PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	
AUTHORS	

VERSION 1 - REVIEW

REVIEWER	Alison A Gustafson, PhD, MPH, RD Assistant Professor University of Kentucky United States
REVIEW RETURNED	07/01/2012

THE STUDY	The introduction could benefit from including several key references which have found contrasting results with regard to neighborhood deprivation and food access/availability. Please refer to articles by Pearce J Am J Prev Med 2007, Wilson K Health Place 2010, Macdonald L Int J Behav Nutr Phys Act 2009. Additionally a recent article by Wang Y in Journal American Dietetic Association would complement the findings here. Lastly, the idea of food swamps is also referenced in work by Roland Strum.

REVIEWER	Leia Minaker PhD (cand) School of Public Health University of Alberta Canada
REVIEW RETURNED	24/02/2012

THE STUDY	Overall, references are recent and relevant. I suggest that the authors consider the following additional reviews in their introduction and discussion sections, as they contain pertinent evidence: Giskes, K., van Lenthe, F., Avendano-Pabon, M., Brug, J. A systematic review of environmental factors and obesogenic dietary intakes among adults: are we getting closer to understanding obesogenic environments? Obesity Reviews. 2011:12;e95-e106. Fleischhacker, S.E., Evenson, K.R., Rodriguez, D.A., Ammerman, A.S. A systematic review of fast food access studies. Obesity Reviews. 2011;12:e460-e471. de Vet E, de Ridder DTD, de Wit JBF. Environmental correlates of physical activity and dietary behaviours among young people: a systematic review of reviews. Obesity Reviews. 2011;12:e130-

	e42. Feng J, Glass TA, Curriero FC, Stewart WF, Schwartz BS. The built environment and obesity: A systematic review of the epidemiologic evidence. Health and Place. 2010;16(2):175-90.
GENERAL COMMENTS	I enjoyed reading this paper, and the national scope, as you mention, is an important strength. In the summary section, p.2, line 14, I would change "neighborhood food availability" to "neighborhood food access", since you have used measures of food access, and food availability applies to a (potentially) different construct than food access (for example, as assessed by the well-known NEMS-S tool (Glanz et al, 2007) or shelf space measures (Rose et al, 2009). Same comment for the Abstract, p.3, line 18, and Discussion, p. 13, line 17. Page 8, line 20-25, you say, "The 3 km buffer has been shown to be relevant for assessing associations between neighborhood resources and individual level behavior." The reference, however, is a paper related to physical activity, which cannot be assumed to have the same geographical relevance as food purchasing or dietary behaviors. I agree that there are no agreed-upon or standard buffer sizes recognized as important for food environments, but I don't think they can be equated with buffer zones relevant to physical activity. Theoretically, buffer zones relevant for dietary behaviors should correspond to places where people procure food. Again - this is not a matter of disagreement with your choice of buffer-zone selection, but with your justification as buffer zones relevant for physical activity. Two articles of potential interest are: Zenk SN, Schultz AJ, Matthews SA, Odoms-Young A, Wilbur J, Wegrzyn L, Gibbs K, Braunschweig C, Stokes C: Activity space environment and dietary and physical activity behaviors: A pilot study. Health & Place 2011, 17:1150-1161, and; Hillier A, Cannuscio CC, Karpyn A, McLaughlin J, Chilton M, Glanz K: How far do low-income parents travel to shop for food? Empirical evidence from two urban neighborhoods. Urban Geography 2011, 32(5): 712-729. Table 3, p. 21. A couple of the beta coefficients for High Density Urban areas are either comparable to or more extreme than those in Low Density Urban areas, but are not statistically significant. These results could be a matter of the smaller sample size (1,935 census block groups in high density urban and 4,132 census block groups in low density urban areas), where perhaps there is not enough power to detect significant differences in the High Density Urban areas, or there could be more variability in High Density Urban areas. Do you have a sense of which of these explanations might be more realistic? If so, it would be an interesting point for discussion.

VERSION 1 – AUTHOR RESPONSE

We thank the editor and the reviewers for the excellent suggestions and feedback. We have addressed each of the reviewer's excellent suggestions and comments as listed below. Our responses are noted with asterisks in the author rebuttal below and bold in the revised manuscript.

From the managing editor
Please amend the title slightly to show where the study was carried out.

*We have clarified the title: "Are neighborhood food resources distributed inequitably by income and race in the United States? Epidemiologic findings across the urban spectrum"

In the Article summary, please abbreviate the bullets a little more. These can be bullets rather than full sentences.
*We have abbreviated the bullet point statements (Article Summary page 2).

Reviewer: Alison A Gustafson, PhD, MPH, RD Assistant Professor University of Kentucky United States

I have no competing interests to declare at this time.

The manuscript adds to the complex questions aiming to understand how neighborhood poverty is differentially associated with food access and availability while also considering the effect of race/ethnicity. The authors are well established in the field of nutrition epidemiology, the built environment, and deprivation. However, there are some areas where the manuscript could use some clarification on selection of methods to measure the retail food environment. Additionally there are several key references within the literature that have been missed with regard to neighborhood deprivation that would add in the relevance of this manuscript.

Abstract
Objective: the first sentence is a run-on and needs to be reworded. The first sentence also needs to include what the inequities in availability are in reference to, such as; inequities in race or income or in composite score of neighborhood deprivation.
*We have revised the text (page 3, lines 7-27) to read "Many recent policies focus on socioeconomic inequities in availability of healthy food stores and restaurants. Yet understanding of how socioeconomic inequities vary across neighborhood racial composition and across the range from rural to urban settings is limited, largely due to lack of large, geographically and sociodemographically diverse study populations." We also specify both poverty and race/ethnicity in the last sentence of the objective.

Last sentence should include nationally representative sample.
*We have revised the sentence to read: "Cross-sectional data from an observational cohort study representative of the US middle and high school-aged population in 1994 followed into young adulthood." (page 3, lines 24-27).

Participants: need to include ages
*We have added the participant ages (18-28 years of age; page 3, line 32).

Results: line 53 into 54. need to include "however, in the HIGH dense, urban areas…."
*Yes- thank you for noticing this omission, the text has been revised (page 4, lines 3-6)

Conclusions: The last sentence overstates results. Given that the study was conducted in urban and "non-urban" including rural is beyond the scope of this manuscript.
* We have deleted the last sentence (page 4, line 21).

Introduction
The introduction could benefit from including several key references which have found contrasting results with regard to neighborhood deprivation and food access/availability. Please refer to articles by Pearce J Am J Prev Med 2007, Wilson K Health Place 2010, Macdonald L Int J Behav Nutr Phys Act 2009. Additionally a recent article by Wang Y in Journal American Dietetic Association would complement the findings here.
*Thank you for suggesting these articles. The Pearce 2007; page 5, line 37 ref #15, Wilson 2010; page 6 line 13 ref #24, and Macdonald 2009; page 6 line 13 ref #22 references are very helpful and have been added to the Introduction. While the Wang 2011 reference is relevant in terms of

disparities in individual diet behaviors there was no direct connection to neighborhood food environments and in the interest of space we did not include this reference.

Lastly, the idea of food swamps is also referenced in work by Roland Strum.
*We agree this is an important reference and have added it to the manuscript (page 5, line 27-28 ref #13).

With regard to food swamps if this is included in the introduction and as part of the hypothesis in the methods please consider using a modified retail food environment index (mRFEI) or justify why it was not used. If food swamps are not part of the key hypothesis than this should be removed from the introduction.
*Indeed, the mRFEI is a valuable tool to describe the relative availability of unhealthy to healthy food outlets. We ultimately decided that the mRFEI was not appropriate for our research question. In the revised manuscript, we added considerable detail and justification to support our examination of the absolute availability of different types of food outlets. Essentially, the aim of our study was to describe the variation of fast food, convenience stores and supermarkets separately and in absolute measures because ratios can obscure variation within the different types of outlets. We included 'food swamps' in the introduction not to describe our hypothesis but to frame the prior research and to support our reasoning for including both healthy and unhealthy food availability. We have revised the text to include this justification (page 9, lines 6-25, ref #32).

Line 46 needs to have a reference after infrastructure.
*We have added a relevant reference to this sentence (USDA 2009; page 5, line 44, ref #14).

Page 6 line 6 needs a reference
*We have added a relevant reference to this sentenc. (Baker 2006; page 6, line 22, ref #25).

Overall some clarification would be helpful to discuss the role of urbanicity since it's a key hypothesis of the paper. Included references to the role more urban or less urban cities have in access and availability to food outlets would help in setting the stage.
*This is a good point and we have revised the text and added references (page 5, lines 39-page 6 line 6: Langelier 2010; ref #16; Ahern 2011; ref #17; Pearce 2008; ref#18). Briefly, while few studies investigate the issue, resource allocation may vary according to urbanicity because rural, suburban, and urban areas exhibit vastly different sociodemographic profiles, economic and political structures, transportation infrastructure, and lifestyles. Such differences likely result in different spatial patterning (e.g., sociodemographic inequities) of food resources relative to residences, workplaces, and other resources.

Page 6 lines 8-29 seem to be more appropriate for the methods. Considering adding some more discussion and setting the stage a bit more and perhaps this paragraph is not as critical in this section.
*In response to the reviewer's recommendations, we have moved much of the methodological detail in this paragraph to the methods section (page 8, line 53 -page 9 line 6).

Methods
Study variables:
Please include or justify why Super Centers were not included.
*This is an important point. Supercenter/warehouse stores are an important source of household food purchases. The main issue is that super center shopping trips often require driving to distant locations because large warehouse stores require industrial size that is not feasible in residential neighborhoods. We did not include super centers because our investigation focused on disparities in neighborhood food availability. That said, further investigations of food purchasing choices in the context of geographic availability are definitely needed. We have revised the text to justify this decision and to point to considering Super Centers in future research (Limitations; page 17 lines 3-

16).

As stated above consider conducting a mRFEI or RFEI to measure food swamps. The results may be more related to measuring one type of store rather than using a measure which provides a more accurate depiction of the ratio of healthy to unhealthy food outlets.
*Again, we added considerable detail and justification of our choice to not use the mRFEI (page 9, lines 6-25 ref#32). In the revised manuscript, we also discuss how controlling for population density helps us to capture resources relative to what might be expected with respect to population distribution (page 9, lines 16-20).

Line 24 page 9 The study referenced is a well conducted study. But are these boundaries transferable to the food environment given the study were more focused on physical activity space.
*We regret our lack of clarity in the original manuscript on this point. Our decision to use the buffer sizes selected in our study was based on walkable and driveable distances within the neighborhood, and not on physical activity resources per se. We provide much greater detail regarding the buffer sizes used in our study. In addition, we include more references related to neighborhoods in relation to food resources (page 8, lines 20-25 refs #3, 29, 30).

Please consider using a neighborhood deprivation index rather than just poverty or justify why this was not used.
*In the revised manuscript, we provide greater detail regarding our major objective, which is to examine heterogeneity in access to food resources across neighborhood race/ethnicity and income. We focus on these two specific characteristics to address the theoretical processes of resource placement in areas with greater purchasing power (income) and political leverage associated with the majority race. In the revised manuscript, we provide some discussion of the neighborhood deprivation index relative to our measures. Essentially the neighborhood deprivation index is very useful for describing the "empirical summary of total area-level variance explained by the census variables" [1]. In contrast, our aim in this study was to examine the underlying interactions between the separate factors of neighborhood poverty and minority race composition on food availability (page 10, lines 8-20, Messer 2006; re f#32).

Limitations
Given that direct observation is not feasible using one source of commercially available data sources provides low sensitivity and positive predictive values for certain geographic locations. Please consider adding more comments on the possibility of results being further or closer to null due to the use of one commercially available data source.
*Yes this very true and deserves more discussion. We have described this limitation in the revised manuscript (page 16, line 30-49).

Reviewer: Leia Minaker
PhD (cand)
School of Public Health
University of Alberta
Canada

I have no interests which could be considered as competing with the current paper under review.

Overall, references are recent and relevant. I suggest that the authors consider the following additional reviews in their introduction and discussion sections, as they contain pertinent evidence:

Giskes, K., van Lenthe, F., Avendano-Pabon, M., Brug, J. A systematic review of environmental factors and obesogenic dietary intakes among adults: are we getting closer to understanding obesogenic environments? Obesity Reviews. 2011:12;e95-e106.

Fleischhacker, S.E., Evenson, K.R., Rodriguez, D.A., Ammerman, A.S. A systematic review of fast food access studies. Obesity Reviews. 2011;12:e460-e471.

de Vet E, de Ridder DTD, de Wit JBF. Environmental correlates of physical activity and dietary behaviours among young people: a systematic review of reviews. Obesity Reviews. 2011;12:e130-e42.

Feng J, Glass TA, Curriero FC, Stewart WF, Schwartz BS. The built environment and obesity: A systematic review of the epidemiologic evidence. Health and Place. 2010;16(2):175-90.

*Thank you for these relevant references. They have been added to the revised manuscript: Giskes 2011; page 5, line 16, ref #6, Fleischaker 2011; page 5, line 16, ref #7, de Vet 2011; page 5, line 13, ref #1; Feng 2010; page 9, line 22, ref #33.

I enjoyed reading this paper, and the national scope, as you mention, is an important strength.

In the summary section, p.2, line 14, I would change "neighborhood food availability" to "neighborhood food access", since you have used measures of food access, and food availability applies to a (potentially) different construct than food access (for example, as assessed by the well-known NEMS-S tool (Glanz et al, 2007) or shelf space measures (Rose et al, 2009). Same comment for the Abstract, p.3, line 18, and Discussion, p. 13, line 17.
*We regret our lack of clarity. In the revised manuscript we clearly state the construct that we measure. With our data, we are unable to fully address food access, which relates not only to availability but includes domains of price and food inventory [2]. For example, in order to have access to the food, the food stores need to be physically available, affordable and high enough quality to purchase. We now use the term neighborhood food resource availability, rather than neighborhood food availability, which we feel more specifically, captures our measure (Abstract page 3, line 37, and Discussion page 14, line 16). In the revised manuscript, we also discuss other dimensions of access that were not examined in our study (Limitations; page 16 lines 39-49).

Page 8, line 20-25, you say, "The 3 km buffer has been shown to be relevant for assessing associations between neighborhood resources and individual level behavior." The reference, however, is a paper related to physical activity, which cannot be assumed to have the same geographical relevance as food purchasing or dietary behaviors. I agree that there are no agreed-upon or standard buffer sizes recognized as important for food environments, but I don't think they can be equated with buffer zones relevant to physical activity. Theoretically, buffer zones relevant for dietary behaviors should correspond to places where people procure food. Again - this is not a matter of disagreement with your choice of buffer-zone selection, but with your justification as buffer zones relevant for physical activity. Two articles of potential interest are: Zenk SN, Schultz AJ, Matthews SA, Odoms-Young A, Wilbur J, Wegrzyn L, Gibbs K, Braunschweig C, Stokes C: Activity space environment and dietary and physical activity behaviors: A pilot study. Health & Place 2011, 17:1150-1161, and; Hillier A, Cannuscio CC, Karpyn A, McLaughlin J, Chilton M, Glanz K: How far do low-income parents travel to shop for food? Empirical evidence from two urban neighborhoods. Urban Geography 2011, 32(5): 712-729.
*In response to both reviewers, we provide much greater detail regarding our selection of buffers and we have added the excellent references you mentioned (page 8, lines 20-25, Zenk 2011; ref #29, Hillier 2011; ref #30).

Table 3, p. 21. A couple of the beta coefficients for High Density Urban areas are either comparable to or more extreme than those in Low Density Urban areas, but are not statistically significant. These results could be a matter of the smaller sample size (1,935 census block groups in high density urban and 4,132 census block groups in low density urban areas), where perhaps there is not enough power to detect significant differences in the High Density Urban areas, or there could be more variability in High Density Urban areas. Do you have a sense of which of these

explanations might be more realistic? If so, it would be an interesting point for discussion.
*In the revised manuscript we provide greater detail regarding the interpretation of the beta coefficients in low versus high density urban areas. The reviewer is correct regarding the standard errors and power issues, which we discuss in detail in the revision (page 15, lines 15-25).

1. Messer, L.C., B.A. Laraia, J.S. Kaufman, et al., The development of a standardized neighborhood deprivation index. Journal of urban health : bulletin of the New York Academy of Medicine, 2006. 83(6): p. 1041-62.
2. USDA, Access to Affordable and Nutritious Food: Measuring and Understanding Food Deserts and Their Consequences, in Report to Congress2009, Economic Research Service.

VERSION 2 - REVIEW

REVIEWER	Alison Gustafson, PhD, MPH, RD Assistant Professor Department of Nutrition University of Kentucky
REVIEW RETURNED	11/03/2012

Reviewer returned their review with no further comments