Author's response to reviews

Title: Existing maternal obesity guidelines may increase inequalities between ethnic groups: a national epidemiological study of 502,474 births in England

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Author's response to reviews: see over
Dear Editor

Thank you for considering our manuscript for publication in your journal. We feel that we have addressed all of the peer reviewers’ helpful comments, and that the paper is now clearer and more interesting as a result. Please find the detailed response to individual comments below.

Thank you
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<th>Major Compulsory Revisions</th>
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<td><strong>1. Hora Soltani</strong></td>
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| **2. Hora Soltani** | Methods: |
| | • This is confusing, should this not be included in the results? "The survey response was 89%, and 135 maternity units were identified with routinely collected and electronically recorded anthropometric data." |
| | • Similarly this statement needs to be in the results and substantiated with appropriate statistical information to demonstrate the representativeness of these units: "The participating maternity units were nationally representative in their catchment population demographics when compared with the general population of women of childbearing age using UK census [28], and index of multiple deprivation (IMD) comparison data [29]." |
| | The survey was used to identify potentially eligible maternity units which routinely collected the required data for the study in an electronic format, and therefore which units could be invited to participate in the study. More detail on the survey has now been included to clarify the purpose and survey methods. |
| | The response to the survey has been moved to the results section and further details provided to fully describe how the number of maternity units moved from 243 to 34. |
| | The wording in relation to the national representation has been changed to |
nationally comparable. Statistical analyses are not carried out for this as the large size of the dataset would produce very small confidence intervals and therefore statistically significant differences which are not clinically significant, and therefore misleading (especially when we are not able to compare like for like data – i.e. comparing a pregnant population with women in the general population who are childbearing age). The discussion of this has been moved to the results section and a table comparing the proportions for socio-demographic variables has been included to show the comparison.

3. Hora Soltani

Results: Please re-write this sentence, it is not very clear: "The association between obesity and all other ethnic groups compared with White women did not reach statistical significance, indicating no difference in the rate of increase in obesity over time." Does this not contradict the statement in the next paragraph: "Therefore the incidence of obesity in Indian women is increasing significantly less rapidly than White women,...".

More detail has been added to clarify this point. The first statement relates to the comparison of White women with women categorised by the top level ethnic group categories (including South Asian), whereas the second statement relates to the comparison of White women and South Asian women in the ethnic subgroup categories (Indian, Pakistani and Bangladeshi).

4. Hora Soltani

In the last paragraph: "Among the South Asian subgroups Bangladeshi, Indian, and Pakistani women all had a significantly increased odds of being obese compared with White women.", is this by using the WHO BMI classification? Please clarify in the text.

This is using the WHO criteria specific to the ethnic groups rather than general population criteria.

The first sentence in paragraph 5 of the results section states: "The remaining analyses used the Asian WHO BMI classifications for all Asian women, and the general population classifications for all non-Asian women" which includes all analysis described in paragraphs 5-7. The associated table for this result (table 4) also states: "Obese BMI defined as >27.5kg/m² for Asian populations, and >30kg/m² for non-Asian populations". Therefore no further clarification has been provided.

5. Hora Soltani

Discussion: More in depth analysis and interpretation of the results would be helpful. Issues such as identified risks associated with maternal obesity and how race may impact on that and literature related to the adverse outcomes of pregnancy for ethnic minorities would be essential here.

We agree – please also see response to comment 1. We have expanded our discussion of ethnic groups and obstetric risk in the introduction and discussion.

6. Jenny Cresswell

Timing of BMI measurement?
The outcome for the study, BMI, is stated to be measured in the first trimester. However, the only exclusions mentioned are the 9% of the data due to missing ethnic group data (results, 1st paragraph). Some women unfortunately always attend their booking

Thank you for raising this point. The data were adjusted to account for late booking – this was an oversight in the reporting and has now been included in the methods section.
appointment later in pregnancy than this (and mean gestational age at booking is 14 weeks in this study), so were they excluded also? Either this exclusion needs to be fully reported (along with any other missing data), or the timing of measurement of BMI needs to be clarified. (In fact, South Asian ethnic groups are more likely to be late bookers than White, so if BMI values measured late were included in the study then this could potentially have biased the findings.)

7. Jenny Cresswell

“Nationally representative” claim Throughout the study, the authors place a substantial amount of emphasis on the fact that this study is “nationally representative”. Indeed, the first line of the discussion section reads “This is the first nationally representative maternal obesity dataset to....” The authors claim the study to be nationally representative because the catchment populations of included maternity units did not differ in demographics from the general population of childbearing age using census data. The authors do not provide any specific details on this comparison. However, I feel this is an inappropriate use of the term “nationally representative”. A nationally representative study is defined as one in which the sample is selected with known probability of selection from a defined population; each individual has an equal probability of selection, and if this is not the case then weights are calculated. This is not the case in this study. The authors should remove the label “nationally representative” from the paper throughout, e.g. instead referring to it as simply a “national study”. If they wish to discuss the representativeness of their data, they should also present specific details of the comparison in a table to show the specific variables compared, the value in both their study and the census and the results of any statistical test(s) used for comparison.

Please also see response to comment 2 above – reference to national representation changed throughout and additional data provided.

Minor Essential Revisions

8. Hora Soltani

Figures: These should be described more clearly both by providing accurate labels for the figures and better description for each axis (e.g. does the vertical line represent the % of obesity in the population?) We have now added additional information to the figures to clarify this. Short titles for the figures provided in the main document are now more descriptive. Figure legends have been added to more thoroughly describe each figure.

9. Jenny Cresswell

Background, 2nd paragraph, 5th & 6th line: Authors have used the greater than (>) symbol; should be using greater or equal than (#). Changed throughout where appropriate (note: not appropriate for the Asian specific BMI criteria for obesity which should be >27.5 rather than ≥27.5).

10. Jenny Cresswell

Methods, 1st paragraph: Greater clarity is needed regarding where the sample came from – the text of this paragraph needs to be revised. If the survey response rate was 89% then there should be ~216 maternity units, not 135 - what happened to the others? If the point the authors are trying to make is that ~80 units are not even collecting any BMI data during antenatal care then this is This point has been addressed in the response to comment 2. We have added additional detail on the survey purpose, methods and response.
surprising, and I feel this is worthy of comment in its own right. Furthermore, there are only actually 34 units who provided any data. I feel it is quite misleading to flag 89% as the response rate, when the more useful statistic for someone trying to interpret the results of this study would be something more along the lines of “we obtained data from 14% (34/243) of the NHS maternity services”.

<p>| 11. Jenny Cresswell | Methods, 6th paragraph: In the first line of this paragraph the authors state that the “data did not require adjustment for age”. However, they then go on to adjust for age in the logistic regression model. Please explain this. | The first statement relates to looking at the potential influence of age at the study population level which could have independently influenced the trends in incidence for the whole study population year on year (e.g. if the maternity population had been significantly older in 2007 compared with 1995 this could have impacted on the incidence of obesity at the population level). The adjustment for age in the logistic regression was to account for the potential confounding of age at the individual level. The first statement has been amended slightly to emphasis the relationship with time. |
| 12. Jenny Cresswell | Results, 4th paragraph, 11th line “The association between obesity and all other ethnic groups compared with White women did not reach statistical significance”. The difference and the CI and/or p-value still should be stated even if the result was not significant. | We have now included the non-significant results in the manuscript. |
| 13. Jenny Cresswell | Discussion, 4th paragraph, 4th line: The authors state “there is international evidence of differential obstetric risk between ethnic groups and the inter-relation between obesity and ethnic groups”. Please specifically cite some of this evidence here. Even better, it would be helpful to the reader if the authors explain briefly what the current evidence base shows. | This specific statement was referring back to the evidence-base which had been discussed in the introduction. We have now elaborated on this in the introduction and in the discussion sections (please also see response to comment 1). |
| 14. Jenny Cresswell | Also, please insert a brief comment explaining why the authors don’t feel it is appropriate for such evidence to inform UK guidelines. For example, there are certainly some relevant studies on obesity and ethnic group from the USA; if the mechanism between obesity-ethnicity-risk is primarily biological then it is not automatically clear why we would expect substantial differences between such similar settings. | Thank you for identifying this issue in the interpretation of this discussion point. We do agree that evidence on ethnic group disparities should inform the development of guidelines, and when the effect is biological then transferability of international evidence to UK populations may be possible. However, the limitations of the evidence-base we were referring to are in the lack of evidence among South Asian populations and the impact of obesity on obstetric risk, and evidence on the use of the lower BMI criteria to define obesity. We have now elaborated on this section in the discussion to clarify and ensure readers do not mis-interpet the point we are making. |</p>
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<td><strong>15. Jenny Cresswell</strong>&lt;br&gt;Methods, 6th paragraph, 5th line It would perhaps be better to state confidence intervals in full (rather than CI) the first time phrase is used.</td>
<td>Confidence interval has been stated in full and abbreviated in the background section which is the first time it is used (paragraph 4)</td>
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<td><strong>16. Jenny Cresswell</strong>&lt;br&gt;Results, 1st paragraph: Mean BMI is presented. Is the data normally distributed? Settings with relatively high levels of obesity often have a skewed distribution of BMI and it would be interesting to know the median.</td>
<td>The data were positively skewed rather than normally distributed which is almost always the case with BMI due to weight-related survival trends. Survival is unlikely when adult BMI drops below gender-specific cut points, whereas survival at the upper end of the BMI spectrum is more widely dispersed. Despite this trend, the majority of publications relating to BMI report the mean values and we wanted to also report mean values to allow comparison between published data. We have now also included the median and IQ range in the table 3 with a footnote that this is due to the data being positively skewed.</td>
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