PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Prevalence and risk factors for Overweight and obesity: a cross sectional countrywide study in Burkina Faso
AUTHORS	Kaboré, Seydou; Millogo, Tieba; Soubeiga, Joseph; Lanou, Hermann; Bicaba, Brice; Kouanda, Seni

VERSION 1 – REVIEW

REVIEWER	Vânia Gaio National Institute of Health Dr. Ricardo Jorge (INSA), Portugal
REVIEW RETURNED	08-Nov-2019

GENERAL COMMENTS	Dear Authors, This article is focusing on an important topic regarding the prevalence of overweight and obesity in a developing country. The study is well-performed according to standard procedures. However, there are some concerns that should be addressed before it could be accepted for publication. Major Revisions 1) In my opinion, the major limitation of this study is the statistical approach that was done. I suggest reformulating it and using Poisson regression models to estimate adjusted prevalence ratios of normal versus obese participants and normal versus overweight participants, separately and stratified by gender. Because undernutrition is also a significant problem is the country, it would be also interesting to do the same approach to compare normal versus underweight participants. 2) Did you considered exploring other obesity measures (waist/hip ratio, waist/height ratio or ABSI index)? This could be an interesting approach to do because BMI is a measure of general adiposity and does not distinguish between central and general obesity. 3) In the discussion section, limitations of the study must be discussed in detail. Please add this information to the manuscript. Minor Revisions 1) Please check the font of the citations numbers all over the manuscript because they are different from the remaining text. 2) Lines 19 and 22 of the Strength section: The “burden” word is not the correct one in this context. Please replace it by “We report here a significant prevalence of overweight …” 3) In the methods section, please add more information about 2013STEPS survey or cite a bibliographic reference with a more detailed description of the survey. 4) Figure 1: the first arrow in the diagram is not aligned. Please improve the image.

	5) Supplementary material are not referred in the manuscript. Please add.

REVIEWER	Ines Gonzalez Casanova Emory University
REVIEW RETURNED	24-Nov-2019

GENERAL COMMENTS	An interesting topic and an important analysis of a national survey from Burkina Faso. However, a better integration of the different sections is needed to fully gage the logic of the design and the meaning of the results. Abstract - You cannot test that hypothesis with a single cross-sectional if there are no previous national surveys of obesity. Throughout be mindful of the term 'increasing'. - You never mention the intention of assessing predictors/correlates of overweight and obesity or how these predictors were selected. Some seem to be consequences of overweight or obesity (dyslipidemia). Also, based on your results, would you recommend smoking as a sensible strategy to prevent obesity in Burkina Faso? - The abstract conclusion does not address most of the results and is not supported by the ones presented. Strengths and limitations - The second limitation makes no sense. Is BF food secure? Also, this goes against your hypothesis that obesity is increasing Introduction - Use updated numbers on NCD from the Global Burden of Disease Study - Be consistent between the use of developing countries vs. low- and middle- income countries (the second is preferred) - The citations do not support the statement that most studies were conducted in urban areas… (you do not have a denominator). I suggest deleting or rephrasing this sentence. - Add a citation after you speak about poor awareness Methods - The prevalence of acute malnutrition in children? Specify age group - Suggest moving study setting paragraphs to the introduction and using this section to describe the 2013 steps survey. - Study population- in the abstract, it says that the age range is between 15 and 64 but here it says 25, which one is correct? Statistical analysis- how did you handle sampling weights? Based on the description it sounds like a complex survey design - What do you mean that you ignored missing data? A more thoughtful approach to missing data is recommended. Suggest assessing risk of bias. Results Prevalence of overweight and obesity- here it is important to account for the sampling frame to see if this is nationally representative In table 4: what are you adjusting for? All other variables? Clarify in footnote Was there any measurement of SES beyond education? What variable attenuates the relationship between secondary education and odds of overweight? Why did you use fat used as a dietary

	variable? I believe you left out from your results and discussion the fact that using butter, lard or margarine was inversely associated with overweight in men. Is there any difference in risk factors for obesity? It is hard to understand conceptually that high cholesterol and hyperglycemia are presented as risk factors for overweight In the discussion addressed adjusted vs. unadjusted as well as the results with smoking.

VERSION 1 – AUTHOR RESPONSE

Reviewer 1 comments to authors	
This article is focusing on an important topic regarding the prevalence of overweight and obesity in a developing country. The study is well-performed according to standard procedures. However, there are some concerns that should be addressed before it could be accepted for publication.	Thank you for the overall positive feed-back. We will try to address to our best the concerns raised by your in-depth and thoughtful review
In my opinion, the major limitation of this study is the statistical approach that was done. I suggest reformulating it and using Poisson regression models to estimate adjusted prevalence ratios of normal versus obese participants and normal versus overweight participants, separately and stratified by gender. Because undernutrition is also a significant problem is the country, it would be also interesting to do the same approach to compare normal versus underweight participants.	These are interesting suggestions. Our study objectives were (1) to determine the prevalence of overweight and obesity and (2) identify the risk factors for overweight/obesity, we are thus interested in the risk factors for being at least overweight (overweight+obese). The condition being investigated is thus overweight+obese as compared to underweight + normal. We felt that treating the outcome variable as a categorical ordinal variable has the merit to recognize the natural order between these categories. While undernutrition is a significant health issue in Burkina Faso, it is not the question being investigated in this particular study, furthermore recent data in Burkina Faso suggest that overweight/obesity exceeds by far underweight in the adult population[1].
Did you considered exploring other obesity measures (waist/hip ratio, waist/height ratio or ABSI index)? This could be an interesting approach to do because BMI is a measure of general adiposity and does not distinguish between central and general obesity.	The author is right in suggesting other obesity measures. However, BMI is considered a good population level index and is widely used to define nutritional status across studies and contexts. For comparability purposes, it is desirable that the risk assessments are based on BMI. We have however, added additional data on the burden of overweight/obesity based on waist circumference.
In the discussion section, limitations of the study must be discussed in detail. Please add this information to the manuscript. Please check the font of the citations numbers all over the manuscript	Ok noted. Correction done. Thank you for this.

because they are different from the remaining text.	
Lines 19 and 22 of the Strength section: The “burden” word is not the correct one in this context. Please replace it by “We report here a significant prevalence of overweight …”	Ok noted. The entire sentence was reworked to account for editorial comments as well
In the methods section, please add more information about 2013STEPS survey or cite a bibliographic reference with a more detailed description of the survey.	Ok this was done. We have added a reference for more details.
Figure 1: the first arrow in the diagram is not aligned. Please improve the image.	Ok corrected. Thanks
Supplementary material is not referred in the manuscript. Please add.	
Reviewer 2 comments to authors	
An interesting topic and an important analysis of a national survey from Burkina Faso. However, a better integration of the different sections is needed to fully gage the logic of the design and the meaning of the results.	Ok thank you. We have reworked the paper with that in mind.
Abstract - You cannot test that hypothesis with a single cross-sectional if there are no previous national surveys of obesity. Throughout be mindful of the term ‘increasing’.	We agree with this. The sentence was modified to account for this comment.
Abstract - You never mention the intention of assessing predictors/correlates of overweight and obesity or how these predictors were selected. Some seem to be consequences of overweight or obesity (dyslipidemia). Also, based on your results, would you recommend smoking as a sensible strategy to prevent obesity in Burkina Faso? - The abstract conclusion does not address most of the results and is not supported by the ones presented.	We have added more clarity to the selection of covariates, and we have we have added a sentence to more clarify the interpretation of the association found between smoking and overweight/obesity: “However, because smoking is an exposure with well-known detrimental consequences on health, our results cannot be interpreted as being in favor of smoking to prevent obesity/overweight.” The conclusion of the abstract was also reworked. The double burden of nutrition is not a result of our study. We have thus deleted this sentence.
Strengths and limitations - The second limitation makes no sense. Is BF food secure? Also, this goes against your hypothesis that obesity is increasing	There was a typo in that sentence that unfortunately altered the meaning of the sentence. It was meant to read as following: “Being overweight may not necessarily equate to being an obese person to be, particularly in a setting where food insecurity is common”
Introduction.	Ok noted.

Use updated numbers on NCD from the Global Burden of Disease Study - Be consistent between the use of developing countries vs. low- and middle- income countries (the second is preferred) - The citations do not support the statement that most studies were conducted in urban areas… (you do not have a denominator). I suggest deleting or rephrasing this sentence.	We have now used low and middle-income across the text. Phrase deleted. We have deleted "most of the studies…"
Introduction. - Add a citation after you speak about poor awareness	The sentence was reworked to give the exact meaning we intended.
Methods - The prevalence of acute malnutrition in children? Specify age group - Suggest moving study setting paragraphs to the introduction and using this section to describe the 2013 steps survey. - Study population- in the abstract, it says that the age range is between 15 and 64 but here it says 25, which one is correct? Statistical analysis- how did you handle sampling weights? Based on the description it sounds like a complex survey design - What do you mean that you ignored missing data? A more thoughtful approach to missing data is recommended. Suggest assessing risk of bias.	The prevalence of acute malnutrition in children under five years was estimated at 8.2% in 2014. The correct range is 25-64 years. Correction done in the abstract. Thank you. The sampling weights were accounted for in all analyses. We have added this information to the method section. We used the Stata's SVY command to derive weighted estimates. We carried out a complete cases analysis meaning that we have ignored missing data. Because of the very few numbers of missingness (education= 8/4472, marital status=5/4472) we did not find it relevant to carry out any sensitivity analysis. We have added the n in the tables.
Results Prevalence of overweight and obesity- here it is important to account for the sampling frame to see if this is nationally representative In table 4: what are you adjusting for? All other variables? Clarify in footnote Was there any measurement of SES beyond education? What variable attenuates the relationship between secondary education and odds of overweight? Why did you use fat used as a dietary variable? I believe you left out from your results and discussion	As previously mentioned, the estimates reported are weighted. Yes. The statistical approach here was predictive. The intention was to include in the model all the predictors that improve the model either because there are significant predictors of overweight/obesity or significant confounder. The adjustment was for all other variables. However, taking into account reviewers' comments and to make more sense of the data, we have added a sentence to more clarify the interpretation of the association found between smoking and overweight/obesity: "However, because smoking is an exposure with well-known detrimental consequences on health, our results cannot

the fact that using butter, lard or margarine was inversely associated with overweight in men. Is there any difference in risk factors for obesity? It is hard to understand conceptually that high cholesterol and hyperglycemia are presented as risk factors for overweight In the discussion addressed adjusted vs. unadjusted as well as the results with smoking	be interpreted as being in favor of smoking to prevent obesity/overweight." We did discuss the association between fat intake and obesity: "The use of butter / fat / margarine as the main source of lipid was inversely associated with obesity in our data. This is an unexpected result as one would expect a lower risk of overweight and obesity among those that use predominantly vegetable oil. The lack of quantification of the consumption of the different types of oil makes difficult the comparison". Although we have come across studies that have used dyslipidaemia and hyperglycaemia as predictors[2], we concur to reviewers' comments and we have reanalysed the data excluding theses variables.

VERSION 2 – REVIEW

REVIEWER	Vânia Gaio National Health Institute Doutor Ricardo Jorge (INSA), Lisbon, Portugal
REVIEW RETURNED	05-Feb-2020

GENERAL COMMENTS	Thank you for the response to all the given considerations to the first version of the manuscript. It is much better now. Congratulations!

REVIEWER	John Cursio University of Chicago, USA.
REVIEW RETURNED	22-Jun-2020

GENERAL COMMENTS	1. In the title, why is Overweight capitalized? 2. In the abstract, P-value is capitalized for primary educational level, make lower case. 3. Why are odds ratios written as proportional odds? 4. Do the models combine obesity or overweight as one outcome? 5. Outline and describe Kish method reference #24. 6. Sample size formula on page 6. 7. Easier to understand sample size formula if all unknown quantities are shown. Therefore, the values 1.5, 8, .8 should be written algebraically and then the unknowns explained later. Is this sample size formula specifically referenced somewhere else? If so, please provide that reference. Also, why is hypertension prevalence used in the sample size formula? Is the proportion to be estimated obesity, overweight, or a combination of the two? Helpful if constituent use of . or , used for decimal places. As shown here, both , and . are used in the text and formula. For example, change 1,5 to 1.5 and ,8 to .8 to be consistent throughout the section. 8. Please describe in more detail how the Butter fat variable is measured. Is this an amount per day? 9. Activity measured over what time period? 10. Fischer test, should be spelled out as Fisher. 11. In the Models, was stepwise selection method used? Were any checks of muticollinearity performed? 12. Table page 14 missing OR for female cohabiting married.

VERSION 2 – AUTHOR RESPONSE

Reviewer 1	
Thank you for the response to all the given considerations to the first version of the manuscript. It is much better now. Congratulations!	Thank you so much for your previous revisions
Reviewer 3	
In the title, why is Overweight capitalized?	Corrected. Thank you
In the abstract, P-value is capitalized for primary educational level, make lower case.	Corrected. Thank you
Why are odds ratios written as proportional odds?	Odds ratios were termed proportional odds to acknowledge the fact that they are derived from the ordinal logistic regression model also called proportional odds models. The parameters of the model represent the exposure odds ratio for being in the highest j categories compared to the lowest categories(k-j). Harrell F.E. (2015) Ordinal Logistic Regression. In: Regression Modeling Strategies. Springer Series in Statistics. Springer, Cham. https://doi.org/10.1007/978-3-319-19425-7_13
Do the models combine obesity or overweight as one outcome?	Not exactly. But rather the model is comparing combined comparisons of the outcome variable. It assumes that on average the effect of any exposure will be the same comparing “normal” to “overweight +obesity” and comparing “normal+overweight” to obesity.
Outline and describe Kish method reference #24.	Ok the method was described in the main text as following and the reference was updated to the source reference. “Once a household is selected, the interviewer creates a listing (sampling frame) of all eligible adults in the household. The listing includes the following variables: name, gender, relationship to the household head and age. Once the listing is created, each eligible member is assigned a unique number. Then using a randomized response table (Kish table), a particular member is chosen for the interview.” Page 6

Sample size formula on page 6. Easier to understand sample size formula if all unknown quantities are shown. Therefore, the values 1.5, 8, .8 should be written algebraically and then the unknowns explained later. Is this sample size formula specifically referenced somewhere else? If so, please provide that reference. Also, why is hypertension prevalence used in the sample size formula? Is the proportion to be estimated obesity, overweight, or a combination of the two? Helpful if constituent use of . or , used for decimal places. As shown here, both , and . are used in the text and formula. For example, change 1,5 to 1.5 and ,8 to .8 to be consistent throughout the section.	The sample size was calculated in the primary study considering high blood pressure as primary outcome. Our study is a secondary analysis of the data. The formula provided is what was used in the primary study. We have calculated the statistical power of our study given the sample size available and the estimated prevalence of obesity alone. Thank you for the other comments they were taken into account.
Please describe in more detail how the Butter fat variable is measured. Is this an amount per day?	The butter fat variable was measured asking each respondent the type of oil most often used in the cook at his/her home.
Activity measured over what time period?	Physical activity was measured based on the mean or median time (minutes) that each respondent spends on average per day doing physical activity (difference in type of physical activity accounted for) at work, for displacement, and/or leisure in a week .
Fischer test, should be spelled out as Fisher.	Thank you so much. Corrected.
In the Models, was stepwise selection method used? Were any checks of muticollinearity performed?	The covariates selection in the multivariable analysis was based on epidemiological plausibility and literature review. No stepwise was carried out. We did however carry out the necessary checks, including multicollinearity, the model assumptions and the overall fit of our final model.
Table page 14 missing OR for female cohabiting married.	All ORs are now there. Thank you.

VERSION 3 – REVIEW

REVIEWER	John Cursio University of Chicago, U.S.A.
REVIEW RETURNED	02-Sep-2020

GENERAL COMMENTS	Thank you for your revised manuscript. I have a few comments that can be easily addressed: 1) Sample size formula: a) Is the resulting solution to the formula n=4800? it would be clearer if this was shown next to the formula b) α should be defined as the type-I error rate in the formula and text not risk or threshold c) Why is hypertension used in this formula for P: shouldn't this be the rate of overweight or obesity since that is what is estimated in the logistic model? 2) Ordinal logistic regression The authors stress that ordinal logistic regression was used assuming the proportional odds model. However, it's not clear in the text or models what the outcome represents. Are the three levels no overweight or obese, overweight, obese? This should be clearly mentioned in the statistical analysis section.

VERSION 3 – AUTHOR RESPONSE

Comments	Revisions
Reviewer 3	
1) Sample size formula: a) Is the resulting solution to the formula n=4800? it would be clearer if this was shown next to the formula	Ok Corrected. Page 6. Thank you
b) α should be defined as the type-I error rate in the formula and text not risk or threshold	Ok Corrected. Page 6 & 7. Thank you
c) Why is hypertension used in this formula for P: shouldn't this be the rate of overweight or obesity since that is what is estimated in the logistic model?	Our study is a secondary analysis reporting data from a primary study where hypertension was used as primary outcome in the calculation of the sample size. We have reported in addition to how the sample size was arrived at, the post-hoc statistical power of our study (investigating obesity) given the sample size at hands.
2) Ordinal logistic regression The authors stress that ordinal logistic regression was used assuming the proportional odds model. However, it's not clear in the text or models what the outcome represents. Are the three levels no overweight or obese, overweight, obese? This should be clearly mentioned in the statistical analysis section. ?	Ok. The dependent variable was described in "the study variables" section. We added a sentence in the statistical analysis to recall the levels of the ordinal dependent variable i.e : underweight, normal, overweight, obese.

VERSION 4 – REVIEW

REVIEWER	John Cursio

	University of Chicago, USA
REVIEW RETURNED	01-Oct-2020

GENERAL COMMENTS	The authors sufficiently addressed my previous statistical comments, however the appropriateness of the sample size formula on page 7 is unclear since its seems to based on an estimate for hypertension. If the study mentioned here was based on the STEPS study, of which 4,800 subjects were used, is the sample size formula necessary? The main message can be conveyed without the first paragraph in this section. Adding more details about the STEPS study, (when it was collected, response rate, individuals surveyed, etc.) would help the reader. The power details in this section can be left as is.

VERSION 4 – AUTHOR RESPONSE

Comments	Revisions
Editor comments	
Please revise your Public and patient involvement statement, both in the manuscript and metadata, to read: "Patients or the public WERE NOT involved in the design, or conduct, or reporting, or dissemination plans of our research"	Ok correction done Page 8 Thanks
Reviewer 3	
The authors sufficiently addressed my previous statistical comments, however the appropriateness of the sample size formula on page 7 is unclear since its seems to based on an estimate for hypertension. If the study mentioned here was based on the STEPS study, of which 4,800 subjects were used, is the sample size formula necessary? The main message can be conveyed without the first paragraph in this section. Adding more details about the STEPS study, (when it was collected, response rate, individuals surveyed, etc.) would help the reader. The power details in this section can be left as is.	Ok correction done. Although we felt it was informative to add how the sample size was arrived at in the primary study, we do agree with the reviewer that this was not necessary for the understanding of our study and previous reference included in the manuscript can effectively inform interested readers on this. We have thus removed the formula and have added more precisions on the STEPS survey. Thanks See page 6