PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	What does my neighbourhood have to do with my weight? A protocol for systematic review and meta-analysis of the association between neighbourhood socioeconomic status and body weight.
AUTHORS	Mohammed, Shimels Hussien; Birhanu, Mulugeta; Sissay, Tesfamichael Awoke; Habtewold, Tesfa; Tegegne, Balewgizie; Esmaillzadeh, Ahmad

VERSION 1 - REVIEW

REVIEWER	Simeon Pierre Choukem University of Buea Faculty of Health Sciences Cameroon
REVIEW RETURNED	27-May-2017

GENERAL COMMENTS	General comments This systematic review and meta-analysis protocol submitted by Mohammed et al. addresses a critical health issue relevant to all geographic areas of the world. Specific comments Introduction Authors should provide references to most of the first four sentences of the introduction Page 3, line 9: "…highest burden of childhood…" Page 3, line 13: define "WHO" when first used

REVIEWER	Andy Jones Norwich Medical School United Kingdom
REVIEW RETURNED	30-May-2017

GENERAL COMMENTS	Potentially interesting review. There are a number of issues with the manuscript 1) The introduction is much too general - there is no need to spend so much space giving a general background on obesity. The focus should move much more quickly to the specific issues of how area socioeconomics is associated with weight status. 2) The authors suggest in the introduction that neighbourhood socio-economic status is an environmental factor. I strongly disagree with this - just because something is measured at the area level doesn't

	mean it is environmental. In fact area SES is a 'compositional' measure (composed of the individuals that live within the neighbourhood) as opposed to a 'contextual' measure, which would include features of the environment. This flaw in the authors conceptualisation means that the stated rationale in the introduction is not well aligned with that the systematic review will provide evidence on. This needs a re-think. 3) The authors talk about looking at the 'effect of' neighbourhood SES on weight status, but given that many of the studies they review will be observational, the level of evidence produced by the review is unlikely to be sufficient such that causality and by ascribed to this level. 4) A very substantial limitation of the protocol is that the authors don't address how differences in the measurement and meaning of SES will be dealt with in the meta-synthesis. This is really key in a study such as this where evidence will be taken from the international literature. Crucial considerations include the fact that what is considered 'deprived' or 'affluent' will differ very considerably in different countries. Further to this, the way in which SES is measured varies substantially internationally. This raises considerable methodological and interpretative challenges for this review, none of which are addressed by the authors. 5) The 'discussion' section of the paper is very disappointing, basically repeating what's in the introduction. I would have expected some reflections on the longer-term implications of the review.

VERSION 1 – AUTHOR RESPONSE

Changes made and justifications:-

1) The revised manuscript has been proofread and edited by a native English speaker.

2) Page number has been added to the PRISMA-P checklist.

3) We removed the picture from Papa et al for the author could not respond after a couple of trials. However, the idea depicted by the picture is stated and referenced in the background section.

4) Referencing and abbreviation issue raised by reviewer 1 (Simeon Pierre Choukem): accepted and duly addressed.

5) On the use of the terminology ‘effect’ in observational studies and drawback of these designs in making causal inference (reviewer 2: Andy Jones), comment accepted; and we have 1) replaced ‘effect’ by other terminologies like association, link etc.., 2) added a paragraph of study strengths and limitations under discussion session, where we indicated that the nature of the studies’ design will preclude making casual inference.

6) The discussion section is wholly changed and further developed as per reviewer 2 (Andy Jones) suggestion. We added a paragraph on the expected outcomes and their policy implications. A paragraph of potential limitations and strengths is also added.

7) Reviewer 2 (Andy Jones) raised the need to address how SES measure will be handled in our analysis given there is variation in its methods of measurement. In the previous protocol, we indicated that NSES measurement methods will also be assessed and data extracted (page 5, additional file: abstraction form). We had also stated that subgroup analysis will be done depending on the sources of heterogeneity, which may include subgrouping by NSES methods. However, we felt that we didn't provide adequate information on how we are going to dealt with it and added a plan of subgroup analysis by NSES measures and geographic areas (page 6).

8) With the concept, neighborhood SES versus individual-level SES, reviewer 2 (Andy Jones) argued that "area SES is a 'compositional' measure…as opposed to a 'contextual' measure…". We have further looked into it and would like to put the following at the reviewer's note. We are cognizant that, though in a different scale, measures of area-level SES or area deprivation often include individual-level parameters like unemployment rate in the area, the proportion of state-owned houses etc... We understood the reviewer's comment from that point of view. However, area SES indexes may also include items like availability of health-enhancing facilities (sporting facilities, fruit/vegetable outlets) and others, which are beyond individual level factors (1-3). A number of multilevel studies showed that area-level socioeconomic status was associated with lifestyle, obesity and other chronic diseases, independent of individual-level SES (4-6). Furthermore, one of the objectives of this study is to synthesize the potential moderating factors of the association between NSES and overweight/obesity; i.e. whether the association varies by individual-level SES (page 4). Thus, we believe, consideration of area SES as a contextual factor is appropriate in the context of our study.

References

(1). Messer LC, Laraia BA, Kaufman JS, Eyster J, Holzman C, Culhane J, Elo I, Burke JG, O'campo P. The development of a standardized neighborhood deprivation index. Journal of Urban Health. 2006 Nov 1;83(6):1041-62.
(2). Pickett KE, Pearl M. Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. Journal of epidemiology and community health. 2001 Feb 1;55(2):111-22.
(3). Kamphuis CB, Giskes K, Kavanagh AM, Thornton LE, Thomas LR, Van Lenthe FJ, Mackenbach JP, Turrell G. Area variation in recreational cycling in Melbourne: a compositional or contextual effect?. Journal of Epidemiology and Community Health. 2008 Oct 1;62(10):890-8.
(4). Maier W, Scheidt-Nave C, Holle R, Kroll LE, Lampert T, Du Y, Heidemann C, Mielck A. Area level deprivation is an independent determinant of prevalent type 2 diabetes and obesity at the national level in Germany. Results from the National Telephone Health Interview Surveys 'German Health Update'GEDA 2009 and 2010. PloS one. 2014 Feb 27;9(2):e89661.
(5). Powell-Wiley TM, Cooper-McCann R, Ayers C. Change in Neighborhood Socio-economic Status and Weight Gain: Dallas Heart Study. Am J Prev Med 2015; 49: 72-9.
(6). Powell-Wiley TM, Ayers C, Agyemang P, Leonard T, Berrigan D, Ballard-Barbash R, et al. Neighborhood-level socio-economic deprivation predicts weight gain in a multi-ethnic population: longitudinal data from the Dallas Heart Study. Prev Med 2014 Sep;66:22-27.

VERSION 2 – REVIEW

REVIEWER	Simeon Pierre Choukem University of Buea Faculty of Health Sciences
REVIEW RETURNED	19-Jun-2017

GENERAL COMMENTS	Accept

REVIEWER	Andy Jones Norwich Medical School UK
REVIEW RETURNED	19-Jun-2017

GENERAL COMMENTS	Definitely improved from the last draft, but: - Crucially I still don't understand how you will deal with variations in the way the neighbourhood NSES will be measured in meta synthesis. Relates to my comment on the previous draft that NSES will be measured many different ways in many different settings. You say "given that there are variations in methods of measuring NSES and NSES-overweight/obesity association varies from country to country, we will do subgroup analyses by NSES measures and countries' economic level (high vs. low). " but I don't see how you can do such subgroup analysis unless you have a relatively small number of different types of measure used. I doubt this will be the case as the measures, in an international study, will be very specific to the setting. Even a 'uniform' measure like per-capita USD would mean something very different in Malawi compared to the UK. Subgroup analysis doesn't seem a way to deal with the considerable heterogeneity that's likely in exposure. - The standard of English in the newly included material isn't as high as the rest of the text. - I could see a revised version of the manuscript but not a document detailing the responses made to the original comments.

VERSION 2 – AUTHOR RESPONSE

Reviewer: 1 Reviewer Name: Simeon Pierre Choukem Institution and Country: University of Buea Faculty of Health Sciences Please state any competing interests or state 'None declared': None Please leave your comments for the authors below Accept : □ We are grateful for your contribution in improving our manuscript.

Reviewer: 2 Reviewer Name: Andy Jones Institution and Country: Norwich Medical School, UK Please state any competing interests or state 'None declared': None declared Please leave your comments for the authors below Definitely improved from the last draft, but: - Crucially I still don't understand how you will deal with variations in the way the neighbourhood NSES will be measured in meta synthesis. Relates to my comment on the previous draft that NSES will be measured many different ways in many different settings. You say "given that there are variations in methods of measuring NSES and NSES-overweight/obesity association varies from country to country, we will do subgroup analyses by NSES measures and countries' economic level (high vs. low). " but I don't see how you can do such subgroup analysis unless you have a relatively small number of different types of measure used. I doubt this will be the case as the measures, in an international study, will be very specific to the setting. Even a 'uniform' measure like per-capita USD would mean something very different in Malawi compared to the UK. Subgroup analysis doesn't seem a way to deal with the considerable heterogeneity that's likely in exposure. □ Thank you for the remarks on the issue. We do share your concern on the lack of uniformity in measuring neighbourhood SES and its impact in comparability of studies. The same is true with individual level SES measures. Despite the limitations, we believe it is possible to meta-analyse studies on NSES-obesity association, like it has been done for the association of individual level SES with health outcomes. As we stated it in our previous reply,

there are, however, standardized methods with better comparability for measuring NSES. These include NSES indices, neighbourhood deprivation indices, neighbourhood wealth index, and neighbourhood economic hardship indices. We will not be including studies which did not use composite measures of NSES. Of course, we didn't find studies that used only one parameter as a measure of NSES. Most studies we checked used indices developed using property ownership (like house, car etc),

proportion of unemployment, proportion of people on state subsidy and availability of some health-enhancing facilities. With the subgroup analysis related with NSES measures variability, we have indicated possibilities like by NSES measures, which means categorizing studies by their method of NSES measurement. For example, group1: studies which used NSES indices, group2: studies which used neighbourhood deprivation index……

 With regard to NSES-obesity association variation across regions or countries, we have indicated as we will do the subgrouping based on the countries' socioeconomic levels (low, middle and high income). We hope it is not difficult to categorise countries in that way as there are already established classifications. For example, Ethiopia goes to low income and UK to high income. Our preliminary analysis showed in low-income countries, rich neighbourhoods are associated with high risk of obesity but we find the opposite in the high-income countries. We had stated the above information in our previous document (page 5, line 4-6; page 6, line 22-23) as well as in the current version (page 5, line 1-2; page 6, line 9-12). Besides, as one of the possible limitations of our study, we have stated that the lack of uniformity in NSES measurement methods may result in high heterogeneity and undermine the comparability of studies. We stated that in the previous document as well as in the current document page 6, line31-33.

- The standard of English in the newly included material isn't as high as the rest of the text. Thank you for the comment. A British student proof read it for us. We edited the spellings using British English dictionary. We hope it has improved.

- I could see a revised version of the manuscript but not a document detailing the responses made to the original comments. We are sorry for you were not able to see our detailed responses to your previous comments and the changes based on the comments. However, we had submitted our response to the comments of yours as well as the other reviewer on the space for authors' reply. We hope that will not happen this time.