COMMUNITY NUTRITION ENVIRONMENTS: PEOPLE'S PERCEPTIONS OF THE GROCERY STORE ENVIRONMENT IN THE EASTERN NEIGHBORHOODS OF PITTSBURGH

by

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Submitted to the Graduate Faculty of

the Department of Behavioral and Community Health Sciences,

Graduate School of Public Health in partial fulfillment

of the requirements for the degree of

Master of Public Health

University of Pittsburgh

2009

UNIVERSITY OF PITTSBURGH

GRADUATE SCHOOL OF PUBLIC HEALTH

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University of Pittsburgh, 2009

Multiple studies have shown that African Americans have less access than do Whites to healthy food in many cities in the US. Less is known, however, about how African Americans perceive their neighborhood nutrition environment, and how this affects their diet. We studied people's perceptions of their access to healthy food in majority-African American neighborhoods in and around the city of Pittsburgh using a mixed methods approach. Supermarket addresses were geocoded using ArcGIS and the location of supermarkets with respect to majority-African American census tracts was determined. A convenience sample of 236 people completed a self-administered survey, and two focus groups (n=14) were conducted. Results demonstrate that whereas some Black neighborhoods are proximal to supermarkets, others are two miles or more away. People's perceptions of the quality of food and service available to them are strongly determined by the identity of the store at which they shop. Satisfaction with the quality of food available in the primary grocery store is positively correlated with self-efficacy (confidence in their ability) to *find* healthy food; it is correlated with self-efficacy to *afford* healthy food in high-income, but not in low-income respondents. Focus group data suggest that while African Americans perceive that the quality of food and service in supermarkets serving the Black community are worse than at branches of the same chain that serve white neighborhoods, they continue to frequent these "Black Identified" supermarkets because of loyalty to Black ownership of some stores, a perceived fear that failure to support stores in their neighborhoods may result in closure, as well as because of the easy

access to "Jitneys" (unofficial taxis), which make regular trips to these supermarkets. We conclude that access to grocery stores that afford a high level of satisfaction with the quality and selection of produce is a predictor of self-efficacy to engage in a healthy diet. Every effort must be made to ensure that stores that cater to African Americans address the perceptions and needs of their clients and provide an environment that enables healthy eating: this will help prevent chronic disease, an objective of huge public health significance.

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1.0 INTRODUCTION

Nutritious food—fruit and vegetable intake in particular—has been shown to be a protective factor against diabetes, heart disease, and cancer [1, 2, 3, 4, 5]. Only 18% of persons aged 2 years and older in Allegheny County in 2005 consumed at least 3 servings of fruits and vegetables per day; furthermore, the prevalence of obesity, a risk factor for multiple chronic diseases, grew in Allegheny County from 21.6% to 24% between 2002 and 2005 [6]. We realize that in order to increase intake of fresh fruits and vegetables among the population, there must be access, both real and perceived, to high-quality grocery stores selling produce at affordable prices. In the US, this is often a function of access to supermarkets, which, because of their economies of scale, make fresh produce available at lower prices than independently owned grocery stores; access to farmers' markets during the summer months in Allegheny County could also affect diet.

African Americans in Pittsburgh bear a disproportionate amount of the burden of mortality resulting from diabetes, heart disease, and cancer [7]. A large percentage of the African American population in Allegheny County resides in the eastern part of the city of Pittsburgh; African Americans represent greater than 60% of the population in the following neighborhoods of Pittsburgh: Homewood, East Hills, Lincoln-Lemington-Belmar, Larimer, East Liberty, and the Hill District. The Borough of Wilkinsburg and Penn Hills Township have census tracts bordering the city with African Americans comprising greater than 78% of their total population [8]. Our aim was to explore whether people living in these neighborhoods have access to a full-service supermarket, and if so, to determine the supermarkets most frequented by these populations. We were interested in understanding how African Americans in these neighborhoods perceive the service and quality of food to be in their supermarkets, and whether their perceptions affect their dietary behavior.

2.0 REVIEW OF THE RELEVANT LITERATURE

To conceptualize the neighborhood food resource environment, a model has recently been put forth by Glanz *et al.* [9]; it includes constructs that are hypothesized, or have been shown to affect the dietary behavior of people. As shown in Figure 1, this model posits that multiple levels in the Social Ecological Model could affect people's diet—policy, environmental variables, and individual-level variables could each have an effect on dietary behavior. Of greatest relevance to this study are the concepts of the Community nutrition environment and the Consumer Nutrition environment; the former represents the location of supermarkets and restaurants in the neighborhood, and people's access to them, in the form of public or private transportation. The latter represents people's experiences in stores, determined by the products available, and their price and marketing.

African Americans have been shown to have lower access to supermarkets, and hence, a different community nutrition environment compared to Whites in multiple studies. Morland *et al.* showed that there were four times as many supermarkets in census tracts with less than 20% Black population than in census tracts with >80% African American population in four states studied [10]. Most recently, Franco *et al.* showed that the availability of healthy foods, as determined by the nutrition environment measures survey–supermarkets (NEMS-S) [11], was higher in predominantly White census tracts than in census tracts in Baltimore with a majority-African American population. Furthermore, supermarkets in Black census tracts had a lower healthy food availability index than those in White tracts [12]. These studies suggest that African American neighborhoods have fewer supermarkets, and hence, less access to healthy food items than White neighborhoods. In Pittsburgh, a study by the Heinz School at Carnegie Mellon University in 2003 showed that most supermarkets in the city lay in neighborhoods with lower than 15% African American population [13].

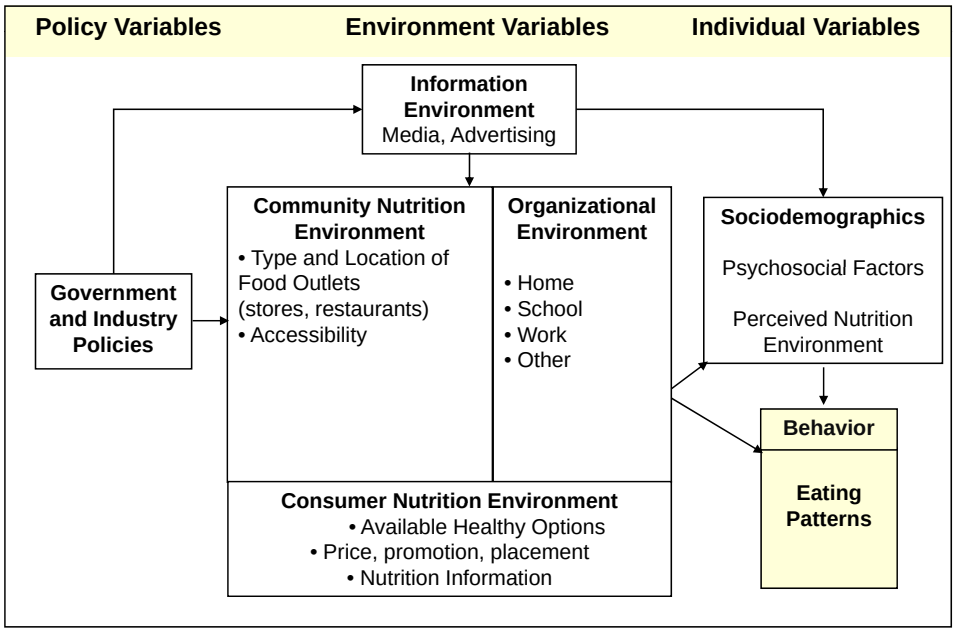

Figure 1: Model of Community Nutrition Environments, from Glanz *et al.* [9]

Linking the presence of supermarkets to the diet of residents of a neighborhood has been more difficult. A study by Morland *et al.* revealed that fruit and vegetable intake by African Americans increased by 32% for every additional supermarket in their census tract [14]. In Baltimore, the healthy food availability index (HFAI) of a neighborhood correlated with *lower fat* intake, but not with *whole grain* or *fruit* consumption among residents [15]. While Morland *et al.* looked only at the type of store and correlated diet with the presence of a supermarket (as categorized by the North America Industry Classification System), Franco *et al.* looked at the availability of a set of healthy food items in stores and were, hence, potentially less prone to bias. These studies do not, however, take into account the *perception* of the quality of stores and that of the food available in them by residents, possibly an important determinant in people's dietary decisions. In fact, the lack of correlation between the HFAI and people's fruit intake in Baltimore (discussed above; [15]) may be a direct result of the lack of measurement of the perceived quality of fruit available in these stores.

The model presented by Glanz *et al.* (Figure 1) does not explicitly include concepts of perceived food quality, or the quality of service in the store [9]. Zenk *et al.* showed that women who shopped in supermarkets or specialty stores rated the quality and selection of produce higher and consumed more fruit and vegetable than those who shopped at independent grocery stores [16]. In Los Angeles, Sloane *et al.* showed that in addition to the fact that the number of people served by each grocery store was higher in African American neighborhoods than in neighboring White areas, the color, texture, consistency, and damage of fruits and vegetables in grocery stores in African American neighborhoods were worse than they were in White neighborhoods; the selection of produce was also significantly different in African American and White neighborhoods [17].

We believe that studies need to take into account consumers' perceptions of the quality of food and service at stores in their neighborhoods in determining the neighborhood food environment. The nutrition environment measures survey–supermarkets (NEMS-S) [11] is a validated instrument designed and tested by Glanz *et al.* to measure the availability and quality of produce in stores. It should, in the future, make objective measurements of the differences in the availability and quality of food in stores possible. Yet, its use in a community-based participatory manner may be essential if the perceptions of the consumers themselves are to be factored in to determining the environment.

In this study, we set out to explore African Americans' perceptions of their community nutrition environment in Pittsburgh. Our aim was to link their perceptions to both their community nutrition environment, as well as to their dietary behavior. To measure behavior, we used the Stages of Change construct of the Transtheoretical Model [18] to stage people along the continuum of the stages of dietary behavior change with respect to adopting a *low-fat* diet and a *high-fiber* diet. We asked survey respondents about confidence in their ability to *afford* and to *find* healthy food in their primary grocery store, allowing us to gauge respondents' self-efficacy in being able to engage in a healthy diet. We also measured personal value attached to eating a low-fat diet with a question from Glanz *et al.* [19].

As will be shown in this paper, the location of grocery stores in the eastern neighborhoods of Pittsburgh is such that a survey to determine people's preferred supermarkets was a pre-requisite to any studies attempting to measure the availability and quality of food

in neighborhoods using the NEMS-S. Hence, this exploratory study sets the stage for a community-based participatory appraisal of grocery stores in the future.

3.0 METHODS

There are three components to this study: 1. An analysis of the location of stores in relation to majority-African American neighborhoods using Geographic Information Systems; 2. A community-based survey of people's perceptions regarding their supermarkets; and 3. Two focus groups to gain an in-depth understanding of the reasons underlying people's choices with respect to supermarkets and dietary behavior.

3.1 GEOGRAPHIC INFORMATION SYSTEMS ANALYSES

Addresses of supermarkets in the neighborhoods of Oakland, Shadyside, Squirrel Hill, Point Breeze, East Liberty, Waterworks, East End, as well as Wilkinsburg Borough, and Penn Hills Township were obtained from the Allegheny County Health Department, and geocoded using ArcGIS [20]. Population data as well as data regarding access to vehicles was obtained for census tracts in Allegheny County from the US Census Bureau [8].

3.2 THE CONSUMER PREFERENCE SURVEY

The Consumer Preference Survey was originally designed and used by the Community Health Councils, Inc. (CHC) in Los Angeles [21]. It was adapted, with permission from CHC, at the Center for Minority Health at the University of Pittsburgh, to suit the local situation in Pittsburgh. Specifically, we included questions collecting demographic information, including the race, gender, level of education, and annual household income before taxes. We also

included a question to measure the respondent's level of participation in the Healthy Black Family Project (HBFP), a Center for Minority Health lifestyle modification program based in the community, a potential variable in determining people's dietary behavior. Finally, we included previously validated measures of dietary fiber consumption [22] based on the Stages of Change construct of the Transtheoretical Model [18], as well as measures of the personalized value attached to a low-fat diet [19]. Rather than ask people whether they were unable to buy healthy food due to cost, as the original survey did, we framed questions that would allow us to gauge self-efficacy (a construct of the Social Cognitive theory [23]) with respect to ability to *afford* and to *find* healthy food.

The survey was pilot tested during the "Take a Health Professional to the People Day" in Pittsburgh, at an African American beauty salon in East Liberty to test for appropriateness of wording and the length of the survey. It was then self-administered, either online using SurveyMonkey.com or a paper version, to a convenience sample of people who voted at the Kingsley Association in Larimer on November 4th 2008, as well as to HBFP participants at the Kingsley Association. People were recruited for the survey using posters and verbal advertisement by the Health Coaches at HBFP. The survey was also offered in the neighborhood of Lincoln-Lemington Belmar through Lemington Community Services, a senior care center. People completing the paper version of the survey had access to this researcher in case they had questions. In the future, such a survey should probably be made available *explicitly* with the option of interview administration to enable lower literate people to take the survey. Survey respondents chose one from many available gifts, at the Center for Minority Health, as an incentive for participation.

The survey analysis was carried out using SPSS [24]. Annual Household income (before taxes) was collected using an interval scale. The survey also collected data on the number of people the respondent typically shops for. The mean of the income interval picked by the respondent was divided by the number of people shopped for to arrive at an estimate of the income available per person in the household (9999 was used for the interval <\$10,000; 50000 was used for the interval >=\$50,000). This ranged from \$1666.5 to \$50,000 per head annually. \$14,999 and below was classified as "low" and \$16666.67 and higher was classified as "high." To control for income, we used this classification as well as the continuous

estimate of income available per person, and saw no difference between partial correlation coefficients.

3.3 FOCUS GROUPS

Two focus groups were held: the first at the Kingsley Association involved four female, participants of HBFP. They were recruited by the researcher (SK) in exercise classes, and by health coaches. Four participants is the lowest recommended number for a focus group [25]; holding the discussion on a saturday when an HBFP Yoga class was not in attendance may have resulted in the low attendance in spite of the recruitment of 10 people. The second focus group was held at the Vintage Inc. Senior Center in East Liberty; 10 participants, including 9 females and 1 male were recruited by the program director. All participants were African American. Both focus groups were facilitated by the researcher (SK), and were about one hour long. Participation in the focus groups was incentivized by making snacks available, and by raffling a $20 gift card to a co-operatively owned grocery store in the city.

Focus groups were transcribed and analyzed by the facilitator. Codes were generated to represent the major themes of the discussion in the first focus group. These codes were then applied to analyze focus group two; one additional theme representing issues relevant to seniors was found in focus group two. Coding analysis toolkit (http://cat.ucsur.pitt.edu/), a free and open-source software, was used to analyze the transcripts using the generated codes. This study was approved by the University of Pittsburgh Institutional Review Board.

4.0 RESULTS

4.1 DEMOGRAPHICS OF SURVEY RESPONDENTS

As shown in Table 1, a majority of the 236 survey respondents were African American, and 70% were over the age of 45. Sixty nine percent were female, and thirty seven percent reported having graduated from college: this is higher than the general population in the US (27%), suggesting that the population surveyed here may be more highly educated than the general US population [26]. 69% of the 236 respondents took the survey on paper, with the rest taking it online. Eighteen percent of the respondents refused to answer the question asking about their annual income; the rest were distributed across the categorical income options in the survey as shown in Figure 2.

In addition, survey respondents came from a variety of neighborhoods and zip codes in Allegheny County: 41% came from the 15206 zip code, which includes the majority-African American neighborhoods of Lincoln-Lemington-Belmar, East Liberty, and Larimer; close to 10% came from each of 15208 and 15221, which include the neighborhoods of Homewood and Wilkinsburg respectively. The zip codes that contained at least 10 survey respondents are presented in Table 2.

4.2 WHERE RESPONDENTS SHOP

Respondents (n=221) reported shopping for groceries in a range of stores. Only 11 respondents mentioned a co-operatively owned or specialty store as their primary grocery store. Most (95%) picked a supermarket as their primary grocery store; no one reported shopping

Table 1: Demographics of survey respondents: n=236

Race	84.5% African American; 12.4% White; 1.3% Asian American; 1.8% Other
Age	30% 18-45 years of age; 70% > 45 years of age (28.6% > 65 years of age)
Education	38% College graduates; 26.4% Some college (1-3 years); 23.3% High school graduate; 8.4% Less than Grade 12; 4% Decline to answer
Gender	69% Female

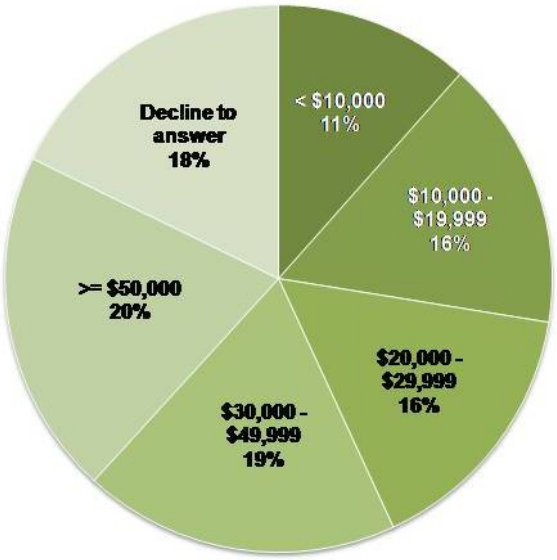

Figure 2: Annual household income before taxes reported by 225 survey respondents

Table 2: Number of survey respondents who reported residing in the respective zip code.

Zip code	**Number of respondents**
15206	93
15221	22
15208	19
15235	15
15201	12
15219	11

primarily at a convenience store. Branches of the local chain supermarket were most often named as the primary grocery store; 73% of the 221 respondents mentioned a branch of the local chain as their primary grocery store.

As seen in Figure 3A and B, almost half of the supermarkets in the eastern neighborhoods of Pittsburgh lie within a 0.8 mile radius. The majority-African American neighborhoods

with no supermarket within a 1 mile radius are also neighborhoods where the access to private vehicles is amongst the lowest in the county. Compared to respondents of the survey from East Liberty or Larimer (n=66), those from Lincoln-Lemington-Belmar (n=23) were significantly poorer (p=0.013), twice as likely to travel to the grocery store by bus, and shopped significantly less frequently (Fisher's exact test; p=0.016). They were also more likely to shop at Store A than at Store B compared to respondents from East Liberty or Larimer (p=0.036; see below, and Figure 3A).

4.3 STORES PERCEIVED TO CATER TO AFRICAN AMERICANS

African Americans make up greater than 65% of the population in the four neighborhoods without a close-by branch of the local supermarket chain: Wilkinsburg, Homewood, Lincoln-Lemington-Belmar, and the Hill District. However, East Liberty and Larimer also have greater than 60% Black populations [27]. These latter two neighborhoods are very proximal to multiple national and local chain grocery stores. Yet, African American participants in focus groups perceived that only 2 stores (A & C in Figure 3A) serve the Black community. Clientele and staff were perceived to all be African American in store A in spite of the fact that the store lay in close proximity to a predominantly white, wealthy neighborhood, Shadyside. In fact, this store lies in a census tract that is actually in Shadyside, but is perceived to be in East Liberty, and serve an exclusively African American consumer base. One participant had this to say about Store A:

> That used to be a mixed area. It is no longer that mixed. Most of the people in there—most of the customers are Black, most of the sales people are Black. And I just think it's a low priority. In terms of the care and the kind of staff they put in there. And the way they package and do all that.

A branch of the local chain supermarket in the northern Allegheny County borough of Fox Chapel (in the Waterworks Mall)is perceived to be the best of all branches, in spite of the presence of a flagship branch in Shadyside. Suggesting that the quality of food sold at a store depends on the clientele, one focus group participant said:

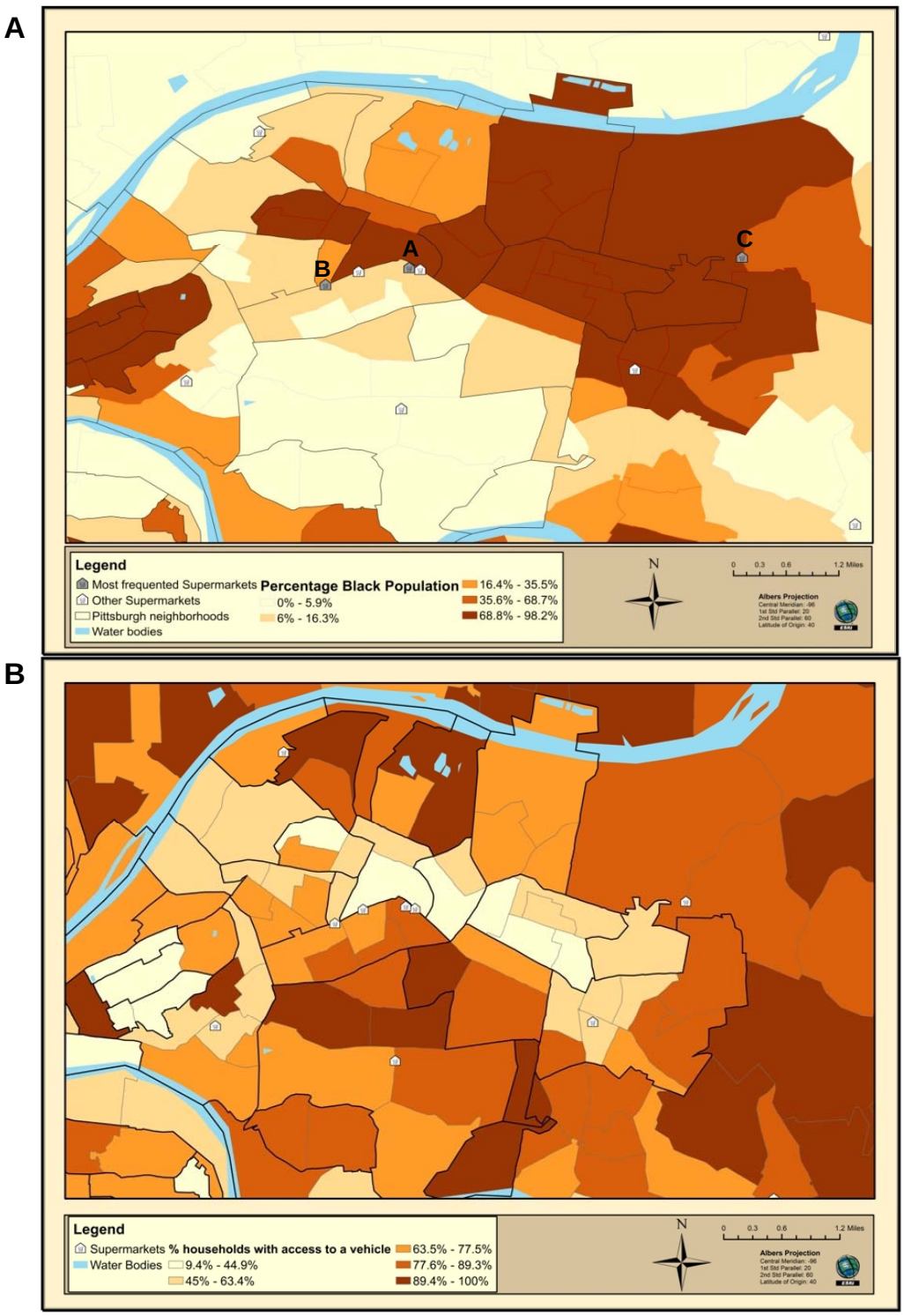

Figure 3: Supermarkets in the eastern neighborhoods of Pittsburgh; A. Stores picked most often as the primary grocery store are shown in grey and labeled. Census tracts are color-coded by Black population (see legend). B. Household access to private vehicles (see legend)

> Fox Chapel is Fox Chapel. The majority of the clientele is Caucasian, upper class. The people are nice, and not only their produce—their meats, cheeses, everything is so much better and fresher.

4.4 THE QUALITY OF FOOD IN STORES

As seen in Figure 4, the proportion of people who are very satisfied with the quality and freshness of food available in their primary grocery store decreased when comparing Store B with either Store A or Store C. Similarly, satisfaction with the selection of produce (fruits/vegetables) was also lower in Stores A and C compared to B (data not shown). Though most respondents picked either "very satisfied" or "satisfied" rather than "dissatisfied" or "very dissatisfied" to express their perception of the quality of food and the selection of produce, focus groups revealed a deeply dissatisfied clientele of stores A and C. Referring to Store A, one participant noted:

> Well, in the produce, there's things like, however they pack it on the trucks or whatever, the first part of the truck's produce will probably go to certain areas, and by the time it gets to the back end, it may be a couple days, a week, then it gets to the other stores. I don't know if they do it systematically like that all the time, but you can kinda tell, because there's no way you'd be touching the fruit!

When asked if food was cheaper at Store A to make up for the lack in quality, one participant responded:

> Same price. Low quality. It's quality that you would get at [name of value store], which is inferior; they could not take that stuff, and put it over there—up at Waterworks—no they couldn't. Not even accepted there. Food is directed to the area.

4.5 SELECTION OF MEAT IN STORES

Store A recently stopped selling fresh meats; there is no butcher in the store anymore, forcing clients to buy only packaged meat. This may be one reason for the difference in satisfaction with the selection of meat between Stores A and B. As seen in Figure 5, the proportion of

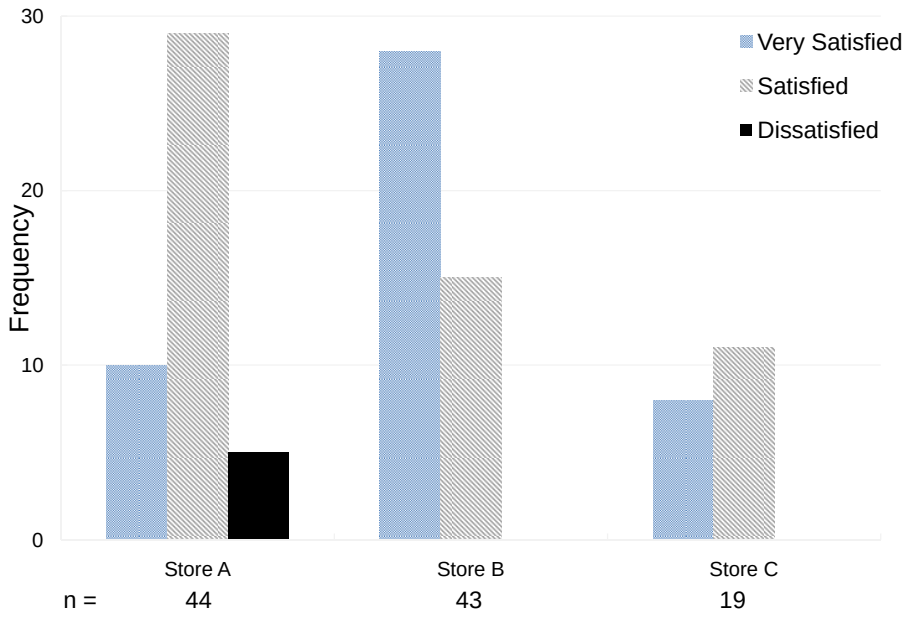

Figure 4: Satisfaction level with quality and freshness of food in the primary grocery store. n=106; Fisher's exact test $p<0.001$

people "very satisfied" with the selection of meat was significantly reduced at Stores A and C compared to that at Store B. Dissatisfaction with the quality of meat at Store A was a recurring theme in both focus groups. One participant put it thus:

> But all the meats are already packaged. And have a price on it. They don't have the fresh meats—fresh poultry or fresh fish, where you can say I want that one, and that one. It's not like that, they're already packaged, sealed, with price, and a deadline for when it's supposed to be no longer sold, but you know, that may or may not be checked.

Concern was expressed about expiration dates on salads as well as meats at stores in the area:

> Another thing is that you have to watch for expiration dates—their meats, I think they tie that over and put different stickers on them, and you've really got to be careful.

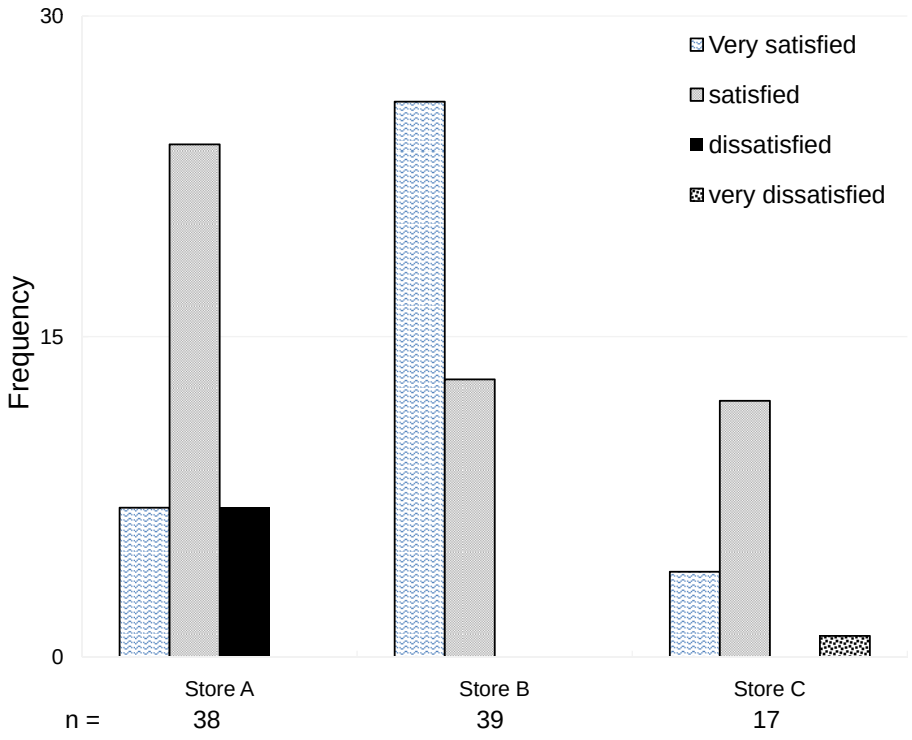

Figure 5: Satisfaction with selection of meat in stores A, B, and C. n=94; Fisher's exact test $p<0.001$

4.6 QUALITY OF SERVICE AT STORES CATERING TO AFRICAN AMERICANS

Perception about the quality of service was gauged from open-ended comments in the survey as well as from the focus groups. In response to a question in the survey asking about desired changes at the primary grocery store, respondents at both Stores A and B mentioned a desire for lower prices, but only respondents who shop primarily at Store A mentioned the need for more cashiers and more check-out clerks. One respondent noted that she would like more in-store specials at Store A; these specials are reportedly offered at other branches of the local chain supermarket, but not at Store A. This is a theme that was discussed in one focus group:

> The prices could be higher sometimes at [Store A] too, like you don't see....at some of the other [branches of the local chain supermarket] they have in-house manager sales. I have never seen that at [Store A].

The discussion led to a participants' perception of the reason for this difference between the branches of the chain store:

> [At Store A,] they can't afford to lose any more profit. They're probably thinking they gotta get this much money if they can, from the people that DO come into the store, whereas the other stores—they're getting a variety of communities, a variety of people coming in that are going to spend their money. They don't have too much choice because they know everybody else is not coming to their store.

There was a recurrent theme of bad service at Store A compared to other supermarkets in the area. One participant put it thus: "You could go within a radius of [Store A], and you can see the difference in the quality of the employees." Furthermore, participants reported that the in-store manager was not responsive to their complaints, leading to a perception that stores in minority neighborhoods were not managed as well as stores in predominantly white communities:

> They just want to make sure that they have these stores open, in these so-called communities. They don't care about the managers' necessarily attitude, and they don't care about how they run their store.

4.7 WHY PEOPLE CONTINUE TO SHOP AT STORES PERCEIVED TO BE OF POORER QUALITY

As can be seen in Figure 3A, stores A and B are very close to each other; they are also on many of the same bus routes. Hence, it becomes important to understand why people continue to shop at Store A given their perceptions that the quality of food and meat, as well as that of the service at this store is inferior to that at Store B, and in general, the reasons for continued allegiance to stores A and C. Three themes emerged in this regard from the focus groups.

4.7.1 Need to support stores that cater to the Black community

A participant in one focus group voiced a need for stores in minority neighborhoods:

> I stopped going there[to store A], but [my friend] had a very good point about—she said that she purposely goes there because she doesn't want them to close the store. Because they really are the only....you know they're one of the more accessible grocery stores for our community—for the black community.

The lived history of the community may give them reason to be apprehensive about Store A shutting down; a branch of the store in Oakland, that served the historic Black neighborhood, the Hill District, shut down in recent years, forcing Hill District residents to shop further away.

4.7.2 Jitneys are only available at some stores and not at others

A theme that arose in both focus groups was that of the availability of Jitneys at stores A and C, but not at Store B, effectively forcing people who did not have access to private transportation, to shop at stores in spite of perceiving the quality of food/service there to be inferior compared to other stores. Jitneys are unofficial taxis that are part of the historic landscape of Pittsburgh, providing an important service to Black communities where legal taxis are difficult to come by [28]. The importance of Jitneys in determining the choice of supermarket was voiced thus:

> You only see that [Jitneys] at [Store C], and [Store A]. And they do that for the Black; people go there to do their large shopping, and they've got two carts. They can't afford to go to [Store B] because they can't get on the bus with that.

A participant in the second focus group reported that people from the Hill District without private transportation had to call for a Jitney at Store B, an added inconvenience, rather than find one waiting outside as was possible at Stores A and C:

> They have to get a Jitney. And that's an extra expense. They have to go by bus and get a Jitney to bring their things back so that makes them have to spend more money. And at [Store B], they make them—they have to call for a Jitney to come, you know.

In Pittsburgh, thus, people continue to buy their food in certain stores in spite of perceiving the food to be of low quality there, because of the availability of Jitneys–a legacy of

discrimination against African Americans.

4.7.3 Pride in Black ownership of a franchise branch of the supermarket

A third theme that explains continued patronage of supermarkets perceived to offer low-quality food and service is support for African American ownership of the franchise branch (Store C) of the supermarket chain. Store C is owned by an African American woman; this is a major source of pride in the community, which wants her to be successful: "I really want to support her. I'm hoping that she's able to hold that store," said one participant in the second focus group. A resident of Homewood, who perceives Store C to lie in her neighborhood, had this to say: "I live in Homewood, and we have been so many years without a grocery store, so finally [we] have one, it's owned by a black woman, and she keeps her store clean." A complaint about Store C, while voiced in the first focus group, did qualify that it was not about the lady (African American) manager:

> I mean it's not quite as bad [as Store A] but you can tell it's going to go that way. And I had to deal with the manager—I mean not the lady manager, but there was another manager—same attitude.

In spite of the lower level of satisfaction with the quality of produce and meat available in store C reported in the survey (Figures 4 and 5), Black ownership of this franchise store is clearly a source of pride in the community and may serve as a moderating factor in the perceptions voiced about that store.

4.8 THE IMPACT OF PERCEPTIONS ON DIET AND SELF-EFFICACY

In order to study the effect of people's perceptions of their food environment on their diet, we sought to test the correlation between level of satisfaction with the quality and freshness of food, and their dietary stage of change (with respect to a low-fat diet or a high-fiber diet; see Methods section). As shown in Figure 6, people who reported being "very satisfied" with the quality and freshness of food at their primary grocery store were more likely to be in *maintenance* with respect to either eating a low-fat diet (Figure 6A) or a high-fiber diet

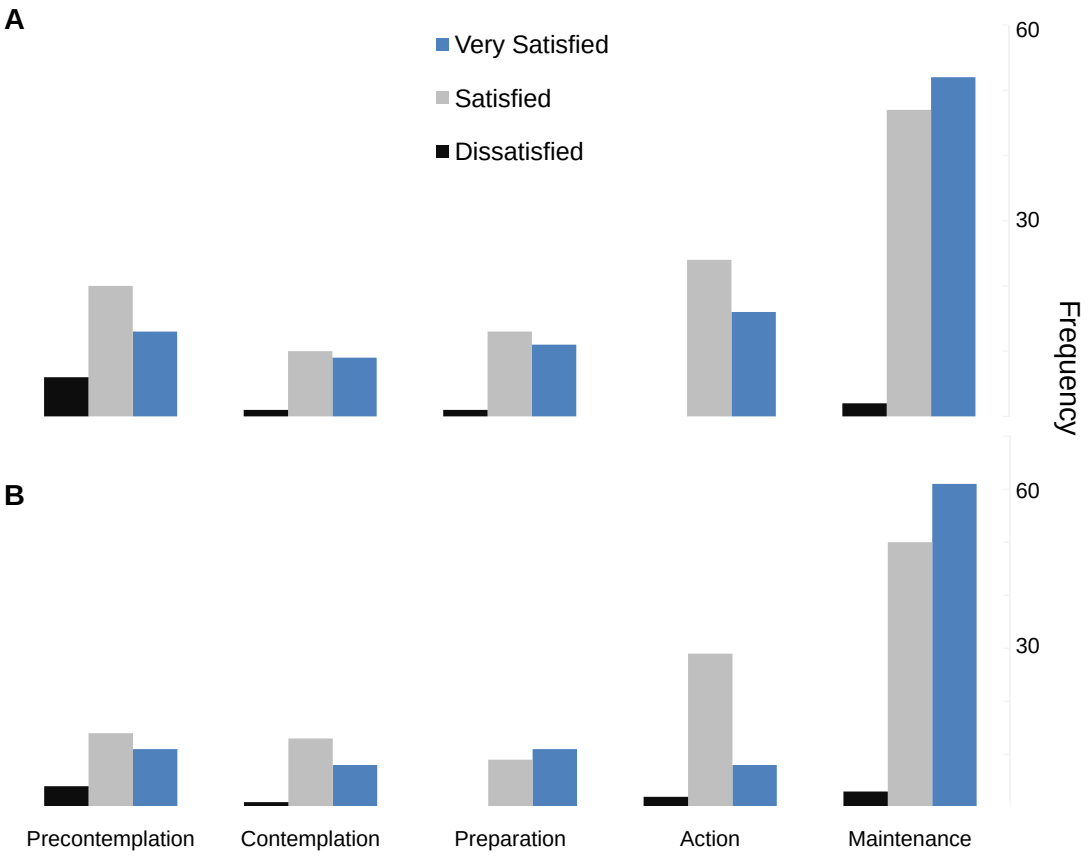

Figure 6: Effect of satisfaction with quality and freshness of food at primary grocery store on stage of change in eating a low-fat diet (A; n=225; p=0.007) and a high-fiber diet (B; n=224; p=0.03)

(Figure 6B), whereas people reporting being either "satisfied" or "dissatisfied" were more likely to be in one of the other stages of change. We saw no significant correlation between reported satisfaction with either the selection of produce or the selection of meat and dietary stage of change.

In order to eat a healthy diet, people need to both *afford* and *find* healthful foods in their stores. We measured people's confidence in their ability to engage in these two behaviors, and studied its correlation with their reported level of satisfaction with the quality and selection of produce and meat. As seen in Table 3, the more satisfied a person reported being with

Table 3: Correlation coefficients after controlling for age and income; all are significant at 0.01 level

	Self-efficacy to find healthy food
Quality and Freshness of Food	**0.410**
Selection of Produce	**0.383**
Selection of Meat	**0.330**

the quality of food, selection of produce, or the selection of meat, the more confident they were in their ability to *find* healthy food, even after controlling for age and annual household income.

A correlation between self-efficacy to *afford* healthy food and reported satisfaction with the quality and freshness of food (0.325; $p<0.01$) and selection of produce (0.244; $p<0.05$) exists, but only for people who reported an annual income >\$16,666.67 per person in the household. Among low-income people (annual income per head in the household =<\$14,999), there is no correlation between their level of satisfaction with the quality or selection of food, and reported confidence in their ability to afford healthy food (see Table 4). This suggests that people's perception of the quality of food available to them is an important determinant of self-efficacy to afford healthy food, given a minimum level of income. Yet, self-efficacy to afford healthy food is correlated with engaging in a high-fiber diet among low-income respondents (Table 4), suggesting that self-efficacy to afford healthy food is an important determinant for low-income people to eat a high-fiber diet. For both high-income and low-income respondents, however, personal value attached to a low-fat diet was the strongest predictor of dietary behavior (see section 4.9 below).

After controlling for age and annual income, satisfaction level with the quality of food is no longer correlated with the stage of change to a low-fat or a high-fiber diet. Since annual income per person in the household is significantly correlated with where the respondent shops (Fisher's exact test, $p=0.03$), and because the identity of the store determines the level of satisfaction with quality of food (Figures 4 and 5), it is conceivable that controlling

Table 4: Correlation coefficients after controlling for age; ***: significant at 0.01 level; **: significant at 0.05 level; *: significant at 0.10 level

	Self-efficacy to afford healthy food	
	Low-income	High-income
Quality and Freshness of Food	0.088	**0.344*** **
Selection of Produce	0.198*	**0.266** **
Stage of change: high-fiber diet	**0.207** **	0.142

for income, in effect, controls for some of the variability resulting from perceptions of quality (annual income per person in the household is not correlated with satisfaction level with the quality of food). Indeed, the satisfaction levels and self-efficacy are significantly correlated before correcting for income: in agreement with the result in Figure 6A and B, satisfaction with the quality and freshness of food in the primary grocery store is positively correlated with stage of behavior change to a low-fat (Pearson coefficient=0.162; p=0.025) and a high-fiber diet (Pearson coefficient=0.144; p=0.046) after controlling for age, but not income.

4.9 EFFECT OF PERSONALIZED VALUE ATTACHED TO LOW-FAT DIET ON DIETARY BEHAVIOR

By far the strongest positive correlation with dietary behavior, after correcting for income and age, is the personalized value attached to a low-fat diet (Table 5). This value attached to a low-fat diet is positively correlated with the reported level of participation in HBFP (n=152; Pearson's correlation coefficient=0.205; p=0.011; Table 5). Because attaching an increased value to eating a low-fat diet is correlated with being further along in the stages of dietary behavior change, we believe it is noteworthy that participation in the HBFP lifestyle modification program is positively correlated with this outcome.

Table 5: Correlation coefficients after controlling for age and income; **: significant at 0.01 level; *: significant at 0.05 level

	Participation in HBFP	Value of low-fat diet
Stage of change: low-fat diet	0.115	**0.631****
Stage of change: high-fiber diet	0.068	**0.488****
Value of low-fat diet	**0.205***	

4.10 COMMUNITY-GENERATED IDEAS TO TACKLE ISSUES

In an effort to determine future directions for research as well as programs, from the point of view of the community, we asked focus group participants how they would envisage dealing with issues that they perceived needed to be dealt with in their neighborhood. Responses ranged from having senior centers contribute, through grants, to help seniors afford healthy food, in addition to farmers' market vouchers from the government, to advertising farmers' markets in neighborhoods.

4.10.1 Helping seniors eat a healthy diet

Senior citizens in one focus group had many concerns about their ability to get to stores after they could no longer drive, and their ability to read the extremely small font used in food labels. With respect to their self-efficacy to eat a healthy diet, they believe that senior centers had a role to play:

> Senior centers make you think more about taking better care of yourself. Because you focus on the type of programs that they have. And a lot of it is nutrition, some of it is more physical activity, most of them are about you.

One participant shared that she learned how to prepare food from simply paying attention to the menu at her senior center:

> Being in a center also, in terms of focusing on food, their menus are such that it makes you kinda think about the way you fix things at home, because you know that these menus are

> planned, counted calorie-wise. Low salt, whatever. So just looking at the menu, sometimes, will give you an idea of fixing something.

Some participants felt that senior centers could have a role to play in making healthy food more accessible to seniors:

> Another idea is perhaps our senior citizens-our senior centers could deposit some type of a grant to help the seniors to be able to afford. They can give us some type of a stipend or a voucher, in addition to what you get for the farmers' market once a year. That would help us to supplement our finances when we go to the store.

4.10.2 Farmers' markets need to be advertised more

There is a perception that many people are not aware of farmers' markets, though they may be present during the summer in some neighborhoods considered to be low-income. One participant advocated advertising these markets: "But there needs to be more advertisement for the farmers' markets. So that it's all in the community - some type of may be a flier or something." In order to draw young parents to farmers' markets, one participant suggested:

> Well, I was going to say, there needs to probably be some kind of outreach to that generation. Then they would be willing to probably go to the farmers' market. So they know that they can spend their money and still get enough for their money, and it will be quality food for the children.

4.10.3 The importance of having your voice heard

There was a recurring theme in both focus groups that suggested that whereas participants believed in the importance of voicing their opinions to in-store managers, their complaints were not acted on, and that their voices needed to be heard by the corporate management of supermarkets. One participant had this to say about the importance of complaining: "If people do not bring it to management's attention, they think everything is ok, or oh, that's the way they like to be treated." Another participant said:

> You'd have to go above management-you'd have to go to the corporate-and say, in these areas, in these stores, they need retraining, or new management or something like that. Because this talking to them-it's just like it falls on deaf ears.

One participant suggested that the clients of supermarkets could be involved in ongoing monitoring of the quality of food and services at the store:

> I think every so often, they should do surveys, when people come in, they should pass out a survey. How was the service, How did you find -was the meat fresh? Was the vegetables fresh? What did you find wrong with the store? How were the attitudes? I think that would help too. And it would have to go to the corporate office. Not to the manager there, but to the corporate office. And let them handle it. You know, because that-I think that's the only way it would get solved.

This suggestion ties nicely back to the original study conducted in Los Angeles; CHC, Inc. is implementing the "Neighborhood Food Watch" program[29] to involve the community in providing feedback to stores in an effort to encourage a dialog between clients and store managers about the needs and perceptions of shoppers.

5.0 DISCUSSION

We have shown that perceptions about the quality of food and service available to people are determined by their choice of supermarket. Only two of the nine supermarkets in the eastern neighborhoods of Pittsburgh are perceived, by African Americans, to cater to their community. Respondents of our survey who shop at either of these two supermarkets rated their satisfaction with the quality and freshness of food, the selection of produce, and the selection of meat *lower* than did respondents who shopped at a different branch of the same supermarket. They also perceived the quality of service to be *poorer* at one of the two stores. In general, African Americans perceive that they are discounted, their voices not heard, and that the consumer nutrition environment available to them is poorer because of a lack of attention to stores that cater to a predominantly low-income, black consumer base.

This study has several limitations: we have focused only on a subset of neighborhoods in Pittsburgh and adjoining Boroughs/Townships in Allegheny County, based on the Health Empowerment Zone [7, 30] of the Center for Minority Health. The study gives us valuable information about the perceptions of African Americans in these areas, but does not allow us to draw conclusions about stores/supermarkets in other areas of the city/county. The survey was administered to a convenience sample who could be contacted through the CMH's newsletter, via posters at the Kingsley Association, or through Lemington Community Services. Not having used a probability sample, we are unable to generalize our findings to the African American population at large in these neighborhoods. However, the demographic data suggest that while we have less representation from people with an annual household income of <$10,000 a year, we do have representation from across the age, education, and income ranges expected in these neighborhoods [27], increasing our confidence in the ability of the data to contribute valuable information about the perceptions and needs of residents

in these areas.

Survey respondents and focus group participants perceived a need for changes in the quality of service, produce, and meat in Store A. Whereas this store technically lies in a predominantly white, high-income census tract, it is perceived to cater almost exclusively to African Americans. The store is a branch of the local supermarket chain in Allegheny County, but is perceived to offer consistently worse service than other branches of the same chain. Participants' ideas to tackle this issue included meeting the corporate management to present their issues, as well as an ongoing monitoring program involving clients monitoring the quality of food and service at the store.

Ongoing monitoring would entail participation by consumers of store A—significantly poorer than consumers of Store B, and predominantly African American—in the management of this store. If the in-store managers or corporate management of the chain were receptive to this idea, it has the potential to provide feedback to the store from shoppers, and over time, to improve efficiency and quality of food and service at the store. However, even in the absence of discernable improvement in the store itself, ongoing monitoring by this historically disadvantaged consumer base could lead to capacity building and empowerment of the Black community. From the point of view of the social determinants of health, an acknowledgement by the community of their needs and voicing their perceptions on an ongoing basis could empower them to reassess their access to healthy food on a regular basis, and make the strides necessary to making sure that they have easy access to affordable, healthy food in their community.

Price has been shown to be a barrier to healthy eating in multiple studies [31, 32, 33]. In our study, we find that confidence in affording healthy food is correlated with being further along in the stages of change to a high-fiber diet in respondents who earn less than $14,999 per head annually. This self-efficacy to afford healthy food was increased when people (who earned >16,666.67 per head annually) were satisfied with the quality of food available in their preferred grocery store. In low-income people, the perceived quality of food had no effect on self-efficacy to *afford* healthy food. The social cognitive theory suggests that self-efficacy is a pre-requisite to sustained behavior change [23]. We conclude that for low-income people, self-efficacy to afford healthy food can be increased by making food more affordable—this

can be done through the presence of grocery stores that serve healty food in underserved neighborhoods such as Lincoln-Lemington-Belmar and Homewood, or by reducing the price of food in supermarkets. However, for people who earn more than $16,666.67 annually, it may be sufficient to take steps to improve the perceived quality and freshness of food and selection of produce available to them in their preferred supermarket. In high- and low-income people alike, however, self-efficacy to *find* healthy food was high if people perceived the quality and freshness of food, and the selection of produce and meat to be of a high quality. Thus it is important that people perceive that their store makes available high-quality food if they are to be confident of their ability to find healthy food.

Self-efficacy is not strongly correlated with the behavior of eating a low-fat or high-fiber diet in this study. Possible reasons for this include the fact that the measure of self-efficacy used was for confidence in ability to afford or find *healthy* food, while the stages of change measures determined people's engagement in a *low-fat* or *high-fiber* diet. Self-efficacy/confidence to engage in a low-fat or a high-fiber diet may have been highly correlated with the respective behaviors, as seen by Glanz *et al.* [19], but our intention here was to get a measure of people's perceived confidence in their ability to find healthy food at the store where they shop, and their ability to afford this food.

We found that eating a high-fiber diet and eating a low-fat diet are directly correlated with the personalized importance attached to a low-fat diet after controlling for age and income. The importance attached by individuals to eating a low-fat diet was correlated with their level of participation in HBFP, a program that seeks to promote health by providing access to health coaches and physical activity classes. Participants in a focus group revealed that while they entered HBFP already knowing of the importance of a healthy diet, participation in the classes, engagement with the health coaches, and interaction with fellow participants had reinforced the importance of this behavior.

In light of our results, we propose that the model [9] in Figure 1 can be modified; the construct of the community nutrition environment, which includes the location and type of stores, should also include the clientele or customer base of the store. Our results suggest that the perceived clientele of a store has an impact on the shopping behavior of residents, as well as on their perceptions of the quality of food available in the store. The dimension

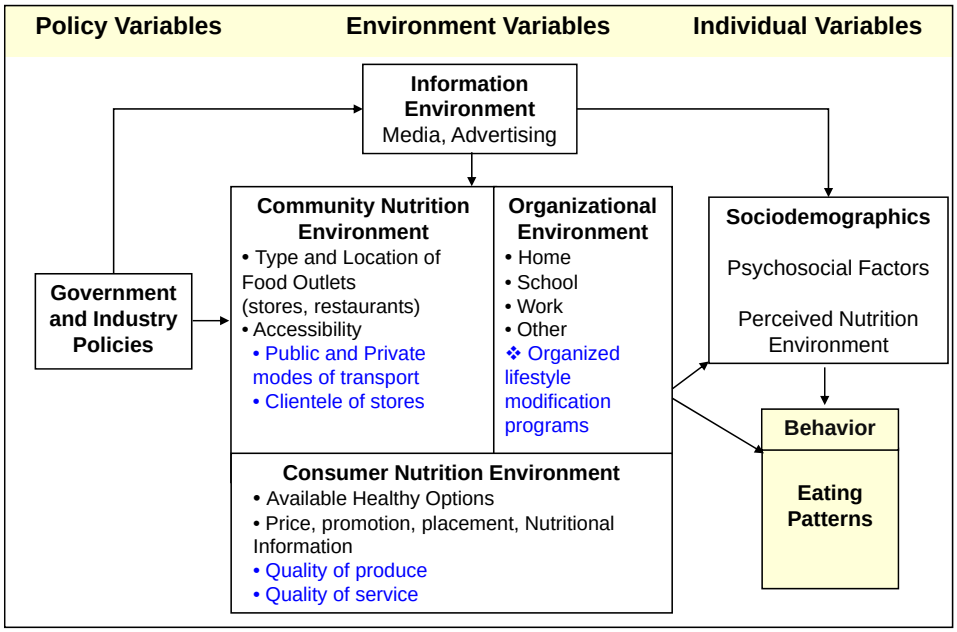

Figure 7: Adapted from Glanz *et al.* [9]; text in blue is addition to the published model

of access, which includes transportation, should reflect the availability of both public and private transportation, and both official and unofficial forms of transportation. The construct of the consumer nutrition environment should include the quality of food, and the quality of service, which impact people's shopping and dietary behaviors. Finally, the organizational environment includes the home, office, and school, but should include organized lifestyle behavior change programs such as HBFP. An adapted version of the model is presented in Figure 7.

6.0 CONCLUSIONS

We conclude from this study, that the community and consumer food environment have impacts on the perception of individuals regarding the healthy food available to them, and impact their behavioral choices. We believe that the ideas and hopes of engagement with store owners expressed by participants suggests that there may be an opportunity for empowerment of the community through participation and providing feedback to supermarkets regarding the needs of their consumers. Eating a healthy diet is essential in preventing multiple chronic diseases. This study demonstrates that consumers of specific stores in the eastern neighborhoods of Pittsburgh perceive less access to a healthy diet due to the poor quality of food stocked at the store and the poor quality of service available there. We suggest that stores should pro-actively engage their consumers to understand their concerns and needs, so as to enable a reduction in the disproportionate burden of chronic diseases borne by these communities.

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