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FOOD CHOICE AMONG HOMEBOUND OLDER ADULTS: MOTIVATIONS AND PERCEIVED BARRIERS

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Abstract

Objectives—The purpose of this paper is to identify: motivations and perceived barriers associated with food choices made by homebound older adults; whether motivations and perceived barriers vary according to social demographic characteristics; and whether motivations and perceived barriers are associated with dietary quality.

Design—This was an observational study using standard interview methods where participants were administered a questionnaire and completed three 24-hour dietary recalls.

Setting—Participants were interviewed in their homes.

Participants—185 homebound older adults were included.

Measurement—Motivations were assessed using a modification of The Food Choice Questionnaire and perceived barriers were assessed using the Vailas Food Enjoyment Questionnaire. Participants answered questions regarding social demographic characteristics. Dietary quality measures of adequate intakes of calories, protein, vitamin D, and vitamin B12 were obtained from the three 24-hour dietary recalls.

Results—Mean age was 78.9; 80% were female; and 36% were African American. Key motivations in food choice included sensory appeal, convenience, and price. Key barriers included health, being on a special diet, and being unable to shop. These varied little by social demographics, except for age. Dietary quality varied according to different motivations and barriers.

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Conclusion—Food choices are based upon a complex interaction between the social and environmental context, the individual, and the food. Efforts to change eating behaviors, especially community-based interventions involving self-management approaches, must carefully take into account individuals' self-perceived motivations and barriers to food selection. Incorporating foods that are tasty, easy to prepare, inexpensive, and that involve caregivers are critical for successful interventions.

Keywords

Food choice; health beliefs; health behavior; nutrition intervention; nutrition policy

Introduction

The eating behaviors of older adults are influenced simultaneously by many factors that subsequently contribute to quality of diet and health status. A substantial body of literature has focused attention on the important role that social-psychological factors play in the eating behavior of older adults. As recommendations to promote dietary change or to attain and maintain optimal weight are increasingly being made to older adults to prevent or manage chronic disease and enhance function, independence, and quality of life, it is essential that behavioral nutritional interventions take into account these social-psychological factors. Such an approach is consistent with a larger public health agenda focused on health promotion and disease prevention that routinely includes factors ranging from individual level attitudes and beliefs to environmental level governmental regulations in various interventions (1-4).

Homebound older adults are an especially important subgroup of older adults to focus on for several reasons. First, estimates of undernutrition are high in this group ranging from between 70% and 93% of individuals and many may be unaware that they are at risk for poor nutritional status (5-11). Second, they are a group whose numbers are rapidly increasing. In 2004, 2.8 million older adults received Medicare home health service, and this number is expected to rise (12). Fewer older persons with functional impairment are entering nursing homes and more are choosing to remain in the community (13). Last, this group is most likely to be the audience for programs and policies that already exist. These include Medicare policies that support nutrition counseling for diabetes and renal disease, federal food and nutrition programs that target at-risk homebound older adults, and state-level programs that may provide nutritional support to homebound older adults (14). Rising health care costs and consumer preferences for aging-in-place call attention to the need for a better understanding of individual factors that may contribute to undernutrition and its consequences in this homebound population in order to improve upon programs that already exist and to develop evidence-based interventions that may prevent costly and unnecessary institutionalization.

The current paper builds upon a growing body of work that focuses on psychological, sociological, and economic micro-level factors that influence food choice in older adults (15-16). Several qualitative studies have found that attitudes and beliefs underlying food choices among older adults are rooted in individuals' sense of social and personal identities, including ethnicity, region, social class, age-cohort, living arrangement, health status, gender, and marital status (17-20). Quantitative studies have been conducted that seek to identify motivations that influence food choice among older adults. For example, Steptoe and his colleagues found that higher age was associated with food choices being made based upon familiarity, natural content, and ethical concerns (21). Additionally, for women, older age was associated with food choices being based upon health and sensory appeal; and for men, older age was associated with food choices being based upon mood and weight control. de Almeida and her colleagues reported that the most important factors influencing food choices among older European adults were perceived quality and freshness of the food, trying to eat healthy,

and price; however barriers to making food choices included self-control, resistance to change, and price (22). Other researchers found that self-perception of having good cooking skills influenced food intake among older men living alone (23). These latter two studies additionally found that low motivation to change constituted barriers to improving energy intake, healthy eating, and appetite.

This paper contributes to the literature by focusing specifically on homebound older adults—a group who are at high nutritional risk and whose choices may be restricted because of their homebound status and consequent dependence on others. The purpose of this paper is to identify: 1) motivations and perceived barriers associated with food choices made by homebound older adults, 2) whether motivations and perceived barriers vary according to social demographic characteristics, and 3) whether motivations and perceived barriers are associated with dietary quality. The focus of this exploratory research was on identifying self-perceived motivations and barriers to food choices that could be useful in developing community-based self-management nutrition interventions for homebound older adults.

Methods

Sample

Participants were a sub-sample of 230 homebound older adults who were part of a larger study designed to comprehensively examine multiple factors associated with eating behaviors among homebound older adults and outcomes associated with those eating behaviors (5). To be eligible to participate in the larger study, participants had to meet Medicare's definition of homebound status (i.e., an “individual [who] has a condition. . . that restricts [one's] ability to leave his or her home except with the assistance of another individual or the aid of a supportive device . . . or [who] has a condition such that leaving his or her home is medically contraindicated”) (24). Additionally, participants had to be community-dwelling; able to communicate or have a caregiver who was able to communicate; free of significant cognitive impairment (if living alone, Folstein's Mini-Mental State Exam Score [MMSE] ≥ 24 and if having a caregiver present, MMSE ≥ 15); free of terminal illness; not being tube-fed; and not dependent on a ventilator. Participants were recruited from area home health agencies, a university-affiliated geriatric medicine outpatient clinic, a university-affiliated inpatient rehabilitation facility, and area churches. Because this study relies upon subjective self-report measures, the sub-sample reported on in this paper includes 185 participants who were able to communicate independently and who were free of significant cognitive impairment (i.e., MMSE ≥ 24). The study protocol was reviewed and approved by the University Institutional Review Board.

Design

Participants were visited in their homes and administered a questionnaire consisting of items related to medical, functional, economic, oral health, social, religious, and psychological factors that could potentially affect eating behaviors. Participants completed a 24-hour dietary recall while in the home and were contacted by telephone over the next two weeks to obtain two additional 24-hour dietary recalls. The recalls were conducted using standardized probing questions, two-dimensional food models to estimate portion size, and a multiple-pass methodology. Nutrition data was analyzed using the Nutrition Data System for Research (25-27).

Measurement

Motivations—Participants were administered a modification of The Food Choice Questionnaire developed and assessed for psychometric properties by Steptoe and colleagues (21). Participants were asked 9 questions regarding the importance of various food attributes in making food choices. These included the following. How important is it for you that the

food you eat on a typical day: 1) contains a lot of vitamins and minerals, keeps you healthy, is nutritious, is high in protein, is good for you, or is high in fiber or roughage (health); 2) helps you cope with stress, helps you cope with life, helps you relax, keeps you awake or alert, cheers you up, or makes you feel good (mood); 3) is easy to prepare, can be cooked very simply, takes no time to prepare, can be bought in shops close to where you live or work, or is easily available in shops or supermarkets (convenience); 4) smells nice, looks nice, has a pleasant texture, or tastes good (sensory appeal); 5) contains no additives, contains natural ingredients, or contains no artificial ingredients (natural content); 6) is not expensive, is cheap, or is a good value for the money (price); 7) is low in calories, helps you control your weight, or is low in fat (weight control); 8) is what you usually eat, is familiar, or is like the food you ate when you were a child (familiarity); and 9) comes from countries I approve of politically, has the country of origin clearly marked, or is packaged in an environmentally friendly way (ethical concern). Response categories included: not at all important, a little important, moderately important, and very important.

Perceived Barriers—Participants were administered the Vailas Food Enjoyment Questionnaire. This instrument was originally developed by the last author for use specifically in older adults who were participating in the Elderly Meal Program in Wisconsin; and it has subsequently been expanded by the first, second, and last authors for use in this study (28). Participants were asked to “please tell me how much you believe the following kept you from eating the foods or meals you wanted to eat any time over the past six months: 1) your health; 2) a special diet; 3) being unable to smell or taste; 4) being unable to see very well; 5) mouth, denture, or teeth problems; 6) medications; 7) being unable to physically feed yourself; 8) being physically unable to cook for yourself; 9) not being able to cook for yourself because of not having the right equipment or facilities; 10) being unable to shop for yourself; 11) money problems; 12) eating alone; 13) the people you eat with; 14) feeling sad or blue; 15) feeling week or tired; and 16) being in pain. Response categories included: very true, somewhat true, somewhat untrue, and very untrue.

Social Demographic Characteristics—Gender (female or male), ethnicity (African American or white), marital status (married or not married), living arrangement (living alone or living with someone), educational status (high school graduate or not), age, and food security was assessed. Food security was measured using the United States Department of Agriculture Abbreviated Six-Item Subset of the U.S. Household Food Security Survey Module Food Security Scale and was included as a proxy for economic well-being (29,30). Participants were categorized according to whether the household was food secure (all members of household having access at all times to enough food for an active healthy life) or food insecure (having limited or uncertain availability of nutritious and safe foods or limited or uncertain ability to acquire those foods in a socially acceptable way).

Dietary Quality—Four indicators of dietary quality, including those that are highlighted as “key recommendations for specific population groups (i.e., older adults), were purposefully selected based upon the Department of Health and Human Services and United States Department of Agriculture Dietary joint publication, “Dietary Guidelines for Americans: 2005,” that are readily accessible to consumers (31). The four measures selected include adequate intakes of calories, protein, vitamin D, and vitamin B12.

Adequate caloric intake was defined as consuming enough calories to maintain current body weight. This measure was derived by subtracting a participant's Estimated Energy Requirements (EER) from their mean daily caloric intake. EER was calculated based upon a formula established by the Institute of Medicine (2005) that takes into account height, weight, age, gender, and physical activity level (32). For women, the EER formula is:

Energy (kcal) = $354.1 - (6.91 * \text{age [y]}) + \text{Physical Activity Coefficient [1 for sedentary]} * (9.36 * \text{wt [kg]} + 726 * \text{ht [m]})$. For men, the formula is: Energy (kcal) = $661.8 - (9.53 * \text{age [y]}) + \text{PAC [1 for sedentary]} * (15.91 * \text{wt [kg]} + 539.6 * \text{ht [m]})$.

Adequate protein intake was defined as ≥ 46 g/d protein for women or ≥ 56 g/d protein for men; adequate vitamin D intake was defined as ≥ 10 mcg/d for women and men between the ages of 51 to 70 and ≥ 15 mcg/d for women and men greater than age 70; and adequate vitamin B12 intake was defined as ≥ 2.4 mcg/d for all groups (31).

Statistical Analyses—Descriptive statistics were used first to characterize the sample and identify motivations and perceived barriers associated with food selection. Next, multivariate binary logistic regressions were performed separately for each of the motivations and perceived barriers to identify independent social demographic characteristics associated with each motivation and perceived barrier. Last, multivariate binary logistic regressions were conducted separately for each of the four indicators of dietary quality to identify whether motivations or perceived barriers were associated with intake. For the binary logistic regression analyses, response categories for motivations were collapsed into not important (not at all important and a little important) versus important (moderately important and very important) and for perceived barriers were collapsed into true (very true and somewhat true) versus untrue (very untrue and somewhat untrue). Multicollinearity between all variables was assessed using a bivariate correlation coefficient matrix; none of the variables demonstrated correlations $\geq .70$. Data analyses were conducted using SPSS Version 12.0.2 for Windows (March, 2004).

Results

Baseline Characteristics

Baseline characteristics of the study sample are presented in Table 1. Mean age of study participants was 78.9 years (s.d.=8.5). There were 91 white women, 57 African American women, 28 white men, and 9 African American men included in the study. The majority of participants had inadequate intakes for total calories and Vitamin D.

Motivations and Perceived Barriers

Motivations underlying food selection that were reported most frequently as very important for the study sample included sensory appeal (i.e., tastes good), convenience, and price; while motivations that were reported most frequently as not at all important in food selection included ethical concerns, mood, and natural content. These are reported in Table 2. The most frequently reported response of very true to perceived barriers to consuming the foods or meals that participants wanted to eat included health, being on a special diet, and not being able to shop for oneself; and the most frequently reported response of very untrue to perceived barriers included not having the right equipment or cooking facilities, not being able to physically feed oneself, and the people eating with them. These are reported in Table 3.

The results of the binary logistic regressions for each motivation and perceived barrier are reported in Table 4. Persons who were older were more likely to be motivated by health and mood in their food choices and less likely to be motivated by weight. Persons who were older were also less likely to perceive health, a special diet, the people eating with them, feeling sad or blue, or feeling weak or tired as a barrier to food choices. Persons with less than a high school education were less likely to be motivated by mood and more likely to be motivated by price in their food choices. Additionally, they were more likely to report money problems as a barrier to food choice. African Americans were less likely to report that ethical concerns motivated their food choices, and more likely to report that money problems and being on a special diet were barriers to realizing choices. There were no differences between the groups

for those motivations and perceived barriers that were most frequently reported, including the primary motivations of sensory appeal and convenience and the primary perceived barriers of not being able to shop for oneself.

Dietary Quality

A binary logistic regression was performed for each measure of dietary quality. All social demographic characteristics were included as controls in the models. Because of the small sample size, only those motivations and perceived barriers that were independently statistically significant at $p \leq .10$ using chi-square analysis were included in the multivariate models.

The likelihood of not meeting recommended dietary intake of Vitamin D was greater in those who reported convenience as a motivation and being unable to shop for oneself as a barrier to food choice and lower in those who reported medications as a barrier (See Table 5.). The likelihood of not meeting recommended dietary intake of Vitamin B12 was higher in those who did not report health as a motivation for food selection (Odds ratio 3.389, $b=1.220$, $\chi^2=5.528$, $p=.019$, $CI=1.225-9.374$). No variables predicted higher or lower likelihood of not meeting recommended dietary intakes for either calories or protein in the multivariate models.

Discussion

This paper contributes to a growing body of literature examining how older adults' food choices are influenced by motivations and perceived barriers associated with both health and non-health related factors. In the case of homebound older adults enrolled in this study, sensory appeal (or aesthetic appeal), convenience, and price of foods were particularly salient. Of least importance in food selection included ethical concerns, mood, and natural content. These findings support Steptoe's earlier findings regarding differences between younger and older adults, and suggest that health messages directed at older adults take into account the value this age group places on particular non-health related factors over others 21.

Of note is that while health was not reported as being an especially important motivation for food selection, it was reported as being the greatest perceived barrier to consuming the foods or meals that participants wanted to eat. While persons may not select foods based upon their health-related qualities, they viewed their health and being on a special diet as interfering with what they really wanted to eat. These are especially important findings in this population who are at high risk for not consuming enough calories to maintain their current body weight (5). It may be that liberalization of therapeutic diets for older adults in the home setting is warranted. The American Dietetic Association has issued a position statement that this is the approach to take with older adults residing in long-term care settings in order to improve both overall nutritional status and quality of life (33).

The social demographic characteristics that were most likely to be associated with variations in motivations and barriers were age and education. Homebound older adults who were of advancing age were less likely to report that numerous barriers interfered with their choices of food. It may be that these older persons have lived longer in their situations, and have had more time to make adaptations in either their cognitions, social support systems, or environments such that perceived barriers mattered less or were able to be overcome (34). Homebound older adults who were less educated were more likely to be motivated by price in their food choices and reported that money problems were a barrier to food choice. This is not an unexpected finding. Nutrition programs targeted at food insecure older adults reach few of those in need (14).

Perhaps among the most significant findings in this study are our non-findings—neither motivations nor perceived barriers (especially those that were reported as most important or true) varied much according to other social demographic characteristics—namely, gender, ethnicity, marital status, and living arrangement. Thus, matters of taste, convenience, price, and familiarity are important motivations related to food selection for all social groups; and issues related to health were the greatest perceived barriers to realizing food choices. Thus, it is important to avoid making assumptions about barriers and motivations based solely on an individual's social demographic characteristics, but rather to assess these on an individual basis. Further, health promotion interventions targeted at changing older adults' food and eating behaviors must consider the motivations that are involved in food choices beyond those related to health (21).

Traditional models of educating individuals to make changes in food behaviors that places the clinician in the expert role and the older adult in the role of recipient of information does not sufficiently capitalize on individuals' knowledge of their own food and eating preferences and concerns, and how individuals' identity is expressed through their consumption of particular foods (18). This is important, especially in light of our findings that educational level is associated with motivations and perceived barriers related to food choice. In her review of nutrition education interventions for older adults, Sahyoun and her colleagues found that among those that were most effective were the ones that included personalized messages and hands-on activities, incentives, and cues (35). At a minimum, this ought to include incorporating familiar and favorite foods that are central to individuals' sense of identity into any proposed dietary changes; and to actively engage and encourage individuals' participation in those proposed changes.

Last, our work found that convenience and price were important motivations in food selection, and not being able to shop for oneself was a barrier in realizing food choices. Efforts to make changes in diets must be simple and require minimal effort and costs on the part of both participants and their caregivers. In the American Dietetic Position Statement on Nutrition Across the Spectrum of Aging (2005), it is recommended that a collaborative approach be taken that includes caregivers in medical nutrition therapy for older adults (36).

This study was limited by its relatively small sample size and its reliance on measures of self-report. Additionally, while this work focused on homebound older adults residing in the Southeastern United States, we might expect that findings from this study extend to other groups as well. However, further studies are necessary to evaluate whether these findings hold for other geographic areas and ethnic groups.

This work was undertaken as a first step toward the development of an evidence-based behavioral nutritional intervention for homebound older adults who are at risk for under-nutrition. Food choices are based upon a complex interaction between the social and environmental context, the individual, and the food. Efforts to change eating behaviors, especially community-based interventions involving self-management approaches, must carefully take into account individuals' self-perceived motivations and barriers to food selection in order to be successful.

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References

1. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Education Quarterly* 1988;15:351–377. [PubMed: 3068205]
2. Hovell, MF.; Wahlgren, DR.; Gehrman, C. The behavioral ecological model: Integrating public health and behavioral science.. In: DiClemente, RJ.; Crosby, R.; Kegler, M., editors. *New and Emerging Theories in Health Promotion Practice & Research*. Jossey-Bass Inc.; San Francisco, California: 2002.
3. Rimer, B.; Glanz, K. *Theory at a Glance: A Guide for Health Promotion Practice*. Vol. 2nd Ed.. US Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2005. <http://cancer.gov/aboutnci/oc/theory-at-a-glance/print>
4. Locher, JL.; Sharkey, JS. An ecological model for understanding eating behavior in older adults.. In: Bales, CW.; Ritchie, CS., editors. *Handbook of Clinical Nutrition and Aging*. Vol. 2nd Ed.. Humana Press; Totowa, NJ: 2009. expected
5. Locher JL, Ritchie CS, Robinson CO, Roth DL, West DS, Burgio KL. A multidimensional approach to understanding under-eating in homebound older adults: The importance of social factors. *The Gerontologist* 2008;48:223–234. [PubMed: 18483434]
6. Millen BE, Silliman RA, Cantey-Kiser J, Copenhafer DL, Ewart CV, Ritchie CS, et al. Nutritional risk in an urban homebound older population: The nutrition and healthy aging project. *Journal of Nutrition Health and Aging* 2001;5:269–277.
7. Millen Posner BE, Smigelski CG, McLaren Krachenfels MS. Dietary characteristics and nutrient intake in an urban homebound population. *Journal of the American Dietetic Association* 1987;8:452–456.
8. Payette H, Gray-Donald K, Cyr R, Boutier V. Predictors of dietary intake in a functionally dependent elderly population in the community. *American Journal of Public Health* 1985;85(5):677–683. [PubMed: 7733428]
9. Sharkey JR, Branch L, Zohoori N, Giuliani C, Busby-Whitehead J, Haines PS. Inadequate nutrient intakes among homebound elderly and their correlation with individual characteristics and health-related factors. *American Journal of Clinical Nutrition* 2002;76:1535–45.
10. Sharkey JR. Risk and presence of food insufficiency are associated with low nutrient intakes and multimorbidity among homebound older women who receive home-delivered meals. *The Journal of Nutrition* 2003;3485–3491. [PubMed: 14608062]
11. Martin CT, Kayser-Jones J, Stotts NA, Froelicher SE. Community-living elders' views on normal and low weight. *Journal of Nutrition Health and Aging* 2008;12(1):45–48.
12. Medicare Payment Advisory Commission. Report to the Congress: Medicare Payment Policy. MedPac. Medicare Health Support, Centers for Medicare and Medicaid Services; Washington, DC: Mar2006 [09.26.06]. <http://www.cms.hhs.gov/CCIP/>.
13. National Center for Health Statistics, Health, United States, 2006 with Chartbook on Trends in the Health of Americans. U. S. Government Printing Office; Washington, DC: 2006.
14. Wellman NS, Kamp BF. Federal food and nutrition assistance programs for older people. *Generations* 2004;28:78–83.
15. Drewnowski A, Shultz JM. Impact of aging on eating behaviors, food choices, nutrition, and health status. *Journal of Nutrition, Health and Aging* 2001;5(2):75–79.
16. Payette H, Shatenstein B. Determinants of healthy eating in community-dwelling elderly people. *Canadian Journal of Public Health* 2005;96:S3, S27–S31.
17. Falk LW, Bisogni CA, Sobal J. Food choice processes of older adults: A qualitative investigation. *Journal of Nutrition Education* 1996;28(5):257–265.
18. Bisogni CA, Connors M, Devine CM, Sobal J. Who we are and how we eat: a qualitative study of identities in food choice. *J Nutrition Education and Behavior* 2002;34(3):128–39.
19. Fischler C. Fischler, Food, self and identity, *Social Science Information* 1988;27:275–292.
20. Lupton, D. *Food, the Body, and the Self*. Sage; London: 1996.
21. Steptoe A, Pollard TM, Wardle J. Development of a measure of the motives underlying the selection of food: the Food Choice Questionnaire. *Appetite* 1995;25:267–284. [PubMed: 8746966]
22. de Almeida MD, Graca P, Afonso C, Kearney JM, Gibney MJ. Healthy eating in European elderly: concepts, barriers, and benefits. *Journal of Nutrition, Health, and Aging* 2001;5(4):217–219.

23. Hughes GM, Bennett KM, Hetherington MM. Old and alone: Barriers to healthy eating in older men living on their own. *Appetite* 2004;43(3):269–276. [PubMed: 15527929]
24. Sections 501-508 of the Medicare, Medicaid and SCHIP Benefits Improvement and Protection Act of 2000 amend 42 U.S.C. Section 1395f(n), 1395(n), 1395fff(b), 1395(x)(v) to modify the Medicare home health benefit. (Public Law 106-554, 12/21/2000.)
25. (NDS-R) Software Version 4.05, developed by the Nutrition Coordinating Center. University of Minnesota Minneapolis, MN Food and Nutrient Database 33, released July 2002.
26. Schakel SF, Sievert YA, Buzzard IM. Sources of data for developing and maintaining a nutrient database. *J. Am Diet Assoc* 1988;88:1268–71. [PubMed: 3171020]
27. Witschi, JC. Short-term recall and recording methods.. In: Willett, W., editor. *Nutritional Epidemiology*. Oxford University Press; New York: 1990. p. 663-671.
28. Vailas L, Nitzke SA, Becker M, Gast J. Risk indicators for malnutrition are associated inversely with quality of life for participants in meal programs for older adults. *Journal of the American Dietetic Association* 1998;98(5):548–553. [PubMed: 9597027]
29. Bickel, G.; Nord, M.; Price, C.; Hamilton, W.; Cook, J. *Measuring Food Security in the United States: Guide to Measuring Household Food Security*, Rev. 2000. United States Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation;
30. Anderson SA. Core indicators of nutritional state for difficult-to-sample populations. *Journal of Nutrition* 1990;120:1557–1600.
31. Dietary guidelines for Americans 2005. US Department of Health and Human Services and United States Department of Agriculture.; 2005 [09/10/07]. <http://www.health.gov/dietaryguidelines/>.
32. Dietary Reference Intake for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients). National Academy Press; 2005 [07.20.06]. <http://www.nap.edu/catalog/10490.html>.
33. American Dietetic Association. Position of the American Dietetic Association: Liberalization of diet prescription improves quality of life for older adults in long-term care. *Journal of the American Dietetic Association* 2005;105:1955–1965. [PubMed: 16402447]
34. Schultz R, Heckhausen J, Locher JL. Adult development, control, and adaptive functioning. *Journal of Social Issues* 1991;47:177–196.
35. Sahyoun NR, Pratt CA, Anderson A. Evaluation of nutrition education interventions for older adults: A proposed framework. *Journal of the American Dietetic Association* 2004;104:58–69. [PubMed: 14702585]
36. American Dietetic Association. Position of the American Dietetic Association: Nutrition across the spectrum of aging. *Journal of the American Dietetic Association* 2005;105:616–633. [PubMed: 15800567]

Table 1

Baseline Characteristics of Study Sample (N=185)

Variables	% or Mean
Female	80.0
African American	35.7
Married	30.3
Lives Alone	35.1
Highest Level of Education Completed	
Less than High School	33.0
High School, Technical, or Junior College	50.8
College or Beyond	16.2
Age	78.9 years (s.d.=8.5)
Food Secure (all members of household having access at all times to enough food for an active healthy life)	94.1
Inadequate Caloric Intake	67
Inadequate Protein Intake	20
Inadequate Vitamin D Intake	82
Inadequate Vitamin B12 Intake	13

Table 2

Motivations Underlying Food Choice (N=185)

Motivation	Not At All (%) Important (%)	A Little Important (%)	Moderately Important (%)	Very Important (%)
Health	28.6	21.1	20.5	29.7
Mood	42.2	23.2	18.4	16.2
Convenience	15.1	11.4	14.6	58.9
Sensory Appeal	5.4	11.4	27.6	55.7
Natural Content	25.4	36.8	19.5	18.4
Price	14.1	13.5	24.9	47.6
Weight Control	32.4	12.4	15.7	39.5
Familiarity	28.1	18.9	15.1	37.8
Ethical Concern	56.8	27.0	8.6	7.6

Table 3

Perceived Barriers to Food Choice (N=185)

Perceived Barrier	Very True (%)	Somewhat True (%)	Somewhat Untrue (%)	Very Untrue (%)
		(%)	(%)	(%)
Health	25.5	23.9	16.8	33.7
A Special Diet	22.2	5.9	11.9	60.0
Unable to Smell or Taste	3.8	8.1	6.5	81.6
Unable to See	2.2	5.9	6.5	85.4
Mouth, Denture, or Teeth Problems	4.9	11.4	17.3	66.5
Medications	3.3	10.6	23.9	62.2
Unable to Physically Feed Self	0.0	2.2	3.2	94.6
Physically Unable to Cook for Self	9.7	13.0	16.8	60.5
Not Having Cooking Equipment	.5	.5	.5	98.4
Unable to Shop for Self	16.8	14.6	14.6	54.1
Money Problems	3.2	11.4	12.4	73.0
Eating Alone	2.7	11.4	17.8	68.1
The People You Eat With	0.0	3.2	8.6	88.1
Feeling Sad or Blue	4.3	24.9	24.3	46.5
Feeling Weak or Tired	6.0	32.6	19.6	41.8
Being In Pain	4.3	24.3	19.5	51.9

Table 4
Logistic Regressions of Motivations and Perceived Barriers by Social Demographic Characteristics (N=185)

Motivation or Perceived Barrier Social Demographic Characteristic	Odds Ratio	Regression Coefficient	Chi-Square	P-Value	95% CI
Health					
Age	1.063	.061	10.035	.002	1.024-1.105
Mood					
Age	1.055	.054	6.659	.010	1.013-1.099
< High School Education	.455	-.787	6.659	.010	.211-.981
Natural Content					
Unmarried	.385	-.953	4.889	.027	.166-.897
Price					
< High School Education	3.066	1.120	6.550	.010	1.300-7.233
Weight Control					
Age	.959	-.042	4.905	.027	.925-.995
Ethical Concern					
African American Ethnicity	.178	-1.723	6.824	.009	.049-.650
Unmarried	.242	-1.417	5.013	.025	.070-.838
Health					
Age	.945	-.057	8.682	.003	.910-.981
A Special Diet					
African American Ethnicity	2.306	.836	4.872	.027	1.098-4.843
Age	.933	-.069	9.524	.002	.894-.975
Unable to See					
Food Insecure	6.470	1.867	5.627	.018	1.383-30.265
Mouth/Denture/Teeth Problems					
Unmarried	3.478	1.246	3.831	.050	.998-12.116
Money Problems					
Living Alone	2.900	1.065	3.776	.052	.991-8.490
Food Insecure	18.139	2.898	13.168	.000	3.791-86.776
< High School Education	4.270	1.452	8.292	.004	1.590-11.467
Eating Alone					

Motivation or Perceived Barrier Social Demographic Characteristic	Odds Ratio	Regression Coefficient	Chi-Square	P-Value	95% CI
Living Alone	3.833	1.344	6.111	.013	1.321-11.123
The People You Eat With					
Age	.882	-.126	4.698	.030	.787-.988
Feeling Sad or Blue					
Age	.934	-.068	5.916	.015	.896-.974
Feeling Weak or Tired					
Age	.948	-.054	4.622	.032	.912-.985

*All models included gender, ethnicity, marital status, living arrangement, food security, education, and age. Only those variables that were significantly associated with the motivation or perceived barrier are reported.

Table 5
Logistic Regression of Vitamin D Intake and Motivations and Perceived Barriers (N=185)

	Odds Ratio	Regression Coefficient	Chi-Square	P-Value	95% CI
Motivation					
Convenience	.278	-1.1279	7.834	.009	.107-.726
Perceived Barrier					
Medications	3.396	1.223	4.813	.028	1.139-10.126
Unable to shop for oneself	.330	-1.198	3.291	.070	.100-1.093

* All models included gender, ethnicity, marital status, living arrangement, food security, education, and age. Only those variables that were significantly associated with the motivation or perceived barrier are reported.