PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Structural Determinants of Food Insufficiency, Low Dietary Diversity and BMI: a Cross Sectional Study of HIV-infected and HIV negative Rwandan Women
AUTHORS	Nicole Sirotin, Donald R Hoover, CJ Segal-Isaacson, Qiuhu Shi, Adebola Adedimeji, Eugene Mutimura, Mardge Cohen and Kathryn Anastos

VERSION 1 - REVIEW

REVIEWER	Aranka Anema Epidemiologist British Columbia Center for Excellence in HIV/AIDS Canada
REVIEW RETURNED	13/12/2011

THE STUDY	Authors should consider revisiting their study design and review variables under consideration inclusion/exclusion criteria not adequately justified Statistical analysis/methods could be strengthened - esp selection of co-variates for multivariate model Key message from analysis misses the mark
RESULTS & CONCLUSIONS	Too many variables are measuring the same thing -e.g. literacy/education; income/employment; meanwhile, much emphasis is placed on alcohol variable, however it is unclear what authors are hoping to get out of this variable, as any alcohol use is likely a function of income rather than substance abuse, which would have been an important behavioral characteristic to assess. An essential variable that seems to be missing from this analysis is number of dependents/ household size. The conclusion falls short of drawing out important and relevant implications of findings
GENERAL COMMENTS	Objective: Suggest that rationale for study be tightened up: E.g. First sentence should state global figure of undernourished (ie. people consuming insufficient calories/day to meet daily requirements) and number people living with HIV in SSA. Few studies have examined FI among HIV+ individuals, or evaluated prevalence and nutritional correlates of FI in this population. Primary measures should be listed before co-variates. Also, authors should include

	definitions of primary outcome variables (as these vary tremendously in food security literature).
	Results: First sentence is not relevant to study objective. Results section should start by citing frequency distribution for primary outcome variables (including dietary dieverisy, which was not reported) AORs should be accompanied by 95% CIs and p-values.
	Conclusion: The current conclusion is weak. Seems to me the most important implications of these findings are for the potential impact of FI on clinical outcomes among PLWA.

REVIEWER	Dr Kayitesi Kayitenkore, Director, Kigali Dermatology Clinic. Rwanda
REVIEW RETURNED	25/01/2012

THE STUDY	Study objectives and prespecified hypotheses are better described in the summary that in the paper it self.
RESULTS & CONCLUSIONS	Since this is a cross-sectional study performed in a cohort of HIV+ women who were enrolled at the same time as HIV- women, it would have been interesting to compare the data with the one collected in HIV- women. Food insufficiency being self-reported is would be difficult to determine the accuracy of answers. Finally the fact that few of the women had low BMI pleads against the self-report of food insufficiency. The HIV + status and stage of disease it self could be related to the burden of low food intake since those women who are undergoing treatment seems to have less alcohol intake and slightly higher BMI.
REPORTING & ETHICS	Potential bias and confounding do not seem to be addressed in the text.

VERSION 1 – AUTHOR RESPONSE

Reviewer#1:

1. Abstract:

Objective: Suggest that rationale for study be tightened up: E.g. First sentence should state global figure of undernourished (ie. people consuming insufficient calories/day to meet daily requirements) and number people living with HIV in SSA. Few studies have examined FI among HIV+ individuals, or evaluated prevalence and nutritional correlates of FI in this population: We have restated the first sentence of the abstract to include the suggested statistics of global figures of undernourished and people living with HIV (line 33-35). We have also restructured the beginning of the manuscript to include these statistics (line 69-73).

2. Primary measures should be listed before co-variates. Also, authors should include definitions of primary outcome variables (as these vary tremendously in food security literature): We have listed and defined the primary outcome variables first in the abstract (line 42-46) and in the text (line 146 (methods), lines 183-193 (results)). We have placed the primary measures as the columns of Table 1 to be able to give the overall prevalence of these outcomes and to cross tabulate them by the individual structural covariates in the rows (p.17, Table 1).

3. Results: First sentence is not relevant to study objective. Results section should start by citing frequency distribution for primary outcome variables (including dietary dieverisy, which was not reported) AORs should be accompanied by 95% CIs and p-values: The abstract results section now starts with the frequency distribution of our three primary outcomes (food insufficiency, dietary diversity and BMI) (line 47-48). We have also made this change in the results section of the text (lines 183-193).

4. Conclusion: The current conclusion is weak. Seems to me the most important implications of these findings are for the potential impact of FI on clinical outcomes among PLWA. We have rewritten the conclusion of the abstract stating that BMI alone should not be used as a screening tool for food insufficiency (line 58-65). We discuss the finding that BMI was higher in the HIV-infected patients and that is likely due to food supplementation programs that are only available to HIV infected women (line 250-257). We included a statement in the abstract highlighting the need for more studies characterizing the health effects of low food insufficiency, low dietary diversity, and low BMI (line 63-65). We have also done this in the conclusions section of the text (line 317-321).

5. Authors should consider revisiting their study design and review variables under consideration: We have changed the study design to include both HIV-infected and HIV negative participants and have reviewed the variables under consideration and removed overlapping variables (removed: education, employment, electricity, line 161-166, page 17 Table 1, page 18 Table 2). We included a new multivariate analysis with fewer predictor variables as suggested in this comment and below in comment "9" (line 216-228 and page 17, Table 1).

6. inclusion/exclusion criteria not adequately justified: We have now included HIV negative women (line 142-143). The age requirement of 25 years or older at study entry restricts to all but the youngest adults. The requirement to be in Rwanda during the genocide (line 132) was part of the design of the parent study RWISA whose goals were, in part, to study the impact of the genocide (reference #16). We do not believe that it greatly impacts this sub study. We also give a reference (#16) to an article that gives more details of the RWISA study design (line 126).

7. Statistical analysis/methods could be strengthened - esp selection of co-variates for multivariate model: We have strengthened the methods section by 1)removing overlapping co-variates (removed: education, employment, electricity line 161-166) 2)adding household size (line 139), 3)including both HIV- and HIV-infected in our new analysis (line 142-143).

8. Key message from analysis misses the mark We have reframed our key message to state that 1) outcomes of food insufficiency and low dietary diversity were quite prevalent in this study population (line 239-241), 2)Low BMI was not correlated with the above two outcomes (line 243-245) and was inversely associated with HIV infection (line 242), likely reflecting food supplementation programs only available to HIV infected women (line 252-254) 3) As food insufficiency and low dietary diversity are associated with adverse health outcomes separate from BMI, and BMI did not correlate with these outcomes, BMI should not be used as the sole screening tool for food insufficiency (line 256-263). 4) Extreme poverty and illiteracy are associated with food insufficiency and low dietary diversity and alcohol use is associated with food insufficiency (lines 218-228). These structural and behavioral factors may be useful targets to prevent the adverse health effects of food insufficiency (lines 322-327).

9. Too many variables are measuring the same thing -e.g. literacy/education; income/employment; meanwhile, much emphasis is placed on alcohol variable, however it is unclear what authors are hoping to get out of this variable, as any alcohol use is likely a function of income rather than substance abuse, which would have been an important behavioral characteristic to assess. An essential variable that seems to be missing from this analysis is number of dependents/ household

size: We have removed the following variables: education, employment, electricity as suggested (lines 161-166). We allowed the alcohol variable to remain because of its strong association with food insufficiency. We believe that this is a significant finding because after controlling for income level, alcohol use is still strongly associated with food insufficiency. We added language to explain this more clearly in the discussion and why this is a potentially especially important finding in Rwanda, where the national alcohol consumption is quite low (lines 283-298). We have added household size to our analysis (line 139, Table 1, third variable row, Table 2, third variable row).

10. The conclusion falls short of drawing out important and relevant implications of findings: We have reworded our conclusions to state more clearly the important implications of our findings as describe in our response to item "8" above.

Reviewer #2:

1. Study objectives and prespecified hypotheses are better described in the summary that in the paper it self.: We reworded the hypotheses of the manuscript to reflect the language in the summary (line 118-122).

2. Since this is a cross-sectional study performed in a cohort of HIV+ women who were enrolled at the same time as HIV- women, it would have been interesting to compare the data with the one collected in HIV- women. We have now included the HIV negative women and compared them with the HIV-infected women and further characterized the HIV-infected women by CD4 counts (line 142-143, lines 189-191, page 17 table 1, page 18, table 2). We have also changed our title to reflect the change in study design. Ironically the HIV negative women had lower BMI than the HIV-infected women (lines 189-191), which suggests that the food supplementation programs in Rwanda that are open only to HIV-infected women have been more than able to overcome the impact of HIV on BMI. We have added this to our discussion (lines 251-257).

3. Food insufficiency being self-reported is would be difficult to determine the accuracy of answers: While self-report is difficult to determine accuracy, we have used two self-report tools, both the questions "Do you have enough food?" and the Household Dietary Diversity Score, in addition to the objective measurement of height and weight (BMI) as our outcomes. Both of our self-report tools have been verified and documented in the food security literature as accurate measurements of food insufficiency and dietary diversity. See References 14, 17.

4. Finally the fact that few of the women had low BMI pleads against the self-report of food insufficiency. The total number of women with BMI <18.5 is 101, 15% of the total population surveyed. As we discuss in lines 250-269, BMI and food insufficiency measure overlapping aspects of a multifaceted problem of undernutrition. It is possible that women who respond "no" to "Do you have enough food" respond that way because while they have sufficient food to keep themselves from malnutrition (BMI <18.5) they do not subjectively have enough food to live the lives they would like to live. Finally, we point out as is noted in the limitations paragraph (lines 311-317) that we cannot rule out that some women could have responded yes to being food insufficient in the hopes that this answer would make them eligible for or referred to a food supplementation program (lines 315-317).

5. The HIV + status and stage of disease it self could be related to the burden of low food intake since those women who are undergoing treatment seems to have less alcohol intake and slightly higher BMI: We have included CD4 count stratification to further characterize the stage of HIV disease (lines

189-191, Table 1, first characteristic row and Table 2, first variable row). There were no systematic / statistical trends across CD4 strata of prevalence's of the three food insufficiency outcomes. While women undergoing treatment with ART had slightly higher BMI, they also self reported lower food diversity, but neither of the differences was statistically significant (Table 2, second variable row). The pattern with alcohol is mixed and we believe not related to ART use although this would be impossible to prove or disprove in this study. Overall, in multivariate models that allowed for adjusting for stage of HIV diseases (i.e., CD4 counts) the women who use alcohol have much higher odds of being food insufficient [OR 3.23 CI (1.99-5.24)], (see table 2, last row).

6. Potential bias and confounding do not seem to be addressed in the text: We have tried to strengthen and add sections that address the potential bias of not explicitly stating that the answers to these research questions would not determine the eligibility to food aid (lines 315-317).