Author’s response to reviews

Title: Consumption of sweetened-beverages and poverty in Colombia: when access is not an advantage

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In the main text, all changes made are illuminated with yellow

Reviewer reports:

Elizabeth Beardsmore (Reviewer 1): My comments are minor and as follows;

This study is useful as evidence of the impact of taxation of sugar sweetened beverages on health inequalities is still a developing area of discussion and analysis. This ecological study explores SSB consumption across sociodemographic and geodemographic spectrums.

Introduction

Page 2, line 53 - “.transitions responsible for this increase have not yet ended" could use "…nutritional influences (or nutritional transitions) relating to health are still ongoing"

A.// The suggestion was accepted, and the text was changed. It now reads as follows: In middle- and low-income countries, the incidence of overweight in children and adults has increased steadily over the past 20 years, and health-related nutritional influences (or nutritional transitions) are ongoing [4-9]. The probable causes of this phenomenon, which, in turn, leads to an increase in chronic diseases, are located from the individual to the ecological level [10].

Page 2, Lines 53 onwards - this is a long sentence and should be restructured (consider grammar).
A.// The suggestion was accepted. The paragraph has been reorganized to make it shorter and more specific.

Page 3, Line 8 - "there are debates for and against this type of measure" could say "there are ongoing debates surrounding taxation"

A.// The suggestion was accepted. The text now reads as follows: Some countries, including some in the Americas, have incorporated a tax on SSB consumption, whereas in other countries, such as Colombia, there are ongoing debates surrounding taxation.

Page 3, Line 33 - when discussing the hypothesis, would it be appropriate to add to the end of this "and this should be reflected in the consumption of SSB”? if that is indeed what I have interpreted from reading this paper? The hypothesis as is reads somewhat unfinished at this stage. when re - visiting this later in the paper you present more detail, should this be included/presented earlier (at this stage of the paper)

A.// The suggestion was accepted. The text now reads as follows: The hypothesis is that at least in theory, disadvantages and inequalities exist for women and children and for the poorest groups, and these should be reflected in the consumption of SB [13-19].

Methods

A little more detail relating to how SSB consumption was estimated from the survey would be useful.

A.// We have written an introductory paragraph that puts the use of the FFQ in the ENSIN into context. In addition, we have supplemented the tool with a question about SB consumption. The text now reads as follows: The ENSIN-2010 estimated the frequency of consumption of 30 foods or food groups and three related practices based on an FFQ that offered 10 response categories indicating consumption/practices in the previous month. The applied FFQ did not differentiate the consumption of SSB or SB; it included both in the same item. In this study, the item “In a typical month, how often do you consume SB (boxed, powdered, bottled)” was analyzed through two expressions of consumption: the prevalence (yes/no) and frequency (number of occasions per day that SB were consumed: frequency/day or times/day). The frequency responses in the FFQ were converted into a continuous variable (times/day) using appropriate dividers to express the frequency of consumption in units of "times/day" [25].
In addition, more general details relating to the survey would be useful to establish validity or some mention relating to how established the tool is for a reader who might be unfamiliar with the National Nutritional Survey.

A.// The suggestion was accepted. The text now reads as follows: In Colombia, ENSINs have been carried out since 2005. Every five years, these surveys study the state of nutrition through anthropometric and biochemical measurements. For the ENSIN-2010, an FFQ was used to study the food and nutrition practices of interest to public health. The checklist of foods, food groups and practices was designed by nutritionists based on the food consumption and nutrition problems identified in the ENSIN-2005. The response section was adapted from two successful reproducibility and validity studies of FFQs used in the Colombian population [27, 28]. Before the FFQ used in the ENSIN-2010 was approved, the facial validity of all its items was guaranteed by applying and adjusting the items in successive pilot tests in the field.

Page 4, line 47 "In addition, the complex design of the sample was incorporated" - I am not entirely sure what this means, some clarification or development in context would improve this

A.// The line was eliminated because it was out of context. This change has been incorporated into the statistical analysis section.

More details relating to the interviews based on the food frequency questionnaire would strengthen the methodological approach section and give a more in depth insight into the reliability of the methodological approach used (Page 4, line 49 onwards)

A.// The paragraph has been rewritten to provide additional details about the interview. It now reads as follows: The FFQ was administered in the subjects’ homes by nutritionist-dietitians through direct interview. The respondent’s privacy was guaranteed throughout the interview. The nutritionists were trained in the interview methods and in applying the FFQ for one month. All the interviews were followed the same procedures, which were standardized and guaranteed in the training. When the FFQ was administered to children between 5 and 11 years of age, their mothers or caregivers responded. The Colombian Institute of Family Welfare (ICBF) obtained informed consent from the participants prior to enrollment.

Results

The section on rank based inequality page 6, line 12 onwards could be re structured for clarity.

A.// We have added a paragraph to introduce the meaning and interpretation of the indicators. We hope this helps to clarify the meaning of the study’s results. The indices based on the ranges
calculated here serve as indicators based on the relationship of the nutrition indicator to the extreme ends of a population ordered according to a socioeconomic indicator or based on the same nutrition indicator.

Gini coefficient on page 6 could be briefly contextualised with economic theory for a more in depth understanding of the findings in this section.

A./ A brief explanation of the interpretation of this index has been added. The text now reads as follows: The Gini coefficient is perhaps the best-known measure of inequality. It has values between 0 and 1. In this context, zero would indicate that SBs were consumed at all monetary poverty levels, that is, equality; in contrast, a value of 1 would represent a situation of perfect inequality, in which SBs were consumed only by people at the poverty level. Values less than 0.30 are considered high or almost perfect equality. The Gini coefficient and the concentration coefficient show that SB consumption inequality was low, with a prevalence ranging from 0.01 in minors to 0.08 in adults. The averages of the median frequency ranged from 0.08 in minors to 0.25 in adults (Tables 1 and 2). When the concentration indices and regression-based indices were plotted, there were relatively flat lines between poverty, mean prevalence, and the average median frequency of times/day of consumption (Figs. 1 and 2).

Page 6, line 35 "regarding average frequencies" could be "Average frequencies fluctuate..

A./ The suggestion was accepted. The text now reads as follows: The average median frequency ranged from 0.08 in minors to 0.25 in adults (Tables 1 and 2).

Page 7, line 8 - line 12; this sentence does not read clearly and should be restructured.

A./ The phrase has been rewritten to make it easier to read. It now reads as follows: While this is generally true, it is not always the case in Colombia when nutritional variables are studied.

Discussion

In the discussion there is mention of how SSBs are classified, as snack foods. This section would benefit from a little more depth in relation to this as there are implications for both the methodological approach and also the wider context. There is no clear distinction or mention relating to this study, are they classified this way at a national level or in the nutritional food survey? If it is in the survey, should this then be mentioned in the methods section under how SSB consumption was calculated? There is also the issue that SSB taxation policy is generally
driven by evidence that suggests that it is "hidden" calories in beverages that let additional sugars in the diet go unnoticed. Some literature suggests a clear distinction between added sugars in drinks and added sugars in snacks, should be clear. There is also literature relating to the impact this has on populations and policy - should some of this be addressed in the discussion?

A.// We have rewritten the paragraph to avoid confusion. It now reads as follows: Another indirect examination of the inequality of SB consumption in the Colombian population also showed that there is no inequality in the classical sense; this finding was related to the pattern of snack food consumption [32].

The discussion also makes mention of brands and the relationship to price, it might also be interesting to consider brand loyalty and if this might have any impact on the findings or in the context of the wider literature and evidence base.

A.// This comment is very interesting, and we have decided to address this issue explicitly in the paragraph. However, the development of these aspects is beyond the scope of the study. It requires specific studies, which would indeed be very interesting to perform in the immediate future. The text now reads as follows: This leads to new challenges in studying inequality in SB consumption because if inequality can be linked to a brand, brand loyalty or even a type of sweetener, then the inequality would be dynamic and at least in theory, it would be possible to establish a relationship between inequality in SB consumption and the price-demand elasticity of these characteristics.

I agree with the recommendations for more accurate methodological approaches to gain relevant insight, should the classification of SSBs be mentioned in this section also.

A.// We have added improvements to the classification of SB and SSB to the recommendations. The text now reads as follows: b) establishing better classifications for SB and SSB by incorporating additional characteristics, such as whether they include added nutritional components, such as fiber or micronutrients, and whether they are artificial or mixed with natural juices….

Overall, this paper is useful in its contribution to the economic impact and wider discussions relating to policy, inequality and can contribute knowledge to the discussion relating to the impact of taxation of SSBs. I also found the findings interesting and your conclusion makes clear the areas for further work and the impacts for policy and practice.

A.// There are no comments.
Wendy Wrieden (Reviewer 2):

Although the written English in this paper was good I still found this paper difficult to read and understand possibly because the majority of the statistical methods used to assess inequalities in Sugar sweetened because the majority of the statistical methods used to assess inequalities in Sugar sweetened beverages (SSBs) were unknown to me. I was particularly confused by Table 1&2 which listed a large range of so called indices of inequality of SSB consumption without any definitions except in a reference that was in Spanish. I would recommend that this paper is rewritten to make it more accessible to an English speaking audience and a more general Public Health community. Approximately half of the references were to publications in Spanish and it is therefore not possible for many potential readers to refer to these without translation.

A.// The new text has been revised by American Journal Experts, and many of the references have been replaced by equivalent ones in English.

The nutritional aspects of the study require more detail. It is not clear how the FFQ has been tested and validated and a copy of the FFQ should be accessible to readers. A comment was made that the question on SSB did not distinguish between carbonated and other soft drinks or specify the type of sweetener so it is possible that measurement included sugar free beverages as well.

A.// We accept the reviewer’s recommendations. We have clarified in multiple parts of the text that our FFQ was based on the ENSIN-2005 and that it incorporated aspects of other FFQs with information regarding reproducibility and validity in the Colombian population. To clarify this information, we have explained that the item that measured SB consumption did not differentiate between SSB and SB. However, in the Colombian population, the consumption of SSB is higher than that of SB. The text now reads as follows:

Variables studied
Measurement of consumption: prevalence and frequency of SB consumption

In Colombia, ENSINs have been carried out since 2005. Every five years, these surveys study the state of nutrition through anthropometric and biochemical measurements. For the ENSIN-2010, an FFQ was used to study the food and nutrition practices of interest to public health. The checklist of foods, food groups and practices was designed by nutritionists based on the food consumption and nutrition problems identified in the ENSIN-2005. The response section was adapted from two successful reproducibility and validity studies of FFQs used in the Colombian population [27, 28]. Before the FFQ used in the ENSIN-2010 was approved, the
facial validity of all its items was guaranteed by applying and adjusting the items in successive pilot tests in the field.

The ENSIN-2010 estimated the frequency of consumption of 30 foods or food groups and three related practices based on an FFQ that offered 10 response categories indicating consumption/practices in the previous month. The applied FFQ did not differentiate the consumption of SSB or SB; it included both in the same item. In this study, the item “In a typical month, how often do you consume SB (boxed, powdered, bottled)” was analyzed….

The FFQ used is described in reference number [25].

The conclusion that the authors make could be easily inferred from the figures they provide so I would like to see more explanation about the value of all the various different inequality calculations.

A.// The results section has been rewritten and expanded to make it easier to read and interpret the results.

Particular issues.

In the abstract prevalences and frequencies are given for children and men. Why exclude women from this summary? It would be better to give figures overall rather than miss out half the adult population.

A.// The text of the summary has been revised, and general figures are now presented.

Introduction.

P2,I lines 57-59 the obesogenic environment could be expanded to include the food environment and food availability.

A.// The recommendation was accepted. The paragraph was extended to incorporate the suggested text.

On p3, lines 57,58 or p 4, lines 33-36 add a reference to any validation or testing that has been carried out on the FFQ prior to its use. Was the same FFQ used for adults and children? Has it been validated or compared with other methods in all the age groups surveyed?
A.// Information on these aspects has been discussed and expanded in the methods section.

P4. Lines 21, 22. if nine geodemographic units has no information on monetary poverty were they excluded. I think this needs to be said even if it seems obvious.

A.// The recommendation was accepted. The text now reads as follows: Nine of the 33 geodemographic units did not have information regarding their monetary poverty and were excluded from some calculations.

Lines 35-37. What was the question asked? It is not enough to say SSB (boxed, powdered, bottled). This needs to be explained for an international readership. It would also be useful to mention any Face validity results for this question if available, i.e., what did respondents understand by this question.

A.// The recommendation was accepted and incorporated into the text as described above.

Lines 39-41. Was this frequency normally distributed? The data is surely ordinal and should perhaps be reported as medians.

A.// The frequency/day is a continuous variable with an asymmetrical, leftward distribution. In the manuscript that was initially submitted, we assumed normality given the large sample sizes. However, the reviewer is also correct; thus, we have recalculated the tables. The inequality indices for the frequency are now based on the median frequency of consumption. In addition, we have adjusted the figures. The absolute values of the indices were changed as expected, but the conclusions remain the same. That is, for the geodemographic units, the same conclusion was reached regardless of whether the median or the average frequency of consumption was considered.

P5. Line 10. Please write this tests in the conventional way, i.e. Chi-squared test or Pearson's chi-square test and independent sample t-test. Check journal guidelines and published articles for suitable way to do this. Also check if t-test is the most suitable statistic if the data are not normally distributed.

A.// The recommendation was accepted and incorporated into the text.
Lines 23-29 Calculated inequality indices. The reference here to easily accessible texts refer to Spanish publications. Much more detail is required and an English reference to suit an English language publication.

A.// Six references have been replaced by their English equivalents.

P6 line 6. This is the first time that correlation has been mentioned. What sort of correlation was this?

A.// This correlation was determined using the Spearman coefficient (\(r_s\)) and describes the prevalence and the frequency/day of SB consumption in the geodemographic units. The text has been rewritten for better clarity. It now reads as follows: The prevalence and the median frequency/day per geodemographic unit, age group and sex are presented in a table (Supplementary material). For all age groups and both sexes, the Spearman correlation (\(r_s\)) of the mean prevalence and the average median SB consumption was high, ranging from 0.35 (adult females) to 0.68 (adult males).

P 7. Discussion. I appreciate the point about not only assessing extremes and that prevalence and average frequency of SSB consumption may be higher in those with a higher monetary income but am unable to check the supporting literature as it is all for a Spanish speaking audience.

A.// Six references have been replaced with English equivalents.

Some good points are made under limitations but they do draw attention to the fact that the study conclusions may be wrong if the item SSB includes diet drinks as well. If this is a possibility perhaps the paper should be renamed as "Consumption of sweetened beverages and poverty, etc.

A.// Given that one of the main limitations of the study is the way in which the National Survey of the Nutritional Situation in Colombia, 2010, asked about beverage consumption, we have accepted the reviewer’s suggestion. In addition, all necessary adjustments have been made to the text to make this clear. For example, now the text does not speak exclusively of sugar-sweetened beverages (SSB); instead, we refer to sweetened beverages (SB), which include those sweetened with sugar.