

Effect of Socioeconomic Status on Food Availability and Cost of the Dietary Approaches to Stop Hypertension (DASH) Dietary Pattern

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The authors assessed food availability and cost of the Dietary Approaches to Stop Hypertension (DASH) dietary pattern and patients' opinion concerning diet and blood pressure by surveying grocery stores and clinic patients in low- and high-socioeconomic status (SES) areas of Boston, Massachusetts. The proportion of DASH items found in stores in low- and high-SES communities was not significantly different (46.5% compared with 75%; $P=.$ 2896). The cost of eating a DASH meal plan was significantly more expensive in high-SES communities (\$40.20 compared with \$30.73 per week; $P=.$ 0413). The authors' results suggest that DASH diet foods are available in low- and high-SES communities, but there is a strong trend toward less food availability in low-SES communities. Eating the DASH diet, however, is more expensive in high-SES communities. Increased information, food availability, and affordability are likely to lead to more widespread adoption of the DASH diet. J Clin Hypertens (Greenwich). 2008;10:603–611. ©2008 Le Jacq

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Manuscript received December 12, 2007; revised March 31, 2008; accepted April 21, 2008*

Hypertension is a leading contributor to morbidity and mortality in the United States and throughout the world. Approximately 7.1 million deaths per year worldwide are attributable to high blood pressure (BP).¹ In addition, according to the World Health Organization, suboptimal BP (systolic BP (SBP) >115 mm Hg) is responsible for 62% of cerebrovascular disease and 49% of ischemic heart disease,¹ and the risk of cardiovascular disease increases progressively throughout the entire range of BP levels.² Because of the large proportion of the population affected by above-optimal BP, preventive strategies are a top priority.

The Dietary Approaches to Stop Hypertension (DASH) dietary pattern, which emphasizes intake of fruits, vegetables, low-fat dairy foods, whole grains, poultry, fish, and nuts and is reduced in fats, red meat, sweets, and sugar-containing beverages significantly lowers BP, even in the absence of reduced sodium intake or weight loss.³ The DASH diet is effective in lowering BP in blacks and whites, in all age groups, and among persons with prehypertension (BP of 120/80–139/89 mm Hg) as well as stage I hypertension (BP of >140/90 to <160/100 mm Hg). The DASH dietary pattern was even more effective when sodium intake was reduced.⁴ In the DASH-Na feeding study, in which all food was supplied, the maximum BP control rate of 84% was achieved with a combination of a low sodium intake and the DASH diet. Furthermore, BP became normal or optimal in 71% of persons consuming the DASH/lower-sodium diet.⁵ In studies of individuals choosing their own foods, DASH lowered BP when it was incorporated into a behavioral intervention that included weight loss and increased physical activity.⁶



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Reduction of BP with adoption of the DASH dietary pattern at a population-wide level might potentially reduce the incidence of coronary heart disease by 15% and stroke by 27% in US adults.³ There is no evidence that the efficacy of DASH varies by education level or annual family income, suggesting that this approach might be a desirable nonpharmacologic intervention for all individuals at risk.⁷ Consequently, the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) includes DASH in its recommendations for the prevention and treatment of hypertension.⁸ The ability to adopt the DASH dietary pattern may be influenced by the availability and cost of DASH foods, by taste preferences, and by patients' lack of information or perceived or actual inability to afford these foods.⁹ These potential barriers to widespread dissemination of DASH were assessed in the current study by surveying food stores and patients in high- and low-socioeconomic status (SES) communities in Boston, Massachusetts, and adjacent communities.

MATERIALS AND METHODS

The Duke University Health System Institutional Review Board reviewed this study and declared it exempt from institutional review board review under 45 CFR 46.101(b)² on December 2, 2005. Informed consent was not required.

Selection of Communities

Communities were considered high- or low-SES based on mean level of educational attainment, mean household income, and unemployment rate. Educational attainment is a measure of SES that may be particularly relevant to health issues and reflect a given person or community's ability to act on and process information as well as their ability to navigate the medical system and understand available options. Income reflects the ability to purchase food and access medical assistance. Last, unemployment rates reflect many measures related to health care, including accessibility of medical treatment.

Using the Massachusetts Community Health Information Profile (MassCHIP), values for the above measures of SES were obtained for all Boston neighborhoods as well as the adjacent communities of Belmont and Brookline, Massachusetts.¹⁰ The MassCHIP database is a collection of demographic factors including population size, income, education level, and unemployment rate. The profile is free and available online through the Massachusetts Department of Public Health.

Educational attainment was defined by two separate measures: the percentage of those aged 25 years and older who successfully completed high school (grades 1–12) and the percentage of persons aged 25 years and older with at least a Bachelor's degree. Mean household income was defined as the total income of a given household, not presuming any family relationship between members of that household. Unemployment rate was defined as the percentage of individuals aged 16 years or older in the civilian labor force who were unemployed.

A low-SES community was defined as a community in which the mean values for education and income were below the mean for the state of Massachusetts and mean values for unemployment were above the mean. A high-SES community was defined as a community in which education and income were above and unemployment was below the state mean.

Food Availability and Cost Survey

Store Selection. Two communities at each SES level were selected for the food availability and cost survey. Within these communities, stores were eligible for inclusion if they were listed in the Greater Boston Yellow Book¹¹ and/or Yahoo! Yellow Pages¹² under "food products," "grocery stores," "market," or "supermarket" and if they were physically located within the boundary of the selected communities using a Boston city map published by Rand McNally.¹³ For each SES classification, at least 3 supermarkets were included. An additional 7 stores for each classification were selected by a study investigator from all other eligible stores within that community. Convenience stores, specialty stores (e.g., meat or fish only), stores with incorrect contact information, or stores in which employees or store owners refused to have their store surveyed were excluded. All eligible stores were open between the hours of 10:00 AM and 6:00 PM. Out of 27 stores approached, 7 refused to be included in the study (1 high-SES store and 6 low-SES stores). A total of 20 stores were selected: 10 in the high- and 10 in the low-SES communities. The principle investigator personally visited and gathered data from each grocery store between March 18, 2006, and May 11, 2006. Prices were recorded without the assistance of store personnel.

Food Availability Assessment. A 7-day menu based on the DASH dietary pattern (consisting of 3 meals and 1 snack per day)¹⁴ was used to create a grocery store shopping list. The specific foods were selected from the 7-day DASH menu found in the National

Table I. DASH Diet Food Groups and Example Items

| FOOD GROUP | DAILY SERVINGS | NO. OF ITEMS IN GROUP | EXAMPLES USED IN THE 1-WEEK MENU |
|-----------------------|----------------|-----------------------|--|
| Bread/grains | 7–8 | 17 | Whole-wheat bread, oatmeal, cereal, rice, spaghetti, crackers |
| Fruits and vegetables | 8–10 | 30 | Cucumber, lettuce, spinach, frozen corn, carrots, celery, apricots, bananas, apples, oranges, raisins, peaches, canned pears |
| Dairy | 2–3 | 11 | Skim milk, margarine, fat-free yogurt, reduced-fat cheese |
| Meat | ≤2 | 9 | Tuna, turkey breast, ground turkey, cod, chicken breast |
| Other | N/A | 30 | Seasonings, cooking oils, condiments, juices |
| All | | 97 | |

Abbreviation: DASH, Dietary Approaches to Stop Hypertension.

Heart, Lung, and Blood Institute (NHLBI) publication “Your Guide to Lowering Blood Pressure with DASH.”¹⁴ In addition to meeting guidelines of the DASH dietary pattern (eg, 9–12 servings/d of fruits and vegetables, 2–3 servings/d of low-fat dairy), the menu contains an average of 2400 mg/d of sodium, which is consistent with the JNC 7 recommendations.⁸ A total of 97 items were required to prepare 7 days of food for one person (Table I). Each of these items was sought in each selected store. If an item was present, regardless of the quantity of the item currently in stock, it was counted as being available. In each store, the number of available items on the menu list was counted and divided by the total number of items on the menu to get the percentage of all items that was available in that store. The 97 food items were divided into food groups (eg, fruits/vegetables, dairy, meat), to calculate the percentage of items in each food group that was available in each store.

Cost Assessment. The current cost of each item in the diet was recorded in two ways: the price of purchasing the exact quantity of each item needed for one person to consume DASH for 1 week (DASH exact quantity price [DEQP]) and the price of purchasing the smallest amount possible (DASH minimum quantity price [DMQP]). If the exact quantity could not be purchased (eg, 1 egg), the price of the smallest quantity that could be purchased (eg, a dozen eggs = DMQP) was divided by the exact quantity needed to get the DEQP for the item (eg, 1/12 of the cost of a dozen eggs would be the DEQP for eggs). For some items, like spices and some condiments that are used in very small quantities, the DEQP could not be accurately estimated. For these items, the DEQP was standardized based on the smallest volume available in any of the stores in which that item was found. Some items on the NHLBI 7-day menu were based on recipes; for these items, the price of the entire recipe was

divided by the number of servings per recipe to derive the price of one serving. If there were multiple options for a particular item, we selected the smallest quantity and least expensive option. All prices were rounded to the nearest cent.

Although most items were found in multiple stores, <10% were found in every single store. To ensure comparability of available items when establishing cost, we calculated cost based on all items found in at least 60% of the stores. The average cost of eating the 7-day DASH diet (both DEQP and DMQP) was averaged over all stores in each SES category and compared between high- and low-SES stores.

Public Opinion Survey

Selection of Community Health Centers. Community health centers were selected from members of the Massachusetts League of Community Health Centers. Health centers that served communities meeting all the criteria described above for defining low and high SES were contacted first and invited to participate. In the event that none of the health centers meeting all of the criteria were willing or able to participate, we selected a center meeting 2 of the 3 criteria. Of the health centers that responded to the initial invitation within the allotted time, 1 health center was selected from a high-SES community and 1 was selected from a low-SES community.

Inclusion Criteria for Participants Completing the Survey. All patients who had appointments on the days that the given community center was to be surveyed were approached about the study by the principal investigator. Patients were invited to participate after they checked in for their appointment. In addition, patients could participate if they approached the principal investigator in response to advertisements and posters displayed in the center’s

Table II. Percentage Availability of DASH Menu Items

| ITEMS | LOW-SES STORES, MEDIAN (IR) ^a | HIGH-SES STORES, MEDIAN (IR) ^a | P VALUE ^b |
|--------------------|--|---|----------------------|
| All | 46.50 (35, 85) | 75.00 (47, 88) | .2896 |
| Produce | 55.00 (33, 93) | 83.50 (53, 93) | .4703 |
| Bread/grain | 41.00 (29, 76) | 70.50 (53, 82) | .0797 |
| Dairy | 22.50 (18, 82) | 68.50 (27, 91) | .1928 |
| Meat | 22.00 (22, 78) | 72.50 (22, 89) | .4731 |
| Other ^c | 61.50 (53, 83) | 67.00 (60, 93) | .2866 |

97 items were included from menus chosen from the Dietary Approaches to Stop Hypertension (DASH) diet eating plan (National Institutes of Health¹⁴) Abbreviation: SES, socioeconomic status. ^aInterquartile range (IR) (25%, 75%). ^bP value of difference calculated using Wilcoxon Rank Sum test. ^cCondiments, juices, and seasonings.

Table III. DASH Exact Quantity Price in Dollars by SES Classification

| ITEMS | LOW SES, MEDIAN (IR) ^a | HIGH SES, MEDIAN (IR) ^a | P VALUE ^b |
|--------------------|-----------------------------------|------------------------------------|----------------------|
| All | 30.73 (21.76, 35.68) | 40.20 (33.96, 50.68) | .0413 |
| Produce | 13.23 (8.57, 14.20) | 16.23 (9.26, 21.78) | .2265 |
| Bread/grain | 3.29 (2.02, 4.68) | 4.53 (3.84, 5.21) | .1124 |
| Dairy | 5.24 (1.93, 8.12) | 7.40 (6.39, 8.58) | .0821 |
| Meat | 1.67 (1.48, 2.65) | 2.28 (2.20, 2.54) | .1304 |
| Other ^c | 8.40 (5.85, 10.29) | 11.35 (8.72, 12.76) | .1306 |

Abbreviation: SES, socioeconomic status. ^aInterquartile range (IR) (25%, 75%). ^bP value of difference calculated using Wilcoxon Rank Sum test. ^cCondiments, juices, and seasonings.

lobby. Based on informal assessment, all participants were required to speak and read English well enough to complete the survey. Data from individuals who completed at least 75% of the survey were included for statistical analysis. All participants were reimbursed with a \$5 gift card. Target sample size was 50 at each center (total N=100).

Survey Construction. The survey was based on the Knowledge of Diet and Blood Pressure (KDBP) study developed by Carter-Edwards and colleagues¹⁵ and included questions on patient characteristics such as demographics, shopping habits, knowledge of healthy nutrition including DASH dietary pattern, opinions about healthy eating and knowledge concerning hypertension and its consequences, and availability and affordability of a healthy diet.

Statistical Analysis

Average food availability and cost (based on individual foods as well as food groups) were calculated and compared across SES categories. Questions on the public opinion survey were scored on a Likert scale. Survey results from all patients at each health center were combined, and mean values were compared between the high- and low-SES community health centers. For all outcome variables, means, medians, and histograms were generated. If data appeared normally distributed, the two-sample *t* test was used. If data were not normally distributed, the Wilcoxon rank sum test was used. All analyses were performed with Stata Statistical Software 2005, release 9.0. (StataCorp LP, College Station, TX).

RESULTS

Community Selection for Food Availability and Cost Assessment

Of the 19 neighborhoods and towns queried, 4 met the qualifications for high-SES classification: Belmont, Brookline, Charlestown, and West End. Eight of the queried communities and towns met the qualifications for low-SES classification: East Boston, Hyde Park, Mattapan, North Dorchester, Roslindale, Roxbury, South Boston, and South Dorchester.

For the food availability and cost survey, the high-SES neighborhoods Charlestown and Brookline and the low-SES neighborhoods East Boston and Mattapan were selected due to their proximity to Boston proper, physical locations in relation to one another (ie, comprising distinct sections of the greater Boston area), and manageable size for surveying. Of the 10 randomly selected grocery stores from the high-SES communities of Brookline and Charlestown, 5 were supermarkets, 2 were markets, and 3 were bodegas (ie, small corner grocery stores). Three supermarkets, 2 markets, and 5 bodegas were randomly selected from the low-SES communities of Mattapan and East Boston.

Food Availability and Cost

The high-SES stores carried on average 73 of 97 (75%) of the DASH food items compared with 45 of 97 (46%) in low-SES stores ($P=.2896$). Table II demonstrates that the high-SES grocery stores tended to carry more DASH items than low-SES stores overall and in each food group category. However, these differences in food availability, while certainly suggesting a difference, were not statistically significant. Table III shows that overall the cost of the DASH food was higher in high-SES stores than in low-SES stores (\$40.20 vs \$30.73

per person per week; $P=.0413$). Although the difference in cost of each food group was not statistically significant, the price trended higher in the high-SES stores in each category.

Characteristics of Survey Participants

Fifty individuals completed the survey at each community health center. Participants surveyed at the high-SES clinic, Back Bay HealthCare Center (BBHC), were more likely to be young and female and less likely to be minorities (Table IV). As expected, the zip code of residence showed that participants at BBHC were more likely to live in high-SES communities; patients at the low-SES clinic, Mattapan Community Health Center (MCHC), were more likely to live in low-SES communities. The survey also confirmed that compared with MCHC participants, BBHC participants had higher levels of education ($P<.0001$) and greater household income ($P=.0006$) and considered themselves in a better financial situation at the end of each month ($P<.0001$).

Community Health Center Selection

The public opinion survey (Table V) was conducted at MCHC, which serves a low-SES community, and at BBHC, which serves a high-SES community. BBHC met only 2 of the 3 criteria (mean household income and educational attainment rate) for high SES but was selected because no community health centers meeting all 3 criteria (mean household income, educational attainment rate, and unemployment rate) agreed to be in the study.

Survey Results

Sixty-six percent of BBHC participants and 42% of MCHC participants were able to identify the benefits of a healthy diet, but most could not completely identify the correct components of a healthy diet (Table V).

When asked to rank priorities for important aspects of life, both high- and low-SES participants ranked health and illness, job/occupation/education, and security as their top priorities (data not shown). Both groups ranked social life as least important. High-SES participants reported that they learn about healthy eating most frequently from a health care provider, followed by friends/family. Low-SES participants reported that they learn about healthy eating most frequently through health care providers. Personal health concerns and time to prepare food were the main influences on food choices for high-SES participants. Food choice for low-SES participants was influenced

most by personal health concerns, culture/ethnicity (eating habits), and time. Price was ranked fourth by both groups with respect to influence on food choice. Despite price being ranked as an equally important influence on food choice, high-SES participants identified time as the most important obstacle to healthy eating, while low-SES participants reported that affordability of healthy foods was the most important obstacle.

Both groups indicated that diet was somewhat or very important to them (94%–88% for high and low SES, respectively). There was no difference between high and low SES in the proportion that ranked their current diet as either healthy or very healthy (64% vs 58%, respectively), their opinion that a healthy diet is definitely or somewhat affordable (68% vs 66%, respectively), or their preparedness to continue to eat or change to a healthy diet as very or somewhat prepared (82% vs 62%, respectively) (Table V).

DISCUSSION

The DASH dietary pattern is recommended for controlling and preventing hypertension and for other health benefits. Although the original DASH studies involved feeding protocols in which all foods were provided to the study participants, current dietary recommendations are based on the assumption that individuals can adopt this dietary pattern in their communities. To identify potential barriers to widespread adoption of the DASH dietary pattern, we explored the food availability and cost of the DASH diet in low- and high-SES communities of Boston and surrounding communities and surveyed patients in these communities with regard to knowledge and opinions about diet and BP.

Food availability and cost may be particularly important potential barriers in low-SES populations. However, the general assumption that a healthy dietary pattern is less available and more expensive to low-income individuals has not been tested. Although the DASH diet is often assumed to be expensive because of the large quantities of fruits and vegetables, it is not essential that these foods be fresh; canned and frozen fruits and vegetables may make the DASH diet more economical. We found that there was a marked trend but no statistically significant difference in the food availability of items in high- vs low-SES neighborhoods (ie, greater food availability in high-SES stores). This trend may have shown statistical significance if a larger number of stores had been included in the analysis. Indeed, a post hoc power calculation demonstrated that we would have had to survey 43

Table IV. Demographics of Surveyed Community Health Centers

| CHARACTERISTIC | BACK BAY (N=50) | MATTAPAN (N=50) | P VALUE |
|---|----------------------|----------------------|---------|
| Age, y | | | |
| 20–39 | 37 | 25 | |
| 40–59 | 10 | 22 | |
| ≥60 | 3 | 3 | |
| Female, No. (%) | 37 (74) | 31 (62) ^a | |
| High-SES zip code, No. (%) | 30 (60) ^b | 3 (6) | |
| Race, No. | | | |
| Native American/Indian | 0 | 2 | |
| African American | 2 | 37 | |
| Caucasian | 31 | 0 | |
| Asian | 4 | 1 | |
| Other ^c | 10 | 6 | |
| No further description | 1 | 3 | |
| No answer | 2 | 1 | |
| Hispanic | 6 | 1 | |
| Education | | | <.0001 |
| ≤Grade school | 1 | 1 | |
| Some high school | 0 | 4 | |
| High school/GED | 2 | 12 | |
| Some college (community or technical college) | 6 | 15 | |
| College (BA or BS) | 24 | 12 | |
| Postgraduate work | 16 | 2 | |
| No answer | 1 | 4 | |
| Household income (per year) | | | .0006 |
| <\$29,999 | 7 | 16 | |
| \$30,000–\$59,999 | 17 | 21 | |
| \$60,000–\$89,999 | 10 | 5 | |
| ≥\$90,000 | 10 | 1 | |
| No answer | 6 | 7 | |
| Amount spent on food each month | | | .3085 |
| \$100–\$399 | 32 | 32 | |
| \$400–\$499 | 13 | 9 | |
| No answer | 4 | 3 | |
| How many people do you buy food for? | | | <.0001 |
| 1 (yourself) | 25 | 5 | |
| 2 | 18 | 11 | |
| ≥3 | 3 | 32 | |
| No answer | 4 | 2 | |
| How far do you travel to buy groceries? | | | .0525 |
| <1 mile | 22 | 11 | |
| 1–10 miles | 24 | 27 | |
| >10 miles | 0 | 4 | |
| Don't know | 0 | 2 | |
| No answer | 4 | 6 | |

Abbreviation: SES, socioeconomic status. ^a2 missing; ^b4 missing; ^cself-selected; most designations would generally be considered an underrepresented minority (eg, Haitian).

stores in each SES category to achieve 80% power to call the observed difference in food availability statistically significant.

We also did not confirm concerns that healthy

foods would be more expensive in low-SES communities.¹⁶ Conversely, we noted that the cost of the DASH diet items was higher in the high-SES communities. Of course, cost is not the same as

| Table V. Public Opinion Survey | | |
|--|--------------------------------|-------------------------------|
| | BACK BAY (HIGH SES) N=50 | MATTAPAN (LOW SES) N=50 |
| Knowledge about components/benefits of a healthy diet | | |
| Correct identification of components of a healthy diet ^a | 3 | 0 |
| Correct identification of benefits of eating a healthy diet ^a | 33 | 21 |
| Opinion concerning a healthy diet | | |
| How important is a healthy diet to you? | | |
| Very important | 31 | 37 |
| Somewhat important | 16 | 7 |
| Neutral | 3 | 3 |
| Somewhat unimportant | 0 | 0 |
| Very unimportant | 0 | 0 |
| No answer | 0 | 3 |
| How healthy is your current diet? | | |
| Very healthy | 4 | 7 |
| Healthy | 28 | 22 |
| Neutral | 14 | 12 |
| Unhealthy | 4 | 4 |
| Very unhealthy | 0 | 1 |
| No answer | 0 | 4 |
| Do you think a healthy diet is affordable? | | |
| Definitely affordable | 17 | 13 |
| Somewhat affordable | 17 | 20 |
| Neutral | 1 | 2 |
| Somewhat unaffordable | 11 | 6 |
| Definitely unaffordable | 0 | 1 |
| Do not know | 2 | 1 |
| No answer | 2 | 7 |
| Are you prepared to change your current diet or continue a healthy diet? | | |
| Very prepared | 17 | 17 |
| Somewhat prepared | 24 | 14 |
| Neutral | 4 | 7 |
| Not very prepared | 0 | 3 |
| Not at all prepared | 1 | 0 |
| No answer | 4 | 9 |
| Abbreviation: SES, socioeconomic status. ^a <i>P</i> <.0001. | | |

affordability, which we were not able to assess. Lower-SES families spend less money on food and may find DASH foods unaffordable even though they may be less expensive in their neighborhood. Not surprisingly, high-income households spend more on food: in the Consumer Expenditure Survey (CES), households in the fourth quartile of income (average \$67,813/year before taxes) spent \$3,952 yearly on food at home compared with households in the second quartile of income (average \$25,546/year before taxes), who spent \$2,527 per year on food at home.¹⁷

Another potential barrier to adopting the DASH diet may be the diversity of food items included in the NHLBI-published menus. A total of 97 food items were required to implement this menu. Although diversity of foods was intentionally built into the DASH dietary pattern to ensure intake of a wide array of nutrients, it is not clear that this degree of diversity is necessary to achieve the BP-lowering effect of DASH. A highly variable diet may be more expensive and/or less convenient.

We also explored potential barriers related to public knowledge and opinion. Knowledge about

the benefits and components of DASH can be influenced by educational attainment, and indeed our data suggest that high-SES participants were more likely than low-SES participants to identify the components of a healthy diet. This is in contrast to the findings of Carter-Edwards and associates,¹⁵ who developed and tested the KDPB survey and noted no statistically significant relationship between knowledge concerning diet and BP and annual household income. Differences between our results and those of Carter-Edwards and colleagues could be due to modifications we made to the KDBP survey (eg, the manner in which components of a healthy diet were defined) and the fact that we defined SES by education, income, and unemployment rate, rather than income alone. Thus, we were able to capture other measures of social capital that members of a given SES classification might utilize to improve their knowledge of healthy lifestyle behaviors. Our finding that relatively few individuals in either group scored high with regard to knowledge of components of a healthy diet is revealing. The KDBP survey asks about familiarity with DASH; low scores may reflect low penetration of DASH information in the general public.

Despite relatively low knowledge, we found that influences on food choices were similar in high- and low-SES communities and that both groups make choices based on health concerns. The top 4 influences on food choice for both high- and low-SES participants were convenience (or preparation time), health concerns, culture/ethnicity (taste consideration), and affordability/price. These results differed from those of Drewnowski and Darmon,¹⁸ who reported that adoption of a healthy diet may have more to do with the economic resources of the household than psychosocial factors. The fact that we were surveying participants in a clinic may have led to overreporting the importance of health concerns. Surveys conducted in other settings and obtaining data on decision making at the point of purchase would clarify the role of health concerns in making dietary choices.

Nonetheless, in this population, health was either the most important or second most important contributor to choice of foods. Participants also reported that their top source of health information was their medical doctor. This finding was confirmed by Moser and Franklin¹⁹ in a national survey for the Hypertension Education Foundation and highlights the importance of health education

by health care providers. These findings suggest that information and advice will be well received and influence dietary behavior regardless of the patient's SES. Of interest, there was no difference by SES in the perceived affordability of healthy foods.

Study Limitations

The most important limitation of our study methods is that we were not able to assess the actual affordability of the DASH diet for each SES group. Such an assessment would require a comparison of the cost of the DASH diet items with an estimate of what is affordable for specific income groups; a widely acceptable estimate is difficult to find. The international literature has utilized national databases that estimate cost of living and cost of food to attempt to address affordability issues in low-income populations. In fact, a recent study by Williams and associates²⁰ derived monthly costs for 3 hypothetical family structures based on a national survey of family expenditures and determined that persons working at minimum wage in Nova Scotia could not afford a nutritious diet.²⁰ In the United States, the 2004 CES, conducted by the Bureau of Labor Statistics, assessed the buying habits of Americans.¹⁷ We chose not to assess affordability using the CES because numerous assumptions would be required to apply the CES to our study population. More direct measures of affordability and perceived affordability are needed.

An additional limitation of the study is the inclusion of different types of stores in the high- and low-SES communities. Inclusion of more bodegas than supermarkets in the low-SES communities could have biased the results in that food selections in smaller stores can be less diverse. After doing further analysis in which we matched the type of store, we again found no statistically significant difference between food availability or cost of items found in high-SES and low-SES supermarkets or bodegas/markets.

Another source of bias is the method of selection of community centers. We were unable to include a community health center that met all 3 criteria for high-SES classification. Therefore, we conducted the survey at a community health center (BBHC) located in a community that met 2 of the 3 criteria for high SES. This compromise in inclusion criteria may have led to smaller differences between the high- and low-SES communities in our study.

Last, it is important to note that the findings of this study may not be generalizable to other regions of the United States or to nonurban environments.

CONCLUSIONS

Since 1997, the DASH dietary pattern has been part of national recommendations for preventing and treating high BP; public health efforts have been made to encourage widespread adoption of the DASH dietary pattern. This study attempted to explore possible barriers in low- and high-SES communities to adoption of the diet such as food availability, cost, public knowledge, and public attitudes. Our results suggest that DASH diet foods are available in low- and high-SES communities, but there is a trend toward less food availability in low-SES communities. In addition, obtaining foods for this diet is more expensive in high-SES communities. Our results further suggest that public education concerning the DASH diet could be improved. Increased information, food availability, and affordability are likely to lead to more widespread adoption of a diet similar to the DASH diet since patients in both SES groups report that they are concerned about healthy eating. Future research will be needed to validate these results in other populations and geographic areas and to test strategies for overcoming barriers to adopting the DASH dietary pattern in high- and low-SES communities.

Acknowledgments and disclosure: We would like to acknowledge Azzie Young, PhD, MPA, and Tarma Johnson, RN, MS, FNP, OCN, of the Mattapan Community Health Center and Lisa Brugnoli-Semeta, RN, of the Massachusetts General Hospital Back Bay HealthCare Center for allowing us to interview their patients. We would also like to acknowledge Pao-Hwa Lin, PhD, (Duke University Medical Center) for providing nutritional expertise. The source of funding for this research was the Duke Hypertension Center/Jones Educational Endowment.

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