

A comparison of the availability and affordability of a market basket in two communities in the Chicago area

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Abstract

Objective: The purpose of the present study was to characterise the food landscape of an inner city African American neighbourhood and its mixed-race suburban neighbourhood. Detailed analysis focuses on the relationship between community store mix and price, availability and produce quality.

Design: A market basket study was completed by members of the Chicago Food Systems Collaborative. The US Department of Agriculture's standard market basket survey and methodology were used. Additional items and analyses were added in consultation with community members.

Setting: Austin is a lower-middle-class African American community of 117 500 on the western edge of Chicago. Oak Park, which borders Austin, is an upper-middle-income suburb of 52 500 with a mixed racial profile.

Subjects: A market basket survey of every retail food store in Austin and Oak Park was completed. A total of 134 were included.

Results: Results indicate that Austin has many grocery stores and few supermarkets. Many Austin groceries stores carry produce that is usually competitively priced, but often of unacceptable quality. Supermarkets had the best selection. Prices were lowest at discount supermarkets. Prices of packaged items were higher at independent stores than at chain supermarkets, but fresh items were cheaper.

Conclusions: Food access is related more to store type than number. In this study, item availability and produce quality varied greatly between store types. Price differences were complicated and varied by store type and food category. This has consequences in terms of food purchasing decisions and dietary quality that public health professionals should acknowledge.

Keywords
Food access
Food security
Grocery stores
Supermarkets
Market basket

The access to quality, well-priced groceries in low-income areas has recently been identified as a factor in family and community food security¹. According to the US Department of Agriculture (USDA), food insecurity is 'limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable food in socially acceptable ways'². Hunger is 'the uneasy or painful sensation caused by a lack of food' or 'the recurrent and involuntary lack of access to food'. In 2002, 11.1% of US households experienced food insecurity³. Moderate hunger was reported by 28% of food-insecure and 3.3% of all households⁴.

In low-income families, food insecurity and hunger are associated with single-parent households, lack of health insurance and low educational attainment⁵. It is estimated that the combination of poor diet and inactivity is the second leading cause of death in the USA⁶. Factors including household income, school food and access to supermarkets are increasingly being examined in the relationship between food and health⁷. The present paper

addresses the relationship between the local food environment and food access by examining the retail food landscape of a Chicago neighbourhood.

Background

Impact of food insecurity and hunger on health

The paradox of hunger and obesity in low-income populations was suggested by Dietz⁸. In women and children, food insecurity is associated with increased prevalence of obesity^{9–12}. Food insecurity and hunger have been linked to other adverse outcomes. Among food-insecure children, these include lower fruit consumption, higher cholesterol intake, headaches, colds, repeated grades and behavioural problems^{13–15}. Dietary quality has been found to be lower in food-insecure women due to lower intakes of fruit, vegetables and milk, and less varied diets¹⁰. Focus groups with limited-resource individuals identified resourceful and harmful coping

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strategies including gardening, coupons, purchasing dented cans, shoplifting, diluting and limiting variety¹⁶.

Possible explanations

Several reasons have been proposed for these associations. Households need to spend available dollars on housing, utilities or health care. This leaves inadequate money for food. Low-cost foods tend to be energy-dense and palatable⁵. Faced with this dilemma, decision-makers serve low-cost foods to satisfy energy needs¹⁰. Overconsumption is easy to achieve, can be habitual and may lead to obesity⁵. This coupled with limited opportunity for physical activity enhances the likelihood of obesity in low-income, food-insecure individuals, families and communities.

This relationship is a concern when coupled with knowledge of food consumption and physical inactivity patterns. Rolls *et al.* have demonstrated that volume is an important factor in regulating food intake¹⁷. A consistent pattern of palatable, energy-dense foods has been found to result in reduced satiety and overconsumption. Conversely, foods that are not energy-dense (such as fruits, vegetables) contain more water and less calories, fat and sugar. In the USA, these are comparatively expensive. Drewnowski and Specter calculated that the energy content of cookies was 1200 kcal/\$; but fresh carrots was 250 kcal/\$⁵. Sugars, oils, refined grains and foods with longer shelf-life tend to be lower in cost and higher in energy. Nutrition educators often encourage consumption of less energy-dense foods, such as raw vegetables. The cost and availability of these foods must be evaluated.

Another factor gaining interest in public health efforts is community food access. The term 'food desert' has been used to characterise areas with minimal retail food stores in the UK¹⁸. Studies of the relationship between food deserts and both food costs and intake have produced inconsistent results^{18–20}. In Minneapolis, Chung and Myers found that supermarkets, which offer lower prices, are concentrated in suburban areas while costlier small and non-chain stores are more likely to be in inner-city areas²¹. In Los Angeles, Sloane *et al.* reported significantly lower availability of fresh fruits and vegetables in lower-compared with higher-income areas. However, availability of meat, poultry and fish was similar in all areas²². An analysis of food and prices comparing rural, suburban and urban New York locations found significant price differences between store types and regions²³.

The absence of a variety of reasonably priced foods of acceptable quality can be a barrier to optimal diet patterns. This may be particularly true for people with transportation barriers or time limitations. Using data from the Atherosclerosis Risk in Communities study, Morland *et al.* found that supermarkets were less available to African Americans than white study participants. In addition, for every additional supermarket in their census tract, the fruit and vegetable intake of African Americans increased by

32%, suggesting that the local food environment is important in adherence to dietary recommendations¹.

Methodology

The present study is the product of The Chicago Food Systems Collaborative, a community–university partnership. This group of community activists and academics, sponsored by the Kellogg Foundation, is working to improve access to healthy food on Chicago's West Side, primarily in the Austin community. The ultimate goal of the project is to found a community-owned store that provides quality foods at competitive prices. Working towards this goal, this study was conducted among all the retail food stores in Austin and Oak Park to discover the characteristics of the food 'landscape'.

By including every retail food outlet in the area, emphasis was placed on the differences between store types, and in particular whether the small neighbourhood groceries prevalent in Austin provide adequate food access to the neighbourhood. Including all stores also means that standard significance testing methods such as *t*-tests that apply to random samples must be used with care.

Austin and Oak Park

Austin is a community of 117 527 inhabitants on the western edge of Chicago. It has a primarily African American population. Income levels are mixed, but Austin averages lower middle income with 24% of the households below the poverty level and a median household income in 2000 of \$US 33 663. It also features a large percentage of long-term residents, with 42% of the households having lived in their homes for at least 10 years. Moreover, it has high rates of crime and health problems, and a high infant mortality rate²⁴.

Austin's neighbouring community of Oak Park was also included in the study. Oak Park is an upper-middle-income suburb with a mixed profile and a population of 52 500. Its median household income in 2000, \$US 59 183, was much higher than in Austin²⁵. Oak Park is important both as a comparison and because, for many people living in Austin, the nearest supermarket is in Oak Park.

Developing the market basket list and collecting the data

The USDA *Community Food Assessment Handbook* guided the data collection, in addition to discussions with community members²⁶. A list of 158 stores was compiled from data purchased from InfoUSA (a data vendor) coupled with geographical surveillance. The total numbers of stores surveyed was 134. There were 24 stores that were not open for business when surveys were attempted, carried no food on the list (gas stations or liquor stores) or refused entry (3).

The food list was based on a USDA handbook list built from the USDA's Thrifty Food Plan recipes. This list does

not include many items that are culturally important in the Austin community. To address this, the list was augmented through consultation with community members in the collaborative. Examples of food items added are greens, sweet potatoes and baby formula. So the results could be duplicated elsewhere, no foods from the USDA survey were removed. Questions were also added on the quality of the produce. Quality rating is extremely subjective, so quality classes were limited to two: 'satisfactory' or 'poor'. 'Poor' was defined as produce that was truly unacceptable due to evidence of rotting such as mould, soft dark flesh or slime. Team partners needed to agree on quality category.

The surveys took place in February and March 2003 on three Fridays in the morning and early afternoon. Friday was chosen as a day in which stores would be well stocked. The time of day was chosen for convenience to the surveyors and to avoid the after-school rush. Surveys were performed by eight teams, each having one student and one community member. The community members were recruited through a local collaborative partner. This approach brought a combination of academic and community-based knowledge to the teams that resulted in few refusals by stores and shared learning among the researchers and the community members²².

The teams were assigned stores of various types in dispersed locations to minimise the effect of team difference on the data. The survey listed foods with a desired common size to assess. Assessment included availability, cost and produce quality. The most common size was used to avoid pricing standard size items versus 'jumbo' sizes that may have limited availability and would be difficult to transport without a car. For each food, surveyors recorded the price of the cheapest item available in the size that most closely matched the specifications. Teams went through a six-hour training prior to the start of data collection, which included an interactive class, a practice session at a local supermarket, and a reaction period in which questions were answered.

Data were summarised by community and store type. There were 10 store types: national and regional chain supermarkets (such as Jewel); discount chain supermarkets (such as Aldi); independent supermarkets; independent groceries ('corner stores'); chain drug stores (such as Walgreen's); gas stations; liquor stores with food; chain convenience stores (such as Seven Eleven); dollar stores; and specialty stores (such as bakeries). Groceries were defined as food stores having an annual sales of \$US 2.5 million or below. This is based on the industry definition of \$US 2 million and our available sales data, which placed the break at \$US 2.5 million²⁷. When no sales data were available, the store was classified by comparing it with stores of similar floor size and product lines. Sales was used for classification rather than floor area following both US industry norms and because, in an urban context, many stores with smaller floor areas are densely packed

with food and operate in the community more like supermarkets than corner groceries.

Due to the variance in the mix of store types between the two communities, much of the focus of the study was placed on the characteristics of the different store types. Stores were analysed by item availability, price and quality of produce. Availability was calculated by store type and product category. Quality data were collected only for produce and were summarised by store type.

Price calculations were completed utilising two techniques. First, prices for the USDA portion of the market basket were calculated using directions from the USDA handbook²⁷. Following this method, in cases where a store did not carry a food, the mean price for that item at all community stores was used. This was done so the total market basket cost could be estimated for each individual store. This could bias the results, especially for stores carrying less than 50% of the total items. The 'total market basket price' thus should truly be used only for general comparison, except in cases where the store carries almost all of the items, primarily the supermarkets. The total price calculations did not include the community-added items. Two store types, dollar and specialty, were eliminated from calculations owing to their low number of items carried.

Due to the limitations of the market basket price technique and the inability of this method to highlight pricing differences for particular food items, prices for each food item were also compared. In this analysis, the mean price of each food item carried by at least two stores within a particular store type was compared with the mean price at the four chain supermarkets. Tables were created for each class of products (produce, grains, etc.) showing whether items were generally cheaper or more expensive at each store type than at chain supermarkets. This analysis allows us to study price patterns in items of particular interest, such as fresh produce. If zero or one store carried an item within a store type, this item was taken out of the analysis and appears as 'No data'. Dollar stores, gas stations and specialty stores are not shown here due to the low number of items carried. Statistical analyses were conducted with the Statistical Package for the Social Sciences (SPSS), version 10.1 (SPSS, Inc., Chicago, IL, USA).

Results

As seen in Table 1, the most striking characteristic of the Austin retail food landscape when compared with Oak Park is its lack of chain supermarkets and the abundance of independent groceries and liquor stores with food. Counting all stores, Austin and Oak Park are served very similarly. Austin has one store for every 1237 residents, while Oak Park has one store for every 1347. However, the types of stores in the two communities are very different. For instance, Austin has one chain supermarket for its 117 527 residents, while Oak Park has three, one for every 17 508 residents. Austin has 50 independent groceries, one

Table 1 Number of stores and population per store by store type and community

Store type	Austin (population = 117 527)		Oak Park (population = 52 524)	
	Number	Population per store	Number	Population per store
Chain convenience stores	1	117 527	4	13 131
Chain drug stores	6	19 588	4	13 131
Chain supermarkets	1	117 527	3	17 508
Discount supermarkets	2	58 764	1	52 524
Dollar stores	4	29 382	2	26 262
Gas stations	8	14 691	7	7 503
Independent groceries	50	2 351	4	13 131
Independent supermarkets	3	39 176	5	10 505
Liquor stores with food	19	6 186	0	NA
Specialty stores	1	117 527	9	5 836
Total	95	1 237	39	1 347

NA – not applicable.

for every 2351 residents, while Oak Park has just four, one for every 13 131 residents.

When the independent groceries are mapped (Fig. 1), it becomes clear that almost every resident of Austin lives within half a mile (~0.8 km) of a corner store. Most live within a quarter of a mile (~0.4 km). Given this situation, the price, availability and quality of the food at these stores could greatly affect the food security of Austin residents. The importance of these independent groceries is emphasised when the location of supermarkets (chain, independent or discount) is mapped, with a quarter of a mile buffer, and overlain with data on the percentage of households in the area that have no car (Fig. 2). Just under half the population of Austin lives more than a quarter of a mile from a supermarket and in areas where more than 25% of the households do not have a car.

Market basket price by community and store type

As seen in Table 2, prices for the USDA market basket show that overall the mean price at Austin stores was 12 cents less than at Oak Park stores. This difference is significant in a simple difference of means *t*-test ($P < 0.001$). Some of the difference may arrive from the methodology of replacing missing values with the mean for all stores in that community. Using an analysis of variance, price differences also varied significantly by store type ($P < 0.007$). Within store types, the number of stores was too small to find significant differences between communities, but the chain supermarket in Austin had somewhat lower prices than the chains in Oak Park. There were also two discount supermarkets in Austin but only one in Oak Park. The independent groceries and supermarkets in Austin also had much lower mean prices than those in Oak Park.

Comparing store types, discount supermarkets were by far the cheapest, followed by independent supermarkets. Prices at chain supermarkets averaged somewhat lower than

independents. Prices at independent groceries were somewhat higher. Chain convenience stores had the highest average prices of any group. Independent grocery prices in Oak Park were similar to chain convenience stores.

Item availability

Differences in store mix between Austin and Oak Park leads to a focus on availability, price and quality by store type. The mean number of items carried within each food category within each store type is seen in Table 3. Using analysis of variance, the effect of store type on availability was tested. Availability differed significantly by store type in all food categories and for the total market basket ($P < 0.000$). Within particular store types, the mean number of items carried was similar in Austin and Oak Park, so only the store type data are shown. Perhaps the most striking result is that chain supermarkets carried nearly all items. Independent supermarkets also carried most items, averaging 93 out of the 102. Discount supermarkets carried fewer items, a little more than 75%. Only one of the three discount supermarkets carried greens and none carried sweet potatoes. Although it is hard to generalise with three stores, they do not seem responsive to local markets. Independent groceries carried a little more than half of the items. They tended to carry items with long shelf-lives. On average, these stores carried four of the 14 fresh fruits and vegetables surveyed. In produce, onions and potatoes were carried by 59% of the independent grocers, but only 44% carried more perishable tomatoes, the next highest item. Chain drug stores and convenience stores carried about half of the surveyed items. The other store classes carried less than 40%.

Quality of fresh produce

While this study focused on the availability of a wide variety of foods as a measure of food access, special emphasis was put on the quality of fresh produce. Poor-quality produce occurred only in two store types: independent groceries and liquor stores. All stores selling poor produce were in Austin. Of the 50 independent groceries in Austin, 32 (or 64%) carried at least one produce item. Of these, 17 (or 53%) carried at least one poor-quality item. Both of the liquor stores that carried fresh produce had at least one poor-quality item. Despite these results, many of the corner stores that carried the most produce carried none of poor quality. None of the six independent groceries that carried 10 or more produce items had any poor-quality items. Five of these were in Austin. Two particularly perishable items (green peppers and lettuce) were more likely than others to be of poor quality. Of the 17 independent groceries in Austin that carried lettuce, six were of poor quality.

Price by food category and store type

Due to the issues in calculating market baskets prices when many stores carry half or less of the items, price was

Oak Park & Austin Independent Groceries February 2003

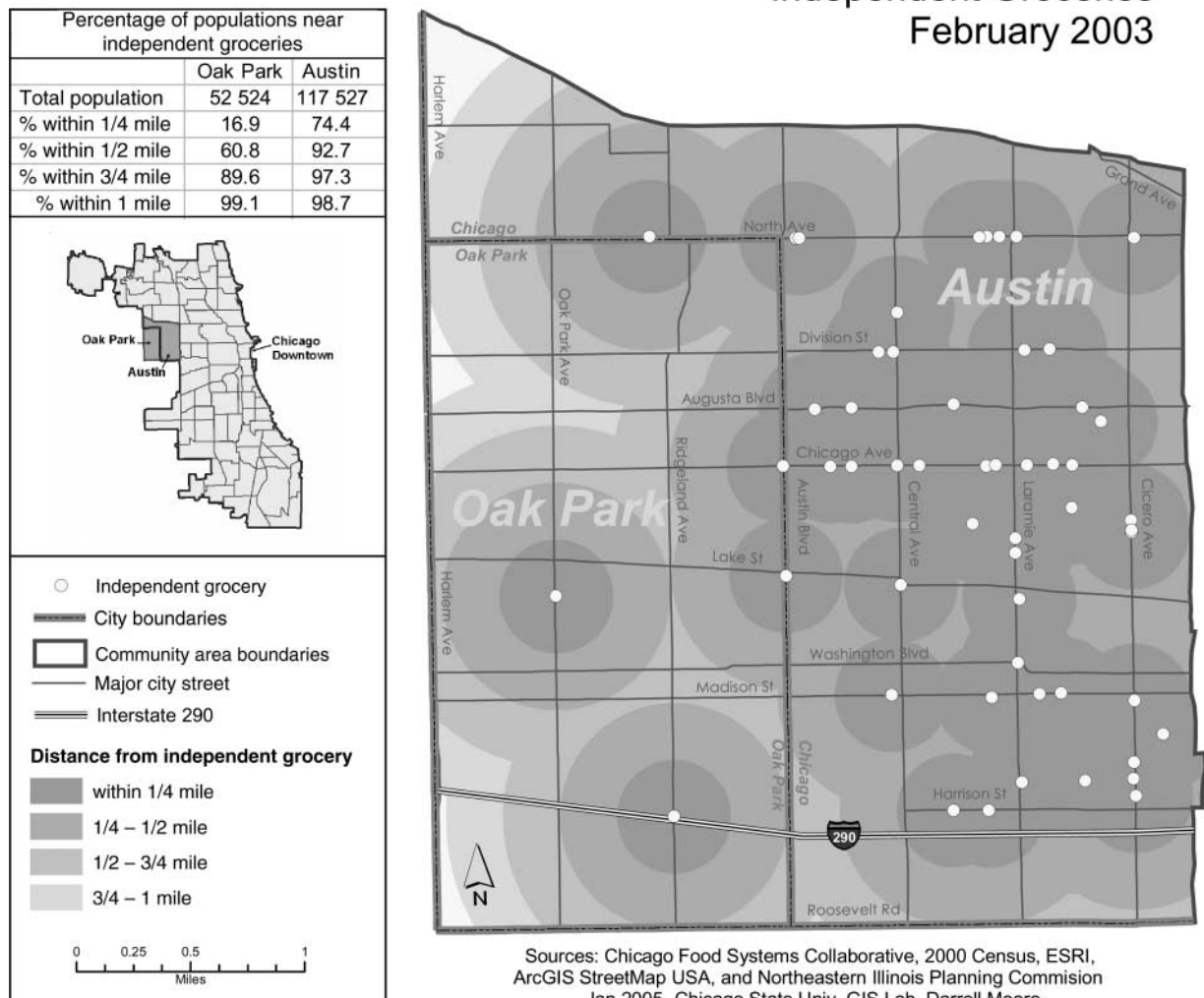


Fig. 1 Most people in Austin are within walking distance of an independent grocery ('corner store'). This is not the case in Oak Park

compared for each food across stores, and then grouped by food category and store type. Table 4 shows how the mean prices of individual items in various food categories within a store type compared to the mean price of those items at chain supermarkets. For instance, when considering all items, the price at chain convenience stores was at least 10% higher than at chain supermarkets for 48 of the items. Six items had similar prices, two were at least 10% cheaper, and 46 were available at no or one chain convenience store. Dollar stores, specialty stores and gas stations were left off the chart owing to their high numbers of missing items. Viewing the data for all 102 items studied, discount supermarkets were at least 10% cheaper than chain supermarkets for the vast majority of the items they carry.

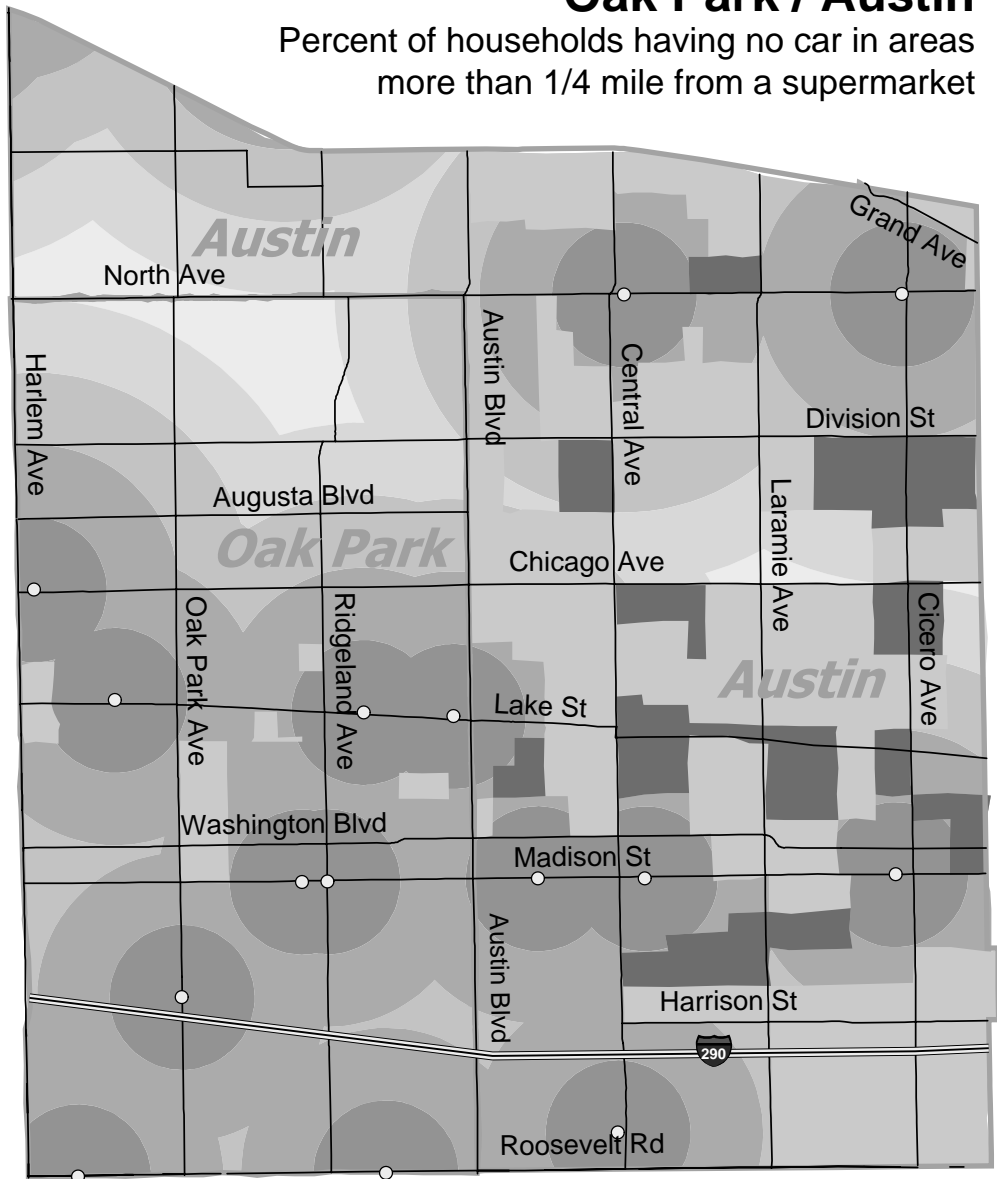
The data become more interesting when viewed by product category. In particular, fresh produce and meat were generally cheaper at independent groceries and supermarkets than at chain supermarkets. Independent

supermarkets were at least 10% cheaper than chains for 11 of the 12 fresh produce items calculated, while independent groceries were cheaper for nine of the 13 fresh produce items calculated (poor quality was often noted). The data were similar for fresh meats. All five fresh meat items were at least 10% cheaper at independent supermarkets than at chains and three of the four fresh meat items calculated were at least 10% cheaper at independent groceries than at chain supermarkets. Discount supermarkets were cheaper than chains in all categories. For fresh produce, prices were also competitive at liquor stores and chain convenience stores, where four of the six items that had similar prices to chain supermarkets were fresh produce items.

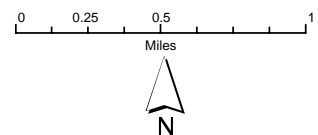
Beyond the fresh meat and produce categories, chain supermarkets were generally cheaper than all other store types except discount supermarkets for all product

Oak Park / Austin

Percent of households having no car in areas more than 1/4 mile from a supermarket



Oak Park	Austin
Area population:	
1 774	53 423
<ul style="list-style-type: none"> Areas more than 1/4 mile from a supermarket where 25% or more of households have no car (includes category below) Areas more than 1/4 mile from a supermarket where 40% or more of households have no car 	
0	13 947
Total population:	
52 524	117 527
<ul style="list-style-type: none"> Oak Park–Austin boundaries Major city street Supermarket 	
Distance from supermarkets	
<ul style="list-style-type: none"> within 1/4 mile 1/4 – 1/2 mile 1/2 – 3/4 mile 3/4 – 1 mile greater than 1 mile 	



Sources: Chicago Food Systems Collaborative, 2000 Census, ESRI, ArcGIS StreetMap USA, and Northeastern Illinois Planning Commission May 2004 -Chicago State Univ. GIS Lab, Darrell Moore

Fig. 2 A large area of Austin, including almost half of Austin residents, is both further than a quarter of a mile to any supermarket and has at least 25% of households without a car

categories except spices, baking supplies and condiments. This is probably because other store types often carried less expensive brands. The 65 items not in these categories include dairy foods and shelf-stable items such as grains

and canned products. For these remaining items, 42 were at least 10% more expensive at independent supermarkets and 48 were at least 10% more expensive at independent groceries than chain supermarkets.

Table 2 Mean price of market basket by community and store type*

Store type†	Mean price (\$US)	
	Austin	Oak Park
Chain convenience stores	134	132
Chain drug stores	108	121
Chain supermarkets	91	116
Discount supermarkets	71	75
Gas stations	111	127
Independent groceries	113	132
Independent supermarkets	94	112
Liquor stores with food	110	NA
Total*	110	122

NA – not applicable.

*Price differs significantly between Austin and Oak Park at the $P < 0.001$ level. Combining both communities, store type is a significant influence on price at the $P < 0.007$ level. Significance testing was not performed between communities within store types due to low numbers of stores.

†Note that missing values were replaced by the mean of stores carrying that item in that community. This means that the mean price of an item in a community affects the price at all stores in that community. This may skew results in store types that carry low percentages of items, such as gas stations, and may account for some of the differences in price between the two communities.

Discussion and conclusions

The type and number of grocery stores differ strikingly between Austin and Oak Park. Austin has many more food stores than Oak Park, but most of these are small, independent groceries and liquor stores with low overall food availability, particularly of produce. While there were some independent grocery stores in Austin with acceptable produce, all poor-quality produce was found at independent grocery stores and liquor stores in Austin. In a focus group with local store owners, both logistical problems in obtaining fresh produce and issues with selling it before it spoils were cited to explain this pattern. If Austin residents had to rely only on grocery stores in the neighbourhood surrounding their homes, obtaining a wide variety of acceptable quality foods for an optimal diet would be difficult.

Food availability differences between the communities are determined by store mix. Chain supermarkets carried close to every item surveyed. Independent supermarkets also carried the vast majority of the items. Overall Austin, with approximately twice the number of residents as Oak Park, had just six supermarkets versus nine in Oak Park.

Price comparisons were complicated. Prices averaged lower in Austin than in Oak Park. By store type, discount supermarkets were by far the least expensive. However, these markets by their nature appeared to carry very generic items that often overlooked the communities' cultural preferences. By item, average prices of fresh produce and meat at independent groceries and supermarkets were lower than at chain supermarkets. Packaged items at the independent stores were overwhelmingly more expensive, except spices, condiments and baking supplies.

Table 3 Mean availability by store type and food class (all stores)*

Store type	Food type (total number of items)										Total (102)
	Fresh F&V (14)	Canned F&V (5)	Frozen F&V (5)	Bread & grain (18)	Dairy (8)	Meats & protein (15)	Fats & oils (7)	Baby food & formula (2)	Sugars & sweets & supplies (9)	Spices & baking supplies (19)	
Chain supermarkets	13.8	4.8	4.8	17.8	8	15	7	2	9	18.5	100.5
Independent supermarkets	13.5	4.5	4.1	16.4	7.1	13.9	6.3	1.3	7.9	18.1	93
Discount supermarkets	12	5	3.7	14.7	5.7	10	7	1.3	8	11.3	78.7
Independent groceries	4.1	3.5	1.5	12.1	2.7	6.9	5	1.2	5.4	12.3	54.6
Chain drug stores	0.9	4.4	0.5	10.7	4.4	4.7	5.4	2	4.3	13.2	50.5
Chain convenience stores	4	2.8	1.2	10.4	6	4	4.8	0.4	5.6	8.2	47.4
Liquor stores with food	0.6	3	0.3	9.5	1.8	4.2	3.8	0.6	4.1	8.4	36.4
Gas stations	0.1	1.9	0	5.3	1.8	2.2	2.3	0.5	3.3	5.4	22.9
Dollar stores	0	1.7	0	2.8	0.2	0.8	0.7	0	1	7.8	15
Specialty stores	0.1	0.5	0	2.4	0.6	0	0.5	0	0.2	2.5	7.2
Mean of all stores	3.5	3.1	1.2	10.2	2.9	5.7	4.2	0.9	4.6	10.5	26.1

F&V – fruits and vegetables.

*Store type was a significant predictor of availability for all food classes at the $P < 0.000$ level.

Table 4 Average price of food items compared with average price of same items at chain supermarkets

	Chain convenience stores (5)	Chain drug stores (10)	Independent groceries (54)	Liquor stores with food (19)	Discount supermarkets (3)	Independent supermarkets (8)
All 102 Items						
Price at least 10% higher	48	42	57	44	1	49
Price similar	6	10	11	13	2	22
Price at least 10% cheaper	2	18	28	15	73	31
No data	46	32	6	30	26	0
All 14 fresh produce Items						
Price at least 10% higher	4	1	2	0	0	1
Price similar	4	0	2	1	1	0
Price at least 10% cheaper	0	0	9	3	11	13
No data	6	13	1	10	2	0
All five fresh meat items						
Price at least 10% higher	0	0	1	0	0	0
Price similar	0	0	0	0	0	0
Price at least 10% cheaper	0	0	3	1	3	5
No data	5	5	1	4	2	0
All 18 spices, baking supplies and condiments						
Price at least 10% higher	6	4	6	5	1	6
Price similar	1	0	0	5	0	5
Price at least 10% cheaper	1	13	12	6	9	7
No data	10	1	0	2	8	0
All 65 other items						
Price at least 10% higher	38	37	48	39	0	42
Price similar	1	10	9	7	1	17
Price at least 10% cheaper	1	5	4	5	50	6
No data	25	13	4	14	14	0

The news is not all bad for Austin. The independent groceries that dominate the area are within walking distance for most Austin residents and often have competitive prices for fresh items, if carried. However, quality and availability are suboptimal as are prices for most packaged items. Interestingly, in a set of subsequent focus groups with community residents and store managers, the best of these local stores appear to be used often to purchase fresh items, especially meat, while other purchases are made outside the community.

The methods and focus of this study were greatly influenced by community member involvement. In specific, the availability patterns of culturally appropriate foods would not have been identified without this input. This information has been used to begin local action in Austin to improve food access by the development of a community-owned grocery supermarket.

If food availability contributes to health through optimal dietary patterns, then Austin residents may experience difficulty attaining good-quality diets from within the community. While Austin residents can and do travel for groceries, limited availability within the community creates barriers for those without easy access to a car. Carrying groceries home by public transportation is difficult and often involves transfer at the city limit.

By studying only two communities, we cannot come to a general conclusion about the influence of race, class or urbanity on food access. Other limitations include the possibly low seasonal availability of produce during the study period. Judgements related to package size selection

were sometimes difficult. The two-category quality measurement is also a limitation.

It is clear from this study that the mix of store types within a community makes a large difference to access to healthy foods. This study highlights the need to consider community food systems as another contributor to food insecurity. The ability of households to obtain foods contributes to optimal dietary patterns and the role that food systems may play in negative health outcomes such as obesity. While chain supermarkets and supercentres may be adequate for areas with high automobile access, in areas with lower access, a diversified store mix could be beneficial. In Austin, discount chains and the few high-quality independent grocers meet particular needs of the residents. Even many of the 'corner stores' offer fresh produce at reasonable prices. This work highlights the need to match store mix to neighbourhood characteristics by those who advocate for public health policy, community groups and planners. Planning and health departments could work with stores to overcome barriers to higher produce quality and variety. While increasing the local market for produce may be difficult, community activists have discussed establishing a local wholesale network to minimise barriers to obtaining produce faced by individual stores.

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Human participant protection: Data were not collected from human study participants.

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