Comparing different residential neighbourhood definitions in the association between density of restaurants and home-cooking among Dutch adults

July 24rd 2019

Prof. Dr. Lluis Serra-Majem and Prof. Dr. Maria Luz Fernandez,
Editors-in-Chief Nutrients

We thank you for the opportunity to revise and resubmit our manuscript and we thank the reviewers for their valuable suggestions to improve it. Please find enclosed a revised version of our manuscript.

The enclosed version of the manuscript has been prepared taking into account the suggestions of the reviewers with changes to the text highlighted using red font.

The comments have greatly helped us to further improve our manuscript and we hope it is now suitable for publication in Nutrients.

Kind regards,
On behalf of the co-authors,

Maria Gabriela Matias de Pinho

Reviewer 1

Comments and Suggestions for Authors

This study examines four different types of neighbourhood definitions and then investigates associations between density of restaurants and associations with cooking at home. Surprisingly, in contrast to previous results using the full sample this study shows no association; this may suggest results of the full sample may vary through space. This study provides a contribution to evidence that the authors should be commended for. Well done. Despite this, improvements to the manuscript can be made throughout. I hope that my points for further clarification are considered as points for constructive feedback. I have three major points and the rest are relatively minor suggestions.

Response: We thank the reviewer for his/her constructive feedback and for the time and effort dedicated to review this manuscript.

Important points to note

- The prevalence of food eaten out of home has increased substantially over the years. Therefore, it is plausible that no association was found due to authors investigating the association between the prevalence of food establishments providing food to eat out of the home but, measuring an outcome of food consumption within the home. If authors investigated the association
between food outlets providing food to eat outside the home and food consumed outside the home would this not be the hypothesised pathway? Could the authors provide a conceptual map (or similar) to show in more detail why this association is hypothesised to occur or at least clarify within the introduction particularly with the focus on restaurants.

**Response:** we thank the reviewer for pointing that our choice for exploring exposure to restaurants was not clear. We have now added the following sentence to the introduction (Lines 86-90):

“Indeed, a previous study using data from the European SPOTLIGHT survey showed that lower neighbourhood access to restaurants, but not greater access to grocery stores, was associated with a higher frequency of home-cooking. Therefore, exposure to restaurants may be an important environmental determinant of home cooking, and in the current study we hypothesise that lower neighbourhood access to restaurants is associated with a higher frequency of home-cooking”.

- Please consider including a sensitivity analyses for study participants lost to missing data or for who data could not be collected. Were they different by sample characteristics? From an original sample of 6,037 to 1,245 is a around 21% of the sample left. More details on who was excluded and if this may bias results is an essential amendment even if included in supplementary online material.

**Response:** We have added table S2 that shows descriptive statistics for participants excluded from the full sample. We have also mentioned this analysis in the methods (Lines 259-261):

“A second sensitivity analysis we performed was descriptive statistics for participants excluded from the full sample”.

And in the results (Lines 307 – 311):

“Table S2 presents descriptive characteristics of the SPOTLIGHT participants according to the exclusion criteria presented in Figure 1. Dutch participants were on average older, and Dutch participants who drew self-defined neighbourhood boundaries showed the highest frequency of cooking at home: 74.1% those participants cooked 6-7 days per week as compared to 65.0% of the full sample”.

- While data were categorised into tertiles please report a sensitivity analyses for quartiles and quintiles if possible. The trouble with tertiles has been reported previously here by Lamb et al. 2015 [https://ijbnpa.biomedcentral.com/track/pdf/10.1186/s12966-015-0181-9?site=ijbnpa.biomedcentral.com](https://ijbnpa.biomedcentral.com/track/pdf/10.1186/s12966-015-0181-9?site=ijbnpa.biomedcentral.com)

**Response:** we have now added Table S5 to the supplement. This table presents the main analyses using the exposure measures split in quintiles. We have also mentioned this analysis in the methods (Lines 183 – 185):

“However, because there is always a risk that the categorisation chosen may lead to a loss of information, and lower the data variability [25], we present sensitivity analysis using the exposure measures split into quintiles”.

and in the Results section (Lines 317 - 320):
“Table S5 shows sensitivity analysis performed as the main models, but with the exposure measures split in quintiles. Result were comparable to the main analysis using tertiles, where regardless of the neighbourhood definition, density of restaurants was not associated with frequency of home cooking”.

Other minor concerns:

Abstract
- Line 29 please be consistent with terminology. Either use relevant areas of exposure OR neighbourhoods.

Response: we have change the sentence as follows (line 29 - 30):

“The definition of neighbourhoods as areas of exposure to the food environment is a challenge in food environment research”.

- Line 30 is it worth stating your population are adults

Response: we mention that our population are adults on line 33.

- Line 34 were administrative boundaries based on home address – please explicitly specify

Response: we added the word “residential” on line 34

- Would suggest referring to ‘four types of neighbourhood definitions’ throughout rather than various definitions which is somewhat vague. You have administrative, 800m 1600m and self-drawn as far as I can see?

Response: we thank the reviewer for this suggestion. We have changed it throughout the text as follows:

“four different neighbourhood definitions”

- Line 40 please make reference to the scale/magnitude of the effect rather than significance.

Response: we agree with author and have now deleted the word “significant”. (Line 40)

- I appreciate the abstract wording is tight however, I would suggest adding a short sentence on your original contribution explicitly. You have many novel aspects which should be highlighted.

Response: we thank the reviewer for this suggestion on highlighting the novel aspects of our study. Due to wording restrictions, we have added only the word “innovative”. (Line 32)

Introduction
- Please consider updating your references to include the most recent systematic review on the food environment by Wilkins et al. 2019 A systematic review employing the GeoFERN framework to
examine methods, reporting quality and associations between the retail food environment and obesity. Health and Place.

- This more recent systematic review will also allow you to update the work of Chaix in 2009 in the second paragraph as it thoroughly examined study methods, quality and reporting.

**Response:** we thank the reviewer for suggesting this reference. We did not substitute the suggested reference for the Chaix 2009, because we are confident that the latter is more appropriate to support the definition made in the second paragraph. However, we have now added few sentences referring to the work of Wilkins et al. 2019, as follows (Lines 76-79):

“A recent systematic review on methods used to measure the food environment in relation to obesity found that the methods used are very diverse and poorly reported. Also, many associations were dependent on the methods used [12].”

- Please provide more detail on why modification was expected by age, income and education. I have provided several studies which may help develop the context around this:

  - https://www.mdpi.com/1660-4601/14/11/1290

**Response:** we thank the reviewer for these suggestions and for indicating those references. We have added the following sentences to the introduction (Lines 90-95):

“Previous literature has also indicated that the relationship between environment and health behaviours may be modified by sociodemographic characteristics such as age, income and education [18,19].” In addition to that, an earlier study we conducted on self-defined neighbourhood boundaries [7] showed that older individuals drew smaller neighbourhoods, and higher educated, long-term residents and women drew larger neighbourhoods, so one may anticipate effect modification by individual characteristics”.

- If possible to include a Figure may help set up the context of the study for instance by presenting an example of the four different definitions of neighbourhood you use.

**Response:** we have now added Figure 2 to the methods section:
Figure 2. Example of the four neighbourhood definitions and the food retailers present.
Methods

- Suggest a new paragraph in methods line 110.

Response: we have done so accordingly (Line 118)

- Please modify your methods to include all the details requested in the GEO-Fern reporting framework see here https://www.sciencedirect.com/science/article/pii/S1353829216302799:

Response: We thank the reviewer for this suggestion. We have filled the reporting checklist and now present it as supplementary files. Some changes in text were made through the methods section to adequate to the reporting framework, for instance: (Lines 138 – 160):

Exposure to the food environment (independent variables)

We used commercially available data on the location of food retailers from Locatus. - Locatus is a Dutch commercial company collecting regular information on the location of several types of retail outlets (https://locatus.com/en/) on a national scale. Locatus staff perform field audits throughout the Netherlands in both rural and urban areas, and record location, type, size and opening times of all retailers. Food retailers located in shopping areas are audited every year; these correspond to two thirds of all food retailers. The food retailers located outside shopping areas are audited every 2-3 years and regular checks are performed. The location of food retailers was determined through x and y coordinate points collected in 2014, the same year as the SPOTLIGHT survey data collection. The Locatus dataset was tested against a field audit in selected areas across the Netherlands in 2019. For the validation study, grocery stores (e.g., supermarkets, local food shops, green grocers) and food outlets (e.g. restaurants, fast food restaurants and cafés) were analysed separately and showed “good” to “excellent” agreement. For instance, the positive predictive value for location of food outlets ranged from 0.82 for take away outlets to 0.94 for fast food restaurants. Values for concordance ranged from 0.76 for full-service restaurants to 0.95 for fast food restaurants (Canalia et al., 2019, in preparation).

The food retailers analysed in this study were classified by the data provider, Locatus, and further categorised into three groups: restaurants, grocery stores and other food retailers (Table 1). Given our outcome ‘frequency of home cooking’, we included in the restaurant category food retailers that most likely sell meals to be eaten away from home such as restaurants, fast food outlets and kebab shops. In the grocery stores category, we included food retailers that mostly sell ingredients to be prepared at home [22]. In the ‘other food retailers’ category, we included all food retailers that are not restaurants, i.e., food retailers such as bakery, cheese and nut stores, but also the food retailers listed under ‘grocery stores’.

We also refer to the GEO-Fern reporting framework at the methods section (lines 185 - 188):

“In order to contribute with quality report on food environment research, we followed the Geo-FERN (Geographic Information System Food Environment ReportiNg) Checklist [26]. The filled check list can be found in the supplement”.

- Table 1 is somewhat confusing for instance, grocery stores are the main heading for column 2 yet grocery stores are included in other food retailers not grocery stores. Please expand on this perhaps provide examples and the codes used to extract the data from the database for international readers. Following the GEO-Fern reporting framework should allow this.

Response: We have expanded Table 1. It now shows the definition of food retailers and their classification.
- Again I would try to go with ‘four definitions’ of neighbourhood not ‘various’ as this is vague.

**Response**: we have changed it to “four different neighbourhood definitions” (Lines 172-173)

- Evidence is required around the size of radial buffer used to support 800m and 1600m as walking and cycling distance.

**Response**: we have now added two references to this paragraph as follows:

“...The buffer sizes were determined based on an assumed distance individuals would in general be willing to walk or cycle [23], and commonly used buffer sizes in previous literature [24]”.

Reference #23 is a report from Statistics Netherlands. On page 43, Table G.4, it is stated that in 2015 the Dutch population was willing to walk 800m and cycle 2550m for total errands. Reference #24 is a paper from James et al., 2014, where the authors tested different commonly used buffer sizes and shapes in the association between the built environment and energy balance. The buffer sizes used by the authors were 400m, 800m, 1200m, and 1600m.

- Did lack of variation of low frequency cooking at home lead to little variability in an important exposure? More details on how this may have impacted on your results is required (Line 170)

**Response**: we agree with the reviewer that this could be one of the reason for the lack of associations. We have now added a sentence in the discussion section mentioning this (Lines 374-379):

“One potential explanation for this lack of association may be a lower variability in the dichotomous outcome measure used for these analyses, as compared to the three categories used in the analysis with the complete sample. This is also evidenced in the sensitivity analysis showing descriptive statistics for participants excluded from the full sample. This analysis showed that a higher percentage of Dutch participants reported to cook 6-7 days per week as compared to the full sample, possibly leading to a lower variation in the outcome variable”.

**Results and discussion**

- Please remove Lines 239 to 241 as these appear to have been left in here by accident. In addition, a proof read of the whole manuscript would benefit readability.

**Response**: we thank the reviewer for spotting that, we have deleted those sentences. We have also proofread the manuscript before new submission.

- Would subheadings help guide the reader in the results?

**Response**: we appreciate the reviewer’s suggestion. However, the results section is already divided into relatively short paragraphs with an introductory sentence. We do not believe that adding headings would increase readability, therefore we opted to not include them.

- Please remove lines 290 – 292 as these also appear to have been left there by mistake.

**Response**: we thank the reviewer for spotting that, we have deleted those sentences.
- Please add an explicit sentence to the discussion highlighting your novel contribution to evidence.

Response: we have now elaborated more on the contribution our work brings to evidence (Lines 396 – 404):

“The uncertain geographical problem it is a well-known limitation on environmental research. This concept demonstrates how the measured influence of area-based characteristics such as the density of food retailers on individual’s health behaviours is dependent on the way neighbourhoods are defined [37]. Many methods used to define neighbourhoods do not accurately represent the area individuals move around in. By analysing participants’ self-defined neighbourhoods, that may better represent their activity space, and also by comparing both ego-centred and administratively defined neighbourhoods, this study contributes to the literature base. Although we did not address temporal dynamics in the food environment, we did account for space variation by using a self-defined neighbourhood [38]”.

- In the reference list 15 (Wolfson) appears to be one space to the left too many relative to the other references.

Response: we have updated the references section and believe this has been corrected.