**Author's response to reviews**

**Title:** A systematic review of heterosexual anal intercourse and its role in the transmission of HIV and other sexually transmitted infections in Papua New Guinea

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**Author's response to reviews:** see over
Dear Editor

Thank you for reviewing our manuscript. We have read carefully the reviewer’s comments and made the necessary changes. We have identified where we do not agree with the reviewer’s changes, as is the case with Reviewer 2’s comments.

The editorial team made an additional request to adhere to PRISMA Guidelines and to state in the title that this is a systematic review. We had already identified in the title of the manuscript that it was a systematic review so we have left the title unchanged. We have also reviewed the manuscript for written expression, particularly the abstract.

We look forward to your favourable response

Angela Kelly-Hanku

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<th>Reviewer Richard Steen</th>
<th>Author Response</th>
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<tr>
<td>1. Is the question posed by the authors well defined? Yes, this is clear and it is an important public health question.</td>
<td>Thank you</td>
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<tr>
<td>2. Are the methods appropriate and well described?</td>
<td>Thank you</td>
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<tr>
<td>- Methods for both the systematic review and the modeling parts of the paper are appropriate and well described.</td>
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<td>3. Are the data sound? They appear to be, the methods are appropriate and data presented clearly</td>
<td>Thank you</td>
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<td>4. Does the manuscript adhere to the relevant standards for reporting and data deposition?</td>
<td>Thank you for this comments we have now clarified this confusion. We have clarified this reporting.</td>
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<td>- There is some lack of clarity in reporting some data, which may be misunderstood by readers. Here I refer mainly to the data on male sex workers and transgenders. In one place, it states that male sex workers were asked about HAI with female clients. Is this exclusively what is reported in the tables or does it also include HAI with the male clients of male sex workers. For transgenders, the data are even more ambiguous – do they represent receptive anal sex only? are transgenders included in general</td>
<td>It only included HAI and not male-to-male anal sex. Part of the confusion is that the study involved male and female sex workers and although the data was examined for the overall sample it was also disaggregated by gender. In PNG transgender</td>
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statements about HAI among females? on bottom of page 10, for example, I really don’t know what you mean by HAI and ‘same sex anal intercourse’ when you’re talking about TG.

same comments apply to reported condom use rates during HAI among these groups.

5. Are the discussion and conclusions well balanced and adequately supported by the data?

This is my main area of comment. While the discussion and conclusion are well supported by the data, the balance could be improved. I would suggest revising to address following points...

Too much of the discussion centres around recommendations for improving behavioural surveillance and there is some unnecessary repetition. I would simply state one time that HAI should be included in BSS, perhaps discussing how this might be done, keeping in mind limitations of BSS, which cannot go into as much detail as full research studies. As countries are looking for ways to streamline BSS instruments, what are the critical questions that should be added on HAI?

More discussion should focus on prevention of transmission through HAI. The paper really only mentions education to increase awareness, and promotion of condom use. There are other potential interventions including asking about HAI during medical checkups, examining for discharge or lesions, STI screening. As recommendations for checkups likely differ for different populations in PNG, what importance should be given to HAI for sex workers, MSM, TG and lower-risk women?

STIs... something more should be said. Were no STI data reported in any of the studies? If not, this gap in the findings and direction for future research should be stated.

HAI appears to be common in PNG but also, as well documented in the background, in many other parts of the world. This could be mentioned in conclusion and abstract with simple statement

are males who identify as women but these TG have not had reassignment surgery as is the case in other part of the work. In PNG TG is a gender not a third sex. We appreciate the complexity of the sex and gender distinction but for this study of male sex workers there were those who identified as a man and those who identified as TG.

Condom use was only for HAI and not male-to-male anal sex. The report presented that data separately.

Thank you for this comment. We have made edits to the discussion and conclusion to ensure that a better balance was reached.

We have streamlined this section and focused on the critical questions.

We have included further detail about what should be done to reduce anorectal STIs and the transmission of HIV through HAI.

PNG has no anorectal STI data. The lead author is the PI on a research grant to conduct PNG’s first study on anal sex and anal STIs. This study will provide the first data on anorectal STIs for the country.

We have amended this as per the request.
along the lines of ‘as in many other parts of the world, HAI is commonly practiced in PNG’

In prevention work, knowledge is important but often secondary to underlying cultural and structural factors that override rational decision making. Brief mention is made of possible reasons for having HAI – violence and ‘traditional beliefs about contagion from blood during menses as well as its contraceptive importance...’ Choosing HAI over vaginal sex to avoid pregnancy, often a greater concern to young people than infection, is a topic that calls out for attention. Was there anything in any of the studies on this?

9. Is the writing acceptable? Yes, generally very clear, a few editorial comments follow.

Specific editorial comments...

- last sentence of first paragraph of background... ‘The contribution of HAI to HIV epidemics, and as a result STI epidemic, is unknown in many settings’ I don’t understand what ‘as a result STI epidemic’ means. It implies that STI epidemics are somehow dependent on HIV epidemics, which does not make sense.

- note misplaced extra ‘HIV’ in opening sentence of background, ‘Penile-anal intercourse HIV is much more likely to transmit HIV’

- Style... in discussion, I would suggest less use of imperative statements like ‘must’ ‘urgently required’, ‘needed’, etc. Recommendations and priorities suggested with ‘should’ and backed by clear logic grounded in the data can be more persuasive,

Reviewer Jan M Risser

The paper is too long and somewhat unfocused. The background is extensive and interesting – but given the well-written background, I am confused about the purpose of the paper.

The information from papers identified through the systematic review could easily be incorporated into the background, perhaps under a subheading for PNG-specific research findings. The systematic review portion of the paper is weak – given that

The authors agree with the reviewer in the importance of cultural and structural factors and that knowledge. None of the studies make any mention of this as you enquire. The lead author is the PI on a research grant to conduct PNG’s first study on anal sex and anal STIs. It is hoped that we will be able to explore some of these issues in detail.

Thank you for these comments, we made a number of changes as per the reviewers suggestion.

We have made the necessary changes and clarified the confusion.

HIV removed.

We have made the suggested changes.

Thank you for these comments. We have clarified the purpose of the paper (with three aims clearly identified) and where possible shortened it te paper by remiving repition.

After careful re-reading of the manuscript and of the other reviewer’s comments, we disagree with the suggestion that we incorporate the information on HAI in PNG in the background. Also, we disagree that the systematic review is weak. Rather we
500 studies were found and 13 were reviewed in this manuscript, and no summary statistic was possible. We believe that the weakness lies with the data collected in PNG and the fact that no statistical summary was possible is not the weakness of the review (or the authors) but of the country data. We believe that through the systematic review we have been able to highlight a number of very important areas where work in the area of HAI needs to improve within the country and offers researchers and other interested people ways to move forward and improve the surveillance of HAI and highlight the importance of anorectal examination to prevent anorectal STIs.

Of more interest are the ‘appropriate values’ that were entered into the transmission probability equation. I would need more information about the equation (is the (1) by the equation the reference – or just an indication that this is equation number 1). Completing the required information in this equation required many assumptions which are not clearly described in the paper. The (1) next to the equation is a label for reference in the main text. The risk equation is a binomial equation, which we use to calculate the cumulative probability of at least one HIV transmission occurring in a given year. It assumes a homogenous population and ignores onward transmission from people infected during the year of calculation. This is a very standard approach for estimating short-term incidence. We have added text to the start of the “Impact of HAI: risk equation analysis” section to provide more background to the equation with references.

2. Figure 1 is not necessary and could easily be summarized in several sentences. Thank you for this comment. While we agree that it could easily be summarized as suggested, in order to comply with Prisma guidelines for a systematic review this figure is required. This Figure is the 4 Phase Flow Diagram as recommended by the Prisma Guidelines.

3. I do not see the importance of Table 1. Thank you for this comment. We believe that Table 1 provides an important overview of the research that explores HAI in PNG. While HAI has been well documented in other parts of the world such work has been very poor in PNG.

In PNG sodomy is illegal. This table highlights that sodomy is not confined to MSM or FSW and that it is an issue facing all populations across all cultural and geographical groups.

4. Table 2 presumably provides information that utilized in the transmission probability calculations – the extrapolation of these data to the equation needs to be explained - more than the footnotes in Table 4. This comment is addressed in our response to comment 6 below.
5. Table 3 could be summarized in a few sentences. Table 3 is a very detailed table and it shows the discrepancy in how HAI is reported and how condom use for HAI is measured. We believe that this table is important and should be visually depicted rather than summarized in a few sentences. This table also highlights just why a forest plot could not be made. To summarize the table would make the paper longer which would contradict the comment that the paper is too long.

6. Under “Risk Equation Analysis” the authors state “Using the representative values in Table 4” – but there is inadequate information about how these values were estimated or extrapolated – and I believe that the methods used to populate the formula should be the primary focus of the paper – not footnotes in the table. The parameter values described in Table 4 broadly represent behavior in PNG. They are based on available data (referenced in the footnotes of Table 4) with HAI condom use and HAI prevalence informed by the results in our review (Tables 2 and 3). As there is limited data for PNG and the quantitative values obtained in the review do not directly inform the parameters we had to use assumed values. The aim of the risk equation analysis is to highlight and reinforce HAI could be an important aspect of the HIV epidemic in PNG. It is not the primary focus of the paper. We have added text in the methods and results section to describe how we estimated parameter values as well as provide more detail in the footnotes of Table 4.