

Access to Healthful Foods among an Urban Food Insecure Population: Perceptions versus Reality

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ABSTRACT *The influence of local food environments on the risk for obesity is important overall, but may be particularly important for food insecure populations in urban settings. Access to healthful foods is most limited among racial and ethnic minorities and low-income populations; these same populations experience the highest rates of obesity and food insecurity. Few valid and reliable measures have been developed to assess the quality of local food environments. This research addresses this gap by introducing an inventory for measuring self-reported perceptions of food access and then compares the perceptions measure to objective assessments of local food environments. Data are focused on an urban population experiencing disproportionate rates of food insecurity. The four-item perceptions of food access inventory had high internal consistency (Cronbach's $\alpha=0.80$). Participants' perceptions of access to healthful foods mirrored the reality of their food environment; however, perceptions of access to alcohol and tobacco were less accurate. Findings suggest that people living in low-income, urban, minority, and food insecure communities can validly assess (in)access to healthful foods. Future research is needed to further validate the perceptions of food access measure introduced and, more importantly, to develop strategies for increasing access to healthful foods in food insecure contexts.*

KEYWORDS *Food security, Food access, Local food environment, Perceptions of food access, Urban, Social determinants of health*

INTRODUCTION

Concerned by the fact that over two thirds of Americans are overweight or obese,¹ researchers and practitioners are beginning to acknowledge that health promotion and obesity prevention efforts focused on individual change alone are “ineffectual” over time because they do not take into account the contexts in which health behaviors and decisions are made.² The obesity epidemic has, in turn, widened the aims of prevention research to include the influence of local food environments on health outcomes.

The influence of local food environments on risk for obesity is important overall, but may be particularly important for food insecure populations. That is, populations experiencing periods of time when they are “uncertain of having, or unable to acquire, enough food for all household members because they had insufficient money and other resources for food.”³ Approximately one in ten

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households in the United States is food insecure, a trend that has remained consistent since 1995.⁴ Food insecurity rates are higher than the national average for households with incomes below the federal poverty line (37.7% were food insecure in 2007), households with children headed by single women (30.2%), and Black (22.2%) and Hispanic households (20.1%).⁵ Paradoxically, for both adults and children, food insecurity (i.e., hunger) is associated with increased risk for obesity.^{6, 7}

BACKGROUND

Disparities in Local Food Environments

A growing body of evidence suggests that local food environments in the US differ based on the racial and economic composition of a community.⁸ Stores selling a wide variety of food items such as chain supermarkets tend to be located in areas that are predominantly populated by Whites and by people representing middle or high levels of income (i.e., populations with low levels of food insecurity), whereas convenience stores and smaller, nonchain grocery stores are more prevalent in communities predominantly populated by racial minorities and people living in poverty (i.e., populations with high levels of food insecurity).^{9–14} In short, an inverse relationship exists between community access to chain supermarkets and rates of food insecurity.

The types of foods sold inside food stores also differ by social context. A market basket survey that examined the costs of several basic grocery items found that nonchain grocery stores, which are most common in low-income and racial and ethnic minority communities, were much less likely to sell “healthier” food alternatives (e.g., whole wheat bread, skinless chicken) compared to chain supermarkets.² Nonchain food stores including convenience and small and mid-sized grocery stores are up to two times *less likely* to sell all varieties of fresh fruits and vegetables compared to chain supermarkets.¹⁰ Moreover, foods sold in convenience or nonchain grocery stores are typically more expensive (i.e., have a higher price tag) than the same product in a chain supermarket.¹⁰

These data suggest that populations living in low-income and racial and ethnic minority communities, contexts in which food insecurity is most prevalent, may have difficulty adhering to obesity prevention efforts such as eating five or more fruits and vegetables per day because these healthful food options are inaccessible. Understanding the person–environment interaction in areas with limited or no access to healthful foods is particularly important as public health efforts are developed to address obesity and food insecurity among disparate populations.

Perceptions of Healthful Food Access

One of the challenges of research focused on the relationship between local food environments and health outcomes is the dearth of valid and reliable measures for assessing food context.^{15,16} The most common method for assessing local food environments involves a process of counting food stores and then geographically anchoring the stores in space using geographic information system (GIS) software; this method typically involves food store identification through existing commercial databases and address books.^{17–20} Limitations related to this method include the risk of misidentification of food stores in the commercial database, store closure between the creation of the data source and mapping, and GIS mapping errors. Observational approaches represent another method for examining local food

environments. Observations are used to both “ground truth” existing commercial databases and assess the types and quality of foods sold inside the stores.^{2,21–24} Both of these methods provide an assessment of physical access to food stores by highlighting whether or not a food store is present in a community. The presence of a food store, however, does not necessarily translate into enhanced perceptions of food access, especially if the quality of the food in the store is less than ideal.²⁴

Limited efforts have been made to assess perceptions of food access.^{15,25,26,27} A three-item scale was developed by Moore and colleagues to assess perceived availability of healthy foods within a 1-mi radius (20-min walk) of participants’ residence.¹⁵ Perceived availability of access to healthy foods was then compared to actual access to supermarkets and other smaller food stores identified through InfoUSA®, a comprehensive commercial database of businesses in the US. This study found that participants living in areas of low supermarket density rated their perceived availability of healthy foods 17% lower than those living in areas with the highest densities of supermarkets.¹⁵ Perceived availability to healthy foods was lowest for non-Hispanic Black and low-income participants.¹⁵ Moreover, participants living in neighborhoods characterized as having low perceived levels of availability of healthy foods were 22% to 25% less likely to have a healthy diet compared to those living in the highest-ranked neighborhoods.²⁷ In an Australian study by Giskes and colleagues, perceptions of food price and availability, rather than actual (objective) measures of the local food environment, were significantly associated with food-purchasing patterns.²⁶

RESEARCH QUESTIONS

The purpose of the present study was to extend existing research on physical access to healthful foods in three ways. First, the methodology used to measure local food environments was based on in-store observations rather than a computerized database of businesses. This allowed for the verification of all stores in the study context and for the assessment of foodstuffs sold inside each store. Second, an extended measure of perceptions of food access was developed based on qualitative feedback from participants living in the target communities.^{24,28} This measure was administered in the present study. Finally, this research is grounded in the perspectives of an urban population disproportionately affected by food insecurity.

This study responds to a call by Lytle in her recent state of the science review of local food environment research by examining the complex intersection between individuals and their environments.²⁹ Using a mixed methods approach, the following research questions were examined: (1) What types of food stores and foodstuffs are available in a southeastern urban community experiencing high rates of food insecurity?, (2) How do participants in this context rate their perceptions of food access?, and (3) How do perceptions of food access and the reality of food stores relate to one another?

METHOD

Data were collected in 2008 at farmers’ markets that were developed as a part of a multiyear (2006–2008) study seeking to increase access to healthful foods in food insecure communities in Nashville, TN, USA. The farmers’ markets took place at Boys and Girls Clubs. Data presented in these analyses focus on three Boys and Girls Club sites that are located adjacent to government-subsidized public housing

projects. The median annual household income in the census tracts surrounding the three research sites (range, \$14,714–\$21,936) was approximately 50% or less than the median annual income for the county overall (\$39,232).³⁰ Two data sources are included in this study: food store audits and self-reported surveys. The research protocol was approved by the Vanderbilt University Institutional Review Board.

Sample

The source population includes all customers frequenting the farmers' markets including parents/guardians of children attending the Boys and Girls Clubs, staff from the clubs, and community members. A convenience sample of customers was recruited to complete four different surveys that were conducted over a 10-week timeframe in 2008. The current analysis is only focused on the first two of these surveys. Each of the four surveys was designed to gather different types of information from farmer's market customers (e.g., demographics, perceptions of food access, food security status). The surveys did not include repeated assessments of the same questions. The main reason for using multiple surveys was to reduce participant burden. Surveys were completed at the farmers' markets, over the telephone, or by e-mail. Each survey was self-reported and completed individually or, upon request, with the assistance of a research assistant. All participants received a \$5 voucher to be redeemed at the farmers' markets after completing each survey.

The sample originally examined in the present study consisted of 82 customers who completed surveys 1 and 2. A subsample was then created; this limited the sample to 37 of the 82 participants who were living within a 1-mi radius of one of the three research sites. Distances between participants' residence and the three search sites were calculated in ArcMap version 9.3 using POINTDISTANCE, a straight-line distance utility. This process ensured that the analytic sample ($N=37$) consisted of participants residing in the same 1-mi geographic boundaries in which the food stores audits were conducted.

Measures

Local Food Environment Audits of all food stores located within 1 mi of the three Boys and Girls Clubs, where the farmers' markets were held, were conducted. The rubric of a 1-mi radius represented a walkable distance for accessing the stores located near each Boys and Girls Club.¹⁸ Food stores included supermarkets (i.e., chain food stores that sell a wide variety of items including food, medicine, toiletries, and alcohol); local markets (i.e., nonchain food stores selling a modest variety of items); and convenience stores (i.e., chain or nonchain stores selling a limited variety of items). A total of 42 food stores were identified and audits were conducted inside 33 of the stores. Of the nine stores that were not audited, eight store owners did not permit the conduct of an audit in their stores and one store was deemed unsafe by research personnel.

The food store audits were conducted by trained student researchers. Each student team was assigned a target area and then each traversed all streets within 1 mi of the Boys and Girls Clubs. For each store, students recorded the layout and flow of the store, types of foods sold in the store, and whether or not the store sold alcohol or tobacco products. The food store audit used in this research was based on an inventory developed by the University of Missouri-Kansas City Health Research

Group.* A copy of the instrument is available upon request from the corresponding author.

Based on the food audit data, local food environment was operationalized into two domains: availability of healthful foods and availability of alcohol and tobacco. Availability of healthful foods focused on access to *fresh fruit*, *fresh vegetables*, *lean meats* (skinless poultry or 86% or greater lean ground meat), *low-fat milk*, and *whole-grain breads*. Availability of alcohol and tobacco focused on access to any *alcoholic beverage* (beer, liquor, wine) or any *tobacco product* (cigarettes, cigars, chewing tobacco). Coding options for each foodstuff are listed in Table 2. An overall store quality composite score was also calculated by summing the values for each of the above items (Cronbach's alpha=0.76, N=33).

Perceptions of Access to Healthful Foods The perceptions of access to healthful foods scale was developed based on qualitative feedback provided during the first and second years of the farmers' market study. This eight-item inventory asked participants to rate the food stores in their neighborhood according to a five-point Likert scale (1=strongly disagree to 5=strongly agree). The inventory focused on access to healthful foods, access to alcohol and tobacco, and the quality and value of the neighborhood food stores. Each item in the scale is listed in Table 3.

An overall measure of participants' perceptions of access to healthful foods was calculated using all eight items in the inventory (Cronbach's alpha=0.64, N=37). Due to the low level of internal consistency yielded from this initial composite, ultimately, a subset of four items was retained and included in the overall perceptions of access to healthful foods scale (Cronbach's alpha=0.80, N=37).

Food Security Status Food security status was measured using a subset of questions developed by the US Department of Agriculture.³¹ Four questions focused on skipping meals over the past year and had a response choice of *yes* or *no*. Six questions focused on worries about food over the past year and included a response choice of *often true*, *sometimes true*, and *never true*. Three of the six questions were only answered by participants with children.

To determine food security status (secure versus insecure), the above items were summed, using values of 0 (no) and 1 (yes) for the four *yes/no* response items and values 0 (never true) and 1 (sometimes or often true) for the six *often true*, *sometimes true*, and *never true* response items. The sum of the food security items was then used to classify participants as food secure (sum \leq 2) or food insecure (sum \geq 3). The same cut points were used for those with children and those without.

Demographics Demographic variables related to sex, race/ethnicity, level of education, household income, number of children, and receipt of food assistance were also collected.

Analysis

All statistical analyses were conducted in SAS version 9.1.3. Descriptive statistics including frequencies and means were calculated for local food environment, perceived food access, and demographic variables. To examine the level of

*The lead investigators of the UM-KC research project included Walker C. Poston, C. Keith Haddock, and Joseph Hughey.

agreement/disagreement between participants' perceptions of food access and the local food environment, chi-square goodness of fit tests were conducted ($\alpha=0.05$). Four separate chi-square analyses were conducted. The first two focused on perceptions versus reality regarding the availability of fresh fruits and vegetables and healthy foods in general, respectively, whereas the third and fourth chi-square analyses focused on perceptions versus reality regarding the availability of tobacco and alcohol products, respectively.

Before conducting the chi-square analyses, data included in the analyses were recoded into *yes/no* categories. More specifically, to examine the level of agreement/disagreement between participants' perceptions on the availability of fresh fruits and vegetables with the reality of availability in the local food environment, participants who agreed or strongly agreed to the survey item "In my neighborhood, it is easy to buy fresh fruits and vegetables" were classified as *yes* and those that responded undecided, disagree, or strongly disagree were classified as *no*. Food stores that sold at least one fresh fruit or one fresh vegetable were classified as *yes* and stores that did not offer any fresh fruits or vegetables were classified as *no*. A similar process was used to compare perceptions versus reality regarding access to healthful foods more generally. Participants who agreed or strongly agreed to the survey item "In my neighborhood, it is easy to buy healthy foods" were classified as *yes* and those that responded undecided, disagree, or strongly disagree were classified as *no*. To categorize the availability of healthy foods in the local food environment, the overall store quality composite score was used. Stores with an overall store quality composite score of 3 or greater were classified as *yes* and those with scores <3 were classified as *no*.

Next, even though the tobacco and alcohol availability items were not included in the four-item composite food access scale, it was theoretically important to examine the relationship between perceptions and reality regarding these unhealthy items. Thus, using the self-report and food store audit items related to tobacco and alcohol availability, the same general process as previously described was used to examine perceptions versus reality for tobacco and alcohol availability.

RESULTS

Participants reported high rates of food insecurity. Over two thirds (68%) experienced food insecurity in the past year (see Table 1). Most of the participants were female (86%) and self-identified as Black or African American (89%). About half of the participants had more than a high school level of education. Level of household income varied among participants with 38% earning <\$10,000/year. Approximately half of the respondents were parents with one or more children under the age of 18 years living in their households. Forty-one percent of the respondents were currently receiving government food assistance (food stamps, Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), or free or reduced price school lunches).

Food Environment

Seventy percent of the food stores surrounding the three Boys and Girls Clubs were convenience stores, 24% were local markets, and 6% were supermarkets (see Table 2). The mean overall food store quality composite scores for the three store types ranged from 6.5 for supermarkets to -0.38 and -0.74 for local markets and convenience stores, respectively. The relatively low average composite scores for the local markets and convenience stores were related to the limited quantity of

TABLE 1 Demographic characteristics (N=37)

Characteristics	Percentage (number)
Biological sex	
Female	86 (32)
Male	14 (5)
Race/ethnicity	
American Indian, Eskimo, or Aleut	3 (1)
Black or African American	89 (33)
White or Caucasian	5 (2)
Missing	3 (1)
Education	
Less than high school	27 (10)
High school graduate/GED	22 (8)
More than high school	49 (18)
Missing	3 (1)
Household income	
<\$10,000	38 (14)
\$10,000–\$19,999	19 (7)
\$20,000–\$29,999	24 (9)
\$30,000 or more	14 (5)
Missing	5 (2)
Number of children	
0	41 (15)
1	24 (9)
2	14 (5)
3 or more	14 (5)
Missing	8 (3)
Food assistance	
Yes	41 (15)
No	54 (20)
Missing	5 (2)
Food security	
Secure	32 (12)
Insecure	68 (25)

Totals may exceed 100% because of rounding.

healthful foods and the abundance of alcohol and tobacco products available for purchase. Most of the local markets and convenience stores did *not* sell at least one fresh fruit or vegetable, lean meats, low-fat milk, or whole-grain breads. In contrast, both of the supermarkets in these communities sold a variety of these healthful food products.

The most accessible items available for purchase at the 33 food stores were tobacco and alcohol products. Ninety-seven percent of the stores sold tobacco products and 88% sold alcohol products. Access to alcohol and tobacco products was highest at the convenience stores; all of the convenience stores sold these products.

Perceptions of Food Access

Table 3 highlights the participants' responses to the perceptions of food access scale. Participants were more likely to *disagree* with the following statements as evidenced

TABLE 2 Food environment by type of store (N=33)

	All store types (N=33)	Supermarket (n=2)	Local market (n=8)	Convenience store (n=23)
Fresh fruit				
None	70% (23)	–	88% (7)	70% (16)
1–2	12% (4)	–	12% (1)	13% (3)
3 or more	18% (6)	100% (2)	–	17% (4)
Fresh vegetable				
None	88% (29)	–	75% (6)	100% (23)
1–2	6% (2)	–	25% (2)	–
3 or more	6% (2)	100% (2)	–	–
Lean meats				
No	88% (29)	–	88% (7)	96% (22)
Yes	12% (4)	100% (2)	12% (1)	4% (1)
Low-fat milk				
None	64% (21)	–	62% (5)	70% (16)
2%	24% (8)	–	25% (2)	26% (6)
1% or skim	12% (4)	100% (2)	12% (1)	4% (1)
Whole-grain bread				
No	64% (21)	–	88% (7)	61% (14)
Yes	36% (12)	100% (2)	12% (1)	39% (9)
Alcohol				
No	12% (4)	50% (1)	38% (3)	–
Yes	88% (29)	50% (1)	62% (5)	100% (23)
Tobacco				
No	3% (1)	–	12% (1)	–
Yes	97% (32)	100% (2)	88% (7)	100% (23)
Overall store quality composite				
	M=0.21	M=6.5	M=–0.38	M=–0.74
	SD=2.22	SD=0.71	SD=1.30	SD=1.48
	Min=–2.0	Min=6.0	Min=–2.0	Min=–2.0
	Max=7.0	Max=7.0	Max=1.0	Max=3.0

by a mean score <3: “My neighborhood has the best food stores in town” ($M=2.65$), “I prefer to shop for food at the local convenience store or corner store” ($M=2.73$), “In my neighborhood, it is easy to buy healthy foods” ($M=2.80$), and “The food stores in my neighborhood sell outdated or rotten products” ($M=2.86$). A score of 3 represents *undecided*, which included those who were truly undecided about a statement as well as the average of the two tails of the Likert response scale. The only item that received an undecided score overall was the following: “In my neighborhood, it is easy to buy fresh fruits and vegetables” ($M=3.03$). Participants were more likely to *agree* with the following statements as evidenced by a score of 3.50 or greater: “In my neighborhood, it is easy to buy alcohol” ($M=3.56$), “In my neighborhood, it is easy to buy tobacco products” ($M=3.86$), and “The local convenience store or corner store is expensive” ($M=4.11$).

Relationship between Perceptions of Food Access and Local Food Environment

As presented in Table 4, 54% of the participants reported that it was not easy to buy fresh fruits and vegetables in their neighborhoods and 64% of stores in these neighborhoods did not sell any fresh fruits or vegetables. Similarly, 65% of

TABLE 3 Perceived access to food in neighborhoods or communities (N=37)

	Strongly agree, % (n)	Agree, % (n)	Undecided, % (n)	Disagree, % (n)	Strongly disagree, % (n)	Missing, % (n)	M (SD)
In my neighborhood, it is easy to buy fresh fruits and vegetables	11 (4)	35 (13)	11 (4)	32 (12)	11 (4)	—	3.03 (1.26)
In my neighborhood, it is easy to buy tobacco products ^{a,b}	43 (16)	22 (8)	19 (7)	11 (4)	5 (2)	—	3.86 (1.25)
My neighborhood has the best food stores in town	5 (2)	30 (11)	11 (4)	32 (12)	22 (8)	—	2.65 (1.27)
I prefer to shop for food at the local convenience store or corner store ^a	5 (2)	30 (11)	16 (6)	30 (11)	19 (7)	—	2.73 (1.24)
In my neighborhood, it is easy to buy alcohol ^{a,b}	27 (10)	27 (10)	22 (8)	16 (6)	5 (2)	3 (1)	3.56 (1.23)
The food stores in my neighborhood sell outdated or rotten products ^b	14 (5)	14 (5)	30 (11)	32 (12)	11 (4)	—	2.86 (1.20)
The local convenience store or corner store is expensive ^{a,b}	46 (17)	32 (12)	8 (3)	14 (5)	—	—	4.11 (1.05)
In my neighborhood, it is easy to buy healthy foods	5 (2)	30 (11)	16 (6)	32 (12)	14 (5)	3 (1)	2.80 (1.19)

Overall perceptions composite: M=11.54, SD=3.83, Min=4.00, Max=20.00.

Totals may exceed 100% because of rounding.

^aItem was dropped to increase the internal consistency of the scale

^bItem was reverse scored in the composite food access scale; data in table are not reverse scored

TABLE 4 Goodness of fit analysis of perceptions and reality of food access

	Perception (%)		Reality (%)		Chi-square goodness of fit test
	Yes	No	Yes	No	
In my neighborhood, it is easy to buy fresh fruits and vegetables	46	54	36	64	$\chi^2=1.59, df=1$
In my neighborhood, it is easy to buy healthy foods	35	65	36	64	$\chi^2=0.01, df=1$
In my neighborhood, it is easy to buy tobacco products	56	44	97	3	$\chi^2=131.30^*, df=1$
In my neighborhood, it is easy to buy alcohol	65	35	88	12	$\chi^2=35.88^*, df=1$

* $p<0.05$

participants reported that it was not easy to buy healthy foods in their neighborhoods and 64% of stores in these neighborhoods did not sell healthy foods. Results from the chi-square goodness of fit tests reveal that the differences between participants' perceived access to either fresh fruits and vegetables or healthy foods and the actual availability of these foodstuffs were not statistically significant at the 0.05 level [$\chi^2(1, N=37)=1.59, p=0.208$ and $\chi^2(1, N=37)=0.01, p=0.913$, respectively]. Thus, there is no evidence to suggest that participants' perceptions differ from the reality of their local food environments in terms of the availability of fresh fruits and vegetables, in particular, and healthy foods, in general.

However, participants' perceptions regarding the availability of tobacco and alcohol products do appear to differ from the reality of their local food environments. Forty-four percent of the participants stated that it was not easy to purchase tobacco products in their neighborhoods; however, such products were not available in only 3% of the local stores. Furthermore, 35% of participants perceived that it was not easy to buy alcohol products in their neighborhoods, yet only 12% of stores did not sell alcohol products. Results from the chi-square goodness of fit tests suggest that these differences were statistically significant at the 0.05 level [$\chi^2(1, N=37)=35.88, p<0.001$ and $\chi^2(1, N=37)=131.30, p<0.001$, respectively]. Given these findings, it appears that tobacco and alcohol products are more readily available than participants perceive them to be.

DISCUSSION

This study found that, within a community context with high levels of household food insecurity, convenience stores were the most prevalent food access points, followed by a handful of local markets, and only two supermarkets. This pattern of food store access in a low-income, minority, urban context corroborates prior research.^{2,9-14} Across the different store types, supermarkets offered the greatest access to healthful foods whereas local markets and convenience stores offered the least access. For example, 70% of the stores in the three target communities were convenience stores, yet 70% of these convenience stores did not sell any fresh fruits or vegetables.

Limited access to healthful foods was also captured in residents' self-reported perceptions of their food environment. Compared to objective measures of access to

healthful foods in local contexts, perceptions of food access do not appear to be biased among the sample population. Participants' perceptions of access to healthful foods mirrored the reality of their food environments. However, when investigating access to alcohol and tobacco products, participants' perceptions appear to be less accurate. In reality, a surfeit of alcohol and tobacco products was available for purchase at the food stores in the target communities; however, many participants did not perceive these items to be accessible. This discrepancy between perceptions and reality regarding access to alcohol and tobacco may be related to other factors that influence access such as the financial resources necessary to purchase products. Indeed, future research is warranted to examine this phenomenon and may also extend into perceptions versus reality of access to other unhealthy products such as high-fat snacks and sweetened beverages.

The congruence between the two measurements of access to healthful foods—perceptions and reality—that were assessed in this study is a key finding in this research. This finding corroborates other research on the relationship between perceived and actual measures of local food environments, which suggest that perceptions of access may be as good or even better predictors of food access than objective measures.²⁶ Results from this study indicate that participants living in low-income, urban, minority, and food insecure communities can validly assess access to healthful foods, and data collection instruments aimed at uncovering participants' perceptions of healthful food access such as the scale introduced herein ought to be included in future research. Moreover, our findings suggest that researchers need not solely rely on objective measures of local food environments through food store mapping and auditing data when examining access to healthful foods since perceptions of access appear to be valid. While it is advantageous to include multiple measures of food access in obesity and food security research, if resources are constrained, then measures of perceptions of food access may sufficiently capture important features of local food environments.

Limitations

Although this study included novel approaches for examining local food environments, it is not without limitations. First, the use of a small, nonrandom sample limits the external generalizability of the findings in terms of both people and places (i.e., not only was our analytic sample a convenience sample, but the locale for the study was also based on convenience). Other important elements of potential sample bias include the relatively high education level of the sample and the mere fact that all of the participants in the current study frequented the farmers' markets, thus, potentially indicating an underlying difference between them and other residents in these urban communities. Even with these limitations, the convenience sample provides a unique and important perspective since all of the participants were living within the same geographic boundaries in which the food store audits were conducted.

Similar to other food environment studies, we imposed geographic boundaries to capture access to food within a 1-mi radius of participants' residence. However, we do not know if these boundaries match the boundaries that participants use to define their local food environment. Future qualitative research is warranted to investigate the spatial boundaries community members use to define their local food environment.³² Finally, while all of the participants shopped at the Boys and Girls Club farmers' markets, we do not know where they purchased the majority of their foodstuffs. Thus, we do not know if the local food environment is the only food

access point or if participants travel to other environments to gain access to healthier foods. In our prior research, we found that participants in the target communities frequently traveled outside of the local food environment one time per month for large food purchases; however, they frequented convenience stores and local markets in the community for smaller purchases much more frequently.²⁴

Given these limitations, additional research on the relationship between perceptions and reality of local food environments among food insecure populations is warranted. In particular, future research ought to include larger samples, gather information on how participants define the boundaries of their local food environment, and examine where people shop for large and small food purchases (i.e., do they stay in the neighborhoods in which they live or do they travel to gain access to healthier foods?).

CONCLUSION

The obesity epidemic is beginning to draw attention to the ways that local food environments influence the public's health.³³ Though important overall, local food environments may have an even greater impact on the health of food insecure populations. Measures of access to healthful foods in local food environments are emergent,^{16,29} and few measures of perceptions of food access have been developed.^{15,26,34} This study contributes to extant research on local food environments in several ways. First, this study focuses on the unique needs of an urban population experiencing very high rates of food insecurity. Second, it offers a new measure for assessing perceptions of access to healthful foods. Third, the newly developed measure was validated by comparing self-reported perceptions of food access to objective assessments of food context. Findings suggest that participants living in low-income, urban, minority, and food insecure communities are able to accurately assess the dearth of access to healthful foods in their communities. Future research is needed to further validate the perceptions of food access measure introduced in this research and, more importantly, to develop strategies for increasing access to healthful foods among food insecure populations.

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