Author's response to reviews

Title: Recreation, transportation or labour saving? Examining the association between household asset ownership and body mass index among Ghanaian women

Authors:

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

COVER LETTER – RESPONSE TO REVIEWERS COMMENTS

We would like to thank the reviewers and the editor for expertly reviewing our manuscript (MS: 4218998101728229) titled “Recreation, transportation or labour saving? Examining the association between household asset ownership and body mass index among Ghanaian women”. We appreciate the comments and suggestions made by the reviewers.

The requested revisions have been effected in the revised version of the manuscript and are highlighted in red. Kindly find attached a detailed description of the revisions.

Sincerely,

Fidelia A. A. Dake
Corresponding Author
REVIEWER 1

A. Major Compulsory Revisions

Comment 1: The source of data portion (line 109) made it clear that the GDHS is a nationally representative sample survey conducted every five years (clearly the recent data should be in 2013). Also in line 113, master sampling frame was constructed from the 2000 Population and Housing Census instead of the 2010 one. Again, Line 88-89 failed to mention the round of the Ghana Living Standard Survey (the recent is round 6). The recent data are available and should be applied in this work so as to generate the desired results.

Response: We would like to thank the reviewer for this very critical observation. The GDHS is a nationally representative sample that is conducted every five years as per the design and implementation of the survey. We are not able to use the 2013 round of data because the survey was not conducted in 2013 as it should have. It was rather conducted in 2014 and the data is not yet publicly available. The 2008 GDHS is thus the latest publicly available data that is why this study makes use of the 2008 data. This clarification has been made in the revised manuscript. Please see line 110 of the revised manuscript.

The 2008 GDHS was conducted prior to the 2010 Ghana Population and Housing Census. The sampling frame that was used was an updated master sampling frame which was constructed from the 2000 census. The details of the sampling design as indicated in this study are available in the 2008 GDHS Report (page 5 of reference number 17). Reference to the sampling design used in the 2008 GDHS has been provided in the manuscript (see reference number 17).

Line 88-89 shows evidence of increased television ownership over a fifteen year period (1998/1999 to 2012/2013) as shown in the Ghana Living Standard Survey Round 6 report which has been duly cited (see reference number 11). Reference is thus made to the trend in ownership of television set as is reported in the GLSS Round 6 report based on data from previous rounds of the survey. The round of the GLSS report has been mentioned. Please see line 90 of the revised manuscript.

Comment 2: The application of “multinomial logistic regression” (line 36 and 37) was not appropriate considering the measure of the dependent variable. It deals with more than two possible discrete outcomes.

Response: The reviewer indicated that the application of multinomial logistic regression was not appropriate considering the measure of the dependent variable.

We would like to thank the reviewer for raising this issue. The reviewer probably raised this issue due to an assumption of an “order” in the dependent variable (BMI; normal weight, overweight and obese). However, in this study, the application of multinomial logistic regression model is justified\(^1\) for statistical and theoretical reasons.

Statistically, the dependent variable in this study is treated as a categorical variable with three categories of normal weight, overweight and obese. The three categories are not necessarily

ordered, they are each treated as a separate category. Theoretically, individuals can be classified into distinct categories of normal weight, overweight or obese based on their BMI. Each of these categories have associated health implications with those who are obese being the most affected.

In this study the three categories were treated as separate categories rather than as an ordered outcome thus making the use of the multinomial logistic regression model appropriate. If we were to have ignored the theoretical reasons for using the multinomial logistic regression and rather used the ordinal logistic regression, it would not have been statistically appropriate. This is because the ordinal regression model makes an important assumption known as the parallel regression assumption. When the assumption of parallel regression is rejected as demonstrated below, alternative models e.g. multinomial logistic regression which do not impose the constraint of parallel regression should be considered.

For this study, the test of parallel regression assumption was performed to determine whether or not it was appropriate to use an ordinal or multinomial logistic regression model. The test can be performed using the omodel test in stata. The results obtained for the test of parallel regression using the omodel test are shown below:

Model 1
Approximate likelihood-ratio test of proportionality of odds across response categories:
\[ \text{chi}^2 (37) = 59.68 \]
\[ \text{Prob} > \text{chi}^2 = 0.0105 \]

Model 2
Approximate likelihood-ratio test of proportionality of odds across response categories:
\[ \text{chi}^2 (30) = 44.76 \]
\[ \text{Prob} > \text{chi}^2 = 0.0406 \]

For both models, the results of the parallel regression test are significant, which means the models violate the null hypothesis that the effects are parallel. Based on the results of the omodel test, the ordinal logistic regression model was not an appropriate model for this study even if the theoretical bases for modelling BMI were ignored. The multinomial logistic regression was thus used as the most appropriate alternative.

**Comment 3:** Paragraph 1-4 of the results: Author must insert the specific/appropriate p-values throughout. This is necessary because the significant(s) of the independent variables in both models (1 and 2) on the dependent variable occurred at varying significance levels (i.e. from p<0.10. p<0.05, p<0.01 and p<0.001). This will prevent the readers from being misled as if the statistical significant(s) was observed under one value.

**Response:** Where applicable the specific/appropriate p-values have been inserted in the results section. See lines 194, 195, 197, 202, 208, 210 and 211 in paragraphs 2-4 of the results section.
Comment 4: Paragraph 2 of the results (line 186): Author must modify the sentence to read as "car and motor cycle being significant at p<0.01 and p<0.10 respectively. This is necessary since the two independent variables were each significant at different levels of significance values.

Response: We would like to thank the reviewer for the suggested revision. The correction has been effected. Please see line 182 of the second paragraph under the results section of the revised manuscript.

Comment 5: Paragraph 1 of the results: Author must insert the appropriate figures (i.e. percentage) to make the interpretation more meaningful.

Response: Thank you very much for the suggestion. The appropriate figures have been inserted where applicable. Please see lines 171, 177 and 179 under the first paragraph of the results section in the revised manuscript.

B. Minor Essential Revisions

Comment 1: Paragraph 4 of the results (line 217): Author should qualify those independent variables 'not significant' as not 'statistically significant'.

Response: The following sentence originally reading as 'The women’s level of physical activity was not significantly associated with their chances of being overweight or obese.' has been changed to 'The women’s level of physical activity did not show a statistically significant association with their chances of being overweight or obese.' to reflect the suggestion made by the reviewer. Please see lines 210-212 of the revised manuscript. Thank you.

Comment 2: Paragraph 4 of the results (line 213): The author should mention the various categories of frequency of watching television in the interpretation. This is due to the fact that the various categories were each significant at different significance levels.

Response: The interpretation for the other two categories of frequency of watching television have been provided. See lines 208-210 in the last paragraph of the results section of the revised manuscript.

Comment 3: Paragraph 4 of the results (line 218-219): The interpretation is too compact. The author could rephrase the sentence to bring out the meaning/understanding clearer.

Response: The interpretation has been expanded. Please see lines 212-215 of the revised manuscript.

C. Discretionary Revisions

Comment 1: Methods paragraph 3 (under variable line 132): Author could define the acronym ‘WHO’ since that is the first time it was used in the article.

Response: The acronym WHO has been spelt out in full. See line 131 of the revised manuscript.
Major Comments

A. Abstract

Comment 1: Abstract 1. Methods- first sentence of the methods line 33-34 needs correction.

Response: The methods section of the abstract has been revised. The use of the word ‘we’ has been changed. The methods section of the abstract now reads as follows:

The study analysed secondary data from the 2008 Ghana Demographic and Health Survey (GDHS) involving a total of 4,916 women aged 15-49 years. The analytical sample consist of 4,010 (weighted sample) non-pregnant females who had valid data on all the variables used in the analyses. The BMI of the women was used as the dependent variable with three categories of normal weight, overweight and obese based on the standard World Health Organization (WHO) classifications. Multinomial logistic regression models were specified to examine the relationship between ownership of household assets and BMI.

See the methods of section of the abstract (line 33-39) of the revised manuscript. Thank you.

B. Introduction

Comment 1: The last sentence of the first paragraph of the introduction, line 61-66 is long and windy with missing words. The meaning will be clearer if shorter statements are used.

Response: The sentence has been divided into shorter sentences. The sentences now read as follows:

Ownership of automobiles, modern household appliances and labour saving equipment such as washing machines, microwave ovens, refrigerators and food processors is gradually increasing in developing countries [4,7]. This is as a result of improved socio-economic status and the rapid rate of urbanization in developing countries over the last three decades. For example, about 14 per cent of households in China acquired a motorized vehicle between 1989 and 1997 [2].

See line 67-70 of the revised manuscript.

Comment 2: The second paragraph with the example of China line 70-74 is not appropriately linked with the flow of the paragraph. The example needs to be linked up well with the current analysis; otherwise it seems so out of place.

Response: The example of China has been properly linked with the rest of the paragraph. The sentence now reads as: “For example, about 14 per cent of households in China acquired a motorized vehicle between 1989 and 1997 [2]”. See line 70-71 of the revised manuscript.
Comment 3: I suggest that the use of ‘Paralleling …’ in line 95 be replaced with a word that shows a relationship between the two conditions e.g. ‘Accompanying’ may be more appropriate. Parallels may not directly indicate relationship.

Response: The word ‘Paralleling’ has been changed to ‘Accompanying’. See line 96 of the revised manuscript.

C. Methods

Comment 1: In describing the main dependent variable, BMI the categories used did not include Underweight <18 kg/m². What happened to the underweight women, were they excluded? I believe it is important that this is stated and described appropriately.

Response: We would like to thank the reviewer for raising this important observation. Underweight women were excluded from the analyses. This has been stated in the revised version of the manuscript. See lines 123, 135-136 of the revised manuscript.

Comment 2: Authors should be mindful of the verb tense used in the methods section under “Independent Variables’. Both the past and present are used interchangeably-consistency is key.

Response: The verb tense agreement in the independent variables section of the methods section has been corrected. Past tense has been used throughout the section. Please see lines 139-149 of the revised manuscript.

Comment 3: Methods of analysis- the writing in this section should be made more scientific by avoiding the overuse of personal pronouns –‘we’

Response: The use of the personal pronoun ‘we’ in the methods of analysis section has been corrected. Please see lines 157-162 of the revised manuscript.

D. Results

Comment 1: In Table 1, since a common denominator is being used, there is no need for the “Nos”. Example

Television
Yes 47.85 1,919
No 52.15 2,091

It is clear that 47.85+52.15 =100. Only the Yes items and totals should be presented for such binary responses. The presentation will be more reader friendly that way.

Response: The ‘Nos’ in Table 2 have been removed as suggested. Please see Table 2 of the revised manuscript. Thank you.
Comment 2: In line 187-188 ‘Obesity was three times more common among women whose households own a television set compared to women who belong to households that do not own a television set (Table 2). Such statements seem repetitive and unscientific. Authors should correct all such repetitive statements in the results.

Response: The statement has been revised and now reads as follows: ‘Obesity was three times more common among women who reported ownership of a television set in their household compared to their counterparts who did not (Table 2)’ See lines 183-184 of the revised manuscript. Also, all other similar statements have been corrected. See lines 183-191 of the revised manuscript.

Comment 3: The results section is overly long. Authors tended to repeat almost all the findings in the Tables. The results should be more focused; present major highlights and not to repeat all information in the table.

Response: The results section has been revised to reflect the major highlights of the study findings. Please see the results section of the revised manuscript.

Comment 4: Language in the results and the whole document ought to be improvement. Generally the results section should be re-written.

Response: The language in the results section and the whole document has been reconsidered. All necessary corrections have been effected. Thank you.

E. Discussion

Comment 1: ‘Television ownership was however, found be marginally associated with increased odds of overweight (P < 0.10)’ The statement in line 232-233 is missing a word and I don’t understand the statistical basis of the ‘marginal’ as used here.

Response: The statement was missing the word ‘to’. The statement has been corrected and now reads as follows: ‘Television ownership was however, found to be associated with increased odds of overweight (P < 0.10) in the current study.’ See lines 230-231 of the revised manuscript.

The word marginal was inappropriately used and has thus been removed. Thank you.

Comment 2: Authors have provided different published articles on obesity and household assets in the discussion. However, in the introduction I was made to believe there was little or no published data on the subject. I will suggest the authors tone down on the gap that this paper is to fill; probably it is too strongly portrayed in the introduction.

Response: The published literature provided is mostly that of studies conducted in regions other than sub-Saharan Africa. The gap as identified is the limited research on the subject in sub-Saharan Africa as has been stated in lines 78-82 of the revised manuscript. We would like to thank the reviewer for the suggestion of toning down the gap. The statement about the gap has been modified. Please see lines 82-83 of the revised manuscript.
F. Tables and figures

Comment 1: In Table 2, what was the decision-significant or not, for Motor cycle and bicycle with p-values 0.057- I was not clear on this.

Response: These findings were reported to be significant at $p < 0.10$. This has been stated in line 182.

G. References

Comment 1: Should conform to the journal requirement especially in citing from a book.

Response: Thank you. References have been provided according to the requirements of the journal.