

**Barriers to food access and food security among seniors and the association between
hypertension and dietary intake patterns in post-menopausal, African American women**

A THESIS

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ABSTRACT

Although much research has been conducted on the health status of older individuals, few studies have addressed how health status is influenced by factors such as food security, food access, and food choice among the population of older adults. Therefore, the purpose of this project was to investigate food choice and the barriers to adequate food security and food access among seniors, and observe associations between dietary intake, supplement intake, and hypertension among post-menopausal, African American women. Focus groups and food frequency questionnaires were used for this project to better understand the factors that affect dietary behaviors in older adults. Results from this project delineate the influencers of food choice among seniors and explain the association between dietary intake and hypertension for younger and older women. Further, insight is provided for future research and nutrition interventions that may have a beneficial impact on these populations such as implementing an intervention to reduce prevalence of hypertension by increasing supplement intake or creating a survey that could be used at congregate dining sites to improve meal selection.

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CHAPTER 1

Literature Review

INTRODUCTION

It is no secret that Americans are living longer than ever before. The current cohort of older adults continues to grow as the baby boom generation reaches retirement (1). In 2000, 16.3% of the U.S. population was sixty years of age and older; this number is expected to increase to 22.2% by 2020 (2). In order for this segment of the population to maintain good health, numerous factors must be considered including access to food, financial status, dietary intake, and the presence of disease (3). Adequate nutrition has been shown to improve health and reduce the development of chronic diseases (4). Consequently, altered intakes of nutrients can further exacerbate the risk of certain diseases such as hypertension (5-7).

Hypertension is a disease of increasing concern among older adults, especially within the African American population. Among all ethnicities, about two-thirds of adults over age 60 have hypertension and this rate is even higher among African Americans (8). Within the United States, 45.7% of African American women have hypertension compared to only 31.3% of Caucasian women (9). Nutrition intake is directly related to hypertension as the disease is associated with elevated sodium intake and inadequate calcium, potassium, and magnesium intakes (5). Hargreaves et al. found that African American women often want to eat healthy, but ultimately choose convenience, resulting in increased sodium intake from snacking and consumption of fast food (10-11). While genetics and exercise also play a role, dietary intake is a major contributor to the development and treatment of hypertension (6-7).

In addition to hypertension, nutrition intake is also linked to factors related to food choice, food access, and food security in older adults. Nutrition and health of older adults can be adversely affected by changing food choices with age. Because of physical limitations and lack of energy, older adults often choose convenience over traditional preparation methods (12). Having limited access to food also places older individuals at greater risk for poor nutrition, because they may not have access to healthy choices such as a variety of fruits and vegetables (13). Further

contributing to the potential for poor nutrition is food insecurity. In 2013, nearly 9% of food insecure households were occupied by individuals ages 65 and older (14). Many barriers exist for adequate food security including: lack of social support, limited neighborhood walkability, seasonal variation, and functional impairments (13, 15-16). For older adults dealing with food insecurity, there are food assistance options available to provide supplemental sources of food. Meals on Wheels and congregate dining programs are examples of this which exist to improve the nutritional status of older adults (17). However, these programs are not often discussed in the literature (13,18-19). Because food choice, limited food access, and food insecurity all have the potential to reduce nutrition quality, they also have the potential to increase health care costs. Rising health care costs are expected to increase by 25% by the year 2030, largely because of the growing population of older adults (20). Still, little is known about how this population makes food choices and accesses the food system.

The subsequent paragraphs of this review will discuss dietary and supplement intake and how it relates to hypertension in older adults. Factors that affect dietary intake among this population (food insecurity, food access, and food choice) will also be discussed. Following this, the rationale for the research project will be given along with research questions for each phase, and the overall study design. After the literature review, there are two chapters which contain papers that have been submitted for publication. Finally, a summary of the results will be presented with conclusions and implications for future research.

Hypertension

Hypertension, or high blood pressure (BP), is a prevalent disease in the United States, but concrete guidelines have not yet been established for select segments of the population. Hypertension is characterized by a systolic BP (SBP) measurement ≥ 140 mmHg and/or a diastolic BP (DBP) measurement ≥ 90 mmHg, with BP less than 120/80 mmHg considered normal (21). However, current professional opinion suggests that a BP measurement up to 140/90

mmHg is acceptable for older adults as a result of natural stiffening in the artery walls (22). If this goal is too difficult to achieve, recommendations state that BP less than 150/80 mmHg can be a suitable target to reduce risk of hypertension in this population (21). Altered recommendations are also made for African Americans, as they have higher rates of hypertension than Caucasians (23, 24). While the reasons for these higher rates are unknown, Fuchs postulated that a combination of genotype, environment, and behavior is the culprit (23). To attempt to control these rates, research has suggested that African Americans should maintain BP at less than 135/85 mmHg in order to reduce organ complications later in life (25). Less stringent guidelines are recommended for African Americans over age 60, but specific values have not been determined (25-26).

When it comes to awareness and treatment of hypertension, older adults have higher rates than younger adults. However, older adults still have lower rates of BP control (27). Figar et al. reported that this lower rate of BP control may be a result of using compliance-based education with orders from health professionals, rather than a self-management and patient empowerment strategy (28). Although this may be true, other reasons likely exist such as medication interactions, poor compliance, and inadequate communication between the patient and the healthcare provider (29). In order to effectively control BP, causes of hypertension must be understood. Many factors contribute to the development of hypertension including obesity, low physical activity level, high intake of sodium, and inadequate intakes of calcium, potassium, and magnesium (6, 30-31). Ideally, decreasing sodium intake and increasing calcium, potassium, and magnesium intakes should have a BP-lowering effect. However, nutrient needs change with age, potentially interfering with the maintenance of healthy diet and lifestyle changes.

Dietary Intake

Dietary intake patterns often shift with age, but not always to meet the changing nutrient needs of older adults. The recommended dietary allowance (RDA), provided by the Institute of Medicine (IOM), is the recommended intake level of a nutrient that is sufficient to meet the

requirements of 97-98% of all healthy people (32). While these recommendations are well established in the adult population, it is not clear how precise they are for older adults (33). This could have serious implications, especially for older women, as their nutrient requirements may be even higher than the current recommendations, potentially exacerbating any nutrient inadequacies (34).

Many factors contribute to the increased risk of nutrient deficiencies in the older adult population including chronic disease, medication use, and decreased appetite (35) as well as financial and social standing (34). According to Bernstein and Munoz, 5 of the 8 leading causes of death for adults ages 65 and older have connections to nutrition (36). Specific nutrients that should be emphasized for older adults to address these conditions include: an increased need for calcium and vitamin D for bone health; regular intake of fiber to maintain a healthy weight; and increased potassium along with decreased sodium to reduce the risk of hypertension, to name a few (37). Hypertension is a prevalent condition among older adults that, in addition to potassium and sodium, has been associated with low magnesium and calcium intakes (30).

Potassium

Inadequate potassium intake has been associated with hypertension. It is found in higher amounts in various fruits, vegetables, and dairy products and is essential for muscle contraction, and therefore, important for normal digestive and heart function (38). Reports show that increased potassium consumption can lead to a reduction in BP, possibly by counteracting some of the effects of increased sodium intake, which could contribute to a reduced risk of hypertension (39-40). Although potassium is a key nutrient for maintaining health, many Americans are not consuming enough. The RDA for older adults for potassium is 4,700 mg per day, yet in adults over the age of 60, women consume an average of 2,413 mg and men consume 2,977 mg (39). This average potassium consumption is even lower among African Americans, with women consuming 2,101 mg and men consuming 2,695 mg, which may contribute to their increased risk

of hypertension (39). Research attributes this low potassium consumption to differences in food choices (39-40).

Sodium

Sodium is another nutrient linked to hypertension, but excessive intake is correlated with the disease in contrast to the inadequate intake of potassium. Sodium is found in table salt, but nearly 75% of the sodium the average American consumes is from processed foods such as deli meat, canned soup, and frozen dinners (41). While the recommended amount of sodium for African Americans and adults over the age of 50 is less than 1,500 mg/day, the average American consumes more than 3,400 mg/day (42). This can have detrimental effects on BP as sodium is responsible for control of blood pressure and volume and excessive consumption can cause an increase in BP (43). Following a diet low in sodium such as the DASH diet resulted in reduced SBP and DBP levels, especially among women, minority populations, and hypertensive individuals (44). He and MacGregor reported that BP reductions could be seen after just weeks of reducing sodium intake (45). If sodium consumption was reduced across the American population, projections indicate that \$7 billion in health care costs could be saved annually by reducing average sodium intake by 400 mg (42).

Magnesium

Similar to potassium, inadequate intake of magnesium is associated with hypertension. Vegetables, bread, and milk are among the most important sources of magnesium for adults (46). Magnesium is a mineral that is vital for many processes throughout the body such as blood pressure, glucose metabolism, protein synthesis, etc. (47-48). Because of its versatility, magnesium functions to prevent disease and promote overall health, but many adults consume below the RDA of 420 mg/day for women and 320 mg/day for men over age 50 (49). Among adults over age 70, average magnesium intake is 205 mg for women and 280 mg for men (50). These values are even lower among African Americans over age 70 with average intake of 144 mg for women and 202 mg for men (50). African Americans likely consume less magnesium than

the rest of the population because dairy consumption is low (often a result of lactose intolerance) (51). Hypertension is associated with low intakes of magnesium (52). Therefore, the inadequate intake of magnesium among older adults and African Americans appears to contribute to their increased risk of hypertension (53).

Calcium

Evidence of a correlation between inadequate calcium intake and hypertension has also been found. The best sources of calcium are dairy products such as milk, yogurt, and cheese. Calcium is important for bone structure and function as well as muscle function and dilation of blood vessels (54). Low intakes of calcium have been associated with osteoporosis and cardiovascular diseases (CVD) such as hypertension (55-56). Compared to the RDA for calcium of 1,200 mg for adults over age 70, women consume an average 748 mg/day and men consume an average of 871 mg/day from diet alone (57). Still lower than these values, Burnett-Hartman found that African American women consumed less calcium than Caucasian women (58), which similar to magnesium, is likely a result of low consumption of dairy products. Even if dairy products are consumed, African Americans tend to consume many turnip, collard, and mustard greens, which may interfere with the absorption of calcium (54, 59). Therefore, older adults and African Americans could be at higher risk of developing diseases related to inadequate calcium intake such as osteoporosis and hypertension. However, nutrient inadequacies can often be resolved by consuming supplements to make up the balance (60).

Supplement Intake

While it is better to obtain nutrients from whole, nutrient dense foods, for older adults with inadequate nutrient intake from diet alone, supplements can be consumed to bring total nutrient intakes closer to the RDA. Many older adults do not need a complete multivitamin supplement; rather, specific vitamins and minerals should be emphasized (60). Specific nutrients that are recommended for older adults to consume in the form of a supplement include calcium, vitamin D, and vitamin B12 (61). Ervin and Stephenson also found that older adults were

deficient in calcium as well as iron and zinc. To investigate this, supplements specific to these nutrients were consumed and total nutrient intakes improved, yet calcium was still below the recommended amounts. It was proposed that this was a result of low-dose calcium supplements which were not enough to bring levels up to the RDA (62).

In addition to the nutrient inadequacies described above, many older adults also suffer from inadequate intakes of potassium and magnesium. Research shows that these nutrients appear to be linked to hypertension (63). Magnesium and potassium supplements could have the potential to reduce risk of hypertension in some individuals, but there has not been research to determine the safety and efficacy of these supplements. In contrast to the plethora of research on vitamin D and calcium, research specific to magnesium and potassium supplements is lacking (64-67). This narrow focus of current research may take necessary coverage away from less common supplements and their potential beneficial effects related to diseases such as hypertension. Although supplements can be dangerous if they contain hidden ingredients such as herbs and botanicals (68), approved supplements can support a healthy lifestyle when age begins to influence appetite and food choice.

Food Choice

Food choices transform with age; some choices may remain constant while others change based on experiences and preferences. After conducting interviews, Falk et al. found that childhood experiences (often related to simple cooking and tradition) were commonly maintained as a component of food choice throughout adulthood (69-70). However, food choices would change based on cost, convenience, and physical health (69). Meanwhile, Briley had similar findings but broke them down further, reporting that food choices changed as a result of many factors including income, education, time, location, health, and change in taste and smell (71). For example, older adults with better health and more education tended to have a wider variety of foods to choose from. If any limitations existed such as physical disabilities or lack of mobility/transportation, food choices became more limited (71).

Personal preference and social interaction also have significant influences on food choice. Regardless of physical or socioeconomic limitations, Eikenberry and Smith reported that personal preference plays an important role in food choice (72). A component of personal preference, taste has been mentioned as one of the most influential regulators of food choice (73). In addition to personal preferences, family and social relationships have been shown to impact food choice (72). Payette and Shatenstein (74) reported that seniors with adequate social support had healthier eating habits. Further, Wylie et al. (75) found that seniors living alone were at higher risk of losing interest in food. This indicates that, in addition to influences related to past experiences, cost, health, and personal preferences, social support also contributes to older adults' food choice. Social interaction with family and friends has been shown to influence not only food choice, but also food access (74-75).

Food Access

Although the majority of older adults are food secure, accessing food can still be a challenge. Older adults may access food from a variety of places including grocery stores, farmers markets, congregate dining sites, meals on wheels, and food pantries. A central barrier to accessing these sites is location (76-77). If older adults live far from a grocery store or have limited mobility, they must find transportation (78-79). This can be difficult as many older adults do not maintain a car and public transportation can be limited, especially outside of metropolitan areas (79-80). Research shows that grocery store environment can also influence food access as older adults may feel uncomfortable in stores with which they are unfamiliar. Narrow aisles and high shelves may also act as deterrents as older adults may not have the ability to navigate properly (79-81).

Having access to healthy foods, specifically, is an important component of food access. However, healthy foods are often expensive and the price of food can be a significant barrier to food access (82). Hendrickson et al. reported that participants in their study found cost to be a major barrier to shopping within their community (83). It can be difficult for older adults living in

lower income neighborhoods to obtain food that is not only filling, but nutritious (79). Research has been conducted in order to address limited access to fruits and vegetables in seniors, but few studies have investigated effects of cost and access to other types of food in this population (19, 84-86). While many factors affect food access among older adults, cost is major barrier for many, and food insecurity can worsen situations of limited access.

Food Insecurity

Food insecurity is a public health issue among many segments of the population, but little is known about food security status of older adults. Food insecurity is characterized by inadequate availability of food, causing altered eating patterns or reduced food intake (87). Among older adults, retirement is often a trigger for food insecurity as social security is relied on for income and may not be enough (88). Strickhouser found that approximately 8% of adults over the age of 60 have low or very low food insecurity (78, 88-89) and this proportion rises dramatically among African Americans where rates are closer to 16% (90). The rate of food insecurity among older adults is lower compared to other population groups, but older adults have higher rates of poverty along with women, African Americans, and welfare recipients (78, 89).

Research has investigated this conundrum to understand why older adults are not using food assistance programs if they are in poverty. Reports show that many older adults have different perceptions of food insecurity and needs for food assistance (91-92). Lee et al. found that older adults who were classified as food insecure had poorer dietary intake and health status than food secure individuals (93). Of those who perceived themselves as food insecure, many participated in the Supplemental Nutrition Assistance Program (SNAP) to help make ends meet throughout the month (92, 94). SNAP is a food assistance program that targets low-income Americans (130% of the poverty level of \$1,265/month for an individual) and provides them with money to purchase foods (excluding alcohol and hot foods) for use at home (95). While the program supports many individuals and households, only one in three older adults who are eligible for SNAP are actually using the program (96). Reasons cited for this reduced usage were

collected quantitatively and included lack of information, belief of being ineligible for SNAP, and stigma associated with the program (84, 97).

For those older adults who are not eligible for SNAP or choose not to participate, congregate nutrition services (congregate dining) are another option. The goal of these programs is to reduce hunger and promote socialization among older adults by targeting adults ages 60 years and older with special focus placed on low income and minority individuals (98). The use of congregate dining programs have been linked to decreased nutritional risk (99-100). Not only does congregate dining provide older adults with nutritious meals, it also gives them an opportunity to socialize (76). Older adults with adequate social support have healthier eating habits and are at a lower risk of losing interest in food than adults living alone or with limited social interaction (74-75). Therefore, a social component in addition to a balanced meal provides older adults with an environment to maintain or promote their health status.

RATIONALE FOR RESEARCH

Upon review of the literature, it is clear that age has profound effects on nutrition and health from the risk of hypertension and dietary intake patterns to food choice and food security status. Research has demonstrated that hypertension is more prevalent in the older adult and African American populations (9). Most of these individuals are aware of their diagnosis, yet BP control is lower than in other population groups (26). Some researchers attribute this to poor communication between the patient and healthcare provider, while others suggest the poor control is a result of dietary preferences (28-30). It is likely that both are involved since hypertension has been associated with inadequate potassium, magnesium, and calcium intakes as well as elevated sodium intake (30). However, additional clarity is necessary for African American, older adults to determine which of these nutrients are associated with hypertension and if the associations are significant.

Many changes are also seen with age with regard to food choice and food insecurity. When older adults retire and begin relying on social security for income, many have to limit spending which can result in changes to their typical food choices (87). Although there are programs available to assist older adults who are food insecure, many are not using the programs (95). Some researchers hypothesize that this is because of the stigma of the programs or lack of information (83, 96). However, most of this data has been collected quantitatively rather than qualitatively, so current literature is lacking in specific opinions and insights directly from older adults. Food choice is another area where some hypotheses exist, but most of the research has focused on younger adults and any research centered on older adults is dated (69, 71-72). Therefore, the purpose of this project was to investigate barriers to food security and changes in food choice with age as well as dietary intakes and associations with hypertension in older adults and African Americans respectively.

RESEARCH QUESTIONS

Phase 1: Focus groups (Chapter 2)

- How do older adults access the food system – where do they purchase food; do they share food; do they use alternative sources such as gardening?
- Have older adults experienced food insecurity – how does this affect the foods they choose to purchase; what are coping strategies to food insecurity; do they use food assistance programs; do they ever run out of food?
- What influences how older adults make their food choices – Do they choose to consume foods they had growing up; does cost play a role in what they choose to eat; how do social opportunities influence their food choices?

Phase 2: Secondary data (Chapter 3)

- How does dietary intake differ between pre- and post-menopausal African American women – are nutrients within the recommended guidelines?
- Does supplement intake differ between pre- and post-menopausal African American women – do post-menopausal women consume larger amounts of supplements; which supplements are most commonly used among pre- vs. post-menopausal women?
- Which nutrients are associated with hypertension or obesity in this group – does inadequate nutrient intake correlate to increased risk of hypertension; are older women at higher risk for obesity and hypertension?

SUMMARY OF RESEARCH STUDY DESIGN AND METHODOLOGY

This project was completed in two phases, with the first using qualitative methodologies and the second using a quantitative data set. In phase 1 of the project, 62 seniors over the age of 60 were recruited to participate in a focus group. Participants were recruited in two counties from senior congregate meal sites, senior apartment homes, and community centers with senior programming. Counties were selected based on SNAP participation rates and the 2013 Rural-Urban Continuum Codes (RUCC). Each county had a RUCC of one, which signified that both counties were located in a metro area with a population of one million or more (101). The RUCC were the same for the selected counties, but SNAP participation rates were purposefully different. Overall SNAP participation rates in these two counties have been increasing over the last few years. However, as of 2012, County 1 had a lower participation rate with 59% of eligible residents using SNAP compared to 72% of County 2 residents. In order to investigate this varied usage rate, opinions were gathered from a variety of seniors living in the selected counties.

Seniors were eligible to participate in the study if they were at least 60 years of age and had adequate mobility in order to do their own shopping or ordered their own foods from the grocery store (many stores offer delivery service). Following recruitment, 8 focus groups were conducted (4 in each county), each lasting approximately 90 minutes each. A list of open-ended questions were developed for the focus groups and were later reviewed and approved by a review committee. Questions were developed to obtain information on food choice, food access, and food security using personal, behavioral, and environmental constructs of Bandura's Social Cognitive Theory (SCT) (102). Examples of questions asked included: What factors affect your food purchases? Do you receive food stamps; how important are they to you? (personal) Do you do your own grocery shopping? If yes, how do you decide which foods to buy when you shop? How do you allocate your money? (behavioral) Describe foods available to you. Do you eat lunch at the senior meal program? (Please tell us about this) Do you have a garden? (Please tell us about

this. What do you grow? Does it provide an important food source?) (environment). Focus group questions and a diagram of Bandura's SCT can be found in the appendix.

Each group was audio recorded and transcribed verbatim. Following transcription, both researchers independently analyzed each transcript using open coding methods (103). Transcripts were first read to gain an overall understanding of the focus group and then each line was coded with assistance from field notes. Following independent analysis, the researchers met to compare codes and reconcile discrepancies. Themes were identified from the most prevalent codes found throughout the eight transcriptions. Relevant quotes were chosen to highlight the significance of certain themes. Statistical Package for Statistical Sciences (SPSS) for Windows version 20.0 (SPSS, Chicago, IL) software was used for analysis of quantitative data.

Food security scores were calculated using the U.S. Household Food Security Survey Module: Six-Item Short Form (104). A longer 18-item U.S. Household Food Security Survey Module is also available, but the short form was chosen for this project in order to reduce the respondent burden for the older adult population. The short form consists of six statements and each was coded as affirmative (yes) or not affirmative (no) based on the response. Raw scores were calculated and classified according to food security status. A raw score of 0-1 represents high or marginal food security; 2-4 represents low food security; and 5-6 represents very low food security (105).

For phase 2 of the project, secondary data was analyzed. For that project, two groups of African American women, 105 pre-menopausal (ages 19-38 years) and 87 post-menopausal (ages 60-89 years) were recruited through advertisements in African American newspapers, community aging groups such as congregate meal programs, cultural community centers, and churches in African American communities. Flyers were posted and e-mails were sent to local colleges and universities to recruit younger women for the study. Women were also recruited from WIC

offices, health clinics, and churches in order to include individuals of varying socioeconomic status. Snowball sampling was used to aid in recruitment efforts.

Dietary information was collected using the Block Survey Food Frequency Questionnaire (106). The questionnaire provided background on typical foods eaten and the frequency of their consumption. Collection of dietary factors included beverages, vitamins and other supplements, and food items broken down by food group. Plastic and paper food models were shown to the participants in order to improve accuracy of the reported intakes. During this phase, SPSS was used to analyze dietary and supplement intakes. Independent sample t-tests were performed to determine significant differences between the two sample groups. Bivariate correlations were conducted to analyze associations between other dietary related factors. Data were checked for normality of distribution.

For both phases, each participant was weighed and measured for stature, following standard procedures, with outer clothing and shoes removed (107). Height and weight measurements were used to calculate body mass index (BMI) as wt/ht^2 (kg/m^2). Additionally, blood pressure (BP) measurements were taken for phase 2. Further detail of the study design and data analysis for both phases can be found within the designated chapter for each paper (chapters 2 and 3). All participants signed a written informed consent form (Appendix) and were given monetary compensation for their time. The University of Minnesota's Institutional Review Board approved this study.

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CHAPTER 2

Investigation of food choice, promoters and barriers to food access issues, and the perception of food insecurity among low-income, free living Minnesotan seniors

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CHAPTER SUMMARY

Objective: Investigate food choice, food access, and food insecurity among seniors.

Design: Eight focus groups were conducted in two counties with high and low SNAP participation rates.

Setting and Participants: Sixty-two seniors (≥ 60 y) were recruited and each attended one focus group at a community center. Sample was 79% female and majority of sample was Caucasian (91%), similar to state demographics.

Phenomenon of Interest: How seniors make food choices and access food, and food insecurity perceptions among this population.

Analysis: Focus group themes were identified based on discussion commonalities. For quantitative data, p-value of 0.01 showed significance.

Results: Five themes emerged: a) former experiences impact eating behaviors; b) financial and food security drive use of food assistance programs; c) food access strategies- restaurants, retail markets, and alternative sources; d) physical changes associated with aging influence food access and intake; and e) social influences play a role in decision making. Food security scores significantly correlated with age, race, income, and food stamp usage.

Conclusions and Implications: Many drivers of food choice among seniors including food security and food access. Need to focus on what shapes choices among this population.

Key words: Seniors, food access, food security, food choice, health

INTRODUCTION

The current cohort of older adults continues to grow as the baby boom generation reaches retirement.¹ In 2000, 16.3% of the U.S. population was 60 years of age and older; this number is expected to increase to 22.2% by 2020.² With these changing demographics and the increasing prevalence of individuals over age 60, it is imperative to focus on the nutritional needs of seniors and how they access food. Adequate nutrition has been shown to improve health and reduce acceleration of the development of chronic diseases.³ This has the potential to reduce health care costs among elderly.⁴ Nutrition quality is also linked to food security and sufficient access to food in older individuals. Therefore, having limited access to food places seniors at greater risk for poor nutrition.⁵ In 2013, nearly 9% of food insecure households were occupied by individuals ages 65 and older.⁶ Several studies have addressed issues related to the food insecurity problem in this population. However, these studies lack qualitative⁷⁻¹² and recent data.^{8,10-12}

Researchers have suggested plausible barriers to food security which include: lack of social support, limited neighborhood walkability,⁵ seasonal variation,⁷ and functional impairments.¹⁰ Many of these studies do not analyze the use of food assistance options such as Meals on Wheels or congregate dining programs which are often used by seniors.^{5,7-11} Of the studies that have reviewed nutrition assistance programs, most have not considered alternative food sources provided by friends or family members.¹¹ Reciprocal relationships in which individuals share excess food with others have also not been widely discussed.¹³ These alternative food sources potentially contribute to a decreased need for the Supplemental Nutrition Assistance Program (SNAP), a food assistance program that provides money for low-income Americans to buy food. Therefore, they are all possible contributing factors to low SNAP participation in some areas of the country. With only 1 in 3 eligible seniors using SNAP nationwide, decreased usage may also be attributed to stigma of the program.^{11,14}

Little is known about how this population makes food choices and accesses the food system. Thus, the purpose of this research was to investigate food security among seniors and determine food access points in 2 urban, Minnesotan counties using qualitative methodology.

METHODS

Study Population And Design

This study was designed to investigate food choice, food security, and promoters and barriers to food access among low-income, free living Minnesotan seniors in 2 urban counties. Counties were selected based on SNAP participation rates and 2013 Rural-Urban Continuum Codes (RUCC). Each county had a RUCC of 1, signifying that both counties were located in a metro area with a population of 1 million or more.¹⁵ The same type of RUCC counties were selected, but they differed by SNAP participation rates. SNAP usage in these 2 counties has increased over the last few years. However, as of 2012, older adults had lower participation in county 1 than county 2 with 59% and 72% of eligible residents using SNAP, respectively. To understand why usage rates differed between 2 urban counties with the same RUCC, but different SNAP participation rates, opinions were gathered from seniors.

Recruitment involved posting flyers and sign-up sheets at senior congregate meal sites, senior apartment homes, and community centers with senior programming in order to recruit seniors who met eligibility criteria including: being at least 60 years of age and having adequate mobility to do their own shopping or order their own food from the grocery store. Flyers explaining the focus groups, along with sign-up sheets, were distributed at recruitment sites at the beginning and collected at the end of the week at which time the investigators called potential participants to inform them of further details and answer questions; 62/64 who enrolled, participated. Program directors and staff assisted in the recruitment process. Following recruitment, from June-August 2014, 2 researchers trained in focus groups conducted 8 focus groups with 4 groups in each of the 2 counties. Each focus group consisted of 8 participants, except 1 group of 6 (n=62). Discussions lasted approximately 90 minutes. During each focus

group, 1 researcher took notes and the other facilitated while the session was simultaneously recorded using 2 digital audio recorders.

A list of open-ended questions used during each focus group was developed by the researchers and later reviewed and approved by a review committee. Questions were developed to obtain information on food choice, food access, and food security using personal, behavioral, and environmental constructs of Bandura's Social Cognitive Theory (SCT).¹⁶ Examples of questions asked included: What factors affect your food purchases? Do you receive food stamps; how important are they to you? (personal) Do you do your own grocery shopping? If yes, how do you decide which foods to buy when you shop? How do you allocate your money? (behavioral) Describe foods available to you. Do you eat lunch at the senior meal program? (Please tell us about this) Do you have a garden? (Please tell us about this. What do you grow? Does it provide an important food source?) (environment) (Table 1).

In addition to focus groups, demographic forms were completed by each participant which provided information including but not limited to age, income, education, food security status, and use of food assistance programs. Following standard procedures, each participant was weighed and measured for stature with outer clothing and shoes removed.¹⁷ Height and weight measurements were used to calculate body mass index (BMI) as wt/ht^2 (kg/m^2), and analyzed for any significant correlations with food insecurity and SNAP usage. This study was approved by the University's Institutional Review Board (IRB). Informed consent was received from each participant prior to initiation of the discussion. Upon conclusion of each group, all participants were given a cash incentive for participating.

Focus Group Analysis

Each group was audio recorded and transcribed verbatim. Following transcription, both researchers independently analyzed each transcript using a well-established open coding method.¹⁸ Transcripts were first read to gain an overall understanding of the focus group and then each line was coded for concepts and ideas generated from discussion. Following independent

analysis, the researchers met to compare codes and reconcile minor discrepancies to ensure that a consensus was reached for each code. Themes were then identified from the most prevalent codes found throughout the 8 transcriptions. Relevant quotes were chosen to highlight the significance of each theme (Table 2).

Using Statistical Package for Statistical Sciences (SPSS) for Windows version 20.0, quantitative data from each county were analyzed separately to observe associations between food security and food assistance usage. Food security scores were calculated using the U.S. Household Food Security Survey Module: Six-Item Short Form.¹⁹ The form consisted of 6 statements and each was coded as affirmative (yes) or not affirmative (no) based on the response. Raw scores were calculated and classified according to food security status, with 0-1 representing high or marginal food security; 2-4 representing low food security; and 5-6 representing very low food security.¹⁹

RESULTS/DISCUSSION

Demographics

Sixty-two seniors participated in the study and the majority were NonHispanic White (91%) and female. About 72% of the seniors had an annual income between \$10,000 and \$30,000, 23% were using food stamps and 62% were using a congregate meal site at least 2-3 times/week (Table 3). Food security scores were calculated for both counties; only 6.7% of participants in county 1 had low food security with a mean score of 0.7 ± 1.6 compared to 25% of County 2 participants with a mean score of 1.4 ± 2.1 . Bivariate correlations showed significant associations between food security score and age, race, income, and food stamp usage (Table 4). Importantly, in contrast to other research, BMI was not associated with food security or SNAP usage, which may account for higher SNAP usage in county 2 over county 1.

The primary difference between the 2 counties was the frequency of food insecurity. Participants in county 2 talked more about SNAP and other programs than in county 1 and SNAP seemed to have a more negative stigma in county 1. No other distinctive differences were noted

between the 2 counties from focus group discussions, so qualitative information was grouped together by 5 major themes that emerged. They included: a) former experiences impact eating behaviors; b) financial and food security drive use of food assistance programs; c) food access strategies are implemented at restaurants, retail markets, and when using alternative sources; d) physical changes associated with aging influence food access and intake; and e) social influences play a role in decision making.

Following placement of quotes within the SCT framework, it was evident that the environment and behavior constructs had more impact on seniors' food choice than personal factors. Although influences from past experiences framed the development of food choice, comments showed that food cost and accessibility appeared to have a more substantial impact on the dietary patterns of seniors, with barriers to food access potentially causing further dietary changes (see Figure). The combined effects of limited incomes and rising food cost have caused seniors to seek out alternate food sources and assistance programs. While these alternate options aided some seniors, others have not used them because of the suggested barriers such as stigma, no monetary need, limited transportation, and lack of program knowledge.

Theme 1: Former Experiences Impact Eating Behaviors

Seniors made important decisions each day and those choices related to food were strongly influenced by past experiences. Factors that contributed most to food choice were foods consumed during childhood, family influence, and travel experience. Participants cited specific dishes they had growing up that they still enjoy today. One participant stated, "Well growing up on the farm, every Sunday we would have chicken, fried chicken. So I still make it." Family influence was another chief contributor to cooking style and ability. Most of the participants learned how to cook and cited that it was often the mother who taught the children how to cook. Although, there were still a few participants who relied on their spouse to do the cooking.

Participants also discussed travelling and how that shaped the way they eat, not only influencing food choice, but cooking style as well. While travel experiences often changed food

preferences of participants, foods consumed during childhood seemed to endure through the years. Similar to this research, an earlier study reported that seniors' food preferences related to simple cooking and tradition often dated back to their youth.²² The current study results show that habits begin to form as eating behaviors from past experiences are repeated. This can lead to the development of traditions that provide structure and enjoyment for seniors, but it can be difficult to uphold traditions when money is a limiting factor. In support of this finding, Eikenberry and Smith²³ reported that personal preference plays an important role in food choice, especially among lower income individuals, which may be due to fear of wasting food.

Theme 2: Financial And Food Security Drive Use Of Food Assistance Programs

Food insecurity was a concern among some seniors, and in this sample, 24% (n=15) had low or very low food security (Table 3). Food insecure seniors believed their lack of income was triggered by retirement and increased expense of food [such as meat]. Other researchers also found that seniors believed their income was no longer adequate once they stopped working and began to rely on social security.²⁴ Wolfe et al.²⁵ found that participants were unable to afford meat, which may impact overall nutrient intakes leading to inadequate consumption of protein and increased consumption of carbohydrates. This imbalance of nutrients may contribute to the development of chronic conditions, which, in turn, may lead to an increase in health care expenditures.²⁴

In this study, when money was constrained, participants searched for assistance programs to supplement their income and food purchases. Congregate dining and other community programs (e.g. food shelves, soup kitchens) were examples of this. Most participants described congregate dining as "beneficial", providing great, affordable meals. However, a few revealed that they disliked the food which limited their use of the program. Congregate dining had no negative stigma attached to its use because most seniors paid something for their meal. Conversely, SNAP usage was controversial in a couple of county 1 groups, with some seniors disapproving of its usage. Participants provided several reasons why they chose not to use SNAP

including they had no perceived need for food stamps (they obtained food from other sources); their income was too high to qualify; and they had associated the program as a welfare program.

The seniors spoke about the stigma of SNAP and believed that implementation of the debit (EBT- Electronic Benefits Transfer) cards reduced the stigma, but some still said they would not use them. Similarly, Martin et al.²⁶ found that seniors were less likely to use food stamps because they felt uncomfortable using them. In contrast, other seniors in this study believed that the program was very helpful. One senior explained, “It goes by your income. I make \$830/month and I maintain a car and my apartment- I pay \$230 I think for rent and if it wasn’t for the food stamps, I wouldn’t make it through the month.”

While some seniors were well-informed, others lacked knowledge about programs available to assist them. The lack of familiarity and misunderstanding of eligibility criteria may be an important barrier to the use of food assistance programs. In many of the groups there were a few participants who were aware of food programs and informed the rest of the group. When a participant shared information about these programs, it encouraged questions from those lacking program knowledge. Other researchers also found that lack of information and limited awareness of eligibility criteria were attributed to low program use.^{27,28}

Theme 3: Food Access Strategies Are Implemented At Restaurants, Retail Markets, And When Using Alternative Sources

While the safety net portion of the food system (e.g. congregate meal programs, SNAP, food shelves) was an important access point for many seniors, they also accessed food from other sources. Most seniors who participated in these focus groups were living independently and still capable of cooking. As a result, they obtained food from retail markets (stores) using a variety of shopping strategies such as coupons and buy 1, get 1 free offers. Seniors also accessed food from restaurants and the alternative food system. Each of these is a subtheme.

Subtheme 1: Retail markets (stores).

Many seniors, even those who were 89 years old, said they were still cooking and thus, still went shopping. Most participants chose grocery stores based on location and price. It was common for participants to visit stores near their home, rather than travelling a distance to find their preferred store, but food price appeared to be even more important. One man explained his store choice by saying, “but actually, strangely enough, Target has quite low prices on their food—not a great selection. And so I find myself shopping there a lot and not going out to eat.” While seniors enjoyed eating out, many opted to shop rather than eat out in order to limit spending. When the retail food system was used, coupons were a vital part of seniors’ spending habits. Seniors stated that they used coupons frequently, but only for things they already planned to purchase. When buy 1, get 1 free offers were used, seniors either kept the free product or gave it to a friend. This theme appeared to connect back to the seniors’ past experiences as many felt that nothing should be purchased if it was not originally planned because it may lead to waste.

Transportation was a common barrier to food access. Although seniors may have wanted to search out stores with lower prices in order to save money, it was difficult for many to access these stores. Most participants were still able to drive, but lacked access to a car or chose not to drive because of associated expenses. As a result, many seniors relied on family/friends or other means of public transportation. While these were effective solutions, seniors often lived a long distance from family or in areas where public transportation was not readily available. Assuming public transportation was available, travel may still have been limited because of scheduling. In addition to transportation, food access can be influenced by functional impairments and grocery store environment,^{10,29} which is consistent with the results of this study. Some participants were affected by these barriers, but still wanted to cook. As a result, they would call in a shopping list and many local stores would deliver groceries for a small fee.

Subtheme 2: Restaurants.

Participants often spoke of eating out at fast-food and casual dining restaurants. Although most restaurants visited were low or moderately priced, it appeared that seniors with higher

incomes chose to eat out more frequently. However, some participants revealed that they focused on price when out at a restaurant even if they had no financial concerns. One participant said, “Ya know, maybe I should just forget about what it costs and buy what I want. I don’t know, but it’s a habit. Comes from my upbringing- from the hard times.” Aside from price, some participants chose to eat out because they desired food they would not cook for themselves. Others enjoyed the simple convenience of not having to cook that day.

Subtheme 3: Alternative food system.

Three components of the alternative food system frequently used by seniors included gardening/fishing, assistance from friends and family, and reciprocity (e.g. trading/sharing food). Gardening was often incorporated into seniors’ daily routines. It served as an important food resource because it provided seniors with inexpensive fresh produce as well as an opportunity to increase their activity level. Several community sites had garden plots specifically designated for seniors. A few participants even mentioned that they still canned their own produce. This saved money and allowed the benefits offered from the garden to be enjoyed throughout the year.

Friends and family also served as a common source of food assistance for seniors. Participants stated that family members often offered transportation, delivered food such as produce and fish, and extended invitations to join them for meals at home or outings to restaurants. Other seniors mentioned family providing food even from a distance. One woman stated, “I have a grandson that does commercial fishing in Alaska and I get salmon, I get halibut and I get moose and caribou.” While some seniors enjoyed fish and other foods that were provided by family members, a few others still did their own fishing. Fishing served as a good hobby and source of food for some seniors.

Results from this study showed that family support was important for seniors. However, when family assistance was not feasible, reciprocity with peers (friends and neighbors) was common; they cooked large meals and shared with neighbors instead of storing for later use. This idea of reciprocity has been seen in other research, demonstrating that it is a common strategy for

seniors to save money.^{13,30-31} Smith and Miller¹³ found that sharing food reduced food insecurity and was important to build a sense of community. Stoller³⁰ reported that older adults were more likely to provide help than receive help, so promoting reciprocity may foster community growth.

Reciprocal relationships also provided social interaction for seniors. Participants appreciated when family took them out to eat because they could have what they wanted to eat without worrying about the cost. Friends and family also sent home leftovers, so seniors had additional meals throughout the week. Researchers have found that the presence of social interaction with family and friends can influence both food choice and food access.³²⁻³³ The social aspect of sharing food is important for seniors, but with sharing food comes the risk of foodborne illness if food is not prepared or stored properly. The immune system becomes less effective with age, so older adults are at an increased risk for foodborne illness. Therefore, this population should be encouraged to follow safe handling practices.²¹

Theme 4: Physical Changes Associated With Aging Influence Food Access And Intake

As seniors aged, physical changes and other health issues developed such as altered taste and smell, sleep changes, and chronic conditions. Some seniors had physical limitations that affected their cooking ability, although most still cooked. One participant used a walker and stated, “It’s hard to stand and cook, but I open my cupboard door and put one foot up.” For some, physical limitations caused a decline in cooking and eating balanced meals, and for others, chronic conditions affected their overall dietary intake. Participants explained that chronic diseases caused them to avoid eating certain foods and physical limitations prevented them from accessing foods they had consumed in the past.

In addition to health issues, sensory perception changed with age and may have affected the variety of food that seniors consumed. Many participants reported observing a change in taste (especially for meat) with age, but only a few noticed a change in their ability to perceive smells. Sensory changes may cause fluctuations in appetite, but seniors may be unaware of the reasons for these fluctuations. While these changes may often be overlooked, they can place seniors at

increased nutritional risk with age.³⁴ Few researchers have focused on the association between food access and physical changes with aging.³⁴⁻³⁶ Therefore, it is necessary for future research to investigate seniors' food access and determine potential barriers in addition to transportation availability and financial security.

Sleep is another factor that may be associated with dietary intake. Participants reported disturbed sleeping patterns because of needing to use the bathroom, not being tired because of low physical activity levels during the day, and being uncomfortable because of physical pain (back aches, muscle pain/cramps). Disturbed sleep appeared to contribute to overall eating patterns as some seniors reported snacking when they got up during the night. One participant discussed her sleeping pattern as, "maybe 8 hours or so. I get up a lot during the night to go to the bathroom. Sometimes I eat some cold cereal, just dry cereal, thinking I can go to sleep better then." Altered eating behaviors such as night eating may contribute to extra calories consumed which, in turn, may lead to other chronic conditions. Sleep patterns have been tied to the development of chronic diseases such as diabetes, coronary heart disease, high blood pressure, etc. and many seniors are not getting the recommended amount of sleep each night.³⁷ More research is needed to assess to what extent these associations are true.

Declines in cognitive function are commonly associated with aging. Many participants had vivid memories of childhood and other experiences, but small details or clarity of a situation were lost. Although they could recall a situation, details such as age and favorite items were often forgotten. Most of the seniors also spoke of the difficulty they had in remembering to take coupons to the store. They took the time to search for and cut out relevant coupons, but forgot to take them along to the store. These may seem like insignificant effects, but frustration may develop as there is potential for a loss in savings from coupons. Not only is memory loss frustrating, but research has shown that memory problems can increase the likelihood of insomnia, further contributing to the effects of inadequate sleep and chronic disease.³⁸

Theme 5: Social Influences Play A Role In Decision Making

Social influence appeared to impact eating behaviors of seniors by getting them to eat balanced meals at the senior center or out with family rather than rely on quick, easy meals of lower nutritional value (cereal, toast, etc.) alone in their rooms. Many seniors made the choice to eat out instead of cooking in order to spend time with friends and family. One participant said, “Yeah, I don’t care where we go to eat, just the idea of getting out with 1 of the kids or grandkids.” If family extended an offer to get together, participants said they would accept the offer regardless of the food or restaurant, which suggests how important social interactions are for seniors. Researchers have found that seniors living alone were at higher risk of losing interest in food,³² so having adequate social support may lead to healthier eating habits.³³

Participants expressed using congregate dining for more than just the food. While most of the participants used congregate programs for lunch, 1 site, in particular, saw more seniors using the program for activities such as games, lectures, and other social gatherings. While social activities were available for most seniors, some participants were still interested in a wider variety of options; they desired social aspects aside from food such as volunteering on committees. This demonstrates the drive seniors had to be involved in a variety of social settings.

Little research has been done to connect food habits and seniors’ social interactions. However, sources do provide context on social capital which explains that seniors have increased mobility when living in an area with helpful neighbors and trust among the community.³⁹ Some participants in this study increased activity by gardening together and trusted friends and neighbors to share food. Furthermore, living in enriched environments can provide seniors with improved health outcomes, justifying that social interaction may be correlated to longevity.⁴⁰

This study is not without limitations. Females tend to live longer than males which is likely why the study population was largely female.⁴¹ Because of study locations, the sample was primarily NonHispanic White (91%), although this is similar to state demographics. More research is needed which oversamples minority seniors. They may be at even greater risk of food insecurity than the general population as previous research has shown that younger minority

groups who live in inner city areas struggle to make ends meet.⁴² Also, this project was designed to focus on community-dwelling seniors, so data regarding individuals with physical limitations are limited. Additional research is needed to address the needs of seniors with limited mobility.

CONCLUSIONS

Research on food security and food access among seniors is limited. Yet, the baby boom cohort in America continues to grow as individuals are living longer than in the past. The results of this study indicated many drivers of food choice among older adults including family influence, travel, childhood experiences, and social interaction, but the environmental constructs of food access and security were of utmost importance. Most seniors had limited incomes and were therefore, using traditional strategies such as coupons to save money. Some seniors used food assistance programs, but many lacked program knowledge. It is critical for communities and policy makers to promote awareness of food assistance programs in older adult populations and understand what shapes their choices. On a local level, program information should be shared via flyers and advertisements at community centers, congregate dining sites churches, grocery stores, and in newspapers. Seniors also relied on the alternative food system, using sources such as gardening, reciprocity, and family assistance. These strategies to save money played an integral role in seniors' lives, so it is necessary for healthcare professionals to focus on the needs of this growing population to ensure that seniors have access to the resources they need to thrive as they age.

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Table 1. List of Focus Group Questions by Topic

Icebreaker
What is your favorite food and why?
Food choices
What are mealtimes like in your household?
Tell us about who you live with.
Who prepares meals and snacks?
How do you decide what to eat? How does health influence your eating behavior?
Please describe what your typical meals look like (B, L, D).
Where do you eat most of your meals?
How has your cooking changed as you have aged? Describe any changes in your food preferences
Shopping strategies
Tell us about shopping. How do you decide what to buy?
What factors affect your food purchases? How often do you shop?
What stores do you usually grocery shop at? How is the overall selection?
Are the stores easily accessible? How do you usually get to the store (car, bus, taxi, etc.)?
How affordable is the selection? What strategies do you use to save money?
What foods do you spend the most money on? What foods are priority foods for you?
How would you change stores in your area?
Food security
How do you manage your finances around food?
How do you allocate your money? How much goes toward food?
Do you have enough money for food? If not, where do you get food from?
Do you receive SNAP vouchers and is it enough to make ends meet?
What encourages you to use SNAP?
If you do not use the SNAP program, what are the barriers to the program?
How does your diet change throughout the month based on the use of your food budget?
Are you, or members of your family, ever hungry because food doesn't last through the month?
Food access points
What other types of food assistance programs do you use? How do you feel when you use them?
Do you eat lunch at the Senior Meal Program? What do you like best/least about the program?
If you have used them, how do you feel about congregate/senior dining sites?
Do you receive food from sources other than the store? Which sources?
Have you participated in reciprocal relationships for food (like trading foods)? Tell us about this.
Do you have a vegetable/fruit garden? What do you grow? Does anyone in the household hunt or fish?

Table 2. Representative quotes presented by focus group theme with SCT construct identified

Representative Quote	SCT construct
Theme 1: Former Experiences Impact Eating Behaviors	
"None of us got out of house without my mother teaching us how to cook, so I've been cooking from a very early age."	Behavior
"And I can cook from a cookbook, but I prefer just doing something relatively quickly like pork chops and potatoes, fried potatoes and onions. I enjoy that."	Personal
"Being able to eat fish is nice and eat some chicken, but the Indian food focusing more on legumes and different fantastic ways to cook vegetables and potatoes and the flavors are just fantastic."	Behavior
"I like chicken and fish. And during the summer I like fresh vegetables. I have a garden also."	Personal
Theme 2: Financial And Food Security Drive Use Of Food Assistance Programs	
They're [SNAP couchers] very helpful. I get \$15 a month and it is amazing how it'll come in very handy.	Environment
"If I ordered something and didn't like it, I'd probably eat it anyway just because I wouldn't wanna waste the money."	Personal
"After they came out with this card we got- ya know it's not really our fault that we're in the situation we're in and it isn't charity, and it gave dignity to me too. It was 1 of the best things they did."	Environment
"You have to have done it 2 or 3 times to get into practice as to how to get the things that you need [at the food shelf]. Your first time, you're just kind of overwhelmed because there is a lot of choice and so it's important to know that when you're going in there, that you are going to be shown categories of food."	Personal
Theme 3: Food Access Strategies Are Implemented At Restaurants, Retail Markets, And When Using Alternative Sources	
"[it's] across the alley basically from where I live. I'm so close I can throw a stone to Korte's."	Environment
"You're at the mercy of the schedules and whether or not they work. I'm in trouble for getting a particular job that I could get tomorrow because I- the bus won't be able to accommodate me on the weekends."	Environment
"I think it's \$10/delivery unless you have 4 people, is that it? Then it's only \$2.50 for delivery. It's a lot cheaper than even trying to crank up a car."	Environment
"[I live] downstairs in my apartment by myself, but my daughter lives upstairs. So, she helps me out and she takes me to the groceries because I don't drive either."	Environment
"I walk down to the trout pond behind the courthouse here and catch trout or I go to the local lakes and if I can catch something big enough."	Environment

Table 2. Representative quotes presented by focus group theme with SCT construct identified (continued)

"Yes because a cousin of mine- she has a huge garden. She says you can always come and pick tomatoes."	Environment
"When my arthritis kicks up a little bit there are days when I can hardly make it through the grocery store cause then I come home and I am really beat, so that kind of affects, you know, how long I shop- go in and get what I need on my list and get out."	Personal
Theme 4: Physical Changes Associated With Aging Influence Food Access And Intake	
That [gastroesophageal reflux disease (GERD)] had an impact because I- one meal that was simple to make was spaghetti. Fry up a little hamburger and just throw the spaghetti sauce in it. Get your noodles ready, throw some cheese, ya know, parmesan on it. That was an easy meal but that took that away from	Behavior
"[I need] something to perk up the taste buds because my taste buds aren't very good anymore. I get the urge to have something and then after I have it, it didn't taste as good as I thought it was going to taste."	Personal
"I remember my father and he was in his 80s I think, and we were out for dinner and he was eating his favorite, which I don't remember what it was."	Behavior
Theme 5: Social Influences Play A Role In Decision Making	
"I have some friends in this area, so sometimes I'll go out on the weekends and have lunch with friends and otherwise I'll make something very simple."	Environment
"I have a lot of cereal on days I don't eat in the lunchroom."	Behavior
"what they're saying is true. I think a lot of people come down to engage in conversation as well as for the meal."	Environment
"They [senior center] have a lot going on" and if anyone is bored "it's their own fault."	Environment
"[we want] more opportunities to socialize in different settings."	Personal
*Some quotes listed above align with multiple SCT constructs.	

Table 3. Sociodemographic Characteristics of Focus Group Participants: Seniors ≥ 60

	Total (n=62)		County 1 (n=30)		County 2 (n=32)		
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Age (years)	78 ± 8.4		80 ± 7.5		76 ± 8.9		
BMI	30.1 ± 6.2		30.9 ± 7.8		29.4 ± 4.2		
Food Security Score	1.1 ± 1.9		0.7 ± 1.6		1.4 ± 2.1		
	Frequency	%	Frequency	%	Frequency	%	
Gender	male	13	21.0%	2	6.7% ^a	11	34.4% ^a
	female	49	79.0%	28	93.3% ^b	21	65.6% ^b
Race	Caucasian	57	91.9%*	30	100.0%	27	84.4%
	African American	3	4.8%	0	0.0%	3	9.4%
	American Indian	0	0.0%	0	0.0%	0	0.0%
	Hispanic	1	1.6%	0	0.0%	1	3.1%
	Asian	1	1.6%	0	0.0%	1	3.1%
	Other	0	0.0%	0	0.0%	0	0.0%
Income	Less than \$5,000	3	5.2%	1	3.7%	2	6.5%
	\$5,001-\$9,999	10	17.2%	5	18.5%	5	16.1%
	\$10,000-\$19,999	20	34.5%	11	40.7%	9	29.0%
	\$20,000-\$39,999	22	37.9%	8	29.6%	14	45.2%
	Greater than \$40,000	3	5.2%	2	7.4%	1	3.2%
SNAP Usage	No	46	75.4%	24	80.0%	22	71.0%
	Yes	14	23.0%	6	20.0%	8	25.8%
	I used to	1	1.6%	0	0.0%	1	3.2%
Congregate Meal Site Usage	Daily	4	6.6%	2	6.7%	2	6.5%
	5 days/week	16	26.2%	6	20.0%	10	32.3%
	2-3 days/week	18	29.5%	7	23.3%	11	35.5%
	1 day/week	9	14.8%	3	10.0%	6	19.4%
	2-3 times/month	5	8.2%	4	13.3%	1	3.2%
	Never	9	14.8%	8	26.7% ^a	1	3.2% ^b
Food Security Score	High (0-1)	47	75.8%	26	86.7%	21	65.6%
	Low (2-4)	10	16.1%	2	6.7%	8	25.0%
	Very Low (5-6)	5	8.1%	2	6.7%	3	9.4%

*^{a,b} Columns with different superscripts are significantly different from each other.

*This is similar to state's general demographic with a NonHispanic White population of 86%.²⁰

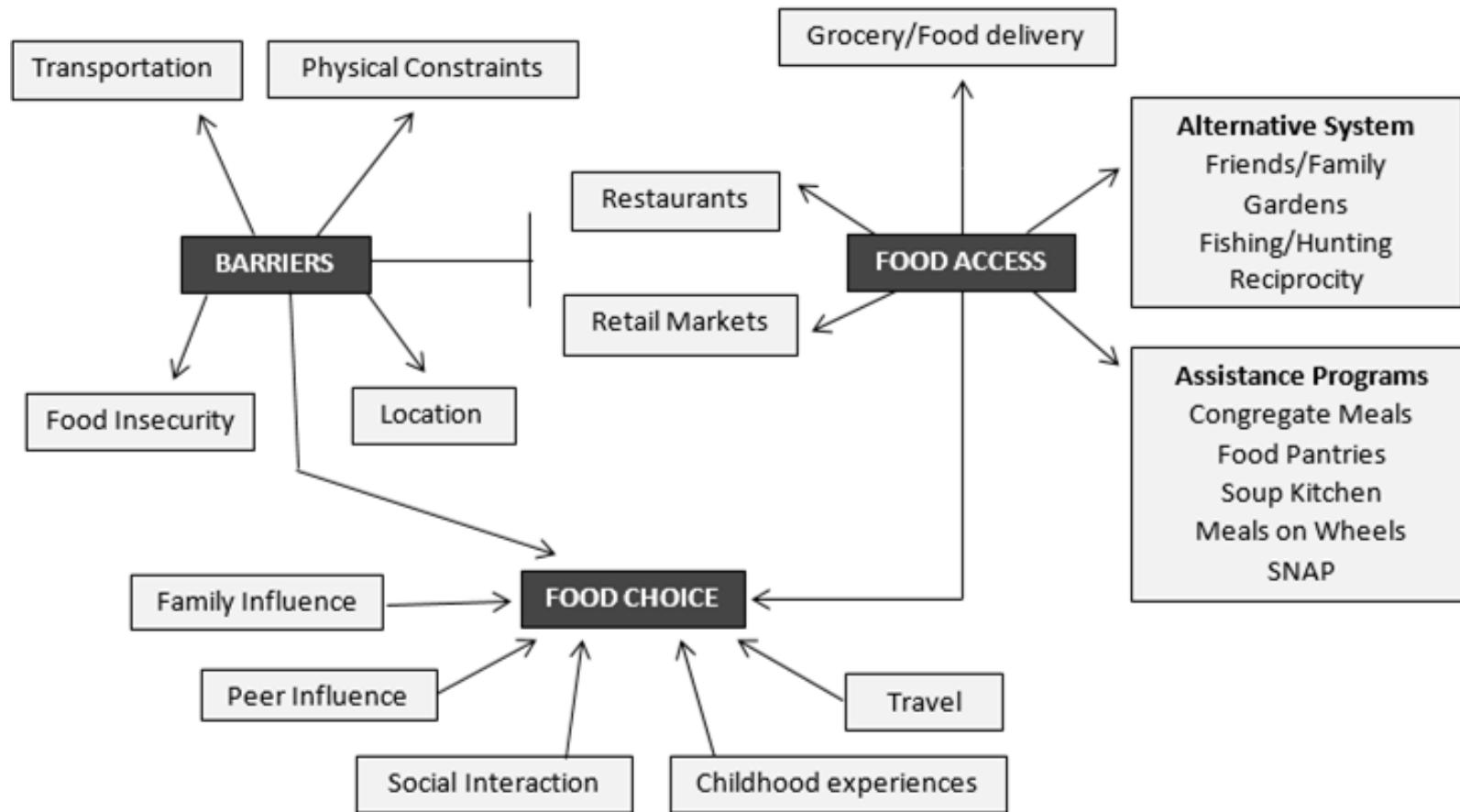
Table 4. Pearson Correlation coefficients for significance among food security related factors

	Food Security Score	BMI	County	Years	Gender	Race	Income	Education	SNAP usage	Meal Site Usage
Food Security Score	1	-.108	.193	-.295*	-.180	.352**	-.345**	-.054	.431**	-.033
BMI	-.108	1	-.117	-.290*	.060	-.209	-.175	.000	.028	-.129
County	.193	-.117	1	-.199	-.340**	.239	.021	.027	.129	-.314*
Years	-.295*	-.290*	-.199	1	.096	-.263*	.224	-.263*	-.439**	-.018
Gender	-.180	.060	-.340**	.096	1	-.055	-.079	.084	-.050	.208
Race	.352**	-.209	.239	-.263*	-.055	1	-.104	-.014	.229	-.229
Income	-.345**	-.175	.021	.224	-.079	-.104	1	.156	-.498**	.102
Education	-.054	.000	.027	-.263*	.084	-.014	.156	1	-.013	.064
SNAP usage	.431**	.028	.129	-.439**	-.050	.229	-.498**	-.013	1	-.014
Meal Site Usage	-.033	-.129	-.314*	-.018	.208	-.229	.102	.064	-.014	1

* Correlation is significant at $P < .05$

** Correlation is significant at $P < .01$

Fig. 1. Conceptual model of factors influencing food choice and access among seniors.



CHAPTER 3

Chapter 3: Dietary and supplement intakes among pre- and post-menopausal African American women and their impact on risk of hypertension.

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CHAPTER SUMMARY

The increased risk of disease among African American women remains a concern, but limited research exists to identify how dietary and supplement intakes contribute to the development of diseases such as hypertension, especially for women of post-menopausal age. Working with 105 pre-menopausal and 87 post-menopausal, African American women, our study found significant differences in dietary and supplement intake, BMI, and BP between the two groups. The women consumed above the RDA for most nutrients, consuming twice the required sodium. Further, pre-menopausal women were below the RDA for iron and both groups consumed below the RDA for fiber, calcium, magnesium, and vitamin E. Nutrition education may be a key intervention strategy to encourage balanced dietary intakes among this population and reduce the risk of chronic disease. More research is needed to determine the effectiveness of changes to supplement and dietary intake and the effect on disease risk among post-menopausal, African American women.

INTRODUCTION

In 2013, 15.2% of the total U.S. population identified themselves as African American and this number is expected to increase to 17.9% of the U.S. population by the year 2060 (1). The population of older African Americans is also projected to increase to 12% of U.S. older adults by the year 2060 (2). With this group continuing to grow, much research has been aimed toward addressing elevated rates of chronic diseases in this population (3-5). In 2013, African Americans had a poverty rate of 27.2% which was higher than the national average of 14.5% and health insurance coverage (84.1%) that was slightly less than national coverage (86.6%) (6). These statistics demonstrate the multitude of factors, in addition to diet, that must be considered to truly comprehend the growth of chronic conditions in the African American population.

Consuming a balanced diet is beneficial for maintaining a healthy lifestyle, especially in populations at increased risk for certain chronic conditions (7,8). African Americans are at risk for a number of chronic diseases including obesity, hypertension, and heart disease (1). Dietary intake patterns can contribute to the development of these diseases, but high blood pressure (BP) for example, can potentially be reduced with altered nutrient intakes such as increased magnesium, calcium, and potassium and decreased sodium (9,10). Hypertension, or high BP, is a disease characterized by a systolic BP (SBP) measurement ≥ 140 mmHg and/or a diastolic BP (DBP) measurement ≥ 90 mmHg. However, current research suggests that a BP measurement less than 150/80 mmHg is more appropriate for the elderly population (11).

While considerable research has been done surrounding the conditions for which African Americans women are at risk, less focus has been placed on post-menopausal, African American women. Compared to 32% of Caucasian women, almost 60% of African American women are obese (12). Hypertension rates also vary by ethnicity with 31.3% of Caucasian women versus 45.7% of African American women with the disease (13). These are overwhelming statistics considering that obesity and hypertension are contributors to a host of other diseases (14). For example, the risk of cardiovascular disease (CVD) increases as BP continues to rise (10). In 2013,

48.9% of all African American women had CVD and between 2007 and 2010, 26% of older African American women had CVD (2,15)

Dietary interventions can play a pivotal role in the prevention and management of conditions for which African Americans are of higher risk (16). Osteoporosis, for instance, is a disease characterized by bone loss which can often be prevented by consumption of adequate calcium from dairy products and other calcium-rich foods (17,18) However, problems can arise when calcium malabsorption occurs or consumption is inadequate (19-21) In these cases, supplementation becomes important (22). Some research has been conducted on supplement intake by African Americans, but the topics of study have had a relatively narrow focus.

Much of the existing research has centered on intake of calcium and vitamin D supplements (23-26). Minimal consideration has been given to consumption of other types of supplements. Most of the literature addresses osteoporosis and diabetes with little regard to other prevalent diseases such as hypertension and heart disease among this population (27-30). Therefore, the purpose of this study was to investigate the associations among dietary intake, supplement use, body mass index (BMI) and hypertension for pre- and post-menopausal, African American women.

METHODS

Two groups of African American women, 105 pre-menopausal (ages 19-38 years) and 87 post-menopausal (ages 60-89 years) were recruited through advertisements in African American newspapers, community aging groups such as congregate meal programs, cultural community centers, and churches in African American communities. Flyers were posted and e-mails were sent to local colleges and universities to recruit younger women for the study. In addition, women were recruited from WIC offices, health clinics, and churches in order to include individuals of varying socioeconomic status. Snowball sampling was also used to aid in recruitment efforts.

When each participant arrived, the study process was explained, consent forms were signed, questionnaires (including demographics, family, social, and medical history) were

completed, and measurements (height, weight, and BP) were taken. The protocol for BP measurement was consistent with national standards established by the American Heart Association, with BP taken with the upper, right arm while the participant was seated (31). Measurements were taken twice and averaged.

Dietary information was collected using the Block Survey Food Frequency Questionnaire (version 98.2). This instrument was validated and used in previous research (32,33). The questionnaire provided background on typical foods eaten and the frequency of their consumption. Collection of dietary factors included beverages, vitamins and other supplements, and food items broken down by food group. Plastic and paper food models were shown to the participants in order to improve accuracy of the reported intakes. This study was approved by the University's Institutional Review Board (IRB).

Data analysis

Independent sample t-tests were used to determine significant differences between the two sample groups. Bivariate correlations were conducted to analyze associations between other dietary related factors. Data were checked for normality of distribution. Statistical Package for Statistical Sciences (SPSS) for Windows version 20.0 (SPSS, Chicago, IL) software was used for analysis of data.

RESULTS

Sample characteristics of pre- and post-menopausal, African American women (n=192) are shown in Table 1. Pre-menopausal women had an average age of 24.5 ± 4.6 years while post-menopausal women had an average age of 72.5 ± 6.2 years. Mean education was 14.7 ± 2.1 years for pre-menopausal women versus 12.6 ± 2.8 years for post-menopausal women. Sixty-eight percent of pre-menopausal women had an average monthly income less than \$1,000 compared to 59% of post-menopausal women. Only 1% of pre-menopausal and 7% of post-menopausal women were making more than \$3,000 per month. Furthermore, BMI was higher in post-menopausal women with a mean of $31.1 \pm 6.7 \text{ kg/m}^2$ and 86% in the overweight/obese category

compared to a mean of $26.6 \pm 6.5 \text{ kg/m}^2$ and 50% of pre-menopausal women in the overweight/obese category (Table 1).

Results of the food questionnaires are shown in Tables 2-4. The comparison of estimated dietary intakes to dietary reference intakes (DRI) for pre- and post-menopausal, African American women is shown in Table 2. The women in each sample group had similar intakes and were above the recommended dietary allowance (RDA) for the majority of nutrients. However, pre-menopausal women had iron consumption lower than the RDA and both groups had vitamin A intake above the RDA as well as fiber, calcium, magnesium, and vitamin E intakes below the RDA. Post-menopausal women consumed significantly more vitamin A and magnesium than pre-menopausal women (Table 2). Regarding the food groups, both the pre- and post-menopausal women had adequate consumption except from the dairy (milk, yogurt, cheese) and protein (meat, poultry, fish, beans, etc.) groups. Post-menopausal women consumed significantly more fruits and vegetables.

The distribution and mean intakes of the acceptable macronutrient distribution range (AMDR) were compared between pre- and post-menopausal women and both groups were within the AMDR for each macronutrient (fat, protein, and carbohydrate) (Table 3). However, the overall trend revealed fat consumption at the top of the range (20-35%) with a mean intake of $34.6 \pm 7.5\%$ and protein consumption lower in the range (10-35%) with a mean intake of $13.3 \pm 2.5\%$. Most women were consuming greater than or equal to the AMDR for fat. This was in contrast to none of the women consuming above the AMDR for protein.

In addition to nutrients from food, supplements also added to the total average daily nutrient intakes. Tables 4 and 5 show the mean and frequency of daily supplement intakes for both groups of women. Each supplement was consumed at levels lower than the tolerable upper intake level (UL). Average daily supplement intake among the post-menopausal sample was significantly greater for every supplement category except iron. The frequency and range of supplement intakes among African American women were also higher for those in the post-

menopausal sample. For instance, 21% of women in the post-menopausal group consumed the highest range of calcium (844.6-1130 mg) compared to only 4% in the pre-menopausal group. Magnesium also varied with 39% of post-menopausal women consuming the highest range (28.7-100 mg) compared to only 18% in the pre-menopausal sample (Table 5).

Using an independent sample t-test, post-menopausal women had significantly higher self-reported rates of heart disease, stroke, high BP, and osteoporosis diagnoses; higher BMI; and higher mean SBP and DBP. Post-menopausal women had a slightly elevated mean SBP of 142.2 ± 20.2 mmHg with 69% reporting to be hypertensive and 49.4% had actual (measured) elevated BP measurements. Furthermore, using bivariate correlations, DBP was significantly associated with calcium and sodium intake and SBP was associated with higher vitamin A intake. In addition, BMI was significantly correlated with intake of iron and vegetables as well as mean SBP and DBP (Table 6).

DISCUSSION

This study found significant differences in dietary and supplement intake, BMI, and BP between pre- and post-menopausal, African American women. The women consumed above the RDA for most nutrients, consuming twice the required sodium. Further, pre-menopausal women were below the RDA for iron and both groups consumed below the RDA for fiber, calcium, magnesium, and vitamin E. This is of concern because post-menopausal women had elevated SBP and dietary intake may be related to this. Post-menopausal women also had significantly higher BMI and rates of many diseases. Differing between the sample groups, post-menopausal women consumed significantly more fruits, vegetables, vitamin A, and magnesium. Further, with the exception of iron, supplement intake was significantly higher for each nutrient among post-menopausal women.

While the women in this study consumed above the RDA for most nutrients, some nutrients still fell short of recommendations. Both groups of women in this study were consuming below the RDA for fiber, calcium, magnesium, and vitamin E and the pre-menopausal women,

additionally, had inadequate iron intake. The RDA, provided by the Institute of Medicine, is the recommended intake level of a nutrient that is sufficient to meet the requirements of 97-98% of all healthy people (34). While these recommendations are well established in the adult population, it is not clear how precise they are for older adults (35). This could have serious implications, especially for older women, as their nutrient requirements may be even higher than the current recommendations, potentially exacerbating any nutrient inadequacies. The increasing life span of women demonstrates the importance of identifying accurate nutrient intakes in order to promote good health as they age. Many factors contribute to increased risk of nutrient deficiencies in the older adult population including chronic disease, medication use, and financial and social standing (36). According to Chernoff, older women, specifically, may be at higher risk of being deficient in micronutrients such as calcium, iron, zinc, and vitamins A, C, D, and B12 (36). Bolzetta et al. added folate and vitamin B6 to this list (33). Of these nutrients, older women in this study were only low in calcium. Research is lacking on nutrient deficiencies in the post-menopausal, African American population. However, inconsistent with this study, Fried et al. found that women and African Americans have an increased risk of frailty (characterized by low energy, lack of physical activity, and unintentional weight loss) which can worsen with age (37,38). Micronutrient deficiencies in vitamins C, D, E, and folate have been found to contribute to frailty, with risk increasing with each deficient nutrient (39). Frailty was not measured among our study population, so conclusions cannot be drawn based on the results, but this could be an important measurement in future studies.

Among our post-menopausal women 69% reported being diagnosed with high BP compared to only 3.8% of pre-menopausal women. Actual BP measurements showed that 49.4% of post-menopausal and 3.8% of pre-menopausal women had high BP, indicating that only 20% of hypertensive, post-menopausal women were under control. Hypertension is a major health concern within the African American population, with African American women having some of the highest rates of hypertension in the world (40). Many factors contribute to hypertension

including obesity, low physical activity level, high intake of sodium, and inadequate intakes of calcium, potassium, and magnesium (41-43). Both pre- and post- menopausal women in our study consumed inadequate amounts of calcium, magnesium, potassium and double the recommended levels of sodium. Average BMI was significantly higher among post-menopausal, African American women in this study. Palmer et al. found that early onset of menopause in African American women was correlated with increased BMI (44). Coylewright et al. had similar findings but ethnic groups were not analyzed separately (45). Jerant and Franks found that severe obesity was associated with increased mortality when hypertension was also present, but this data was also not specific to African Americans (46). In addition to uncontrolled hypertension and elevated BMI, the older women in our study had higher self-reported rates of heart disease, stroke, high blood pressure, and osteoporosis. Obesity, hypertension, and menopause are risk factors for CVD among African American women (47). Our findings suggest that not only was age significantly related to disease risk, but nutritional status (dietary intake and BMI status) also placed the women at high risk.

While post-menopausal women consumed significantly more magnesium than pre-menopausal women, both groups of women consumed below the RDA. According to van Dam et al., vegetables, bread, and milk were among the most important sources of magnesium for adults (29). Consistent with our results, it is likely that African Americans consume less magnesium than the RDA because dairy consumption is low (often a result of lactose intolerance) (48). Magnesium is a mineral that is vital for many processes throughout the body such as blood pressure, glucose metabolism, protein synthesis, etc. (49, 50). Because of its versatility, magnesium functions to prevent disease and promote overall health. Hypertension is associated with low intakes of magnesium (51). Low intakes have also been associated with the incidence of stroke and other cardiovascular diseases (48, 51-53). These conditions are more prevalent among African Americans and inadequate magnesium intake appears to manifest itself in this population as well (52), which was consistent with our findings. It is difficult to find research on the intake

of magnesium by age, but recent studies have found significant disparities between ethnic groups with higher average magnesium intake in Caucasian compared to African American women (53, 54). Burnett-Hartman et al. found that older African American women consumed magnesium at levels less than Caucasian women and lower than the RDA (55), which was similar to the women in our study.

Additional nutrients associated with hypertension include sodium and calcium, each of which had altered intakes among the women in our sample. The women had elevated intakes of sodium, almost twice the RDA. This can have detrimental effects on BP as sodium is responsible for control of blood pressure and volume and excessive consumption can cause an increase in BP (56). Dissimilar to our results with a positive correlation between sodium and DBP only, following a diet low in sodium such as the DASH diet resulted in reduced SBP and DBP levels, especially among women, minority populations, and hypertensive individuals (57). Hargreaves et al. found that African American women often want to eat healthy, but ultimately choose convenience, resulting in increased sodium intake from snacking and consumption of fast food (58, 59). This was consistent with our study, with African American women consuming almost 4 servings of the “other” food group which included fats and oils, sweets, and soda.

The women in our study also had low intakes of calcium which may have impacted their BP, according to Appel et al., but which also has been associated with osteoporosis and CVD (9,54). Calcium is important for bone structure and function as well as muscle function and dilation of blood vessels (60). Similar to the women in this study, Burnett-Hartman found that African American women consumed less calcium than Caucasian women and the RDA (55). The best source of calcium is from dairy products which African Americans are typically lacking. Even if dairy products are consumed, African Americans tend to consume many turnip, collard, and mustard greens, which may interfere with the absorption of calcium (60, 61). Therefore, African American women could be at higher risk of developing diseases related to inadequate calcium intake such as osteoporosis and hypertension.

Differences were also observed for vitamin A intake, with both groups consuming above the RDA and post-menopausal women consuming significantly more than pre-menopausal women. Little research exists regarding vitamin A intake among African Americans, likely because, similar to this study, they appear to have adequate intake. Leafy green vegetables are a staple in most African American diets and they are a good source of vitamin A (61, 62). So, while vitamin A intake may appear to be appropriate in this population, it is possible to consume too much. In amounts close to the RDA, vitamin A intake can be beneficial, but with amounts only twice as high as the RDA, the potential for adverse effects arises (62). Studies have found associations between high consumption of vitamin A and increased mortality and incidence of colon cancer (63, 64). Similar to our findings, Penniston and Tanumihardjo found high levels of vitamin A, and in their sample it was associated with osteoporosis and hip fractures (65). This high vitamin A intake along with low consumption of dairy among African Americans may lead to an increased risk for osteoporosis in this population.

Although African Americans may be at higher risk for certain conditions as a result of inadequate nutrient intakes, many older women in this study were taking supplements, which could bring total nutrient intakes closer to the RDA. Post-menopausal women had significantly higher daily mean supplement intakes for every self-reported supplement compared to pre-menopausal women. Post-menopausal women also consumed amounts in the higher ranges for each supplement. Research in populations apart from African Americans cover a broad range of supplements taken by older individuals, including various vitamins and minerals as well as herbal supplements (66-69). However, most of the existing research on supplement intake among older African Americans is focused on vitamin D and calcium (23-26). This limits the associations that can be drawn between supplement intake and various disease risks. While vitamin D and calcium are important supplements, the narrow focus may take away necessary coverage for other, less common supplements such as vitamin A and magnesium. Foote et al. found that African Americans consumed greater amounts of vitamin A from supplements than other ethnic groups,

but no comparison was made to potential implications of this intake level (70). Van Dam et al. did a thorough investigation of magnesium intake related to development of diabetes, but supplement intake was mentioned only briefly to state that it was not clear if the results would also apply to magnesium supplementation (29).

CONCLUSIONS

Post-menopausal, African American women are at increased risk for many diseases including obesity and hypertension, which are closely linked to dietary intakes. As a result, researchers have emphasized the importance of nutrition education in reducing the incidence of chronic conditions in this population (71-73). Although data on supplementation among the African American population are lacking, supplements may be a key component to addressing any nutrient inadequacies. Adequate magnesium and calcium, and reduced sodium intakes appear to be associated with decreased risk of hypertension and women in our study could benefit from education regarding these dietary changes. Congregate meal sites in predominately African American areas may be a good place to provide group education. However, more research is still needed to determine the effectiveness of other supplements and which nutrients would be of utmost importance to target diseases for which older African American women are most susceptible.

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Table 1. Sample demographics of pre- and post-menopausal African American women

	Menopause Status		
	Pre-Menopause (n=105)	Post- Menopause (n=87)	Total (n=192)
	Mean ± SD		
Age	24.5 ± 4.6 ^a	72.5 ± 6.2 ^b	46.3 ± 24.6
Number of years in US	21.3 ± 7.6 ^a	71.3 ± 9.3 ^b	43.9 ± 26.3
Number of times moved	3.7 ± 3.0 ^a	1.0 ± 2.4 ^b	2.5 ± 3.1
Years of education	14.7 ± 2.1 ^a	12.6 ± 2.8 ^b	13.7 ± 2.7
BMI	26.6 ± 6.5 ^a	31.1 ± 6.7 ^b	28.6 ± 6.9
Hours of sleep	7.0 ± 0.8 ^a	7.0 ± 1.0 ^a	2.1 ± 1.0
	Frequency		
Marital status	single	86 (84)	5 (6)
	married	12 (12)	17 (20)
	divorced	4 (4)	24 (28)
	widowed	0	39 (46)
Birthplace	U.S.	90 (86)	85 (98)
	developed country	4 (4)	1 (1)
	developing country	11 (10)	1 (1)
Occupation	student	62 (60)	0
	housewife	1 (1)	1 (1)
	health/teacher/parking attendant	35 (34)	10 (12)
	manual labor	2 (1)	1 (1)
	service/ police	2 (1)	0
	childcare	1 (1)	2 (2)
	retired	0	69 (82)
Monthly income	homemaker	1 (1)	2 (2)
	<\$300	20 (20)	3 (4)
	\$300-500	23 (23)	15 (19)
	\$500-1000	25 (25)	29 (36)
	\$1000-3000	32 (31)	27 (34)
BMI category	>\$3000	2 (1)	6 (7)
	<18.5	2 (2)	1 (1)
	18.5-24.9	50 (48)	11 (13)
	25-29.9	28 (26)	30 (35)
	>29.9	25 (24)	44 (51)

^{a,b} Columns with different superscripts are significantly different from each other.

Table 2. Estimated dietary intakes compared to dietary reference intakes for pre- and post-menopausal, African American women

	Menopause Status			
	Pre-Menopause (n=105)		Post-Menopause (n=87)	
	RDA	Mean ± SD	RDA	Mean ± SD
Nutrients (based on 2011 DRI values)				
Calories (kcal)	N/A	2087.6 ± 855.4	N/A	2031.9 ± 1017.5
Protein (g)	46	68.9 ± 29.6	46	69.1 ± 37.1
Fat (g)	N/A	81.0 ± 40.4	N/A	81.3 ± 50.4
Carbohydrate (g)	130	277.6 ± 120.0	130	266.1 ± 123.9
Calcium (mg)	1000	821.5 ± 428.7	1200	864.9 ± 436.8
phosphorus (mg)	700	1172.0 ± 492.0	700	1216.3 ± 563.4
Iron (mg)	18	15.9 ± 7.9	8	14.6 ± 6.4
Sodium (mg)	1.5	2772.2 ± 1191.3	1.2-1.3	2813.1 ± 1650.7
Potassium (mg)	4.7	2920.4 ± 1309.1	4.7	3279.4 ± 1391.0
Vitamin A (IU)	2300	9251.0 ± 8401.8*	2300	13393.8 ± 9297.7*
Vitamin A (µg)	700	1223.6 ± 884.0*	700	1693.2 ± 998.0*
Thiamin, B1 (mg)	1.1	1.6 ± 0.7	1.1	1.6 ± 0.8
Riboflavin B2 (mg)	1.1	1.8 ± 0.8	1.1	1.9 ± 0.8
Niacin (mg)	14	21.0 ± 9.3	14	20.3 ± 10.6
Vitamin C (mg)	75	175.9 ± 110.5	75	165.5 ± 99.1
Saturated fat (g)	N/A	24.3 ± 12.9	N/A	24.4 ± 16.5
Oleic acid (g)	N/A	29.4 ± 14.8	N/A	29.5 ± 19.2
Linoleic acid (g)	12	20.4 ± 11.3	11	21.2 ± 13.0
Cholesterol (mg)	N/A	211.4 ± 127.5	N/A	216.3 ± 142.3
Dietary fiber (g)	25	17.6 ± 9.4	21	19.5 ± 9.0
Folate (mg)	400	423.2 ± 203.3	400	423.9 ± 163.4
Vitamin E (mg)	15	10.2 ± 5.1	15	11.5 ± 5.6
Zinc (mg)	8	10.0 ± 4.6	8	10.6 ± 4.9
Vitamin B6 (mg)	1.3	1.8 ± 0.9	1.5	2.0 ± 0.9
Magnesium (mg)	310-320	275.1 ± 120.8*	320	314.9 ± 123.3*
Daily servings of food groups (based on MyPyramid)				
Vegetables	2.5 cups	3.0 ± 2.6*	2.5 cups	3.8 ± 2.9*
Grains	6 oz	5.7 ± 2.8	6 oz	5.2 ± 3.1
Meat, fish, eggs, beans	5.5 oz	1.8 ± 1.03	5.5 oz	1.9 ± 1.6
Milk	3 cups	1.3 ± 1.0	3 cups	1.3 ± 1.0
Fruit	2 cups	1.6 ± 1.1*	2 cups	2.1 ± 1.1*
Other	Use Sparingly	3.2 ± 1.8	Use Sparingly	3.7 ± 2.4

*Denotes significance with p-value <0.05

Table 3. Distribution and mean intakes of the acceptable macronutrient distribution range (AMDR) for pre- and post-menopausal, African American women

		Menopause Status		
		Pre-menopause (n=105)	Post-menopause (n=87)	
Fat AMDR (20-35%)		Mean \pm SD	Frequency	Mean \pm SD
% kcal from fat		34.6 \pm 7.5		34.8 \pm 7.3
% meeting AMDR	<AMDR		1 (1)	
	=AMDR		54 (52)	
	>AMDR		49 (47)	
Protein AMDR (10-35%)				
% Kcal from protein		13.3 \pm 2.5		13.6 \pm 2.7
% meeting AMDR	<AMDR		6 (6)	
	=AMDR		94 (94)	
	>AMDR		0	
Carbohydrate AMDR (45-65%)				
% kcal from carbohydrate		53.6 \pm 8.8		53.7 \pm 8.5
% meeting AMDR	<AMDR		16 (16)	
	=AMDR		74 (74)	
	>AMDR		10 (10)	

Table 4. Average daily supplement intake of pre- and post-menopausal, African American women

Supplement	Upper Level (UL)	Mean intakes	
		Pre-menopause (n=104)	Post-menopause (n=87)
Vitamin A (IU)	10,000	1037.2 ± 1851.2 ^a	2216.8 ± 2677.1 ^b
Vitamin C (mg)	2,000	90.2 ± 244.5 ^a	221.3 ± 394.1 ^b
Vitamin D (IU)	4,000	80.8 ± 141.5 ^a	159.0 ± 193.0 ^b
Vitamin E (mg)	1,000 mg	17.9 ± 46.8 ^a	83.0 ± 155.5 ^b
Iron (mg)	45	8.1 ± 18.2	10.4 ± 17.6
Calcium (mg)	2,000-2,500	86.7 ± 238.8 ^a	279.9 ± 429.7 ^b
Zinc (mg)	40	5.0 ± 12.5 ^a	9.0 ± 14.4 ^b
Beta-carotene (ug)	ND	393.5 ± 913.7 ^a	1476.9 ± 4053.1 ^b
Vitamin B1 (mg)	ND	0.8 ± 2.4 ^a	1.6 ± 3.0 ^b
Vitamin B2 (mg)	ND	0.9 ± 2.4 ^a	1.7 ± 3.1 ^b
Vitamin B6 (mg)	100	0.7 ± 1.5 ^a	1.3 ± 1.7 ^b
Vitamin B12 (ug)	ND	1.8 ± 3.9 ^a	3.6 ± 4.5 ^b
Folate (mg)	1,000	119.2 ± 243.8 ^a	209.5 ± 232.5 ^b
Copper (mg)	10	0.4 ± 0.7 ^a	0.8 ± 1.0 ^b
Selenium (mcg)	400	5.8 ± 16.8 ^a	23.0 ± 55.1 ^b
Magnesium (mg)	350	20.2 ± 35.4 ^a	39.7 ± 48.2 ^b
Niacin (mg)	35	9.1 ± 30.9 ^a	18.3 ± 30.9 ^b

^{a,b} Columns with different superscripts are significantly different from each other.
ND: Not determined

Table 5. Frequency and range of supplement intake among pre- and post-menopausal, African American women

Supplement	Range	Frequency	
		Pre-menopause (n=104)	Post- menopause (n=87)
Vitamin A (IU)	.00	72	48
	1-5,000	31	37
	5,001-10,000	1	2
Vitamin C (mg)	.00	63	41
	1-500	34	31
	501-1,250	6	11
	1,251-1,750	1	4
Vitamin D (IU)	.00	72	50
	1-400	32	37
Vitamin E (mg)	.00	65	40
	1-95.7	33	26
	95.8-221	5	6
	222-316	1	9
	317-690.1	0	4
Iron (mg)	.00	68	49
	1-18	25	33
	18.1-46.4	6	1
	46.5-83	5	4
Calcium (mg)	.00	68 (65)	42 (48)
	1-323	30 (29)	25 (29)
	323.1-844.5	2 (2)	2 (2)
	844.6-1130	4 (4)	18 (21)
Zinc (mg)	.00	72	47
	1-15	27	35
	15.1-65	5	5
Beta-carotene (ug)	.00	68	44
	1-4200	35	39
	4200.1-10145	1	2
	10145.1-26200.4	0	2
Vitamin B1 (mg)	.00	71	43
	1-3.3	28	35
	3.4-11.5	5	9
Vitamin B6 (mg)	.00	71	43
	1-3.6	28	36
	3.7-7	5	8

Supplement	Range	Frequency	
		Pre-menopause (n=104)	Post- menopause (n=87)
Vitamin B12 (ug)	.00	71	43
	1-6	28	35
	6.1-18	5	9
Folate (mg)	.00	69	43
	1-400	30	39
	400.1-1200	5	5
Copper (mg)	.00	72	50
	1-2	32	37
Selenium (mcg)	.00	69	45
	1-20	32	34
	20.1-157.2	3	2
	157.3-235	0	6
Vitamin B2 (mg)	.00	71	43
	1-7.1	28	36
	7.2-11.7	5	8
Magnesium (mg)	.00	72 (69)	50 (57)
	1-28.6	13 (13)	3 (4)
	28.7-100	19 (18)	34 (39)
Niacin (mg)	.00	71	43
	1-34.3	28	35
	34.4-85.7	1	1
	85.8-120	4	8

Table 6. Pearson correlation coefficients for significance among dietary related factors

	SBP	DBP	BMI	Education	Monthly income	Calories (kcal)	Protein (g)	Fat (g)	Carb (g)	Vitamin A (IU)	Vitamin E (a-TE)	Calcium (mg)	Sodium (mg)
SBP	1	.538**	.309**	-.311**	.096	.051	.026	.050	.061	.210**	.170*	.134	.069
DBP	.538**	1	.358**	-.153*	.091	.133	.119	.121	.124	.145*	.136	.157*	.152*
BMI	.309**	.358**	1	-.146*	.282**	-.054	-.032	-.050	-.044	.068	.026	-.009	-.024
Education	-.311**	-.153*	-.146*	1	.237**	-.135	-.125	-.158*	-.099	.010	-.075	-.087	-.151*
Monthly income	.096	.091	.282**	.237**	1	-.056	-.059	-.025	-.063	.082	.059	.014	-.077
Calories (kcal)	.051	.133	-.054	-.135	-.056	1	.891**	.925**	.928**	.337**	.724**	.633**	.925**
Protein (g)	.026	.119	-.032	-.125	-.059	.891**	1	.845**	.754**	.405**	.642**	.650**	.869**
Fat (g)	.050	.121	-.050	-.158*	-.025	.925**	.845**	1	.727**	.226**	.734**	.505**	.866**
Carb (g)	.061	.124	-.044	-.099	-.063	.928**	.754**	.727**	1	.370**	.625**	.641**	.840**
Vitamin A (IU)	.210**	.145*	.068	.010	.082	.337**	.405**	.226**	.370**	1	.414**	.314**	.401**
Vitamin E (a-TE)	.170*	.136	.026	-.075	.059	.724**	.642**	.734**	.625**	.414**	1	.427**	.714**
Calcium (mg)	.134	.157*	-.009	-.087	.014	.633**	.650**	.505**	.641**	.314**	.427**	1	.550**
Sodium (mg)	.069	.152*	-.024	-.151*	-.077	.925**	.869**	.866**	.840**	.401**	.714**	.550**	1
Potassium (mg)	.152*	.182*	.037	-.070	.081	.801**	.789**	.640**	.826**	.582**	.638**	.712**	.754**
Magnesium (mg)	.166*	.148*	.053	-.035	.096	.784**	.775**	.653**	.792**	.597**	.730**	.675**	.764**
Vitamin A from supplements (IU)	.092	.096	.188**	-.018	.121	.048	.026	.064	.033	.055	.143*	-.007	.081
Ca from supplements (mg)	.027	-.005	.201**	-.117	.169*	.064	.088	.063	.055	.122	.140	.050	.099
Servings vegetables	.079	.088	.159*	.073	.164*	.368**	.359**	.272**	.410**	.732**	.504**	.244**	.403**
Servings bread, cereal, rice	.021	.022	-.099	-.068	-.165*	.730**	.641**	.627**	.726**	.250**	.514**	.443**	.764**
Servings meat, fish, poultry, beans	.006	.103	-.008	-.140	-.053	.702**	.887**	.727**	.510**	.359**	.510**	.342**	.733**
Servings milk, yogurt, cheese	.066	.097	-.029	-.093	.016	.382**	.436**	.327**	.350**	.094	.234**	.800**	.323**
Servings fruit	.270**	.105	.046	.026	.154*	.081	.036	-.085	.246**	.284**	.099	.218**	.041
Servings oils, sweets	.167*	.129	-.006	-.144*	.039	.605**	.389**	.673**	.505**	.025	.482**	.212**	.495**

Table 6. Pearson correlation coefficients for significance among dietary related factors (continued)

	Potassium (mg)	Magnesium (mg)	Vit A from supplements (IU)	Ca from supplements (mg)	Servings vegetables	Servings bread, rice	Servings meat, fish, beans	Servings milk, cheese	Servings fruit	Servings oils, sweets
SBP	.152*	.166*	.092	.027	.079	.021	.006	.066	.270**	.167*
DBP	.182*	.148*	.096	-.005	.088	.022	.103	.097	.105	.129
BMI	.037	.053	.188**	.201**	.159*	-.099	-.008	-.029	.046	-.006
Education	-.070	-.035	-.018	-.117	.073	-.068	-.140	-.093	.026	-.144*
Monthly income	.081	.096	.121	.169*	.164*	-.165*	-.053	.016	.154*	.039
Calories (kcal)	.801**	.784**	.048	.064	.368**	.730**	.702**	.382**	.081	.605**
Protein (g)	.789**	.775**	.026	.088	.359**	.641**	.887**	.436**	.036	.389**
Fat (g)	.640**	.653**	.064	.063	.272**	.627**	.727**	.327**	-.085	.673**
Carb (g)	.826**	.792**	.033	.055	.410**	.726**	.510**	.350**	.246**	.505**
Vitamin A (IU)	.582**	.597**	.055	.122	.732**	.250**	.359**	.094	.284**	.025
Vitamin E (a-TE)	.638**	.730**	.143*	.140	.504**	.514**	.510**	.234**	.099	.482**
Calcium (mg)	.712**	.675**	-.007	.050	.244**	.443**	.342**	.800**	.218**	.212**
Sodium (mg)	.754**	.764**	.081	.099	.403**	.764**	.733**	.323**	.041	.495**
Potassium (mg)	1	.917**	.072	.180*	.642**	.508**	.589**	.419**	.438**	.294**
Magnesium (mg)	.917**	1	.113	.214**	.666**	.638**	.554**	.418**	.323**	.343**
Vitamin A from supplements (IU)	.072	.113	1	.528**	.085	.086	.044	.005	.070	.093
Ca from supplements (mg)	.180*	.214**	.528**	1	.243**	.015	.107	.019	.091	-.033
Servings vegetables	.642**	.666**	.085	.243**	1	.202**	.296**	.000	.304**	.065
Servings bread, cereal, rice	.508**	.638**	.086	.015	.202**	1	.420**	.284**	.035	.410**
Servings meat, fish, poultry, beans	.589**	.554**	.044	.107	.296**	.420**	1	.130	-.088	.272**
Servings milk, yogurt, cheese	.419**	.418**	.005	.019	.000	.284**	.130	1	.119	.093
Servings fruit	.438**	.323**	.070	.091	.304**	.035	-.088	.119	1	-.021
Servings oils, sweets	.294**	.343**	.093	-.033	.065	.410**	.272**	.093	-.021	1

CHAPTER 4

Summary of Key Findings

Conclusions and Implications

SUMMARY OF KEY FINDINGS

Phase 1a: Focus Groups

The results presented below have been adapted from the following manuscript: Oemichen M, Smith C. Investigation of the food choice, promoters and barriers to food access issues, and food insecurity among low-income, free living Minnesotan seniors. *Submitted to Journal of Nutrition Education and Behavior.*

Quantitative

Sixty-two seniors over the age of sixty participated in this study with a mean age of 80 ± 7.5 years in County 1 and 76 ± 8.9 years in County 2. Seventy-nine percent of the participants were female. The majority were Caucasian (91%); 5% were African American, 2% were Asian, and 2% were Hispanic. About 72% of the seniors had an annual income between \$10,000 and \$30,000. At the time of the study, 23% of participants were using food stamps and 62% were using a congregate meal site at least 2-3 times/week (**Chapter 2, Table 3**).

Food security scores were calculated for both counties. In County 1, 86.7% of participants were classified as having high food security with a mean score of 0.67 ± 1.6 as compared to only 65.6% of County 2 participants with a mean score of 1.4 ± 2.1 . Aligned with this, County 1 had only 6.7% of participants with low food security compared to 25% of County 2 participants. Overall, both counties saw participants divided as follows: 75.8% high food security, 16.1% low food security, and 8.1% very low food security. Bivariate correlations showed significant associations between food security score and age, race, income, and food stamp usage (**Chapter 2, Table 4**).

Qualitative

Five major themes emerged from focus group discussions and analysis. They included: a) former experiences impact eating behaviors; b) financial and food security drive use of food assistance programs; c) food access strategies- restaurants, retail markets, and alternative sources; d) physical changes associated with aging influence food access and intake; and e) social

influences play a role in decision making. The following is a brief description of the conclusions reached after reviewing each theme.

Theme 1: Former Experiences Impact Eating Behaviors

Seniors reported several factors that influenced their food choice including foods consumed during childhood, family influence, and travel experiences. Participants cited specific dishes they had growing up that they still enjoy today. Family influence was another chief contributor to cooking style and ability. Most of the participants learned how to cook and cited that it was often the mother who taught the children how to cook. Though this was a common occurrence, there were still a few participants who relied on their spouse to do the cooking. Participants also discussed travelling or living in other countries and how that shaped the way they eat. Travel not only influenced food choice, but for some participants, it influenced cooking style. While seniors have developed traditions they enjoy, it can be difficult to uphold the traditions when money is a limiting factor.

Theme 2: Financial And Food Security Drive Use Of Food Assistance Programs

Comments made throughout the focus groups made it clear that most of the participants were self-sufficient for caring for themselves, however, many seniors relied on multiple assistance programs to help provide them with food through the month. Congregate dining, for example, had a social component and many participants thought the dining sites provided great, affordable meals. The majority of participants described the dining programs as “beneficial”. However, a few revealed that they disliked the food offered which limited their use of the programs.

Compared to congregate dining sites, the usage of other food assistance programs such as SNAP was lower, especially in County 1. A commonly cited reason for not using food stamps was that there was no need. However, several participants reported struggling to make ends meet and said they would use them if they qualified but believed that their income was too high to qualify for program benefits. The seniors also spoke about the stigma surrounding food stamps,

but this stigma seems to be subsiding as the program changes to make it more comfortable to use (using EBT cards instead of coupons). However, some seniors still said they would not use them.

While some seniors were well-informed, others lacked knowledge about the programs available to assist them. The lack of familiarity and misunderstanding of eligibility criteria may be an important barrier to the use of food assistance programs. In many of the groups there were one or two participants who were aware of food programs and informed the rest of the group. When this information was shared, it encouraged questions from those lacking program knowledge.

Theme 3: Food Access Strategies- Restaurants, Retail Markets, And Alternative Sources

While the safety net portion of the food system (e.g. congregate meal programs, SNAP) was an important access point for many seniors, they also accessed food from other sources.

Subtheme 1: Retail markets (stores).

Many seniors, were still cooking and thus still went shopping. Most participants chose grocery stores based on location and price. Although location was important when choosing where to shop, food price appeared to be even more important. Many seniors opted to shop rather than eat out in order to limit spending. Coupons were a vital part of seniors' spending habits, but were only used for things they already planned to purchase in order to prevent waste. When buy one, get one free offers were used, seniors either kept the free product or gave it to a friend.

Transportation was a frequently encountered barrier to limited food access. It was difficult for many seniors to access the stores with lower prices. The majority of participants were still able to drive, but many lacked access to a car or chose not to drive because of associated expenses. As a result, many seniors relied on family/friends or other means of public transportation. Other seniors chose not to go to the grocery store but still wanted to cook, so they would call in a shopping list and many local stores would deliver groceries for a small fee.

Subtheme 2: Restaurants.

Participants often spoke of eating out at fast-food and casual dining restaurants. Although most restaurants visited were low or moderately priced, it appeared that seniors with higher incomes chose to eat out more frequently. However, some participants revealed that they focused on price when out at a restaurant even if they had no financial concerns. Aside from price, some participants chose to eat out because they desired food they would not cook for themselves. Others enjoyed the simple convenience of not having to cook that day.

Subtheme 3: Alternative food system.

Three components of the alternative food system that were frequently used by seniors included gardening, assistance from friends and family, and reciprocity (i.e. trading/sharing food). Gardening was often incorporated into seniors' daily routines. It served as an important food resource for seniors as it provided them with inexpensive fresh produce as well as an opportunity to increase their activity level. A few participants still canned their own produce, which saved money and allowed the benefits offered from the garden to be enjoyed throughout the year.

Friends and family also served as a common source of food assistance for seniors. Family members often offered transportation, delivered food, and extended invitations to join them for meals at home or outings to restaurants. While some seniors enjoyed fish and other foods that were provided by family members, a few others still did their own fishing, which served as a good hobby and source of food for some seniors. Many participants also relied on reciprocity between friends and neighbors. Participants cooked meals in bulk and shared with neighbors instead of storing for later use. These reciprocal relationships not only served as another strategy to save money, but also provided social interaction for seniors.

Theme 4: Physical Changes Associated With Aging Influence Food Access And Intake

As seniors aged, physical changes, chronic conditions, and other health issues developed. Some seniors had physical limitations that affected their cooking ability, though most still cooked. For some, physical limitations caused a decline in cooking and eating balanced meals, and for others, chronic conditions affected their overall dietary intake. In addition to health issues,

sensory perception changed with age and may have affected the variety of food that seniors consumed. Many participants reported observing a change in taste with age, but only a few noticed a change in smell. Many seniors noted that they had lost their taste for meat.

Sleep is another factor that may be associated with dietary intake. Many seniors had disturbed sleeping patterns because of needing to use the bathroom, not being tired because of lower physical activity levels during the day, and simply being uncomfortable (some reported muscle cramps, back problems, poor circulation, and general soreness). This lack of sleep appeared to contribute to overall eating patterns as some seniors reported snacking when they got up in the middle of the night.

Theme 5: Social Influences Play A Role In Decision Making

Social influence appeared to impact both the eating behavior and social engagement of seniors by getting them to eat balanced meals at the senior center rather than rely on quick, easy meals of lower nutritional value (cereal, toast, etc.) alone in their rooms. Most seniors enjoyed eating at senior meal programs, but some factors such as weather, transportation, or other social commitments influenced where participants chose to eat. Many seniors would eat out instead of cooking in order to spend time with friends and family, regardless of the food or restaurant. Seniors also used congregate dining for more than just the food. Seniors often used the program for activities such as games, lectures, and other social gatherings. While social activities were available for most seniors, some participants were still interested in a wider variety of options, such as volunteering on committees. This demonstrates the drive seniors had to be involved in a variety of social settings.

Phase 2: Survey and Food Frequency Questionnaire

The results presented below have been adapted from the following manuscript: Oemichen M, Smith C. Dietary and supplement intakes among pre- and post-menopausal African American

women and their impact on risk of hypertension. *Submitted to Journal of Nutrition in Gerontology and Geriatrics.*

This sample consisted of 192 pre- and post-menopausal, African American women. Pre-menopausal women had an average age of 24.5 ± 4.6 years while post-menopausal women had an average age of 72.5 ± 6.2 years. Sixty-eight percent of pre-menopausal women had an average monthly income less than \$1,000 compared to 59% of post-menopausal women. Furthermore, BMI was higher in post-menopausal women with a mean of 31.1 ± 6.7 kg/m² and 86% in the overweight/obese category compared to a mean of 26.6 ± 6.5 kg/m² and 50% of pre-menopausal women in the overweight/obese category (**Chapter 3, Table 1**).

Estimated dietary Intakes compared to RDA

The women in each sample group had similar intakes and were above the RDA for the majority of nutrients. However, pre-menopausal women had iron consumption lower than the RDA and both groups had vitamin A intake above the RDA as well as fiber, calcium, magnesium, and vitamin E intakes below the RDA. Post-menopausal women consumed significantly more vitamin A and magnesium than pre-menopausal women (**Chapter 3, Table 2**). Regarding the food groups, both the pre- and post-menopausal women had adequate consumption except from the dairy (milk, yogurt, cheese) and protein (meat, poultry, fish, beans, etc.) groups. Post-menopausal women consumed significantly more fruits and vegetables.

Nutrient distribution compared to AMDR

Both groups of women were within the AMDR for each macronutrient (fat, protein, and carbohydrate) (Table 3). However, the overall trend revealed fat consumption at the top of the range (20-35%) with a mean intake of $34.6 \pm 7.5\%$ and protein consumption lower in the range (10-35%) with a mean intake of $13.3 \pm 2.5\%$. Most women were consuming greater than or equal to the AMDR for fat. This was in contrast to none of the women consuming above the AMDR for protein (**Chapter 3, Table 3**)

Supplement Intake

Supplements also added to the total average daily nutrient intakes. Each supplement was consumed at levels lower than the tolerable upper intake level (UL). Average daily supplement intake among the post-menopausal sample was significantly greater for every supplement category except iron. The frequency and range of supplement intakes among African American women were also higher for those in the post-menopausal sample. For instance, 21% of women in the post-menopausal group consumed the highest range of calcium (844.6-1130 mg) compared to only 4% in the pre-menopausal group. Magnesium also varied with 39% of post-menopausal women consuming the highest range (28.7-100 mg) compared to only 18% in the pre-menopausal sample (**Chapter 3, Table 5**).

Disease Associations

Post-menopausal women had significantly higher self-reported rates of heart disease, stroke, high BP, and osteoporosis diagnoses; higher BMI; and higher mean SBP and DBP. Post-menopausal women had a slightly elevated mean SBP of 142.2 ± 20.2 mmHg with 69% reporting to be hypertensive and 49.4% had actual (measured) elevated BP measurements. Furthermore, using bivariate correlations, DBP was significantly associated with calcium and sodium intake. In addition, BMI was significantly correlated with mean SBP and DBP (**Chapter 3, Table 6**).

CONCLUSIONS AND IMPLICATIONS

Using qualitative and quantitative data, the purpose of this two-phase research project was to investigate and observe associations between dietary habits and factors related to physical, social, and economic health among older adults in the United States. These themes were analyzed in phase 1 through focus groups with older adults to garner specific and candid opinions about the matters of food insecurity, food access, and food choice, and in phase 2 through a secondary data set with older African American women to observe associations between hypertension and dietary/supplement intakes.

Primary findings from this project indicate that past experiences, culture, and cost are some of the most influential drivers of food choice and dietary intake among older adults. Additional factors such as adequate access to food, social interaction, and presence of disease can also play an important role in shaping the dietary habits and traditions that older adults develop over their lifetime. While this research provides a good base for understanding the importance of social and cultural factors related to food choice among older adults, more research is warranted to determine the efficacy of supplement intake, understand the issue of food insecurity among older adults, and investigate the factors of food access and food choice related to minority groups,. This research also identifies potential areas for future research and strategies that may be implemented to promote good health among older adult and African American populations.

The potential exists for many older adults to experience decreased appetite and altered nutrient absorption with age, which can be detrimental to their health and quality of life. As a result of their food choices, older adults may have inadequate nutrient intakes which may increase their risk of disease. Implementing interventions with supplements could have the potential to counteract these effects but most current research is focused on calcium and vitamin D supplements to address bone loss. Limited information is available regarding other supplements such as potassium and magnesium, which could address inadequacies and reduce the risk of diseases such as hypertension. An intervention could be initiated to give supplements to older

adults in order to bring overall nutrient intakes closer to the RDA. Various doses and types of supplements could be measured to observe any reduction in BP and determine which type yields the best results. However, supplements can be dangerous for older adults because of potential medication interactions. Therefore, further research is necessary to determine the efficacy and safety of various supplement doses among older adults prior to any interventions.

While there may be potential for supplements to address nutrient inadequacies, barriers such as food insecurity can hinder some older adults from using supplements as a strategy to improve health. It can also restrict normal dietary intake or lead to altered eating patterns while trying to save money. Although food assistance programs such as congregate dining and SNAP are available for older adults, many who are eligible are not using the programs. Since many among this population believe that they are ineligible or are unaware of available programs, it is essential to promote assistance programs specifically to older adults. Posting this information at senior centers, grocery stores, churches, etc. could improve awareness and provide older adults with additional resources that will allow them to consume a more balanced diet. Other older adults were aware of the programs, but were not using them because they disliked the food offered. For this group, an important next step is to design and conduct a survey to determine which meals older adults would prefer to see on the menu.

Existing research related to dietary behaviors among older adults is limited, especially among minority populations. African Americans, in particular, have an increased risk for a variety of diseases such as obesity, heart disease, hypertension and diabetes. Yet, themes regarding factors of food choice, food access, and food insecurity have not been thoroughly investigated among this population. To address this, interventions using qualitative methods such as focus groups should be employed. Gathering specific information about food assistance use in the community would provide insight into the importance of various programs according to African Americans. This information could be used to change the way minority populations are targeted to ensure they are receiving adequate help based on their specific concerns.

In conclusion, based on this project, directions for future research and strategies for change related to dietary intake and food choice among older adults and African Americans should include: 1) determining safety and efficacy of supplement doses and their role in disease prevention; 2) improving use and awareness of food assistance programs by conducting surveys and promoting the programs in locations frequented by older adults; and 3) focusing research on minority populations, especially related to socioeconomic factors such as food access and food insecurity.

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APPENDICES

PARTICIPANT CONSENT FORM

Investigation of the food choice, promoters and barriers to food access issues, and food insecurity among low-income, free living Minnesotan seniors.

This project is being conducted by Chery Smith, PhD, RD, University of Minnesota (Department of Food Science and Nutrition), and Megan Oemichen, R.D., graduate assistant.

You have been asked to take part in a focus group that will look at food insecurity and access to food for elderly individuals in your area. We are looking at barriers to food access and whether food assistance programs are used in addition to food purchases. You were asked to be a participant because there is very little current information on factors relating to food access for the elderly.

Please read this form carefully and ask any questions you may have before agreeing to participate in this project.

Procedures:

This focus group will last approximately one and a half hours. Listed below are a few examples of questions that will be asked during the session.

- Do you receive food stamps (SNAP vouchers) and is it enough to make ends meet? What encourages you to use this program?
- How do you feel about the selection of grocery stores/supermarkets available in your area? Are there enough to meet your needs? How would you change stores in your area?
- Do you feel there are enough food assistance programs in the county available to meet your needs? Which assistance programs do you use?
- Are you, or members of your family, ever hungry because the food doesn't last through the month?

Additional measures will be requested including height and weight, depression, and demographic information. The session will be audio recorded to ensure we don't miss any of your important comments.

Risks and Benefits:

There are no direct benefits to participation in the study. There are some slight risks associated with answering questions that some persons may find intrusive or embarrassing. There are also risks to privacy because the confidentiality of responses during a focus group cannot be absolutely ensured. You are always welcome to skip a question that you do not wish to answer.

Confidentiality:

The records for this project will be kept private, in a locked file in Dr. Smith's office. Only your first name will be attached to your transcript. Only project staff will have access to this file. If the information becomes published, your identity will not be given out, it will remain confidential.

Compensation:

You will receive a \$20 Target gift certificate for your participation. Full compensation will be provided only if you complete the focus group. It is fine if you decide to leave early or withdrawal, however, because of financial constraints we will not be able to pay you.

Voluntary Nature of the Project:

Your decision to participate (or not) will not affect any present or future relations with the University of Minnesota or any community public program. If you decide to participate in the project, you are free to withdraw at any time.

Contacts and Questions:

Those conducting this project are (Professor) Chery Smith, PhD, MPH, RD and Megan Oemichen. You may ask any questions you have now and if you have questions later you may contact Chery Smith at (612) 624-2217, or Megan Oemichen at (612) 345-0706. You will be given a copy of this form to keep for your own records. If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D-528 Mayo, 420 Delaware Street S.E., Minneapolis, Minnesota, 55455; telephone [\(612\) 625-1650](tel:(612)625-1650).

Statement of Consent

I have read the above information. I have asked questions and received answers. I consent to this project.

PARTICIPANT SIGNATURE _____ **DATE** _____

INVESTIGATOR SIGNATURE _____ **DATE** _____

****THANK YOU for your participation****

DEMOGRAPHIC INFORMATION

1. **Name:** _____ **Age:** _____ years
2. **Gender:** Male Female
3. **Race:**

<input type="checkbox"/> Caucasian (white)	<input type="checkbox"/> Hispanic
<input type="checkbox"/> African American (black)	<input type="checkbox"/> Asian
<input type="checkbox"/> American Indian	<input type="checkbox"/> Other
4. **Household Income (Annual or yearly):**

<input type="checkbox"/> Less than \$5,000	<input type="checkbox"/> \$10,000-\$19,999	<input type="checkbox"/> Greater than \$40,000
<input type="checkbox"/> \$5,001-\$9,999	<input type="checkbox"/> \$20,000-\$39,999	
5. **Education:**
 - 8th grade or less
 - Some high school
 - High school graduate, GED or equivalent
 - Some undergraduate/college/technical/vocational school
 - Completed college/technical/vocational school
 - Completed graduate/professional school
6. **Total number of people in household:** _____

7. **Number of children in household:** _____

8. **Where do you currently live?** Own house Apartment Shelter Live with relatives
 Assisted Living Other _____
For how long? _____

9. **Do you currently have a job?**

- Yes
 No -----> **If no, what was your last job?** _____

10. **Do you get food stamps?** No Yes I used to

11. **How long have you received food stamps?**

- <6 months 6 months-1year 1-5 years >5 years

12. **Do you receive social security?** No Yes

13. **How long have you received social security?**

- <6 months 6 months-1year 1-5 years >5 years

14. **In general, would you say YOUR DIET is:**

- Poor Fair Good Very Good Excellent

15. **In general, would you say YOUR HEALTH is:**

- Poor Fair Good Very Good Excellent

16. Have you ever been diagnosed with any of the following conditions?

Please check all that apply.

- Diabetes Heart Disease High Blood Pressure Cancer Don't Know None of these

Others: _____

17. Do you make your own food purchases? No Yes

18. How many minutes are you from the grocery store where you most regularly shop?

19. How do you get to the store?

- Car Bus Taxi Friend Family Other _____

20. How often do you eat at a senior meal site?

- Daily 5 days/week 2-3 days/week 1 day/week
 2-3 times/month Never

21. How many times have you used food pantries in the PAST 12 MONTHS?

- 0 1 2-3 4-6 7-9 10+

22. How many times have you used a hot meal program in the PAST MONTH?

- 0 1 2-3 4-6 7-9 10+

23.I get my food from:

- | | | | | |
|--|--|---|---------------------------------------|--|
| <input type="checkbox"/> Grocery store | <input type="checkbox"/> Small convenience store | <input type="checkbox"/> Senior meal site | <input type="checkbox"/> Garden | <input type="checkbox"/> Family/friends |
| <input type="checkbox"/> Fast-food restaurants | <input type="checkbox"/> Sit-down restaurants | <input type="checkbox"/> Church | <input type="checkbox"/> Soup kitchen | <input type="checkbox"/> Friends give me |
| <input type="checkbox"/> products from hunting/fishing | <input type="checkbox"/> Food stamps | <input type="checkbox"/> Other: _____ | | |

24.Which of these statements best describes the food eaten in your household in the *last 12 months*:

- Enough of the kinds of food we want to eat
- Enough but not always the kinds of food we want
- Sometimes not enough to eat
- Often not enough to eat
- Don't Know

For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last April.

25.“The food that (I/we) bought just didn’t last, and (I/we) didn’t have money to get more.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

26.“(I/we) couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true

- Never true
- DK or Refused

27.In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes
- No (Skip AD1a)
- DK (Skip AD1a)

28.[IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- DK

29.In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

- Yes
- No
- DK

30.In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

- Yes
- No
- DK

I believe that **MY**:

Weight is _____ lbs.

Elderly Focus Groups Questions

Investigation of the food choice, promoters and barriers to food access issues, and food insecurity among low-income, free living Minnesotan seniors.

Introduction: Welcome everyone. We'd like to tell you about the project and review the Informed Consent handout and have you sign it before we move on. We would like to remind you all that participation in this study is voluntary and you are free to withdraw at any time.

This session will be tape-recorded.

Please tell us your first name and a little about yourself. During the focus group discussion, we will use only first names.

Icebreaker: What is your favorite food and why?

- 1. Let's first talk about your family's diet. What are mealtimes like in your household?**
 - ◆ Tell us about who you live with? Do you still have children living in your household?
 - ◆ Who prepares meals and snacks?
 - ◆ How do you decide what to eat? Does health influence your eating behavior?
 - ◆ Please describe what your typical meals look like (B, L, D). How about snacks?
- 2. Does everybody here do the shopping? Tell us about shopping. How do you decide what to buy?**
 - ◆ What factors affect your food purchases: taste, convenience, nutritional value, cost, etc.? How often do you shop?
 - ◆ What stores do you usually grocery shop at? How is the overall selection at the stores where you shop? How far are you willing to travel for a better selection?
 - ◆ Are the stores easily accessible? Are there adequate transportation options available? How do you usually get to the store (car, bus, taxi, etc.)?
 - ◆ How affordable is the selection? What strategies do you use when money is tight to stretch the budget?
 - ◆ What foods do you spend the most money on? What foods are priority foods for you?
 - ◆ How do you feel about the selection of grocery stores/supermarkets available in your area? Are there enough to meet your needs? How would you change stores in your area?
- 3. How do you manage your finances around food?**
 - ◆ Do you get social security or a pension and does it provide you with enough money to buy the food you need each month? How do you allocate your money? How much goes toward food? How much more would you need to make it through the month?
 - ◆ Do you receive food stamps (SNAP vouchers) and is it enough to make ends meet? What encourages you to use this program?
 - ◆ If you do not use the SNAP program, what are the barriers to the program? Do you receive food from other sources, limiting the need for food stamps?

- ◆ How does your diet change throughout the month based on the use of your food budget? I.e., feast for 3 weeks, famine at the end of the month...
 - ◆ Do you eat lunch at the Senior Meal Program? What do you like best/least about the program? What encourages you to use this program?
 - ◆ What other types of food assistance programs do you use? Food shelves, soup kitchens, WIC...How often do you use these programs? How do you feel when you use them? Which programs do you use most often? Why?
 - ◆ Are you, or members of your family, ever hungry because the food doesn't last through the month?
- 4. What about other sources of food? What places do you rely on to get the food you need each month?**
- ◆ Do you receive food from sources other than the store? Which sources?
 - ◆ Do you feel there are enough food assistance programs in the county available to meet your needs? Which assistance programs do you use?
 - ◆ If you have used them, how do you feel about congregate/senior dining sites? Is the meal affordable? Is the facility accessible?
 - ◆ Have you ever participated in reciprocal relationships for food (like trading foods)?
 - ◆ Do you have a vegetable/fruit garden? What do you grow? Does anyone in the household hunt or fish? Does it add significant amounts of food to your diet?

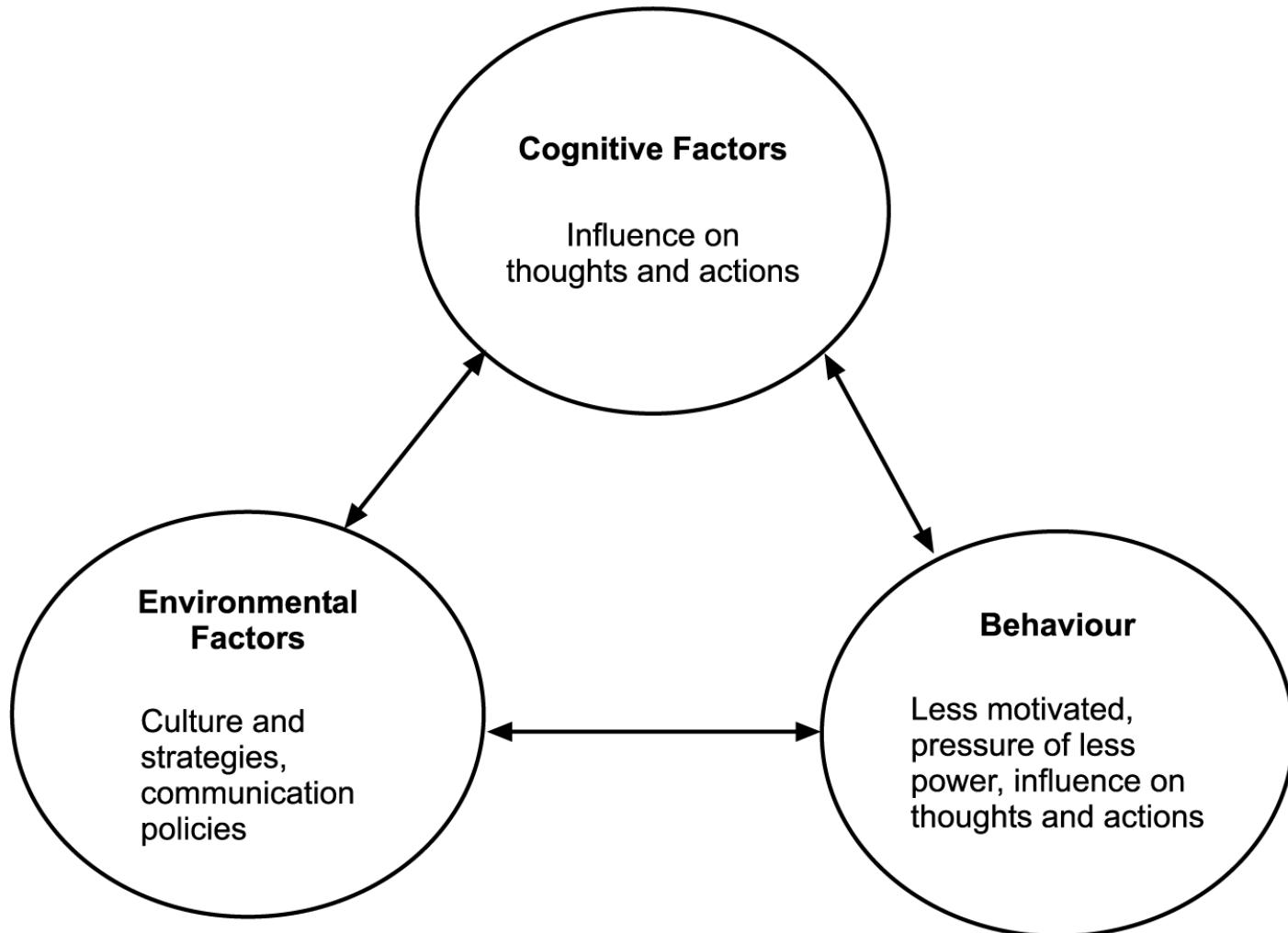
Closure: Before we conclude this session, is there anything that you would like to add?

Now I will take a few minutes and review what we've talked about. Is this an adequate summary of what we've talked about? Am I leaving something out that may be important?

Next, we'd like to take your height and weight in the next room.

Thank you for coming.

Albert Bandura's Social Cognitive Theory (SCT)



Available from: <http://www.vwmin.org/social-cognitive-theory-education.html>

Participant Questionnaire

Initials:

General Information

- 1) Age _____
 - 2) Birthdate _____
 - 3) Marital status: single Married Divorced/separated Widowed
 - 4) Birthplace (city/state) _____
 - 5) Number of years in U.S. _____
 - 6) How many times have you moved in the last 10 years? _____
 - 7) Occupation _____
 - 8) Highest level of education you have completed _____
 - 9) Your monthly income is closer to (\$): <300 300-500 500-1,000 1000-3000 >3000
 - 10) How many hours do you sleep? <6 7 8 >9

Medical Information

Blood Pressure (BP): 1) 2)

Weight _____ (kg) Weight _____ (kg)

Height _____ (cm) Height _____ (cm)

Have you ever been told by a doctor you had any of the following conditions:

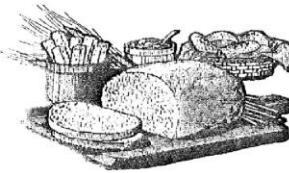
Condition	No	Yes	Don't Know
Heart disease, angina, heart attack			
High blood pressure			
Stroke			
Chronic bronchitis or emphysema			
Asthma			
Diverticulosis, rectal/colon polyps			
Chronic colitis			
Diabetes			
Thyroid condition			
Kidney disease			
Bladder disease			
Liver disease, cirrhosis, hepatitis			
Stomach ulcers			
Rheumatoid arthritis			
Osteoporosis			
Anemia			
Depression			
Constipation			
Swallowing difficulties			
High cholesterol or TG levels			
Reflux, heartburn			
Leukemia or other type of cancer			

Thank you for taking the time to answer this questionnaire and for participating in our study!!

RESPONDENT ID NUMBER											
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯
⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰
⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱
⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲
⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳

TODAY'S DATE											
○ Jan	DAY	YEAR									
○ Feb											
○ Mar	① ②	1998 ○									
○ Apr	① ②	1999 ○									
○ May	② ③	2000 ○									
○ Jun	③ ④	2001 ○									
○ Jul	④ ⑤	2002 ○									
○ Aug	⑤ ⑥	2003 ○									
○ Sep	⑥ ⑦	2004 ○									
○ Oct	⑦ ⑧	2005 ○									
○ Nov	⑧ ⑨	2006 ○									
○ Dec	⑨ ⑩	2007 ○									

FOOD QUESTIONNAIRE



This form is about the foods you usually eat.
It will take about 30 - 40 minutes to complete.

- Please answer each question as best you can. Estimate if you aren't sure.
 - Use only a No. 2 pencil.
 - Fill in the circles completely, and erase completely if you make any changes.

Please print your name in this box.

SEX	AGE	WEIGHT pounds	HEIGHT ft. in.
<input type="radio"/> Male <input type="radio"/> Female	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 18 19 19 20 20 21 21 22 22 23 23 24 24 25 25 26 26 27 27 28 28 29 29 30 30 31 31 32 32 33 33 34 34 35 35 36 36 37 37 38 38 39 39 40 40 41 41 42 42 43 43 44 44 45 45 46 46 47 47 48 48 49 49 50 50 51 51 52 52 53 53 54 54 55 55 56 56 57 57 58 58 59 59 60 60 61 61 62 62 63 63 64 64 65 65 66 66 67 67 68 68 69 69 70 70 71 71 72 72 73 73 74 74 75 75 76 76 77 77 78 78 79 79 80 80 81 81 82 82 83 83 84 84 85 85 86 86 87 87 88 88 89 89 90 90 91 91 92 92 93 93 94 94 95 95 96 96 97 97 98 98 99 99 100
If female, are you pregnant or breast feeding?			
<input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> Not female			

What kinds of fat or oil do you usually use in cooking? MARK ONLY ONE OR TWO

- | | | |
|--|---|--|
| <input type="radio"/> Don't know, or Pam | <input type="radio"/> Butter/margarine blend | <input type="radio"/> Lard, fatback, bacon fat |
| <input type="radio"/> Stick margarine | <input type="radio"/> Low-fat margarine | <input type="radio"/> Crisco |
| <input type="radio"/> Soft tub margarine | <input type="radio"/> Corn oil, vegetable oil | |
| <input type="radio"/> Butter | <input type="radio"/> Olive oil or canola oil | |

PLEASE DO NOT WRITE IN THIS AREA

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During the past year, have you taken any vitamins or minerals regularly, at least once a month?

No, not regularly Yes, fairly regularly →

(IF YES) WHAT DID YOU TAKE FAIRLY REGULARLY?

VITAMIN TYPE	HOW OFTEN					FOR HOW MANY YEARS?					
	DIDN'T TAKE	A FEW DAYS per MONTH	1-3 DAYS per WEEK	4-6 DAYS per WEEK	EVERY DAY	LESS THAN 1 YR.	1 YEAR	2 YEARS	3-4 YEARS	5-9 YEARS	10+ YEARS
Multiple Vitamins. Did you take...											
Regular Once-A-Day, Centrum, or Thera type	<input type="radio"/>										
Stress-tabs or B-Complex type	<input type="radio"/>										
Antioxidant combination type	<input type="radio"/>										
Single Vitamins (not part of multiple vitamins)											
Vitamin A (not beta-carotene)	<input type="radio"/>										
Beta-carotene	<input type="radio"/>										
Vitamin C	<input type="radio"/>										
Vitamin E	<input type="radio"/>										
Folic acid, folate	<input type="radio"/>										
Calcium, alone or combined with something else	<input type="radio"/>										
Zinc, alone or combined with something else	<input type="radio"/>										
Iron	<input type="radio"/>										
Selenium	<input type="radio"/>										

If you took Once-a-day, Centrum or Thera-type multiple vitamins, did you usually take types that

contain minerals, iron, zinc, etc. do not contain minerals don't know

If you took vitamin C or vitamin E:

How many milligrams of vitamin C did you usually take, on the days you took it?
 100 250 500 750 1000 1500 2000 3000+ Don't know

How many IU's of vitamin E did you usually take, on the days you took it?
 100 200 300 400 600 800 1000 2000+ Don't know

Did you take any of these supplements at least once a month?

Ginkgo Ginseng St. John's Wort Kava Kava Echinacea Melatonin DHEA
 Glucosamine/Chondroitin Something else Didn't take these

The next section is about your usual eating habits in the past year or so. This includes all meals or snacks, at home or in a restaurant or carry-out. There are two kinds of questions to answer for each food:

HOW OFTEN, on average, did you eat the food during the past year?

*Please DO NOT SKIP any foods. Mark "Never" if you didn't eat it.

HOW MUCH did you usually eat of the food?

*Sometimes we ask how many you eat, such as 1 egg, 2 eggs, etc., ON THE DAYS YOU EAT IT.

*Sometimes we ask "how much" as A, B, C or D. LOOK AT THE ENCLOSED PICTURES. For each food, pick the picture (bowls or plates) that looks the most like the serving size you usually eat.
(If you don't have pictures: A=1/4 cup, B=1/2 cup, C=1 cup, D=2 cups.)

*Sometimes we made the "D" column a darker color. This is just to remind you to make sure you really eat that large a serving.

EXAMPLE: This person drank apple juice twice a week, and had one glass each time. Once a week he ate a "C" sized serving of rice (about 1 cup).

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MON.	2-3 TIMES per WEEK	ONCE per WEEK	TWICE per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME SEE PORTION SIZE PICTURES FOR A-B-C-D			
										How many glasses each time			
Apple juice	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Rice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME How many glasses on the days you drink it?				
											How many glasses each time	1	2	3
How often do you drink the following beverages?														
Tomato juice or V-8 juice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses each time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Real 100% orange juice or grapefruit juice, including fresh, frozen or bottled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses each time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When you drink orange juice, how often do you drink a calcium-fortified brand?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Usually calcium-fortified	<input type="radio"/>	<input type="radio"/>	I don't know	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sometimes calcium-fortified	<input type="radio"/>	<input type="radio"/>	I don't drink orange juice	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Hardly ever calcium-fortified	<input type="radio"/>	<input type="radio"/>		
Other real fruit juices like apple juice, prune juice, lemonade	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kool-Aid, Hi-C, or other drinks with added vitamin C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinks with some juice in them, like Sunny Delight, Juice Squeeze	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many bottles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instant breakfast milkshakes like Carnation, diet shakes like SlimFast, or liquid supplements like Ensure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses or cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Glasses of milk (any kind)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When you drink glasses of milk, what kind do you usually drink? MARK ONLY ONE:														
<input type="radio"/> Whole milk	<input type="radio"/> Reduced-fat 2% milk	<input type="radio"/> Low-fat 1% milk	<input type="radio"/> Non-fat milk											
<input type="radio"/> Rice milk	<input type="radio"/> Soy milk	<input type="radio"/> I don't drink milk or soy milk												
HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME				
											How many bottles or cans	1	2	3-4
Regular soft drinks, or bottled drinks like Snapple (<i>not</i> diet drinks)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many bottles or cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beer or non-alcoholic beer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many bottles or cans	<input type="radio"/>	<input type="radio"/>	3-4	<input type="radio"/>
What kind? MARK ONLY ONE:	<input type="radio"/> Regular beer	<input type="radio"/> Light beer	<input type="radio"/> Non-alcoholic beer	<input type="radio"/> I don't drink beer										
Wine or wine coolers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses	<input type="radio"/>	<input type="radio"/>	3-4	<input type="radio"/>
Liquor or mixed drinks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many drinks	<input type="radio"/>	<input type="radio"/>	3-4	<input type="radio"/>
Glasses of water, tap or bottled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many glasses	<input type="radio"/>	<input type="radio"/>	3-4	<input type="radio"/>
Coffee, regular or decaf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many cups	<input type="radio"/>	<input type="radio"/>	3-4	<input type="radio"/>
Tea or iced tea (<i>not</i> herb teas)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many cups	<input type="radio"/>	<input type="radio"/>	3-4	<input type="radio"/>
What do you usually add to coffee? MARK ONLY ONE:	<input type="radio"/> Cream or half & half	<input type="radio"/> Nondairy creamer	<input type="radio"/> Milk	<input type="radio"/> None of these										
What do you usually add to tea? MARK ONLY ONE:	<input type="radio"/> Cream or half & half	<input type="radio"/> Nondairy creamer	<input type="radio"/> Milk	<input type="radio"/> None of these										
Do you usually add sugar (or honey) to coffee?	<input type="radio"/> No	<input type="radio"/> Yes	IF YES, how many teaspoons each cup? <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4											
Do you usually add sugar (or honey) to tea?	<input type="radio"/> No	<input type="radio"/> Yes	IF YES, how many teaspoons each cup? <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4											

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HOW OFTEN	NEVER	A FEW per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME SEE PORTION SIZE PICTURES FOR A-B-C-D								
	How often do you eat each of the following fruits, just during the 2-3 months when they are in season?																	
Raw peaches, apricots, nectarines, <u>while they are in season</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many each time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Cantaloupe, <u>in season</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Strawberries, <u>in season</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Watermelon, <u>in season</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Any other fruit <u>in season</u> , like grapes, honeydew, pineapple, kiwi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
How often do you eat the following foods all year round? Estimate your average for the whole year.																		
Bananas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many each time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Apples or pears	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many each time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Oranges or tangerines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many each time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Grapefruit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Canned fruit like applesauce, fruit cocktail, or dried fruit like raisins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME								
Eggs, including egg biscuits or Egg McMuffins (Not egg substitutes)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many eggs each time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Bacon	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many pieces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Breakfast sausage, including sausage biscuits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many pieces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Pancakes, waffles, French toast, Pop Tarts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many pieces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Breakfast bars, granola bars, Power bars	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Cooked cereals like oatmeal, cream of wheat or grits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which bowl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
High-fiber cereals like All Bran, Raisin Bran, Fruit-n-Fiber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which bowl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Which high-fiber cereal do you eat most often? MARK ONLY ONE:																		
<input type="radio"/> All Bran or Bran Buds											<input type="radio"/> Raisin Bran							
<input type="radio"/> Fiber One, Fruit-n-Fiber, etc.											<input type="radio"/> I don't know							
<input type="radio"/> Something else											<input type="radio"/> I don't eat it							
Product 19, Just Right or Total cereal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which bowl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Any other cold cereal, like Corn Flakes, Cheerios, Special K	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which bowl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Milk or milk substitutes on cereal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many oz. on cereal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Yogurt or frozen yogurt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Cheese, sliced cheese or cheese spread, including on sandwiches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many slices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
When you eat cheese, is it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Usually low-fat	<input type="radio"/>	<input type="radio"/>	Sometimes low-fat	<input type="radio"/>	Hardly ever low-fat	<input type="radio"/>	Don't know/don't eat	<input type="radio"/>

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HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME
	SEE PORTION SIZE PICTURES FOR A-B-C-D									
How often do you eat the following vegetables, including fresh, frozen, canned or in stir-fry, at home or in a restaurant?										
Broccoli	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Carrots, or mixed vegetables or stews containing carrots	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Corn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Green beans or green peas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Spinach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Mustard greens, turnip greens, collards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
French fries, fried potatoes or hash browns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
White potatoes not fried, incl. boiled, baked, mashed & potato salad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Sweet potatoes, yams (Not in pie)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Cole slaw, cabbage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Green salad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Raw tomatoes, including in salad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> 1/4 <input type="radio"/> 1/2 <input type="radio"/> 1 <input type="radio"/> 2
Salad dressing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many Tbsp. <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Is your salad dressing	<input type="radio"/>	Usually low-fat	<input type="radio"/>	Sometimes low-fat	<input type="radio"/>	Hardly ever low-fat	<input type="radio"/>	Don't know/don't use		
HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME
	SEE PORTION SIZE PICTURES FOR A-B-C-D									
Any other vegetable, like okra, squash, cooked green peppers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Refried beans or bean burritos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Chili with beans (with or without meat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Baked beans, black-eye peas, pinto, any other dried beans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Vegetable stew	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which Bowl <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Vegetable soup, vegetable beef, chicken vegetable, or tomato soup	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which Bowl <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Split pea, bean or lentil soup	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which Bowl <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Any other soup, like chicken noodle, chowder, mushroom, instant soups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Which Bowl <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Spaghetti, lasagna or other pasta with tomato sauce	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Cheese dishes without tomato sauce, like macaroni and cheese	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Pizza, including carry-out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many slices <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME SEE PORTION SIZE PICTURES FOR A-B-C-D				
	Do you ever eat chicken, meat or fish? <input type="radio"/> Yes <input type="radio"/> No IF NO, SKIP TO NEXT PAGE													
Hamburgers, cheeseburgers, meat loaf, at home or in a restaurant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much meat	<input type="radio"/> 1/8 lb.	<input type="radio"/> 1/4 lb.	<input type="radio"/> 1/2 lb.	<input type="radio"/> 3/4 lb.
Tacos, burritos, enchiladas, tamales, etc. with meat or chicken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Beef steaks, roasts, pot roast, or in frozen dinners or sandwiches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
How do you like beef cooked?	<input type="radio"/> Rare	<input type="radio"/> Medium	<input type="radio"/> Well done	<input type="radio"/> I don't eat beef										
Pork chops, pork roasts, or dinner ham	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
When you eat meat, do you	<input type="radio"/> Avoid eating the fat	<input type="radio"/> Sometimes eat the fat	<input type="radio"/> Often eat the fat	<input type="radio"/> I don't eat meat										
Veal, lamb or deer meat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Ribs, spareribs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many ribs	<input type="radio"/> 3-4	<input type="radio"/> 5-6	<input type="radio"/> 7-8	<input type="radio"/> 9+
Liver, including chicken livers or liverwurst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Gizzard, pork neckbones, chitlins, pigs feet, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Mixed dishes with beef or pork, like stew, corned beef hash, stuffed cabbage, meat dish with noodles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Mixed dishes with chicken, like chicken casserole, chicken & noodles, pot pie or in stir-fry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Fried chicken, at home or in a restaurant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	# medium pieces	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Chicken or turkey not fried, such as baked, grilled, or on sandwiches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
When you eat chicken, do you	<input type="radio"/> Avoid eating the skin	<input type="radio"/> Sometimes eat the skin	<input type="radio"/> Often eat the skin											
HOW OFTEN	NEVER	FEW TIMES per YEAR	ONCE/MONTH	2-3 TIMES/MONTH	ONCE/WEEK	TWICE/WEEK	3-4 TIMES/WEEK	5-6 TIMES/WEEK	EVERY DAY	HOW MUCH EACH TIME				
	Oysters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C
Other shellfish like shrimp, scallops, crabs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Tuna, tuna salad, tuna casserole	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much of the tuna	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Fried fish or fish sandwich, at home or in a restaurant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Other fish, not fried	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Hot dogs, or sausage like Polish, Italian or chorizos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Are your hot dogs	<input type="radio"/> Usually low-fat	<input type="radio"/> Sometimes low-fat	<input type="radio"/> Hardly ever low-fat	<input type="radio"/> Don't know/don't eat them										
Boloney, sliced ham, turkey lunch meat, other lunch meat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many slices	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Are your lunch meats	<input type="radio"/> Usually low-fat or turkey	<input type="radio"/> Sometimes low-fat	<input type="radio"/> Hardly ever low-fat											

HOW OFTEN									HOW MUCH EACH TIME					
	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	SEE PORTION SIZE PICTURES FOR A-B-C-D				
Noodles, macaroni, pasta salad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Tofu, bean curd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Meat substitutes, such as veggie burgers, Gardenburgers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many patties	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Chinese food, Thai or other Asian food, not counted above	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Snacks like potato chips, corn chips, popcorn (not pretzels)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Are these snacks	<input type="radio"/> Usually low-fat	<input type="radio"/> Sometimes low-fat	<input type="radio"/> Hardly ever low-fat	<input type="radio"/> Don't know/don't eat										
HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME				
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Peanuts, other nuts or seeds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Crackers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Doughnuts, Danish pastry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Cake, sweet rolls, coffee cake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Are they	<input type="radio"/> Usually low-fat	<input type="radio"/> Sometimes low-fat	<input type="radio"/> Hardly ever low-fat	<input type="radio"/> Don't know/don't eat										
Cookies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many	<input type="radio"/> 1-2	<input type="radio"/> 3-5	<input type="radio"/> 6-7	<input type="radio"/> 8+
Are your cookies	<input type="radio"/> Usually low-fat	<input type="radio"/> Sometimes low-fat	<input type="radio"/> Hardly ever low-fat	<input type="radio"/> I don't know/don't eat										
Ice cream, ice milk, ice cream bars	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D
Is your ice cream	<input type="radio"/> Usually low-fat	<input type="radio"/> Sometimes low-fat	<input type="radio"/> Hardly ever low-fat	<input type="radio"/> I don't know/don't eat										
Pumpkin pie, sweet potato pie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many slices	<input type="radio"/> 1/2	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
Any other pie or cobbler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many slices	<input type="radio"/> 1/2	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
Chocolate candy, candy bars	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many bars	<input type="radio"/> small	<input type="radio"/> medium	<input type="radio"/> large	<input type="radio"/> ② large
Other candy, not chocolate, like hard candy, caramel, jelly beans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many pieces	<input type="radio"/> 1-2	<input type="radio"/> 3-5	<input type="radio"/> 6-7	<input type="radio"/> 8+
PLEASE DO NOT WRITE IN THIS AREA														

HOW OFTEN	SEE PORTION SIZE PICTURES FOR A-B-C-D									
	NEVER OR A FEW TIMES PER YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	2+ TIMES per DAY	
Biscuits or muffins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many each time <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Rolls, hamburger buns, English muffins, bagels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many each time <input type="radio"/> 1/2 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3
Dark bread like rye or whole wheat, including in sandwiches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many slices each time <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
White bread or toast, including French, Italian, or in sandwiches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many slices each time <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Corn bread, corn muffins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many pieces <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Tortillas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many each time <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Rice, or dishes made with rice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How much <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Margarine (not butter) on bread or on potatoes or vegetables, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many pats (tsp.) <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Butter (not margarine) on bread or on potatoes or vegetables, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many pats (tsp.) <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Gravy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many Tbsp. <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Peanut butter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many Tbsp. <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Jelly, jam, or syrup	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many Tbsp. <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Mayonnaise, sandwich spreads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many Tbsp. <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Catsup, salsa or chile peppers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many Tbsp. <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Mustard, soy sauce, steak sauce, barbecue sauce, other sauces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	How many Tbsp. <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Did you use the pictures to choose your serving size on this form?										
<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> I didn't have any pictures.										
Would you say your health is										
<input type="radio"/> Excellent <input type="radio"/> Very good <input type="radio"/> Good <input type="radio"/> Fair <input type="radio"/> Poor										
How many times have you gone on a diet?										
<input type="radio"/> Never <input type="radio"/> 1-2 <input type="radio"/> 3-5 <input type="radio"/> 6-8 <input type="radio"/> 9 or more										
Did you ever drink more beer, wine or liquor than you do now?										
<input type="radio"/> Yes <input type="radio"/> No										
How many hours do you watch television or video, per day or per week on average?										
<input type="radio"/> None <input type="radio"/> 1-6 hours/week <input type="radio"/> 1 hour/day <input type="radio"/> 2 hours/day <input type="radio"/> 3 hours/day <input type="radio"/> 4+ hours/day										
Do you smoke cigarettes now? <input type="radio"/> No <input type="radio"/> Yes										
IF YES, On the average about how many cigarettes a day do you smoke now?										
<input type="radio"/> 1-5 <input type="radio"/> 6-14 <input type="radio"/> 15-24 <input type="radio"/> 25-34 <input type="radio"/> 35 or more										
What language do you usually speak at home or with friends?										
<input type="radio"/> English <input type="radio"/> Spanish <input type="radio"/> Something else <input type="radio"/> English & something else equally										
What is your ethnic group? (MARK ONE OR MORE)										
<input type="radio"/> Hispanic or Latino					<input type="radio"/> Black or African American			<input type="radio"/> American Indian or Alaska Native		
<input type="radio"/> White, not Hispanic					<input type="radio"/> Asian			<input type="radio"/> Native Hawaiian or Other Pacific Islander		
Thank you very much for filling out this questionnaire. Please take a minute to go back and fill in anything you may have skipped.										
PLEASE DO NOT WRITE IN THIS AREA										
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