunk’ than relying on knowledge of the quantity consumed by the partner.

8. Page 12. Where does the figure of odds of 1.3 for unprotected sex come from? I was looking at table 3, where the odds of condom use in southern Africa if self or partner is drunk is 0.83. The inverse of this is 1.2, and not 1.3. Thus the number of sex events may need to be re-calculated.

Discretionary Revisions

9. Abstract (and also Background page 4): Is ‘failure to use condoms’ the best wording? The study includes a range of situations including (presumably) monogamous couples who use alternative contraception methods or are trying to conceive. Not using a condom in these situations would not be a ‘failure’.

10. Page 8. It could be a bit clearer here that we don’t know whether the individuals knew their HIV status or not. This is stated in the limitations, but wasn’t clear enough earlier on.

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

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

I declare that I have no competing interests