Author’s response to reviews

Title: Does access to healthy food vary according to socioeconomic status and to food store type? An ecologic study

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The authors would like to thank for very insightful questions and comments. They have helped to improve the quality of the paper. We are submitting the reformulated version of the article in accordance with the suggestions of the Scientific Editor and Reviewers. Reviewer comments and our responses are written in black and in blue for easy viewing, respectively. In the manuscript, the changes made were kept in red color.
• Decision Editorial

In addition to the referee comments, please address the following editorial points:

1. Please copy edit your manuscript and ensure the correct reference style is used. See below for more information.

ANSWER: Thank you for the consideration of our manuscript. We reviewed and ensured the reference is correct.

2. Please ensure your methods section contains enough detail that your study could be repeated by others. Include a blank copy of your interview guide or a list of questions as an additional file.

ANSWER: In order to have a very clear methods sections, we have revised the text, added some parts and rewritten others to clarify some points. We also are submitting a list of questions used in our data collection, as an additional file. Thank you for the suggestion.

• Reviewer 1: Rita de Cássia Akutsu

1 - What are the exclusion criteria for PAHs?

ANSWER: Thank you for placing this comment. The exclusion criteria of the HAP poles were added in the manuscript.

The exclusion criteria for the poles participating in the study were: location in areas of low vulnerability to health (n=6) and had participated of intervention related to food and nutrition in previous studies (n=2). So 42 poles were considered eligible out of the 50 HAP poles working in the municipality at the time of study.

2 - What is the criterion for the selection of 2 PAHs?

ANSWER: Two poles were selected in each region because this ecological study is considered the first step of a randomized controlled trial, in which we conducted a community intervention study as a second step. Thus it was necessary to allocate one pole to the intervention group and another pole to the control group. This minimal approach (2 poles per region) was representative of HAP centers with 95% confidence and less than 1.4% error, based on the estimated population proportion. We added these criteria in the manuscript. More information about the study phase “community intervention study” can be found on Menezes et al (2018).

Reference:
3 - Why did the sample only include people aged 20 years or older? What is the criterion for eliminating, for example, those between the ages of 18 and 20?

ANSWER: We included people aged 20 or older in the sample because we chose to work only with adults and the elderly. According to the World Health Organization (2009), the adult phase is the period between 20 and 59 years of age.

Reference:

4 - What is the reliability of the instruments used in the study (original and current)?

ANSWER: The inter-rater reliability, test-retest reliability, and construct validity of retail food store and open-air food market observation tools were evaluated by Duran et al (2015). Inter-rater and test-retest reliability were generally high, with most Kappa values greater than 0.70 (range 0.49-1.00). The results showed that the measures were reliable and able to reveal significant differences across store types and different contexts. The authors suggest that the tools may be used to reliably measure the food stores and restaurant food environment in urban settings of middle-income countries. We also highlight that those instruments were tested in Brazil, and considering we also used them in the Brazilian context, it was not necessary to revalidate for the applied context.

Reference:

5 - How reliable is HFSI? What is the number of constructs of the instrument?

ANSWER: Healthy Foods Index (HFSI) is calculated based on the instrument described above, which demonstrated high reliability. Kappa statistics for inter-rater reliability for measurement tool items collected at open-air food markets and retail food stores ranged from 0.66 to 0.95.
Test-retest reliability was likewise high, with kappa statistics ranging from 0.61 to 1.00 (Duran et al., 2015).

The HFSI is composed of twelve variables related to the consumer nutrition environment, including the availability, variety, and advertising of healthy food (such as fruits and vegetables) and ultra-processed products (sugary drinks, corn snacks, and cookies filled with chocolate) (Duran et al., 2013; Costa et al., 2018).

Thank you for those consideration. We added both in the manuscript.

Reference:


6 - In pg 6 lines 7 - 11 add summary description of the criteria of Duran et al., 2013;

ANSWER: We agree and have added the summary description:

Data collected for the community nutrition environment included locations and types of food stores. The stores types were classified as follows: a) large-chain supermarkets (commercial establishment of food in large areas of intense flow and easy access, presenting greater supply and lower prices); b) specialized FV markets/stores or open-air food markets (fixed and mobile establishment, specialized in the distribution of horticultural products); c) local markets (old and traditional establishment that supply small domestic emergencies); and d) convenience stores and bakeries (retail trade usually located in gas station, with sale of processed foods and manufacture of bakery products) (Duran et al. 2013).

7 - Replace comma by point in line 13 of pg 07;

ANSWER: There is some confusion here. In English we use commas to separate off the thousands and millions in compound numbers. We re-checked this grammar rule and it is correct.

8 - The results chapter should begin by describing the quality of the instruments used (reliability) so that the power and strength of the other results are better understood;
ANSWER: We understand, but we disagree with this specific suggestion, considering the goal of this manuscript was not to assess the reliability of the instruments, but the Duran (2015) study. We propose in here to investigate whether access to healthy foods vary according to stores types and the SES level among the Health Academy Program (HAP) members. So we believe the results chapter should begin with description of the population and food stores. However, we agree that this information (quality of instruments used) is important, and we have added it in the Methods section.

Reference:


9 - The authors report that in the city of the study there is a specific public policy for the installation of health food stores. Does the information proceed? What is the structure of such a program? When was it implanted? Has the program been evaluated yet? Was the variable adequately treated so as not to confuse the study?

ANSWER: Yes, the information proceeds. In the discussion section of the article we included more information about this food and nutrition security municipal policy to justify the greater predominance of specialty FV markets/stores, open-air food markets found in the areas examined.

In Belo Horizonte there has been a food and nutrition security municipal policy since 1993, under the jurisdiction of the Municipal Secretariat for Social Assistance, Food Security and Citizenship (SMASAC), regulated currently by municipal legislation 11,065 of 2017. According to this policy, sustainable food and nutritional security is referred as the guarantee of regular and permanent access to food with quality, in sufficient quantity, based on healthy food practices (Law nº 15.982/2006). In this way, the municipal administration has provided a set of actions planned to guarantee the access to food for the entire population, by implementing in the city specialty FV markets/stores, open-air food markets, which offer healthy food at lower prices.

We have expanded our text to discuss about this food and nutrition security municipal policy.

Reference:

10 - The authors bring in the affirmative discussion and results of other studies that anchor their discussions. The study designs, sample and main results of such studies are essential for readers to evaluate the quality of the studies presented and whether they actually serve as a measure of comparison or analysis of their own results.

ANSWER: We agree with the reviewer and have added information about the studies. Thank you for this contribution.

- Reviewer 2: Marie-Claude Paquette

This paper's objective is to explore whether access to healthy foods vary according to store type and SES among users of public health promotion program in Brazil.

Background:

-Relevant review of the literature

ANSWER: Thank you for the comment.

-What is meant by local markets? Public markets?, corner stores? Would be interesting to add come context of what is meant.

ANSWER: Thank you for your suggestion. As was also suggested by the other reviewer, we have added a description of each establishment to improve the reader's understanding.

In the manuscript we added information in the paragraph: “Data collected for the community nutrition environment included locations and types of food stores. The stores types were classified as follows: a) large-chain supermarkets (commercial establishment of food in large areas of intense flow and easy access, presenting greater supply and lower prices); b) specialized FV markets/stores or open-air food markets (fixed and mobile establishment, specialized in the distribution of horticultural products); c) local markets (old and traditional establishment that supply small domestic emergencies); and d) convenience stores and bakeries
(retail trade usually located in gas station, with sale of processed foods and manufacture of bakery products) (Duran et al. 2013)

-When you talk about the low quality at higher price, are you talking about nutritional quality?

ANSWER: No, sorry about this misunderstood. We are talking about physical nature or condition of food - if it is good or bad. Quality is considered in literature one indicator of the consumer nutrition environment (food characteristics within stories). Other food attribute variables measured were availability, variety and price. We have modified the text to make this clearer.

Method:

-What is meant by the "provision of a morning shift"?

ANSWER: It means that the HAP centers should have “priority operation in the morning hours”, rather than afternoon or nights. We have rewritten the text to clarify this point. We clarify that the HAP service usually operates during the morning, in almost all centers – a characteristic of the service.

-What is included in all commercial FV food stores? Are supermarkets included in this definition?

ANSWER: Yes, supermarkets are included in the definition. It is included all establishments that sold fruits and vegetables, obtained from the registry of the Municipal Joint Taxation Secretariat, plus open-air produce markets. Those establishments were composed by large-chain supermarkets; specialized FV markets/stores; open-air food markets; local markets; convenience stores and bakeries. Hence, it is important to note that we investigated the most important food stores in Brazil, that accounts for the biggest of total energy according to a national survey of 55,970 households: supermarkets, local markets and greengroceries (Machado et al., 2018). We have included this information in the text to make this more clear.

Reference:

-How are frequent HAP users defined?

ANSWER: Frequent users were those who regularly participated in the practice of physical exercise in the HAP center in the previous month to the beginning of data collection. We have rewritten the text to clarify this point.

-Data collection is not clear. Where all FV food stores in each HAP surveyed? Examples would help for the classification of the food stores. Again, I do not know what local markets refer to.

ANSWER: We fully agree with this observation. We added the classification definition of the food stores surveyed in the study. We hope this information help to understand what types of FV food stores we surveyed. We also have expanded our data collection subsection to clarify our methods. Thank you for your suggestion.

-The way you use the word access make me think more that you are talking about availability, what is available inside the food store and its variety. In my understanding access is a larger concept that includes availability, accessibility, accommodation, affordability and acceptability. https://www.ncbi.nlm.nih.gov/pubmed/7206846

ANSWER: The dimension access has been evaluated in the food environment literature through different indicators. We agree that the most complete definition involves availability, accessibility, affordability, accommodation and acceptability (Penchansky and Thomas, 1981; Caspi et al., 2012). According to the Caspi et al (2012) availability “refers to the adequacy of the supply of healthy food; examples in the food environment might include the presence of certain types of restaurants near people's homes, or the number of places to buy produce”. In our study we have evaluated more than that. We evaluated access measured by the Healthy Food Store Index (HFSI) that includes variables related to the consumer nutrition environment, concerning the availability, variety, and advertising of healthy food (such as FV) and ultra-processed products (sugary drinks, corn snacks, and cookies filled with chocolate). We believe that the term access has different dimensions (availability, accessibility, acceptability) that corresponds to the score used in this study. Hence, we have others articles in literature that have measured access using the Healthy Food Store Index (HFSI) (Duran et al, 2013; Costa et al, 2015).

Reference:

How was the distance of user's home used in analysis?

**ANSWER:** Data home addresses of the HAP users were obtained via face-to-face interviews. The distance of user's home from food stores were used for selection of HAP users that participated in this study. We used spatial analysis techniques to identify users that residing up to 1,000 meters (m) from the food stores investigated. The aimed was to included HAP users that lived in the territory of HAP, corresponding to the social context investigated. In the total, 932 HAP users were excluded. We have rewritten the text to clarify this point.

-Only the distance and income of participants were used?

**ANSWER:** No. Besides the home addresses of the HAP users, we collected sociodemographic variables such as age, sex, years of education, occupation and family income of participants. We showed this information in the results section and on Table 1 for description of the HAP users.

Results:

-Categories of retired or pensioners and unpaid activities at home does not seem mutually exclusive.

**ANSWER:** Thank for the observation. We believe the text is not clear in the article. We rewrote. We considered different occupations: retired or pensioners were people receiving financial benefit of the government (they might have better financial condition in the vulnerable context evaluated). Those people who carried out activity in their own homes do not have any remuneration or salary. For this reason, we showed the results separated.

-What is considered low income?
ANSWER: It should be realized that we evaluated income as a numeric variable, rather than categorical (low vs. high income). However, we clarify that we were studying a disadvantaged community with low income, in which the monthly income per capita of the sample population ($278.90) is far below the median income of the municipality ($1144.4) and the country ($768.0) (IBGE, 2014).

Reference:


-Is the HSFI discriminate in this study, the values between different store types does not seem to be that different….

ANSWER: The Healthy Foods Index (HFSI) is composed of twelve variables related to the consumer nutrition environment, concerning the availability, variety, and advertising of healthy food (such as FV) and ultra-processed products (sugary drinks, corn snacks, and cookies filled with chocolate). This index creates scores ranging from 1 to 16. The bigger values of HFSI show the best access to healthy foods in the establishments to the detriment of unhealthy foods. The results showed that the general of HFSI value was 11 (range = 5-16). Regarding the type of stores, specialized FV markets and open-air food market showed better HFSI (13, range = 7-16) that represented the best access to healthy food. The HFSI of large chain supermarket was 8 (range = 5-11) and local market was still lower (7: range= 5-16). We believe that because the score is a scale there is a big difference between specialized FV markets and open-air food market and the large chain supermarket and the local market. We can conclude that the large chain supermarket and the local market offer more unhealthy foods in comparison to specialized FV markets and open-air food market.

We thank you for the suggestion. The HFSI explanation was added in the text.

Discussion:

-The data on the local food environment should be presented in the results section.

ANSWER: The data on the local food environment were presented in the discussion of the article because we want to justify and discuss about greater predominance of specialty FV markets/stores, open-air food markets in the areas examined. Considering this manuscript do not
have the purpose of describing the food environment, we did not presented it in the results sections. For further details, we referenced in the paper our article that had the aim to provide analysis of distribution of local food retail within the HAP territory.

Reference:

Costa BVL, Oliveira CDL, Lopes ACS. Food environment of fruits and vegetables in the territory of the Health Academy Program. Cad Saude Publica. 2015;31:Sup159-169.

-Limits should include that only HAP participants' characteristics were used to determine the neighborhood characteristics.

ANSWER: We believe that is correct. We changed the text and incorporated this limitation.

-Limits should also include that participants shopping outlets were not documented, it is not known if they use the stores in their sector primarily or other stores on their commute or activity space.

ANSWER: We agree and included the limitation in the manuscript. However, it should be emphasized that proximity is one of the main decision factors for choosing the place of food purchasing (Cannuscio et al. 2014). In our study we conducted qualitative research that revealed individuals purchased FV from shops close to their houses (Figueira et al., 2014). The same pattern were also verified when we asked the address where they shop FV. The high proportion of households without a vehicle also suggests that proximity to food stores is important to shopping behaviour. This may be one of specific findings to a developing country.

Reference:


-I do not understand the sentence " The use of buffer in determining food environment implies determined and recognized boundaries....."

ANSWER: Sorry about this misunderstood. We wanted to say that the use of buffer to determine the food environment evaluated implies determining limits that may not be real in relation to the areas where people actually engage with the food environment. Their food environment could be smaller or larger (than the one evaluated). We have rewritten the text to clarify this point.
Highlights

While the second highlight that state that an increase in FV markets promote access to fresh products may be true this study did not look at this aspect.

ANSWER: We supposed the highlight is correct. We made this affirmation based in the Healthy Foods Index (HFSI) results. This index is composed of variables related to the availability, variety, and advertising of healthy food (such as FV) and ultra-processed products (sugary drinks, corn snacks, and cookies filled with chocolate). This index creates scores in which a higher values show the best access to healthy foods in the establishments to the detriment of unhealthy foods. The results showed that specialized FV markets and open-air food market had the better HFSI (13: range = 7-16), hence representing the best access to healthy food. The Multiple linear regression analysis showed that the type of food store, represented by specialized FV markets/stores or open-air food markets (p < 0.001) and supermarkets (p < 0.05), positively influenced access to healthy food, accounting for approximately 70% of the variation in access. Therefore, an increase of 1% in specialized FV markets/stores or open-air food markets and supermarkets raised HFSI values by 0.12 and 0.07 points, respectively. Income did not influence the HFSI values of the commercial establishments.

We believe that after including a better explanation about HFSI in the text, this relation should be more clear to interpret. Thank you.