**Author’s response to reviews**

**Title:** Syphilis and HIV prevalence and associated factors to their co-infection, hepatitis B and hepatitis C viruses prevalence among female sex workers in Rwanda

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**Author’s response to reviews:**

Comments from editor:

1. In the methods you describe that ‘Mean, proportion, and 95% confidence interval were computed for descriptive analysis of variables’. I may have missed these 95% CI for prevalences, please add 95%CI for the overall prevalences of the different STI.

R/ 95%CI were added in overall prevalence of different STIs in the revised manuscript

2. You also describe that ‘Prevalence in different socio-demographic characteristics was estimated for HIV, syphilis, HBV, HCV infections and for HIV and syphilis coinfection.’ Please be specific what you mean by ‘estimated’. It seems that you calculated proportions of being STI positive and it may be considered to include a statistical test for the association between demographics and STI (such as with a chi-square test). For example, as described now you state that ‘prevalence increased with age or the prevalence of HIV was decreasing with the level of education’. A statistical test may confirm these statements.
Dear editor, you are right. Results from Table 2 are describing prevalence of HIV, syphilis, HBV, HCV and HIV-syphilis co-infection. Statistical tests were not needed in Table 2. The statements were modified in the revised version for more clarity.

3. Finally, please note a p-value of 0.00 as p<0.01

Your comment is considered, corrections were made in the revised manuscript

Birgit H. B. van Benthem (Reviewer 1):

1. The manuscript is clearly written and has important results. It is a national study among CSW in Rwanda and study participants are selected in different venues country-wide. It is important to know that the Rwandese government sponsored this study

The Rwandese Government and other partners supported financially this study. We reported it in acknowledgement section.

2. Introduction and discussion

The manuscript refers to many comparable papers among CSW of several continents/countries. I would summarise the most important studies, mainly the ones in neighboring countries, since it is now too much an enumeration of papers both in the discussion and introduction (can be shorter).

Suggestion approved, introduction and discussion sections were shorted. The current references are many from Africa and the region where Rwanda is included.
3. I'm not confident on the used tests for HIV and syphilis serology. More details on sensitivity and specificity of the rapid tests would be useful

R/ The used HIV and syphilis tests in the study are those approved and used in all health facilities in Rwanda. They are enough sensitive and specific.

The sensitivity and specificity of used tests for HIV and syphilis screening are as follow:

a. Vironostika® HIV Uni-form II Ag/Ab, 4th Generation (HIV screening test)
   - Sensitivity: 100%
   - Specificity: 99.0%

b. Murex HIV Ag/Ab Combination 4th Generation Murex® (HIV confirmatory test)
   - Sensitivity: 99.8%
   - Specificity: 99.3%

c. RPR (syphilis screening test)
   - Sensitivity: 78%-100% according to syphilis stage (Primary, secondary or tertiary syphilis)
   - Specificity: 85%-99%

d. SD Bioline (syphilis screening test)
   - Sensitivity: 95.45%
   - Specificity: 99.85%

4. Since the prevalence of most infections is very high (>20%, OR may mislead. It would be better to use prevalence ratios instead, at least for HIV and syphilis.
Prevalence Ratio can also be used in this kind of study but the most common is logistic regression model to indicate associated factors to the variable of interest, especially if we want to control variables, and it was used in many studies with prevalence even more than the one in our study.

5. Minor comments

Results (page 9, line 20): it would be of interest to know how many women refused to participate in the study.

The study didn’t capture the refusal rate. It was an opportunity of FSWs to be tested of HIV, syphilis, hepatitis B and hepatitis C viruses for free. We are confident that the refusal rate was around 0%.

6. Could the authors elaborate on how representative the study participants are for the whole group of CSW in Rwanda?

This question is answered in the method section where there is statement explaining how participants were recruited. At National level, recruitment was VDT in all hot spots with at least 5 participants per day. In limitation paragraph we said that home-based FSWs and FSWs operating inside hotels were not captured.

7. In the introduction or discussion it is important to describe what kind of facilities are available for CSW and how the infections found are treated and what would be the follow-up of these women and the prevention measures that need to be taken based on the outcomes of the study.

Suggestion integrated in the revised version. FSWs with any positive test were transferred to the nearest health facility or the health facility of choice for appropriate clinical care. The follow
up in clinical care was not mentioned because there are national guidelines of patients strategies in all health facilities.

Prevention measures are mentioned in conclusion paragraph.

Barbara Castelnuovo, PhD (Reviewer 2):

1. I have concerns regarding the methods used for this analysis

It is not clear what is the rationale for the model used

R/ The rationale of the model is to inform decision makers and implementers where they should focus efforts to prevent and to treat STIs among FSWs. The intention was to determine where FSWs are most vulnerable in regards to STIs (HIV and syphilis co-infection), what explain high STIs prevalence among this group

2. Particularly some of the independent variables (HBV and HCV), which are also quoted by the authors as STIs, don't seem to be really independent

R/ HBV and/or HCV could be associated with HIV and syphilis co-infection. They are independent because they can explain HIV and syphilis co-infection.