Author's response to reviews

Title: The odd man out in Sub-Saharan Africa: Understanding the tobacco use behavior in Madagascar

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Author's response to reviews: see over
Reviewer #1

Major Compulsory Revisions:
Methods Section:
Please indicate:

Comment
- why you chose to use secondary analysis, using DHS data, rather than use standard WHO/CDC survey tools, e.g. GATS, etc.?

Response
The DHS is the most comprehensive unit level data to collect tobacco use information for a number of countries in Sub Saharan Africa (SSA), including Madagascar. As at May 2013, GATS data are not publicly available for SSA countries, including Madagascar [1].

Comment
- why was there gender imbalance in your sample ?

Response
DHS surveys are designed primarily to collect information from females [2]. It also collects information from a special male questionnaire from half of the households surveyed. Tobacco use information for males are only collected from this questionnaire, hence the imbalance. We have clarified this in the Methods section and acknowledge that as a limitation in the limitations sub-section by including the following:

The different sample sizes for males and females and low sample sizes for some demographic variables in the study resulted in wider confidence intervals, leading to less precision in the interpretation of the regression estimates.

Comment
- what was the case-definition of a "current smoker" adopted in your work"?

Response
Women [3] and men [4] who participated in the DHS were asked if they currently smoke cigarettes or use other forms of tobacco. The answers were coded as Yes/No/Missing. The questions used for this study were: 1) “Do you currently smoke or use any type of tobacco? Yes/No”, 2) “Do you currently smoke cigarettes? Yes/No”, and 3) “What (other) type of tobacco do you currently smoke or use? Pipe, Chewing tobacco, Snuff, Other (specify)”. We have revised the paragraph three of the Methods section of the manuscript with the following information:

The participants in the DHS were asked several health-related questions, including their tobacco use behavior. The choice behavior of a participant’s tobacco consumption was determined by positive self-reported responses to whether s/he currently smoked
cigarettes or smoked/used any type of tobacco and the type of tobacco s/he currently
smoked/used (Pipe/Chewing tobacco/ Snuff/Other)

Results & Discussion:

Comment
- please clarify the possible effect of "marital status" on "smoking status, as it seems
contradictory between what is mentioned in the Results section versus Discussion section

Response
We conducted gender-wise analyses and the results for males show that while marriage did not
have a significant effect on smoking status, the relative risks were higher for married males than
unmarried males for both SLT use (1.2 times) and dual use (1.5 times). For females, marital
status did not seem to affect their tobacco consumption choices in any significant way. This
information has been incorporated in the last two paragraphs of the Results section.

Discussion section

Minor Essential Revisions:

Introduction:

Comment
Last paragraph: please change the objectives' verbs into past tense

Response
We have revised the paper as suggested

Comment
Methods: you may wish to change "secondary education" into "high-school education"; "higher
education" into "university education", so that people from different parts of the world would
identify with such categories similarly

Response
This has been changed as suggested.

Results:

Comment
- Figures 1a and 1b: please re-arrange countries in both graphs in a "decrescendo order” as far as
smoking status distribution by gender: more impressive and easier interpretation

Response
We made the change as suggested.

**Comment**
- Table 1: please move "total columns" to the far right, as these sum up other Categories

**Response**
We have revised the paper as suggested

**Comment**
- Table 2: please suffice with two decimal points for all results (point estimates and 95 % confidence intervals): simpler and provides standardization of results’ reporting in the same table

**Response**
Thanks. It has been changed as suggested

Discussion:

**Comment**
- I enjoyed reading it.

**Response**
Thank you.

**Comment**
You may wish to highlight how different the situation is in Madagascar, in comparison to other SSA nations in your study

**Response**
We have amplified the difference in the use of tobacco products with the inclusion of the following sentence in paragraph 1 of the Discussion section of the revised manuscript:
   Indeed, nearly half of Malagasy adult males in this study reported that they used some form of tobacco product (48.90%). SLTs use prevalence (24.62%) was at least 20 percentage points higher than any of the other countries.

**Comment**
- Please remove the statements which follow reference (35) to the "Conclusion & Recommendations" section

**Response**
We have revised the paper as suggested

Acknowledgements:

**Comment**
Please indicate in which city, country is the mentioned "College of Public Health"

Response
The College of Public Health is in East Tennessee State University, Johnson City, Tennessee, USA. We have revised the paper accordingly.

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

Response
Thank you.

Comment
Quality of written English: Needs some language corrections before being published

Response
We have done line-by-line editing and asked a colleague not familiar with the subject to edit the paper.

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

Reviewer #2

Major compulsory revisions

Comment
1. Page 4: the authors describe the steps the government has taken to combat the increasing tobacco use. Nothing is said about increasing the taxes of tobacco products while this is known to be one of the most important and most effective measures. Can the authors write something about this also?

Response
We and incorporated information of taxes in the third paragraph of the Introduction and second paragraph of the Discussion sections.

Comment
2. Page 7: How was wealth measured? Is the ‘standardized wealth index’ a questionnaire?

Response
The wealth index was used as a proxy to income which was not collected in the survey. Wealth Index used information on household ownership of consumer items, ranging from a television to a bicycle, as well as characteristics of a respondent’s dwelling, such as its source of drinking
water, sanitation facilities, and type of flooring material used. Each asset was assigned a weight (factor score) generated through principal components analysis, and the resulting asset scores were standardised in relation to a normal distribution with a mean of zero and standard deviation of one. Each household was then assigned a score for each asset, and the scores were summed for each household. (Please refer to DHS Final Report 2008-09 for more details [5].)

This variable was not constructed by the authors. People behind DHS computed this wealth index variable and provided it along with the unit level data. We have added this information as a footnote in the Methods section.

**Comment**

3. Page 7: the statistics are not clear for me. Are the independent variables put into the analyses together or one by one? If one by one, why do the authors check for multicollinearity? If put together, why do the authors not discover multicollinearity if they put age and age squared together in the model?

**Response**

The independent variables were put into the analysis together. The age squared variable has been dropped from the revised model which ran separately for males and females. The multicollinearity, measured by VIF, was found to be less than 10 for all the variables except secondary education category for male-regression for which VIF was 12. (VIF 10 is the cut off as a rule of thumb). We included the following information in the last paragraph of the Methods section:

> The MNLM models were checked for possible multicollinearity, but it did not warrant dropping any variables. Robust standard errors were used because of lack of information on structure of heteroskedasticity and large sample in the Madagascar DHS dataset. The Chi square goodness of fit statistics was estimated to check the overall fit of the model and is reported along with the MNLM results in Table 2.

**Comment**

4. Page 7: the reason why the authors are using age squared is still not clear for me with the explanation they give.

**Response**

We have dropped the age-squared variable from the revised model, which was run separately for males and females. It was dropped because it was found to be insignificant for the female regression and was actually adding more confusion than value.

**Comment**

5. Page 8: The results are weighted by what? Also indicate that the data is weighted in figure 1a and 1b.

**Response**

The revised model presented in Table 2 uses probability weights (option `pw` in Stata) from the survey. The same weights were also used to compute the estimates in Table 1 and Figures 1a and
b. This point has been clarified in the last paragraph of the Methods section of the revised manuscript.

**Comment**

6. Page 8: In describing the females results, the authors speak about dual use, while in men use ‘of any tobacco’ was described. Is it any products or dual use? If it is dual use, correct this also in the figures 1a and 1b.

**Response**

“Any tobacco” in the manuscript refers to smoking, smokeless, and dual use. On the other hand, “Dual use” refers to the use of smoked and smokeless. To avoid confusion, we changed “Any tobacco” to “All tobacco” in the text, figures and tables.

**Comment**

7. Page 9: results in table 1 are weighted. By what?

**Response**

The DHS dataset is based on survey weights developed by those that collected the data, i.e., the National Institute of Statistics of Madagascar and the US-based ICF International. As such, all results presented in the manuscript are based on survey weights. We have clarified this point in the Methods section of the revised manuscript with the following:

Detailed description of the survey, including methodology, questionnaire development, administration, collection of information and management of data by survey weights to make it representative of the respective populations have been discussed in earlier studies and reports [5,6], and are also available online at ICF International [2].

**Comment**

8. Page 9: The prevalence of tobacco use has a strong gender gradient with … (p<0.05)# indicate which test was used and give also the statistic. For example: chi² = …. Also indicate that in the table.

**Response**

We would respectfully like to point out that most regression routines usually perform a statistical test (chi-square test in this case) to compute a probability (p-value) for each coefficient in the model, which we did. However, reporting the statistical test along with the p-value will make the table clumsy and reporting the results difficult. Therefore, we strongly believe that reporting p-value alone serves our purpose of assessing whether the coefficient is statistically significant at a certain level of confidence (95% in this case).

**Comment**

9. Page 9: Among males, smoking peaks at 20-24 years (35.82%) and not at 45-49 as indicated in the text.

**Response**

We made the correction accordingly.
Comment
10. Table 1: indicate also the significance in the table (for example chi² p-values with *)

Response
Please refer to response to comment #8 above.

Comment
11. Place the total prevalence above the table instead of below as it is now.

Response
We made the change as suggested.

Comment
12. There is a ‘*’ in the table but without any explanation.

Response
The star should read “All other religious groups which are not Christian, not Muslim, or not traditional.” We added it to the table.

Comment
13. Results in general: page 9-10: the authors are speaking in terms of more or less, while no indication of significance is given.

Response
We stated the level of significance (p-values) in parentheses to the narrative in the results section, where necessary.

14. Page 10: In females, dual use is also low in traditional religion.

Response
We agree to your point that dual use is also low in females belonging to traditional religion similar to female Muslims, but not with smoked tobacco products or smokeless tobacco products use, where females belonging to traditional religion had high prevalence rates compared to female Muslims. We planned to state only the salient findings in the narrative hence stated that “Muslim females had the least prevalence of all tobacco products”. We have incorporated this information into the paragraph 4 of the Results section. However, religion was not included in the female regression model due to the small sample sizes.

Comment
15. Table 2: it is not clear if these are univariate analyses or if these results are controlled for other variables.

Response
This is the sentence now we have in the revised manuscript:
Table 2 presents the relative risk ratios (RRRs) from the multinomial logit regression for the choice of tobacco use among males and females aged 15-49 years.

Comment
16. For dual use: are there enough respondents in these analyses to do the comparative analyses? Maybe it would be good to put the number of respondents within every category in the table (for example ‘Smokeless Tobacco Products (n = …)).

Response
Thank you. We included sample sizes (n) for each type of tobacco use in table 1.

Comment
17. Age: (first time) indicate that this variable is used as a continuous variable in this analysis.

Response
We defined all the variables in the study in the Methods section of the revised manuscript. It has been indicated as “All variables, except age and wealth index, were categorical”, which means age and wealth index are continuous variables. To avoid confusion, we included a footnote in table 2 about the same. The footnote reads “Age and wealth index are continuous variables and all others are categorical.”

Comment
18. Wealth index: also continuous variable, indicate that.

Response
Please see the response to comment #17.

Comment
19. Page 10: other + muslim + traditional have a lower relative probability compared to Christian. So instead of ‘People from other religious faiths’, it is better to say ‘People from all other religious faiths studied’. What about the comparison between for example Muslim and traditional, …?

Response
We conducted gender-wise analyses and the analyses involving females did not include religion because of the small sample sizes. In our analyses for males, Christians were chosen as the reference category in determining the likelihood of tobacco use in non-Christian (Muslim, traditional and other) adults. A comparison between ‘Muslim and traditional’ or ‘Muslim and other religion’ or ‘traditional and other religion’ is not possible under the present model specification because when using a dummy variable in regression one can only compare the other categories with the reference category (Christians, in this case). In this respect, if we want to compare Muslim vs. traditional, we have to use one of them as the reference group, which means that Christians will not be the reference group. Therefore, we would respectfully like to retain Christians as the reference group because it is the largest religious category in in the study.
Comment
20. Page 11: FCTC: by whom adopted? Also by Madagascar? In which amount? Taxes, Protection from exposure to tobacco smoke, Regulation of the contents of tobacco products, Regulation of tobacco product disclosures, Packaging and labeling of tobacco products, Education, communication, training and public awareness, Tobacco advertising, promotion and sponsorship, Demand reduction measures concerning tobacco dependence and cessation? It would be interesting to know more about these measures in Madagascar, so the reader can see what is missing and what are the next steps that must be taken to prevent tobacco in Madagascar.

Response
The FCTC was unanimously adopted by the Member States of the World Health Assembly in 2003 and as of May 2013, it has been ratified by 176 Parties, including Madagascar in 2004. We have incorporated this information in the Discussion section of the revised manuscript.

With respect to tobacco control policies in Madagascar, we have provided a fairly exhaustive list in paragraph 4 of the introduction based on the 2011 WHO MPOWER report [7], American Cancer Society’s Tobacco Atlas [8], Tobaccocontrollaws.org [9-11] and information collected from the WHO regional office of Africa in Brazzaville, Congo. The next step is proper implementation and enforcement of these policies, along with changing social norms about tobacco use. This information has been incorporated in the Discussion section.

Comment
21. Page 12: Smoking already starts in adolescents so why not start prevention at an earlier age when they are not are already smoking or addicted? I think this is a better preventive strategy than battle smoking when people are already addicted to it.

Response
We agree with the reviewer that it is better to start prevention at earlier age. At the same time, we believe that it is important to help those smoking to quit. We have clarified this point in the Discussion section.

Comment
22. Page 12: ‘In this respect, …., tobacco use was inversely related to higher education, income brackets and non-manual employment …’. This is not investigated. The authors used the categories ‘no use’, smokeless tobacco products’, ‘smoked tobacco products’ and ‘dual use of tobacco products’. To investigate tobacco use like described here, they had to look at ‘total tobacco use = sum of the 3 last categories’. If you look at these results in the first table, it suggests that non-manual + unemployed are both categories with very low tobacco use.

Response
Tobacco use in this paper refers to all three forms of usage- smoked only, smokeless only and dual use of tobacco products. These results the reviewer describes have now changed with the revised estimates separately for males and females and our description in the text has been changed accordingly.
Comment
23. In the next sentence, the authors say that uneducated people are using more tobacco (all forms) compared with educated people. This was also not investigated as high education was the base category. To investigate this, the authors must take no education as base and compare this with the other categories.

Response
These numbers have now changed with the revised estimates corrected accordingly.

Comment
24. Page 13: last sentence first paragraph: it is always good to have more educated people in a country, for different aspects of life. Although, to battle tobacco use, I would say that a more achievable goal is to give more information on tobacco use to the lower educated people or to implement smoking prevention programs tailored on the lower educated people. That is the correct preventive measure here. It is not an achievable goal to make all people follow higher education, so they won’t smoke. Also, not all people have the skills to follow higher education. This thinking is only correct for smokeless tobacco products as the results for smoking and dual use are different.

Response
We agree with the reviewer and have incorporated the following sentence in paragraph three of the discussion section:

This suggests the need to increase awareness programs about the ill effects of SLTs, while finding ways to reach the lower educated people with this information or implementing prevention programs tailored for such people.

Comment
25. Page 13: second paragraph, first sentence: the authors are speaking about a reduced use of SLT and dual use when the wealth index increase. A RRR of 0.522 and 0.725 is found. This does not mean that the use reduces by 48% (1-0.52= 48) and 27% (1-0.73 = 27) respectively. As this is a ratio, the correct calculation is: for smokeless tobacco products: 1/0.52 = 1.916 # by decreasing wealth, the use of smokeless tobacco products increase by 91%. For dual use: by decreasing wealth, dual use increases by (1/0.72 = 1.379) 38%. Or you can also say: By increasing wealth, use of SLT is decreasing by 0.52 times and dual use by 0.725 times.

Response
We have revised the statement pertaining to males in paragraph 7 of the Discussion section as:

While the wealth index did not have an effect on the choice of male smoking, an increase in a person's wealth significantly decreased the relative risks of being a SLTs or dual user of tobacco products by a factor of 0.45 [RRR = 0.45, 95% CI (0.38, 0.54)] and 0.7 [RRR = 0.70, 95% CI (0.51, 0.98)] times, respectively.
Similarly, we have revised the statement pertaining to females in paragraph 7 of the Discussion as:

Wealth had varying effect on the choice of tobacco use among females. While wealth was significantly associated with relative risk of smoking among females \[RRR = 1.59, 95\% CI (1.11, 2.24)\], the risk of SLT use was negative \[RRR = 0.59, 95\% CI (0.52, 0.66)\].

**Comment**
26. Page 13: second paragraph: occupation: the results given about the people in agriculture, are the results compared with people who are unemployed. This reference category must also be stated here. Otherwise, it seems you compare people in agriculture with the rest of the population.

**Response**
We have included the reference category to avoid confusion.

**Comment**
27. Page 14: First sentence: same mistake as above: 14\% must be 16\% (1/0.86 = 1.16).

**Response**
These numbers are now changed with the revised estimates and hence corrected accordingly.

**Comment**
28. Page 15: first paragraph: what does the authors mean about social norming?
Do they mean the implementation of social norm interventions? Social norm interventions are part of the strategy ‘Education, communication, training and public awareness’ in the FCTC, but more can be done. I would not only focus on social norm interventions but also start at schools with smoking prevention, increasing taxes, ….

**Response**
“Social norming” in the paper refers to social norm interventions, including education. We have incorporated the following in the Conclusion section:

Along with current progress in tobacco control, the government and public health community of Madagascar should engage in health education efforts to make all forms of tobacco use socially unacceptable, while discouraging tobacco use initiation and encouraging cessation.

Minor essential revisions

**Comment**
29. Page 5-6: ‘The overall response rate for the household survey in Madagascar was 98.8\%, with 17,375 females (response rate 95.6\%) aged ….’ I would make two sentences of it as it is confusing to see the response rate twice but on a different topic.

**Response**
We have revised the Methods section of the manuscript as:
The overall response rate for the household survey in Madagascar was 98.8%. Approximately 96% of females aged 15-49 years (n=17,375) and 93% of males aged 15-59 years (n=8,586) provided information on their current use of tobacco products, which include smoked, smokeless and dual use of tobacco products.

Comment
30. Page 6: state the corresponding author’s institution.

Response
The corresponding author’s institution is East Tennessee State University. We have incorporated this information in the paper.

Comment

Response
“viz.” refers to "namely", "that is to say", and "as follows". We have replaced it with “namely” to avoid confusion.

Comment
32. Page 9: 7th line: it must be: males with no or primary education.

Response
We have revised the paper as suggested.

Comment
33. Page 14: 8th line: couple must be couples.

Response
We have revised the paper as suggested.

Comment
34. Page 15: limitations, 5th line: in respective country must be in the respective countries.

Response
It has been corrected.

Discretionary revisions

Comment
35. Page 3: put an ‘a’ before ‘potential market in line 6 of the second paragraph.

Response
We have revised the paper as suggested.
Comment

Response
We have revised the paper as suggested.

Comment
37. Page 14: 4th sentence: change: However, the huge difference in the rate of smoking among married males and females indicates that still a larger percentage of the female population in the country are exposed to SHS …

Response
We have revised the paper as suggested.

Comment
Level of interest: An article of limited interest

Response
We have addressed all comments and concerns raised by the reviewer.

Comment
Quality of written English: Needs some language corrections before being published

Response
We did line-by-line editing and requested a colleague not familiar with the paper to review it for language.

Comment
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Reviewer #3

Comment
This paper aims to estimate tobacco use in 17 Sub-Saharan Africa with a focus on understanding factors associated with tobacco use in Madagascar. The word ‘influenced’ [page 3, para 1] in stating the hypothesis is not appropriate as a cross-sectional study cannot establish any ‘influence’.

Response
We have replaces “influence” with “association”.

Comment
Given the four response categories, the use of multinomial logistic regression is appropriate while the technical details of the model (page 5, para 3) may not be useful.
Response
Thank you for this suggestion. However, other reviewers of the paper prefer the technical details of the model to be retained for the reader to better orient with the study. Therefore, we would respectfully like to retain the technical details of the model.

Comment
• There is no rationale or conceptual framework in the paper to justify inclusion of explanatory variables considered in the modelling as independent variables.

Response
The inclusion of the explanatory variables was informed by the existing literature. Simultaneously, the choice was constrained by the information available in the DHS dataset for Madagascar, which is a limitation of this study. We have clarified this point in the Methods section of the manuscript and acknowledge this limitation in the limitation section of the paper by incorporating the following:

Another limitation is that although the choice of the explanatory variables for the study was informed by the literature, it was simultaneously constrained by information available in the DHS dataset for Madagascar. As such, other variables such as tobacco industry promotions, smoking and anti-smoking media messages, and receptivity and/or exposure to smoking/tobacco use cessation programs that might potentially influence adult males and females in Madagascar were not included.

Comment
• The argument of pooling the data from men and women to run a single model is weak, given the differential pattern of tobacco use in men and women. I suggest that authors rerun the analyses for men and women and present the results separately for men and women. This is also supported by very high values of RRR for male, compared to female (e.g. RRR=33.64 for dual use of tobacco).

Response
We have rerun the models separately for males and females. The results of the two separate models are now presented on Table 2 instead of the combined model before.

Comment
• The authors used ‘robust standard errors’ without explaining the rationale for such use.

Response
“Robust standard errors” is a statistics used when there is inadequate information about the structure of heteroskedasticity and it is safe to use because in case heteroskedasticity is not present, the robust standards will become conventional standard errors. Thus, we have added a brief rationale for using the “robust standard error” in the Methods section of the revise manuscript as:
Robust standard errors were used to improve estimates because of lack of information on structure of heteroskedasticity of the data.

Comment
• The authors used ‘weighted percentages’ in the Result section, while there is no mention of weighting (how it was created?) in the Method section of the paper.

Response
The DHS dataset is based on survey weights developed by those that collected the data, i.e., the National Institute of Statistics of Madagascar and the US-based ICF International. As such, all results presented in the manuscript are based on survey weights. We have clarified this point in the Methods section of the manuscript that

Detailed description of the survey, including methodology, questionnaire development, administration, collection of information and management of data by survey weights to make it representative of the respective populations have been discussed in earlier studies and reports [5,6], and are also available online at ICF International [2].

Comment
• Table 1 should include total number (n) in each response category so that readers can interpret the percentages more precisely. E.g. 3.4% of how many women were using smokeless tobacco? It has implication in modelling.

Response
A row containing the ‘n’ is now added to the top of the table for each category.

Comment
• There are inconsistencies in presentation of the results of multinomial logistic regression model. Table 2 presents RRR while the text says ‘odds ratio’ [page 10, para 2]. Some of the RRR estimates are very high with a very wide confidence interval (e.g. no education, compared to higher education, has an RRR of 30.9 with 95% CI: 7.58*126.0). These are difficult to interpret and may not have good precision.

Response
‘Odds ratio’ was an inadvertent terminology in this context and it has now been corrected in the text.

We have rerun the multinominal regression models separately for males and females and some of the issues related to high point estimates with wide confidence intervals are now mitigated. However, some still do exist because of sample sizes, which is evident through wide confidence intervals and might not provide a good precision. We have acknowledged this problem in the limitations sub-section of the revised manuscript by including the following:

The different sample sizes for males and females and low sample sizes for some demographic variables in the study resulted in wider confidence intervals, leading to less precision in the interpretation of the regression estimates.

Comment
• It is not evident why the authors have interpreted RRR as relative probability while in reality these are estimates of relative risk.

Response
It was inadvertently written as such. Correct terminologies are used now.

Comment
• There is no information about goodness of fit or adequacy of the fitted model and as such it is impossible to know whether the fitted model is a good fit.

Response
We have added the goodness of fit statistics along with Table 2.

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

Response
Thank you.

Comment
Quality of written English: Acceptable

Response
Thank you.

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

Response
Thank you.

REFERENCES


