Author’s response to reviews

Title: Uptake and correlates of HIV testing among men in Malawi: evidence from a national population–based household survey

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Author’s response to reviews:

Many thanks for your time reviewing our manuscript. All the concerns raised have been addressed accordingly. The responses are below:

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“Uptake and correlates of HIV testing among men in Malawi: evidence from a national population–based household survey”

Concerns raised by Huiru Dong (Reviewer 1)

ABSTRACT

1. 0.05 significance level is conventionally used, so "The level of significance was set at P 0.05." is not be necessary to mention in the abstract.

Thank you for your comment. We have deleted this sentence. See page 2, second paragraph, line number 30.

INTRODUCTION

1. The prevalence of HIV over the past five years was noted, how about the incidence of HIV?

Thank you for your question. We have revised this part to include the incidence. See page 4, paragraph 1, line number 67-70. It reads:
“Malawi is making progress in the fight against HIV: The HIV prevalence for adult population aged 15-49 has declined over the past five years, from 10.6% in 2010 to 8.8% in 2016. New HIV infections have also dramatically declined from 98,000 new infections in 2005 to 36,000 in 2016.

2. Is there data available on the HIV testing rate over time?

Thanks for this question. There is limited age-and sex-disaggregated data available on HIV testing. As such, we depend much on the survey data such as Demographic and Health Surveys (DHS) because this data is comprehensive as compared to routine data collected in public health facilities.

3. It is helpful to provide more context about HIV testing specific to Malawi, for example, where can people receive this service, recommended frequency, cost, availability, barriers, etc.

Thank you for your observation. We have added more literature to provide a brief context of HIV testing specific to Malawi. Specifically, we have provided information on where people can access this service, the cost and also when did Malawi start offering this service. See page 5, line number 87-90.

4. Factors associated with HIV testing among women in Malawi have been examined in previous studies. It is helpful if authors provide more rationales about why the factors for men would be different.

We are grateful for your observation and comments. We have greatly revised this part to provide more rationales for investigating HIV testing in Men. See page 5, line number 89-105. It reads:

“Despite the availability of free HIV testing services, there has been low uptake of HIV testing services among men in Malawi. A recent Malawi population-based HIV impact assessment (MPHIA) estimates that 35% of men in Malawi have never tested for HIV. Men are a key population disproportionately affected by HIV and represent an important group to engage in HIV testing and prevention services. Besides, men in Malawi, as in many other African countries, are the key decision-makers in their households and control economic resources that might be significant for HIV prevention and care. Thus, a better understanding of the factors influencing the uptake of HIV testing in this population is required to inform the development of strategies to scale up HIV testing among men in Malawi, and ultimately, prevent HIV infection and promote timely linkage to HIV treatment and care. For instance, this might highlight the
specific categories of men who need to be targeted with more efforts in order to improve HIV testing uptake. Elsewhere, studies have found a positive association between the likelihood of men having tested for HIV and older age, marital status, higher income as well as higher educational. To date, there have been no studies that have investigated the predictors of HIV testing among men in Malawi. Therefore, the aim of this study was to investigate factors associated with lifetime HIV testing among men in Malawi using a nationally representative sample”.

Method

1. A typo on line 98: "The survey was was implemented by…".
We are grateful for your observation. It was indeed a typo and we have deleted it.

2. What is the detailed measure for wealth? Considering that there were participants as young as 15 years old, was it measured as individual or household wealth/income? How the categories of poor, medium, and rich were defined? More information is also needed about the measurement of working status. Additionally, are these two factors highly correlated?

Thank you for your questions. Wealth index was measured as household wealth based on the household possessions (e.g., TV, radio, bicycle) and housing quality (e.g., type of floor, wall, and roof). We have also cited the source of this information in the manuscript. The DHS categorizes household wealth index into five groups; poorest, poor, middle, richer, and richest. This study recoded household wealth index into three groups by combining “poorer” and “poor” for poor and “rich” and “richer” for rich. We have removed working status in the analysis because it was not a good variable to influence a lifetime HIV testing. We have revised this paragraph as well see page 7, paragraph 2, line number 144-159.

3. Is there data available on substance use and sexual orientation, which are important factors to consider for HIV testing?

Thank you for your question. It is indeed true that substance use and sexual orientation are important factors to consider for HIV testing. However, we did not find these variables in the data set and we have included this as one of the limitations of this study. See page 15 paragraph 2, line number 335-338. It reads:

“It is imperative that our results be interpreted under a set of limitations. First, the study was limited to only the variables collected in the MDHS. As such, other important variables (such as
substance use and sexual orientation) that may affect HIV testing but were not available in MDHS could not be examined”.

4. It is easy to understand that factors like religion might be stable over time. However, the authors mentioned that history of genital discharge referred to information in the past 12 months. Are other independent variables, such as area of residence, work status, and number of sexual partners, referred to status or behaviours in the past 12 months as well? Considering that the dependent variable was based on the question "Have you ever tested for HIV?", the timing of HIV testing is unclear. It is therefore possible that HIV testing happened before the exposure status. In this case, the factors are not qualified as the predictors of HIV testing, or factors affecting HIV testing service utilization. The authors need to justify the temporal relationship between these exposures and HIV testing.

Many thanks for your observation and comment. We agreed with you that some of the factors were not qualified as predictors of HIV testing because it was difficult to establish the temporal relationship between these factors and a lifetime HIV testing. History of genital discharge in the past 12 months, working status, number of sexual partners in the past 12 months have been removed from our analysis. However, we have maintained area of residence because this is a factor which can influence a lifetime HIV testing because of accessibility of services.

5. How many observations have missing value for all these variables? Assuming observations used in this analysis were based on completed sample without missing value, authors need to report how many incomplete sample were excluded.

Thanks for your question and comment. For this analysis, we included data for all men who participated in the survey (i.e. 7478 men). Therefore, we did not exclude some of the participants in the analysis. However, some of the variables of interest had missing values and they were not included in the analysis. We also mentioned this in the method section. See page 7, paragraph 2, line 145-146.

Results

1. Region (Northern, Central, Southern), frequency of reading newspaper, frequency of listening to the radio, and frequency of watching TV were included in result tables, but not in method
section. The authors need to provide more rationales on why accessing to media (probably in the past 12 months), i.e., newspaper, radio, TV, will be predictive for HIV testing.

Thank you for your observation and comment. We have revised and included region of residence as well as exposure to mass media in the method section. Exposure to mass media was not measured in the past 12 months but rather for a long period of time and we have provided an explanation in the manuscript. See page 14, paragraph 2, line 302-310.

2. Conceptually speaking, there should be moderate level of correlation between marital status and number of sexual partners. Looking at Table 1, 58.1% sample were currently married, however, 74% sample had 0 sexual partner and 26% sample had at least 1 sexual partner. Shouldn't the frequency of people who had sexual partner be higher?

Thank you for your observation. We were referring to number of sexual partners EXCLUDING spouse hence no correlation with marital status. However, number of sexual partners in the past 12 months has been removed in our analysis.

Discussion

1. The rate of HIV testing information could be provided in the introduction section.

Thanks for your good suggestion. We have revised this part. See page 12, paragraph 1, line 250-255.

2. Regarding age as a predictor for HIV testing, what is the guideline for HIV testing in Malawi? It is expected that men aged 15 to 19 years might have low engagement of sexual behaviours, therefore at lower risk of HIV, which in turns will be associated with low prevalence of HIV testing. It is hard to tell from the current study that the low prevalence of HIV testing among young men is due to poor access to health care services. Potential sub-analysis can be done to restrict the sample to those who are sexually active, then examine whether age is still a predictor.

Thanks for your question and comment. In Malawi the guidelines for HIV testing allow people from 13 years to go for the service. It is true that men aged 15 to 15 years might have low engagement of sexual behaviours. We have revised this paragraph and include it as one of the possible explanation for the observed low uptake of HTS among men aged 15 to 19 years. See page 12, paragraph 1, line 257 to 273. It reads:

“In particular, participants’ age was an important factor associated with HIV testing in this study. Men who were aged 20 years or older were more likely to have had HIV testing compared to adolescent men. This finding is in accordance with a recent study in Haiti which revealed that older men were more likely to have been tested for HIV than men aged 15 to 19 years. Similarly,
a study in South Africa reported that young males were less likely to be tested for HIV than order males. The low uptake of HIV testing among adolescent men observed in this study could be attributed to a number of factors. Adolescent men may have low HIV related knowledge as well as limited access to health care services including HIV testing services. For instance, a report by UNICEF reveals that only 32% of boys aged 15–19 years in sub-Saharan Africa know how HIV is transmitted and how it can be prevented. Furthermore, men aged 15 to 19 years might have low engagement of sexual behaviours, therefore perceive themselves as having a lower risk of HIV, which in turn contributes to low uptake of HIV testing among this age group. Fear and stigma surrounding HIV and HIV testing in healthcare facilities may also prevent adolescent men from getting tested for HIV in Malawi. Thus, program planners need to develop and design effective programs, policies, and strategies that target adolescent men in Malawi”.

3. It is interesting to see that key socio-demographic factors such as wealth index, working status, covered by health insurance, were strongly associated with HIV testing in bivariate analyses, however, they were all not significantly associated with HIV testing in multivariable model. It is helpful if authors provide some potential explanations.

Thank you for the good comment. We have added a paragraph in the discussion section to provide some potential explanations. See page 15, paragraph 2, line 326 to 333. It reads:

“While the body of existing evidence suggests that key socio–demographic factors such as wealth index, area of residence, religion and covered by health insurance are associated with HIV testing, this study found contrary results. These variables were strongly associated with HIV testing in bivariate analyses; however, in the multivariable model the results modified and were all not significantly associated with HIV testing. These conflicting results could possibly be due to different sample size, study participants and setting as well as the differences in the definition of ‘HIV testing’ adopted by the studies. Further exploration of the role of these factors in uptake of HIV testing among men in Malawi is recommended.”

4. Reading newspaper once a week or more than once a week increases likelihood of HIV testing, however, watching TV once a week decreases likelihood of HIV testing. The authors only discussed the effect of reading newspapers. It is helpful to discuss the result of watching TV, especially why it is negatively associated with HIV testing.

We are very grateful for your suggestion. We have revised this paragraph and added more discussion on why watching TV once a week decreases likelihood of HIV testing. See page 14, paragraph 1, line 315-323. It reads:

“on the other hand, this study shows that watching television less than once a week was negatively associated with HIV testing. Even though exposure to television may play an important role in spreading information about HIV including where to go for HIV testing, the influence depends largely on the content of the television programme. It is possible that the television programmes that men watch do not contain HIV related information. As such, they
may not have the opportunity to learn the benefits of HIV testing on the television and this could partly explain the negative association between watching television and HIV testing observed in this study. Therefore, there is a need for HIV program managers to channel HIV related information to media outlets commonly used by men in Malawi such as newspapers. This also highlights the need for future qualitative studies to understand media preference among men in Malawi.”

Concerns raised by Mostafa Shokoohi (Reviewer 2)

Comments for Abstract

1. The abstract, results section, is expected to reflect the main findings of the manuscript. It is not clear why the authors only reported the estimates for age group 30-39 years while other upper age groups are also significant; or, why currently married status is reported the only significant marital category while formerly married group is also significant.

Many thanks for your comment and observation. It is indeed true that the abstract should reflect the main findings. That is why we only reported the estimates of the most significant categories that strongly predicted the likelihood of HIV testing among men. Within a category we picked the group which had higher Odds Ratio than the other. We thought reporting everything in the abstract will defeat the whole purpose of the abstract. However, we have revised it to include the other variables that were significant. See page 2, paragraph 3, line 35 -43. It reads:

“Overall, 69.9% of the participants had ever been tested for HIV. The results indicate that age, region of residence, marital status, education, age at first sexual debut and frequency of reading newspaper as well as watching television once a week are significant predictors of HIV testing among men in Malawi. In particular, men who were in the age group 30–39 years (AOR = 3.00; 95% CI = 2.35–3.83), married (AOR= 3.01; 95% CI = 2.50–3.63), those with secondary or above education (AOR = 2.73; 95% CI = 2.09–3.56), and those who read newspaper at least once a week (AOR = 1.31; 95% CI = 1.08–1.59) were likely to utilise HIV testing service than their counterparts.”

2. The P-value for being significant should be less than 0.05, NOT less than or equal 0.05.

Thank you for the observation. It is true that for P-value to be significant should be less than 0.05. However, less than or equal 0.05 is also accepted because if you find that the p-value is equal to 0.05, you can’t say that it is not significant.

For instance:

If P=0.05 we say it is marginally significant BUT we can’t say it is not significant.
However, we have deleted the sentence in the abstract. See page 2, paragraph 2, line 30.

3. The conclusion is a bit confusing when the authors compare their estimate in 2016 with the estimate in 2010. The authors should consider this point that they studied ever (lifetime) HIV testing as their main measure. So, I feel that that 52.2% in 2010 might be a part of the 2016 estimate and there had been only around 17% change within this period.

Thanks for this comment. We have revised the conclusion and deleted the confusing part. See page 3, line number 45-52. It reads:

“The findings suggest that HIV testing services and programmes need to target younger unmarried men aged 15-19, men with low level or no education and expand HIV testing services to the central and southern regions of Malawi. Targeting the undiagnosed men living with HIV in a timely manner is a crucial and necessary step not only for achieving the UNAIDS’ 90–90–90 targets but for individuals to benefit from antiretroviral treatment and to sustainably reduce population–level HIV transmission.”

Comments for the main text

1. I would like the authors explain a little bit more on the scientific background and rationale for their research on why they are exclusively forcing on data from men. I am wondering if there is such data among women but the author did not report them? While I see that the authors highlighted that "more women utilizing HIV testing services than men", but a more discussion or support is required for their hypothesis that it is good to understand men's behaviours with regard to HIV testing practices.

We are grateful for your observation and comments. We have greatly revised this part to provide more rationales for investigating HIV testing practices in Men. See page 5, line number 89-105. It reads:

“Despite the availability of free HIV testing services, there has been low uptake of HIV testing services among men in Malawi. A recent Malawi population–based HIV impact assessment (MPHIA) estimates that 35% of men in Malawi have never tested for HIV. Men are a key population disproportionately affected by HIV and represent an important group to engage in HIV testing and prevention services. Besides, men in Malawi, as in many other African
countries, are the key decision–makers in their households and control economic resources that might be significant for HIV prevention and care. Thus, a better understanding of the factors influencing the uptake of HIV testing in this population is required to inform the development of strategies to scale up HIV testing among men in Malawi, and ultimately, prevent HIV infection and promote timely linkage to HIV treatment and care. For instance, this might highlight the specific categories of men who need to be targeted with more efforts in order to improve HIV testing uptake. Elsewhere, studies have found a positive association between the likelihood of men having tested for HIV and older age, marital status, higher income as well as higher educational. To date, there have been no studies that have investigated the predictors of HIV testing among men in Malawi. Therefore, the aim of this study was to investigate factors associated with lifetime HIV testing among men in Malawi using a nationally representative sample”.

2. Definition of HIV testing as the main outcome of the study is indeed the main challenge of the study: a) While the HIV surveillances do predominantly focus on recent HIV testing (i.e., last 3 months, last 6 months, last year), this study has hinged on the lifetime occurrence of HIV testing. Undoubtedly ever HIV testing can be useful in some contexts, but in the context in which HIV infection is prevalent might not have that much implication; b) While the HIV testing per se is an important practice, this without knowing the "results of the test" might not again have implication for HIV prevention. This should be clear that whether the participants who took HIV test knew their results of their test or not. More discussion on this required in this manuscript.

Many thanks for your comment. We have revised to provide more explanation on how the main outcome was measured. See page 7, paragraph 1, line 135-140. It reads:

“The outcome variable for this study was based on a self–reported previous HIV testing status. This was measured by asking the participants this question: ‘Have you ever tested for HIV?’ HIV testing was treated as a binary variable and the responses were coded as yes or no. The ‘yes’ category included those who had ever tested for HIV at least once in their lifetime prior to this survey and the ‘no’ category included those who had never tested for HIV in their lifetime”.

We have also added a statement in the discussion section as a limitation of this study because it was not indicated in the DHS whether participants who took HIV test received their test result or not. See page 15, paragraph 2, line 335-349. It reads:
“It is imperative that our results be interpreted under a set of limitations. First, the study was limited to only the variables collected in the MDHS. As such, other important variables (such as substance use and sexual orientation) that may affect HIV testing but were not available in MDHS could not be examined. Second, the cross-sectional nature of MDHS limits the capacity to draw any causal inferences. Third, assessment of the outcome variable and some of the covariates was based on self-reported, thereby potentially introducing social desirability bias in participants’ responses. Furthermore, the present study assessed the lifetime occurrence of HIV testing by the participants. It did not focus on recent HIV test seeking behaviour (i.e., last 3 months, last 6 months, last 12 months). It is therefore possible that HIV testing happened before the exposure status. Finally, the outcome measure ‘ever been tested for HIV’, while being useful indicator to assess the overall uptake of HIV testing services, does not assess whether the participants who took HIV test received the results of their test or not. Taking an HIV test without knowing the ‘results of the test’ might not have implication for HIV prevention. Further research is needed to complement the findings of the current study by addressing the above limitations.”

3. Modeling: the regression modeling of this manuscript is also another challenge. The authors modelled "lifetime" HIV testing on a set of sociodemographic measures that had reflected the "current status"; for example, current marital status, or currently working. Such type of molding makes the interpretation of the findings difficult. This is barely acceptable that the current working status, for example, can reflect the past occupation history of the study participants. The interpretation is also vague: How can current working status predict lifetime HIV testing? There are two general recommendations: a) either choose only those variables/covariates in the modeling that are either measured for a lifetime period or/and those that might have impacted the lifetime HIV testing; b) change the approach of analysis and tell the audience that among how the sociodemographic and other factors (please do not call the covariates as independent variables - instead, call them covariates) were different between those who reported HIV testing and those who not. In the second option, you need to report the percentages/proportions of the study covariates according to the HIV testing status (like with I see in Table exactly). With this, you may not need to do regression analysis (not sure), but even descriptive statistics can of greater importance and informative that what we see now. However, if the authors still would like to keep their approach of analysis, I would strongly recommend to remove some of the covariates in the regression molding that is conceptually not well fitted in the analysis.

Many thanks for your observation and comments. We agreed with you that some of the factors were not qualified as predictors of HIV testing because it was difficult to establish the temporal
relationship between these factors and a lifetime HIV testing. As such, some variables (e.g. history of genital discharge in the past 12 months, working status, number of sexual partners in the past 12 months) have been removed from our analysis. However, we have maintained marital status because this variable can predict a lifetime HIV testing. We have also named the variables as COVARIATES not Independent variables as suggested. See page 7, paragraph 2, line 145-159. It reads:

“The potential covariates of HIV testing were selected based on literature review and completeness of data within the 2015–2016 MDHS dataset. The selected covariates were the following: age (in four categories: 15–19, 20–29, 30–39, 40–54 years), marital status (categorized as never married, married and formerly married), region of residence (northern, central, southern), area of residence (rural vs. urban), education level (none, primary school and secondary school or above), religion (Christians, Muslims and no religion), and household wealth index (poor, medium and rich), covered by health insurance (yes/no), age at sexual debut (categorized as: no sex, less than 15 years, 15–24 years, 24 and above years), and exposure to mass media (frequency of reading newspaper, frequency of listening to the radio, and frequency of watching TV) and an asset-based index of wealth (poor, medium and rich). Some of these study variables were re-coded to suit the purpose of the study while some were used as they are in the original dataset. For instance, religious affiliation was re-coded into Christians, Muslims and no religion. MDHS categorized household wealth index into five groups; poorest, poor, middle, richer, and richest. This study re-coded household wealth index into three groups by combining “poorer” and “poor” for poor and “rich” and “richer” for rich.”

4. Another point with regard to statistical analysis is that I can see five clusters of covariates (can be seen from the Figure). So, I would like to see the impact of each cluster separately. Significant predictors in each cluster (sometimes called chunk-wise regression molding, sometimes called as stepwise molding) can be molded in a final regression analysis. This is given the fact that the authors select only those covariates that are well defined and fitted with their outcome measure.

Thanks for your comment and suggestion. Since we have removed some variables from our analysis. We have also deleted the figure and changed the analysis approach (i.e. we have removed the five clusters of covariates) see the new analysis approach on page 9, line 184-201. It reads:

“Descriptive statistics (frequencies) were calculated to describe the characteristics of men included in this study and the results were presented as proportion (%). The association between each categorical covariate with the outcome variable (HIV testing) was tested by using Pearson chi-square test ($\chi^2$). Logistic regression was then used to establish the magnitude and direction of the associations. All variables that were significant at $P \leq 0.25$ in bivariate analysis (logistic
regression) were entered together into a multiple logistic regression model. Crude and adjusted odds ratios and their 95% confidence intervals (95% CI) were estimated. A complex sample analysis procedure of the Statistical Package for the Social Sciences (SPSS, IBM version 22) was used to account for the multistage sampling used in DHS. All analyses used sampling weights and adjusted for the sampling design (clustering and stratification). A P-value <0.05 was considered statistically significant.”

5. Any changes in the analysis and findings need to be taken into account in the discussion as well. We have done that see the discussion section and the tables.

6. Lastly, I would like ask the authors about the possibility of having a comparison table for data of 2016 and 2010; on both descriptive statistics and regression analysis.

Thank you for this comment. However, much as comparing data for 2010 and 2016 could indeed strengthen the evidence base, our interest was on identifying the factors that might influence HIV testing practice among men in Malawi not comparing the testing levels between 2010 and 2016. We recommend future studies to look into that.