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Utilizing a Toolkit with Individualized Food Label Education for Healthy Food Choices to Reduce the Burden of Chronic Disease Among Black Americans

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Dedication

I dedicate my work to my mother who not only told me anything was possible, but also showed me; to my children who inspire me to make the world a better place; and to my husband who encourages and supports me every day.

Abstract

Background/Purpose: Black Americans are disproportionately affected by chronic diseases related to diet including hypertension, diabetes, obesity, and stroke when they lack healthy food options and healthy living environments. The purpose of this project was to implement and evaluate the feasibility and effectiveness of a toolkit that primary care providers could use to educate and support Black adults in adopting healthy diet habits to improve overall outcomes and work towards decreasing this disparity.

Methods: This quality improvement project took place at a Community Health Clinic in an urban neighborhood. Participants received nutrition education utilizing a graphic titled "Your Nutrition Facts" that contained daily calorie and nutrient needs and a Brief Action Planning Intervention session to assist participants in developing a goal related to improving one nutrient for two weeks. Participants completed pre and post intervention Likert Scale surveys with questions on nutrition knowledge, ability to determine healthy foods from labels, and confidence in making diet changes.

Results: Effectiveness was measured using paired t-tests. Results showed a significant increase in all survey questions post intervention including a 22% overall increase in ability to tell if a food healthy from its label, a 10% increase in confidence of improving diet, and increases in knowledge of daily calorie needs (130%) and daily nutrient needs (151%).

Conclusions: Diet education and support, provided within primary care provider office visits is effective in improving knowledge, ability, and confidence in selecting healthy foods, and can work towards mitigating health disparities and the effects of structural racism.

Keywords: *Health Disparities of the Black Population, Social Determinants of Health, Nutrition, Evidence-Based Practice, Patient Education, Nutrition Facts Label, Brief Action Planning*

Utilizing a Toolkit with Individualized Food Label Education and Brief Action Planning (BAP) for Healthy Food Choices to Reduce the Burden of Chronic Disease Among Black Americans

Non-communicable chronic disease is a leading cause of mortality and morbidity in the United States and Black Americans have a higher prevalence of obesity, diabetes, cardiovascular disease, hypertension, chronic kidney disease, hyperlipidemia, and stroke than their White counterparts (Office of Disease Prevention and Health Promotion, [ODPHP], n.d.). They also develop chronic diseases at younger ages, increasing the likelihood of complications (Chen et al., 2018) which are in part attributable to dietary habits.

Chronic disease management in acute and outpatient settings adds billions of dollars to healthcare costs in the United States each year. Obesity adds approximately $147 billion per year (Centers for Disease Control [CDC], 2021), diabetes adds approximately $237 billion per year (American Diabetes Association [ADA], 2018), and cost for cardiovascular related diseases add approximately $200 billion per year including $100.9 billion for heart disease, $23.6 billion for stroke, and $48.9 billion for hypertension (Benjamin et al., 2018).

Development of chronic disease is largely preventable or delayable with healthy lifestyle choices including dietary choices; however, making healthy choices is challenging for multiple reasons. Fast food is inexpensive, easier to obtain than fresh food in some areas, and doesn't require time for preparation. Highly processed prepackaged food from stores is easier and quicker to prepare as well, but frequently contains high levels of salts and sugars.

Wording on the front of food packaging can mislead consumers into believing that foods contain health benefits they do not. For example, an item may claim it contains "whole grain," to reduce heart disease when it actually contains little or no whole grains (Kadey, 2021). One study regarding snack food labeled as "vitamin-fortified" found consumers are more likely to perceive

them as healthy, less likely to refer to Nutrition Facts Label on them for nutrition information, and less likely to choose a healthier product over them (Verrill et al., 2017). Another study found foods featuring “low” or “no” nutrient claims (e.g., low fat, no added sugar) were not healthier overall than other foods in the same category and many contain harmful amounts of other ingredients, for example a low-fat food may contain high sodium (Taillie et al., 2017).

Utilizing the Nutrition Facts Label is usually the only way to determine what nutrients are in the food, however using them to meet individual nutrition needs isn’t simple; it requires knowledge of individual caloric and nutrient needs as well as the skill to calculate individual nutrient needs from the standard 2000 calorie amounts on the Nutrition Facts Label.

This quality improvement (QI) project focused on utilizing a comprehensive toolkit for Black patients seen at a health center. The toolkit included an individualized Your Nutrition Facts graphic each participant could use to easily determine which foods are healthy for them and information about reading food labels, as well as a Brief Action Planning Intervention to elicit short term goals for a behavior change to improve diet.

The purpose was to implement and evaluate the feasibility and effectiveness of a toolkit that primary care providers could use to educate and support Black adults in adopting healthy diet habits which will improve overall outcomes for health.

Background

To understand why the Black population carries a higher burden of disease, we must understand the history that has segregated Black people into poorer, less healthy neighborhoods. White families have had the opportunity to build wealth and purchase land across the United States that they have passed down through generations for centuries, while Black families were restricted from building wealth or owning land. This inequality began with slavery when Black

families worked to build wealth for White families, and was perpetuated over centuries by laws, policies, and the acts of racist individuals and groups.

After hundreds of years of slavery in the United States, the Thirteenth Amendment to the U.S. Constitution outlawed slavery in 1865. Black families began to gain wealth, build businesses, purchase homes, and hold political seats in government including more than a dozen in the U.S. Congress (Foner, 2019). In the late 1870's, Jim Crow laws began to be enacted across the country and the Black community's progress was halted and regressed (Encyclopedia Britannica, n.d). In 1877 the U.S. Supreme Court held up segregation in Hall v. DeCuir, ruling that states cannot prohibit segregation on public transportation, therefore making it more difficult for Black people to travel and limiting the work they could secure. Black codes were enacted to restrict what land Black individuals could purchase, where they could live, where they could work, and where they were allowed to be present. When challenged in 1896, the U.S. Supreme Court upheld Jim Crow laws in Plessy v. Ferguson allowing states to enforce segregation laws (Encyclopedia Britannica, n.d.).

Federal, State, and local governments enacted many laws and regulations to construct racially segregated neighborhoods including:

- 1910s Zoning laws to mandate seperate living areas for Black and White people
- 1920s Interracial marriage outlawed & new regulations created that people can only live on a street where they could legally marry the majority of people on that street
- 1926 U.S. Supreme Court upheld restrictive covenants on deeds that forbid renting or selling the property to Black people; in 1948 the Court reversed its decision stating covenants infringed on the sellers' rights to conduct business
- 1938 Public Housing developments intentionally segregated by race

- 1949 U.S. Housing Act included permission for local authorities to continue the practice of segregation by race in new public housing developments
- 1950's new income limits forced people who made middle income wages out of public housing, contributing to concentrated poverty and underfunding of public housing buildings leaving them subject to dilapidation (Rothsetin, 2018).

In the early 1900's use of exclusionary zoning practices began, further segregating Black people from White people. Zoning laws such as large lot sizes, house square footage minimums, occupancy limits, and allowance of single family houses only made houses unaffordable for many Black families (Rothstein, 2018). Beginning in the 1930's with the New Deal, entire White suburban neighborhoods were built with exclusionary zoning or as Homeowner Associations with covenants forbidding Black people from living there (Rothstein, 2018).

Although the Fourteenth Amendment to the U.S. Constitution contains an equal protection clause, the U.S. Supreme Court has upheld exclusionary zoning despite its discriminatory effect. In 1974, the Supreme Court upheld a regulation that restricted the number of unrelated people who could live together in Village of Belle Terre v. Boraas; the regulation has since spread to almost two thirds of communities in the U.S. In 1975, the Supreme Court denied a complaint of Warth v. Seldin to allow for multi-family zoning in an area where only 0.3% of land was zoned for multifamily. In 1977, the Supreme Court allowed for exclusion of low and moderate income housing in Metropolitan Housing Corporation v. Village of Arlington Heights (Whittemore, 2021).

The ability to build wealth plays a part in which neighborhood people live in. Black people were not able to build wealth in the way their White counterparts were. Social Security and the Fair Labor Standards Act (minimum wage, overtime pay, and child labor laws) excluded

agriculture and domestic work, which was majority Black workers leaving them underpaid compared to other industries and without social security benefits when unable to work.

The Federal Government subsidized building of suburban neighborhoods ensuring the houses were affordable for White people, while prohibiting Black people from purchasing them. The Federal Government also restricted Black people from purchasing houses in Black neighborhoods by redlining those neighborhoods. The 1934, Federal Housing Administration (FHA) began the practice of redlining Black neighborhoods, giving them a rating of D, which made them too risky for FHA insured loans leaving Black people unable to secure loans to buy houses. The FHA also gave poor ratings to houses that were too close to Black neighborhoods on the premise that they would lose value. This encouraged the surrounding of Black neighborhoods with industrial zones and highways. It wasn't until 1968 that the Fair Housing Act banned racial discrimination in housing and made redlining by the Federal Government unlawful (Rothstein, 2018).

When WWII ended in 1945, the GI Bill granted veterans low interest loans to purchase homes and funding for college tuition. While the bill was written to be racially fair, it relied on individual states and private institutions to administer and provide the funding, frequently leaving Black soldiers unable to use the benefit to purchase homes or attend college. Many banks refused to lend money to Black individuals at all (Thompson, 2019) and others refused to lend money to them to purchase homes located in White neighborhoods. Many cities also changed zoning laws to require large lot sizes or minimum square footage of houses thereby making the neighborhoods unaffordable for people with lower income (Greene, 2017).

White men were also able to use the GI Bill to earn a college degree while Black men were frequently excluded from admissions to colleges and were instead directed to trade schools.

Colleges that had historically accepted persons of color lacked funding and the ability to absorb the influx of veterans who returned from WWII wanting to use their GI benefit for a college education (Thompson, 2019). This diminished Black people's ability to attain good paying jobs leaving them more likely to remain in poverty and remain in segregated neighborhoods. These conditions exacerbated economic and educational differences between Black and White people.

Many highways in the United States were designed and constructed under Federal Highway Act of 1956. Their construction split neighborhoods along racial lines, destroyed many Black communities, and separated many others from the downtown areas where job opportunities were greatest (Greene, 2017).

Although 58 years have elapsed since the Civil Rights Act of 1964 was passed ending Jim Crow laws, Black people remain more segregated than other racial and ethnic groups in part due to laws that reduced Black people's ability to build wealth and in part due to the decisions made when the highway systems were designed (Greene, 2017). A 1984 review found public housing remains almost always segregated by race (Rothstein, 2018). In 1998, a civil rights group won a lawsuit ending the practice of Black families with low income being placed in housing projects while White families with low income were given rental vouchers to live in neighborhoods of their choice (Rothstein, 2018).

Neighborhood Effects on Health

While most people in the United States are met with some barriers to making healthy food choices, Black people are overrepresented in poor neighborhoods which have higher rates of fast-food restaurants, fewer grocery stores, limited access to healthy food, and lower walkability with less opportunity for physical activity (Kraft et al., 2020). These factors make it more challenging to maintain healthy weight and good health which has contributed to the

increased prevalence of chronic disease in this population.

Multiple studies have shown an association between neighborhood composition and health and life expectancy. The built environment, the preserved natural environment, and zoning, regulatory, and other laws can have an effect on health outcomes. Neighborhood factors that negatively affect health include proximity to highways and industry, over concentration of fast food restaurants and convenience stores, and over concentration of alcohol outlets. Neighborhood factors that positively effect health include access to healthy food, access to natural environments (e.g., tree canopies, parks, green spaces) for recreation, and street walkability, (Prochaska, et.al., 2020).

Robinette, et al., (2017) conducted a longitudinal analysis of health related to socioeconomic status of neighborhoods finding that persons residing in poorer neighborhoods are at greater risk for poor health. The CDC (2020) tool for life expectancy by neighborhood revealed that life expectancy for residents of the neighborhood where the QI project was implemented was 76.2 years, which is over a full year less than the United States average life expectancy of 77.3 years and almost four years less than the Massachusetts life expectancy of 80.1 years (CDC, 2020).

An examination of the Jackson Heart Study found that residing in disadvantaged neighborhoods is associated with a higher cumulative biological risk (CBR) score which consists of cardiovascular, metabolic, inflammatory, and endocrine biomarkers. The poor neighborhoods where many Black people reside contribute to poor health (Barber et al., 2016). A systemic review by John Hopkins confirmed that those neighborhoods have excessive fast-food restaurants and convenience stores which carry mostly unhealthy food and that they lack grocery stores and supermarkets which carry healthier foods. The review also found that negative health

outcomes are associated with residing in neighborhoods with fast food restaurants and convenience stores and lower body weight is associated with living in neighborhoods with grocery stores or supermarkets (Kraft et al., 2020).

Data shows Black populations remain more segregated and live in less healthy neighborhoods than other populations putting them at higher risk for health problems. Data also shows a disparity in chronic diseases between Black adults and White adults. While disease development is multifaceted, dietary habits are a major contributing factor for diabetes, hypertension, obesity, and stroke and play an important role in management of these diseases as well as in patient outcomes related to them.

Black persons have overall higher disease prevalence and are 50% more likely to develop high blood pressure than White persons and 200% more likely to die from heart disease at a younger age. Of persons aged 50-64 in the U.S., 61% of Black people have high blood pressure compared to 41% of White people, 23% of Black people have diabetes compared to 14% of White people, 43% of Black people are obese compared to 33% of White people, and 7% of Black people have had a stroke compared to 4% of White people (CDC, 2017).

In addition to having higher prevalence, Black persons also have poorer management of these chronic diseases. Healthy People 2020 objectives related to Black people include decreasing their health disparities related to diabetes and hypertension. The proportion of people who have diabetes with and HA1c greater than 9 is 11% for White people and 24.3% for Black people. The target for 2020 was 16.2% (ODPHP, n.d.). The proportion of people who have hypertension that is well controlled is 51.7% for White people and 41.5% for Black people. The target for better control of hypertension for 2020 was 61.2%, the data is pending.

Problem Statement

Systemic racism made purchasing homes and building wealth essentially unattainable, and instead created segregated, unhealthy neighborhoods for Black families: leaving them to carry a higher burden of chronic disease, while White families were supported by Federal, State, and Local governments in purchasing home, building wealth, obtaining quality education, and in the creation of healthy neighborhoods to live in. Chronic diseases that Black adults have higher risk for developing compared to White adults include stroke, obesity, hypertension, chronic kidney disease, and diabetes. A lack of knowledge related to nutrient needs can contribute the risk of developing new disease or exacerbating chronic disease.

The quality improvement project utilized a comprehensive toolkit to address the patients' lack of knowledge regarding calorie and nutrient needs and provided patients with an individualized, easily accessible graphic of their needs to assist them in selecting healthy foods. The toolkit also utilized Brief Action Planning to remove barriers and build confidence in their ability to make healthy food choices. The goal of this project was to increase knowledge and confidence in selecting healthy foods for Black adults which will improve overall outcomes and work towards decreasing health disparities.

Analysis of Project Site

Research confirms many patients do not receive education or recommendations of diet and its effect on health during medical office visits, that diet education which is provided is not individualized based on all chronic conditions and risks, and that Black patients receive lower quality care at medical visits than do patients who are White (CDC, 2017).

The location of the project site was an urban Community Health Center (CHC) in Massachusetts. CHCs receive government funding enabling them to have longer office visits

with patients and provide more services onsite for their patients than traditional primary care provider's (PCP) offices. While this specific CHC includes over twenty-five primary care providers, it employs only one dietician, thus relying primarily on PCPs to provide nutrition education during office visits. An analysis of the health center showed it lacked an evidence-based toolkit for providing patient education and recommendations for healthy diet choices that providers could utilize during office visits.

Review of the Literature

Review Process

A comprehensive review of the literature was conducted using the databases Cumulative Index of Nursing and Allied Health Literature (CINAHL) Complete, Cochrane Library, and PubMed. Qualifiers for all searches included English language, all adult patients, and peer reviewed. Since the data, demographics and disparities for this project are specific to the United States, articles from other countries were excluded. Published dates for articles were restricted to the past five years (2016 – 2021).

The initial search using the Medical Subject Headings (MeSH) terms food label AND diet OR nutrition OR food habit OR eating habit OR lifestyle OR food AND patient education OR patient teaching, only yielded 1 result, so the search was expanded excluding the MeSH terms patient education OR patient teaching, which then yielded 128 results between the three databases.

The search of CINAHL resulted in 71 articles, but only 5 were appropriate for inclusion. 20 articles were excluded based on participants (15 were from a different country and 5 focused on children or teenagers instead of adults). Eighteen articles were related to topics other than food including smoking, medications, auto immune disease, and the I-Pad. Of the articles that fit

the initial criteria, one was excluded because it was related to the effect of pregnancy on reading food labels, and one was excluded because it focused on food menus in restaurants instead of food labels. Two articles were excluded because they discussed results of programs for weight loss that included multiple interventions, and lacked independent results related to food label knowledge. Seventeen articles that were related to food labels were excluded because they did not focus on food label knowledge for health (16 focused on consumer buying habits and one focused on choices based on literacy). Seven of the articles were excluded because they focused only on effectiveness of front-of-food labels in marketing to improve healthy food choices instead of diet or nutrient knowledge.

A Cochrane database search resulted 54 articles, but only one was appropriate for inclusion. Seven articles were excluded based on participants (five were from a different country and two focused on children). A total of 23 articles were excluded because they were related to topics other than food. Of the articles that fit the initial criteria, five articles were excluded because they included multiple interventions within the study without separate results for food labels. Seventeen articles were excluded for being related to food but not food labels. Three articles were excluded because they focused only on effectiveness of front-of-food labels, and one article was a duplicate from CINAHL complete.

A search of PubMed resulted in three articles, none of which were included in the review. Two were excluded because they were related to restaurant menus and behavior, the other was a meta-analysis that included data from multiple countries, so it didn't meet criteria for inclusion. Of the 128 articles obtained from the searches, six were appropriate for inclusion in the review.

Findings

Nutrition labels provide information at the point of purchase and all the studies reviewed

for this project found a positive correlation between reading nutrition labels and choosing healthier foods. One study found food label use may account for up to 17% of diet changes (Anastasiou et al., 2019) and while they also found that food label use may be driven by consumer desire to control weight or chronic disease, their systemic review of 26 studies confirmed a strong positive correlation exists between food label use and healthy food selection. Ni Mhurchu et al., (2018) used eye tracking monitoring at a grocery store on 1255 participants to determine which consumers were reading food labels. A comparison of consumers who read food labels to those who did not, found that purchases of the group who read food labels were significantly healthier.

A systemic review of studies compared consumers who use Nutrition Fact Labels to select food to those who use other forms of food labels including food claims and front-of-package labels and found those who used Nutrition Facts had higher quality diets (Anastasiou, et al., 2019). Kollannoor-Samuel, et al., (2016-a) measured diet quality and glycemic control for people with prediabetes. They compared diets of participants who use Nutrition Facts to those who use food claims on the food product and found participants who use the Nutrition Facts made healthier food selections and had better glycemic control measured by HbA1c blood tests.

One study contained 7067 subjects who participated in an online survey related to food knowledge (Dewey et at., 2017). The first survey found that less than 5% of participants knew the daily recommended intake for sodium, and that knowing daily recommended intake was associated with increased odds of reading food labels as well as positive association with choosing foods lower in sodium. During the second and third surveys in the study, participants were shown Nutrition Facts Labels to compare and asked questions about which food was healthier and which had less sodium. By the third survey, participants were able to identify foods

higher in sodium and were more likely to reduce their salt intake (Dewey et al., 2017).

Three of the studies reviewed worked with participants over multiple sessions. One study worked with 12 families to measure nutrition literacy of food labels, a risk factor for chronic disease development (Parekh, 2018). Another worked with one group of subjects on nutrition label use over multiple visits and compared findings to the control group who received usual care (Kollannoor-Samuel, et al., 2016-b). Dewey et al., (2017) used three online surveys regarding food labels to reach multiple participants over 3 interactions. All found improved diet selection knowledge through nutrition label use and Parekh (2018) found sustained behavior changes in participants with multiple visits.

Evidence Based Practice

Evidence based practices based on a review of the literature was utilized during this quality improvement project including educating individuals on healthy nutrition to improve their diets and use of Brief Action Planning to motivate a behavior change in diet habits.

Nutrition Education

While studies related to food label use and diet quality are less common, multiple studies confirm that nutrition awareness has a strong association with diet quality. A cross sectional study of older adults showed higher Healthy Eating Index (HEI) scores among individuals with dietary guidelines nutrition awareness (Vaudin et al., 2021) and an analysis of dietary habits of individual with low income showed significant improvement in HEI scores after a nutrition education program (Gills et al., 2021). Confidence in food selection skills is associated with higher quality diets as well (Lavelle et al., 2020). The U.S. Department of Health and Human Services and the U.S. Department of Agriculture have created media to raise awareness and advocate for nutrition education to improve dietary habits of individuals (U.S. Department of

Health and Human Services and U.S. Department of Agriculture, 2020).

Brief Action Planning

Brief Action Planning uses the patient's confidence level as an indicator of the likelihood the patient will be successful at an attempted behavior change. If the patient's confidence level is low, barriers are explored, and patients are encouraged to create possible solutions to removing them. Evaluating one's own situation, problem solving to remove barriers, and setting a SMART (specific, measurable, achievable, relevant, time bound) goal increases the likelihood of the patient in making behavior changes to improve their diet, and thereby their health (Bailey, 2017).

After going through BAP, follow up showed that 53% of people were successful at changing behavior (Bailey, 2017). Studies show that patients who can self-manage their chronic diseases have less exacerbations, use less health care resources, and have improved quality of life (Gutnick et al., 2014). BAP also allows for short duration intervention, respecting the patient's time which may be limited. With practice, this type of patient counseling can be provided in approximately three minutes while remaining effective (Gutnick et al., 2014).

Calculating Values for Nutrition Recommendations

Individualized dietary needs are calculated using current dietary recommendation guidelines for adults (Utah Department of Health, 2021). Persons who are younger than 19, are pregnant, or are breastfeeding have dietary needs outside of the scope of this project, therefore dietary recommendations were not included for those groups.

Body Mass Index is calculated using standard calculation (weight in pounds x 703) / (height in inches2) (National Heart Lung Blood Institute, 2000). Level of Activity is determined by using descriptive criteria for classifications of sedentary, lightly active, moderately active, very active, or extra active (Colditz, 2019; Utah Department of Health, 2021).

Caloric needs are calculated (Appendix A) by multiplying the person's activity level with the person's Basal Metabolic Rate (BMR), which is the number of calories a body needs while resting. Harris-Benedict formula is used to determine BMR (Utah Department of Health, 2021)

Weight loss of 5%-7% carries multiple health benefits including reduction in risk for dyslipidemia, hypertension, and diabetes mellitus while weight loss of 10% or more also carries a reduction of risk for cardiovascular events (Perreault & Delahanty, 2021). A safe way to lose weight is to deduct 500 calories from the daily diet totaling 3500 less calories per week, which equals one pound of weight loss per week. To prevent malnutrition, it's not recommended that persons with a BMI less than 25 reduce their caloric intake. The lowest recommended calories per day for adult women is 1200 calories and for men is 1800 calories (Utah Department of Health, 2021).

Nutrient needs are calculated based on age, biological sex, and caloric needs (Appendix B), and further adjusted for chronic conditions using current guidelines for recommendations (Appendix C). The macronutrients fat and carbohydrates are calculated using the Acceptable Macronutrient Distribution Range (AMDR) (U.S. Department of Agriculture, n.d.-a), while protein is calculated based on weight. A healthy diet consists of no more than 20% - 35% fat and 45% - 65% carbohydrates (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2020). While the AMDR for protein is 10% - 35% of diet, the Daily Value % (DV%) for protein is not listed on Nutrition Facts Labels and multiple resources use grams to express protein recommendations instead of percentage of calories. Therefore, proteins are calculated as weight in pounds x 0.36 (U.S. Department of Agriculture, n.d.-b).

Only micronutrients listed on the Nutrition Fact label are included in the recommendations since the label is mimicked and then individualized. These values are also

calculated based on current dietary recommendations. Less than 10% of calories should come from saturated fats, and trans-fat consumption should be kept as low as possible (Mozaffarian, 2021). Healthy adults should consume no more than 300mg cholesterol per day (US Food and Drug Administration, 2020) and no more than 2300mg of sodium per day (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2020).

Dietary fiber consumption is recommended at 14 grams per 1000 calories. There is not a recommendation for total sugars, but it is recommended to keep added sugars to less than 10% of total calorie intake. Vitamin D, calcium, iron, and potassium recommendations are based on sex related to differing needs at current age due to variations over the lifespan (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2020).

Adjustments were made for common chronic diseases that are related to or can be exacerbated by diet including chronic kidney disease, coronary vascular disease (CVD), diabetes mellitus (DM), heart failure (HF), hypercholesterolemia, hyperlipidemia (HLD), hypertension (HTN), and obesity.

The current recommendation for sodium intake is no more than 2300mg per day (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2020), but for people with CKD, the recommendation is no more than 2000mg per day (Rosenberg, 2020) and for people with CVD, HTN, or HF, the recommendation is no more than 1500 per day (Appel, 2021) (Hennekens & Lopez-Sendon, 2021). Lowering saturated fat intake to less than 7% of calories and decreasing cholesterol to only 200mg per day is recommended for people with CVD, HLD, DM, and obesity (Perreault & Laferrère, 2020). People with elevated cholesterol are also encouraged to decrease cholesterol intake to less than 200mg per day (U.S. National Library of Medicine, 2021). People with chronic kidney disease also have lower nutrient needs related to

fiber, protein, calcium, and potassium (Rosenberg, 2020). These considerations were factored into creating specific macronutrient and micronutrient recommendations.

Theoretical Framework

The theoretical frameworks used for this project were Brief Action Planning from Motivational Interviewing and Bandura's Self-Efficacy Theory. Both focus on effecting behavior change through increasing the confidence levels of patients in their ability to make the change. Brief Action Planning encompasses the spirit of Motivational Interviewing (MI) with compassion towards and acceptance of the patient, as well as partnering with and evoking ideas from the patient (Gutnick et al., 2014). BAP, however, is more focused, efficient, and requires less time than MI making it a more easily utilized in a primary care office visit. Eliciting a plan from patients instead of generating one for them increases the likelihood of them following through with the plan. It also teaches them the process of creating a plan for themselves that they can then utilize without assistance (Gutnick et al., 2014).

The Self-Efficacy Theory, first developed in 1977 by Albert Bandura posits that efficacy expectations effect performance; if a person believes they have a good chance of making a behavior change, they are more likely to make the change. Once a person can achieve one goal in an area, they attain an experiential confidence making them more likely to achieve similar goals (Bandura, 1977). The intent of the intervention was to have patients set and achieve one goal around healthy diet, understanding that their success may inspire them to set and achieve other goals related to healthy diet habits.

Methods

The overall intent of this quality improvement project was to implement and evaluate the effectiveness of a toolkit that primary care providers could use to educate and support patients in

healthy diet habits during office visits. The short-term goals of the project included increasing participants' knowledge of their specific nutrient and calorie needs, increasing their ability to select healthy foods by reading food labels, and increasing their confidence in changing their eating habits. The long-term objective was to improve the diet habits of the Black participants as a step towards decreasing health disparities in this population.

Project Site and Population

The project site was at a Community Health Center in an urban neighborhood in Massachusetts where there a high population of Black people. The Table below lists the racial composition of the people that reside in the neighborhoods that make up the zip code where the project site was located (Zip Code Profile, 2021).

Black	37.03%
Hispanic	36.36%
White	21.12%
Two or More Races	3.8%
Asian	1.45%
Other Race	0.19%
American Indian Or Alaskan Native	0.04%

Massachusetts scores among the best in the country in averages for diet behaviors that support healthy weight including eating fruit daily and avoiding sugary drinks, as well as above average activity levels that supports healthy weight; but while the overall prevalence of obesity in Massachusetts is 25%, estimates of the prevalence of obesity for residents in the zip code where the project was conducted is much higher at 34.2% (CDC, n.d.) and is estimated at 38.7% by the CDC's ZCTA.

The Centers for Disease Control and Prevention's zip code tabulation area model-based data provides crude estimates of the prevalence of chronic conditions throughout the U.S. by area. The following chart lists the CDC's estimates for prevalence of chronic conditions related

to diet in the zip code where the project site was located (Zip Code Profile, 2021) (CDC, 2021, January 21).

Data Set	Prevalence	95CI
High Blood Pressure	34.2	(33.9, 34.6)
Coronary Heart Disease	6.7	(6.5, 6.8)
Diabetes	13	(12.7, 13.2)
High Cholesterol	31.2	(30.9, 31.5)
Chronic Kidney Disease	3.6	(3.6, 3.7)
Obesity	38.7	(38.3, 39.2)
Stroke	4.3	(4.2, 4.5)

The Community Health Center was an ideal site for the project because it is located in an area where Black people are the most populous race, and because its designation as a CHC tasks it with improving public health issues of the neighborhood in addition to providing comprehensive health care. Responsibilities of the CHC include eliminating health disparities between racial and ethnic groups (Massleague, n.d.) and providing support to mitigate social determinants of health.

Black patients seen at the Community Health Center were offered to participate in a single diet education and support session while they waited to see their PCP during a scheduled office visit. The session utilized a toolkit created for the project which consisted of a pamphlet, an educational intervention, and a Brief Action Planning Intervention.

Participants who met criteria for participation were recruited from the group of patients who had office visits scheduled with a primary care provider at the CHC during the months of November and December 2021. Participant inclusion criteria was as follows:

1. Black race.
2. Adult aged 19 or older (younger individuals have different dietary needs which are out of the scope of the dietary guidelines used for calculating calorie and nutrient needs).

3. Not be pregnant or breastfeeding (nutrition needs are out of the scope of the dietary guidelines used for calculating calorie and nutrient needs).
4. Able to read or have a companion who can read (nutrition information on labels relies on written information).

Participant recruitment was attempted in three ways, invitation by the DNP student, referral from a provider, and self-referral by information obtained from posters (Appendix D) hung on doors at the clinic. Providers were informed of the project and given instructions on how to refer patients to participate in the project, but no referrals from providers and no self-referrals from patients were received. All participation was generated by direct invitation from the DNP student. Potential participants were identified by review of the clinic's daily provider schedule for patients who met inclusion criteria and whose appointments coordinated with days the DNP student was present at the site.

Patients were approached while in the waiting room, given a brief description of the project, and asked to participate; those who agreed to participate were asked to rate their activity level, which was needed to calculate BMR. All other information required to calculate the calorie and nutrient amounts was obtained from the chart including an updated weight measured at the current visit. The actual intervention of diet education and support occurred while the patient was waiting in the exam room for the PCP to arrive, which was possible because patients remain in their clothes instead of being asked to change into a gown while waiting for the provider at this health center.

Project Design

A three-page pamphlet with individualized diet information was created for this project (Appendix E). Page one contained a Your Nutrition Facts graphic that mimics the Nutrition Facts

Label found on foods with one of three graphic options based on the participants medical history of chronic diseases related to diet. Graphic One was used with patients who hadn't developed any of the chronic diseases that are included in this project. Graphic Two, which included warnings (Appendix F) that the participant should limit trans fats and added sugars was used with patients diagnosed with coronary vascular disease, hyperlipidemia, or hypercholesteremia; and Graphic Three, which included warnings (Appendix F) that participant should limit trans fats, added sugars, and sugar sweetened drinks including natural fruit juices was used with participants with BMI greater than 30 or Type 2 Diabetes (Appel, 2021; Hennekens & Lopez-Sendon, 2021; Perreault & Laferrère, 2020; Rosenberg, 2020; U.S. National Library of Medicine, 2021)

Page two contained information on using Daily Value % from Nutrition Facts Label for a quick reference while shopping, as well as a list of diets that were recommended for the participant (Appendix G) from evidence-based guidelines from American Diabetes Association, American Heart Association, National Kidney Foundation, National Heart Lung Blood Institute, US Department of Health & Human Services, and the US Food & Drug Administration.
Page three contained images of health claims used on food labels for advertising including "May reduce risk of heart disease" on Multigrain Cheerios, "Healthy kids entre" on SpaghettiOs, and "No artificial flavors" on Kraft Macaroni & Cheese along with their corresponding Nutrition Facts Labels with unhealthy amounts of nutrients highlighted.

Amounts for individualized calorie and nutrient recommendations in the Your Nutrition Facts graphic were calculated by utilizing a predeveloped spread sheet on the DNP student's university Google dive. The spread sheet was programmed with equations to calculate individual daily calorie needs to maintain current weight (Appendix A) based on age, sex, height, weight,

and activity level, as well as daily nutrient needs based on calories, age, and sex (Appendix B) and then adjusted for chronic diseases (Appendix C) using evidence-based guideline recommendations.

Once calculated, results were printed on a color pamphlet which included the appropriate graphic of Your Nutrition Facts and used during the intervention. Participants were given the pamphlet to take with them and encouraged to capture a picture with their cell phones for easy access while grocery shopping.

The budget (Appendix H) for development and implementation of the project included preprinted papers with pages two and three of the graphics, printing and laminating two recruitment posters for the project site waiting room, images purchased for the poster, a portable-colored printer for printing the individualized page one of the graphic at the project site, printer ink, and printer paper. Total cost of the project was $447.17. No outside funding was obtained, and the DNP student paid for all associated costs.

Education Intervention

The educational intervention was broken into three parts. The first part included showing participants the Your Nutrition Facts graphic with their individualized daily recommended amounts of calories and nutrients, then comparing them to a Nutrition Facts Label found on foods. It also included a brief explanation of values that were adjusted for disease related diet recommendations specific to them (e.g., 1500mg sodium per day for patients with heart failure instead of 2300mg). A box of oatmeal and a can of chicken noodle soup were used for comparison. Participants were educated that they could count values of specific nutrients in foods they consumed throughout the day to determine if they were meeting the recommended value of specific nutrients. It was pointed that out counting values on foods throughout the day is

a challenging endeavor which may not work for many participants although still encouraged for those who wanted to attempt it.

The second part of the education intervention utilized the % Daily Value (DV) on food labels as a simpler method of utilizing the Nutrition Facts Labels to select healthier foods. Participants were taught to choose foods that had 5% or less of nutrients they wanted to consume less of (e.g., saturated fat) and 20% or more of foods they wanted to consume more of (e.g., daily fiber). Participants were also made aware of their recommended diet, Mediterranean, DASH, Vegetarian, or Low Carb and encouraged to research the diet online or with their PCP for specific information on the diet.

The third part of the education intervention involved educating participants on discerning claims on front of food labels created for advertising purposes from actual nutrition facts and food content from Nutrition Facts Label and Ingredient list with a goal of imparting understanding that the front of food labels is not always accurate and even when they are, other aspects of the food may still be unhealthy. This step included a review of labels from some of the images on the pamphlet, a box of oatmeal, or a can of chicken noodle soup. Comparisons noted were:

- Multi Grain Cheerios “100% Daily Value of 9 Vitamins & Nutrients” and “May reduce the Risk of Heart Disease” compared to 8g of added sugar (2 teaspoons) per serving shown on Nutrition Facts.
- Multi Grain Cheerios “5 Whole Grains” compared to the Ingredient list showing the first largest ingredient is oats, the second corn, and the third sugar.
- Kraft Macaroni & Cheese “No Artificial Flavors, No Artificial Preservatives, No Artificial Dyes” compared to 710mg of salt per serving shown on Nutrition Facts Label.

- Campbell's SpaghettiOs "20% of Daily Vegetables" and "Healthy Kids Entree" compared to 600mg of salt per cup and 1050mg per serving shown on Nutrition Facts Label.
- Nature's Path Organic Maple Nut Instant Oatmeal "Always Organic," "37g of Whole Grain," and "5g of Protein" compared to 11g of added sugar (almost 3 teaspoons) shown on Nutrition Facts Label, and the Ingredient list showing the first largest ingredient is oats, the second sugar.
- Progresso Chicken Noodle Soup which many people assume chicken noodle soup is healthy compared to 690mg of salt per serving shown on Nutrition Facts Label.

Brief Action Planning Intervention

The Brief Action Planning Intervention (Appendix I) began with asking the participant if they were interested in improving eating habits for one nutrient on the Nutrition Facts Label for two weeks. While the toolkit included participants' individualized value for all nutrients found on Nutrition Facts Labels, participants were asked to choose only one nutrient since attempting to monitor and improve all at one time could be overwhelming. Most participants wanted to attempt a change to improve their eating habits and Motivational Interviewing was utilized for the few participants who were initially reluctant. All participants did agree to attempt improving one nutrient for two weeks.

Participants were guided to develop a SMART (specific, measurable, achievable, relevant, time bound) goal around a behavior change related to choosing food healthier foods that involved encouragement of reading both food labels of items while shopping as well as food labels of items already in their refrigerator and cabinets at home since people tend to purchase the same or similar foods each time they shop.

After developing the SMART goal, participants were asked to rate their confidence level in meeting the goal on a scale of zero to ten, with zero representing no confidence and ten representing total confidence. Participants with a low confidence level were assisted in recognizing and eliminating barriers using BAP techniques until their confidence level reached at least a seven.

The final step of the intervention involved asking participants to form an accountability plan to follow up with their PCP and to request a referral to the Dietician if they desired further education and support in improving their diets.

Data Analysis

Pre and post-intervention surveys which were completed by participants immediately prior to and immediately following the intervention were used to measure the effectiveness of the project. The survey was completed on printed paper with each set numbered and labeled as pre or post intervention. Data was analyzed with Statistical Product and Service Solutions (SPSS) utilizing a paired t-test of each patient's pre and post survey results to determine effectiveness of the toolkit at the project site. The survey consisted of seven questions with five option Likert scale responses (Appendix J) that covered three areas of interest, participants' confidence in changing dietary habits, participants' knowledge of their individual calorie and nutrient needs, and participants' ability to recognize foods that are healthy based on food labels. The seven questions used for the survey were:

1. I am confident I can change my diet habits to eat healthier.
2. I know how many calories I need each day for my current weight.
3. I know how many grams/milligrams of nutrients I need each day to eat healthy.
4. I can tell if a food is healthy for me by reading the Nutrition Facts Label.

5. I can tell if a food is NOT healthy for me by reading the Nutrition Facts Label.
6. I can tell if a food is healthy for me by reading the ingredients label.
7. I can tell if a food is NOT healthy for me by reading the ingredients label.

Protection of Human Subjects

Internal Review Board (IRB) approval was obtained from University of Massachusetts and the CHC project site's parent company prior to initiation of the project. Health Insurance Portability and Accountability Act (HIPAA) standards of care were strictly followed for all interactions at the community health center site to protect patients' private health information (CDC, 2018). Data analyzed off site consisted only of completed pre and post intervention surveys, which contained no participant identifying or health information. The risk to patients that participated in this project while receiving care at the primary care provider's office was no different than the risk during standard care.

Results

In total, 45 participants completed the pre intervention survey and participated in the interventions during scheduled appointments with the primary care providers. One participant's intervention was halted when the provider arrived, and the participant did not want to stay after the visit to complete the intervention and post intervention survey. Their pre intervention survey was omitted from the results, leaving 44 total results for analysis.

Implementation phase of the project was conducted in December 2021 and January 2022. A review of the daily record during this time found a total of 236 Black adults, age 19 or older were scheduled for an appointment with a primary care provider, 166 patients presented to the clinic for their appointment, and 70 patients did not show up for their appointment.

The clinic had between six and nine providers seeing patients concurrently, and the overlapping of visits prevented 107 patients from being invited to participate when the DNP student was with other patients. Seven patients declined to participate in the project. Three patients who had Black noted as their race in the electronic health record, stated they were not Black so were excluded from participation. An additional three patients were not asked to participate, two because they were being seen for hospice informational meetings and one because they were positive for suicidal ideation.

Table 1

Paired t-test for Pre- and Post-Intervention Likert Scale Results

	Pre-Intervention		Post-Intervention		Paired t	*df*	p
	M	SD	M	SD			
Question 1	4.2500	0.99124	4.6818	0.73998	-3.934	43	<.001
Question 2	1.7727	1.03122	4.4545	.90102	-13.247	43	<.001
Question 3	2.0000	1.29399	4.5909	.69276	-11.709	43	<.001
Question 4	3.7955	1.32208	4.7955	.55320	-5.354	43	<.001
Question 5	3.8864	1.31566	4.7500	.68624	-4.968	43	<.001
Question 6	3.7727	1.42834	4.5909	.84408	-4.068	43	<.001
Question 7	3.7500	1.46470	4.7727	.60477	-5.070	43	<.001

Note. N = 44 p<.05IBM

SPSS was used for data analysis, and a paired t-test was conducted to compare the Likert scores of pre and post intervention results (Table 1). Question 1 measured participants' confidence in their ability to change diet habits to eat healthier. There was a significant increase in the scores after the intervention (mean=4.6818, SD=0.73998) than before the intervention (mean=4.2500, SD=0.99124); paired t(df)= -3.934(43), p<0.001 representing a 10% increase in confidence.

Question 2, which measured participants knowledge of their daily caloric needs showed a significant increase in the scores after the intervention (mean=4.4545, SD=.90102) than before the intervention (mean=1.7727, SD=1.03122); paired t(df)=-13.247(43), $p<0.001$ representing a 151% increase in knowledge. Question 3, which measured participants knowledge of their daily needs for nutrients listed on the Nutrition Facts Label also showed a significant increase in in the scores after the intervention (mean=4.5909, SD=.69276) than before the intervention (mean=2.0000, SD=1.29399); paired t(df)= -11.709(43), $p<0.001$ representing a 130% increase in knowledge.

Questions 4 and 5 measured participants' ability to determine the health of a food item by reading the Nutrition Facts Label, with question 4 asking if they can tell if a food is healthy and question 5 asking if they can tell if a food is unhealthy. Question 4 showed a significant increase in the scores after the intervention (mean=4.7955, SD=.55320) than before the intervention (mean=3.7955, SD=1.32208); paired t(df)= -5.354(43), $p<0.001$ representing a 26% increase, and question 5 showed a significant increase in the scores after the intervention (mean=4.7500, SD=.68624) than before the intervention (mean=3.8864, SD=1.3156); paired t(df)= -4.968(43), $p<0.001$ representing a 22% increase in ability

Questions 6 and 7 measured participants ability to determine the health of a food item by reading the ingredients list, with question 6 asking if they can tell if a food is healthy and question 7 asking if they can tell if a food is unhealthy. Question 6 showed a significant increase in the scores after the intervention (mean=4.5909, SD=.844084) than before the intervention (mean=3.7727, SD=1.42834); paired t(df)=-4.068 (43), $p<0.001$ representing a 22% increase, and question 7 showed a significant increase in the scores after the intervention (mean=4.7727,

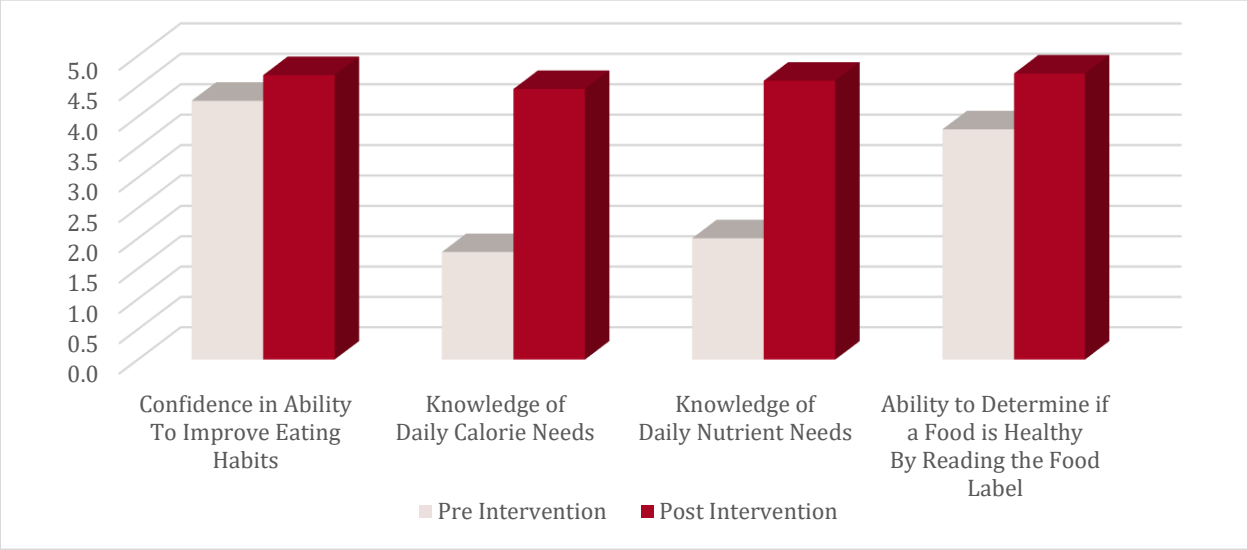
SD=.60477) than before the intervention (mean=3.7500, SD=1.46470); paired t(df)= -5.070(43), p<0.001 representing a 27% increase in ability.

While results show significant increase in all areas, the largest increase were in knowledge of individual caloric and nutrient needs, with ability to determine the health of a food item by reading information on the label having the second largest increase, and confidence in ability to change personal eating habits to improve diet with the smallest increase.

Paired t-test results were also conducted on grouped questions (Figure 1) to review the three areas of interest: participants' confidence in changing dietary habits (Question 1), participants' knowledge of their individual calorie needs (Question 2) and individual nutrient needs (Question 3), and participants' ability to recognize foods that are healthy based on food labels (Question 4-7). The following graph shows improvements in all measured areas related to selecting a healthy diet.

Figure 1

Changes in Confidence, Knowledge, and Ability of Selecting a Healthy Diet



Grouped questions 4-7 showed an overall significant increase in the scores after the intervention (mean=4.7083, SD=.71815) than before the intervention (mean=3.7917, SD=1.38864); paired t(df)= -7.208(143), $p<0.001$ representing a 24% increase in overall ability to determine the health of food from information on its label.

Discussion

Implementation of this project highlighted the difficulty for the one dietician at the practice to provide diet education and support for all patients within a practice and the need for providers to take ownership of this piece of patient care. The increase in participant knowledge, ability, and confidence in selecting healthy foods and making diet changes with the comprehensive toolkit can be continued through subsequent office visits by providers devoting a portion of time to discussing diet habits during visits. This continuation would reinforce its importance to patients and provide the opportunity for them to build their experiential confidence increasing the likeliness of achieving similar goals (Bandura, 1977).

Use of the toolkit was shown to produce significant improvements in knowledge of individual nutrient and calorie needs and in ability to read food labels for healthy foods. The pamphlet that participants took home with them allowed for reinforcement of learning, provided individualized nutrition information, and demonstrated reading food labels. The theoretical framework of Brief Action Planning aligned well with the project due to its ability to elicit goals from patients as well as to be utilized in a short time frame.

The toolkit allows providers to efficiently broach the subject of healthy diet and provide specific daily recommended nutrient amounts to patients, which is shown to increase the likelihood of them reading food labels (Dewey et at., 2017). Providers could also reinforce use of Nutrition Facts Label which has been shown to increase selection of healthy foods (Ni Mhurchu

et al., 2018), and build on patients' confidence in food selection skills which is also associated with selection of higher quality diets (Lavelle et al., 2020).

Patients would also benefit from providers being skilled in Brief Action Planning since it's an effective tool in eliciting behavior changes in patients to improve their health (Baily, 2017). During implementation of the project, repeated use of BAP quickly increased efficiency by the student. Time wasn't measured during the intervention, but a reduction in length of each intervention was noticed towards the end of the project. Gutnick et al., (2014) showed that with practice, BAP can be effectively provided in three minutes.

The COVID-19 pandemic effected participation in this project. There were less patients seen at the site because some appointments were conducted via telehealth. During the last two days of the project, the clinic moved all appointments possible to telehealth due to an increase in cases of COVID-19 in the area so there were only a few patients in person at the clinic. The pandemic also caused a shift in clinic policies to decrease contact among people. The need for distance between people didn't allowing for the student to set up at the waiting room, where they would have been able to interact with more patients and potentially increase the number of participants.

Considerations

All the information needed to create individualized Your Nutrition Facts graphic with calculated individual daily calorie and nutrient amounts is already found in the Electronic Health Record (EHR) except for patients' activity levels. Age and sex are part of the EHR; height and weight are routinely checked at office visits and BMI calculated from them; and chronic diseases are included in patients' problem lists. Activity is the one missing piece. Adding the question that would include the patients' activity level in the EHR along with programming to calculate

recommended calorie and nutrient values would make them easily available for providers to hold discussions regarding diet selection at office visits.

Use of additional pre and post intervention questions may have yielded valuable information to further determine the effectiveness of the toolkit and areas that should be addressed for improvement. Questions regarding participants' use of Nutrition Facts Labels, Ingredients list, and front of food labels (i.e., advertisements on food) to determine the health of foods and their use in selecting food would be beneficial in future iterations of this quality improvement project.

Conclusion

The Black population carries a higher burden of chronic disease compared to the White population. Historical legislation and regulations that have segregated Black people into neighborhoods with built environments that limit outdoor physical activity, that are surrounded by highways and industrial zones causing air and noise pollution, and that are zoned to allow more fast food restaurants, liquor stores, and convenience stores (instead of supporting fresh food markets and grocery stores) have contributed to the disproportionate prevalence of chronic diseases in this population.

Historical legislation and regulations including restrictive covenants, exclusionary zoning, and racially exclusionary clauses have frequently disallowed the movement of Black people out of those neighborhoods into healthier areas. At the same time minimum wage and labor laws built the White middle class while excluding agriculture and domestic work that employed mostly Black people, and FHA and GI loans supported White people in moving out of urban areas further diminishing resources for those areas.

Until neighborhoods better support health for everyone, healthcare providers must seek ways to mitigate the disparities for those who are harmed by their living environments in addition to the healthcare they currently provide. This project, which aimed to provide Black participants with education about healthy diets as well as confidence to make healthy food selections, exhibited a way that primary care providers can assist patients in reducing their risks related to chronic diseases.

Results of the project show significant improvement in knowledge, ability, and confidence of participants in selecting healthy foods. Implementation of the project showed diet education and Brief Action Planning can occur within an office visit and highlighted the fact that this work needs to be shared among primary care providers instead of relying on dieticians to provide nutrition education and support.

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Appendix A

Calculating Daily Caloric Needs

Required Data:

Sex____ Age _____ Height Inches ____ Weight Pounds _____

Activity Level:

Activity Level	Description	Result
Sedentary	Engages only in activities of independent living	1.2
Lightly Active	Light exercise or sports 1-3 days per week	1.375
Moderately Active	Walk 1.5 – 3 miles a day, 3-5 days per week	1.55
Very Active	Hard exercise or sports 6-7 days per week	1.725
Extra Active	Very hard exercise or sports & physical job, or double training	1.9

Calculate Body Mass Index (BMI)

(Weight in pounds x 703)/Height in inches^2

Calculate Basal Metabolic Rate (BMR)

Female = 655+(4.3 x Weight in pounds)+(4.7 x Height in inches)-(4.7 x Age in years)

Male = 66+(6.3 x Weight in pounds)+(12.9 x Height in inches)-(6.8 x Age in years)

Calculate Daily Calorie Needs to maintain current weight.

BMR x Activity Level Result

If person wants to lose weight, calculate Daily Calorie Needs to lose 1 pound per week

Highest Value of:

Female = (BMR x Activity Level Result)-500 OR 1200

Male = (BMR x Activity Level Result)-500 OR 1800

(National Heart Lung Blood Institute, 2000; Colditz, 2019; Utah Department of Health, 2021)

Appendix B

Calculating Nutrient Needs

<table>
<tr><th rowspan="2">Nutrient</th><th colspan="4">FEMALE</th><th colspan="4">MALE</th></tr>
<tr><th>Age 19-30</th><th>Age 31-50</th><th>Age 51-70</th><th>Age 71+</th><th>Age 19-30</th><th>Age 31-50</th><th>Age 51-70</th><th>Age 71+</th></tr>
<tr><td>Total Fat
(AMDR Total Fats 20-35%)
9 kcal per gram</td><td colspan="4">LOWER RANGE CALCULATION
(Total Calories x 0.2) / 9</td><td colspan="4">UPPER RANGE CALCULATION
(Total Calories x 0.35) / 9</td></tr>
<tr><td>Saturated Fats</td><td colspan="8">(Total Calories x 0.1) / 9</td></tr>
<tr><td>Trans Fat</td><td colspan="8">Recommendation is to keep as low as possible</td></tr>
<tr><td>Cholesterol</td><td colspan="8">300mg</td></tr>
<tr><td>Sodium</td><td colspan="8">2300mg</td></tr>
<tr><td>Total Carbohydrates
(AMDR Total Carbohydrates 45-65%)
4 kcal per gram</td><td colspan="4">LOWER RANGE CALCULATION
(Total Calories x 0.45) / 4</td><td colspan="4">UPPER RANGE CALCULATION
(Total Calories x 0.65) / 4</td></tr>
<tr><td>Dietary Fiber</td><td colspan="8">Total Calories x 0.014</td></tr>
<tr><td>Total Sugars</td><td colspan="8">No recommendation has been made</td></tr>
<tr><td>Added Sugar</td><td colspan="8">(Total Calories x 0.1) / 4</td></tr>
<tr><td>Protein</td><td colspan="8">Weight Pounds x 0.36</td></tr>
<tr><td>Vitamin D</td><td colspan="3">15mcg</td><td>20mcg</td><td colspan="3">15mcg</td><td>20mcg</td></tr>
<tr><td>Calcium</td><td colspan="2">1000mg</td><td colspan="2">1200mg</td><td colspan="3">1000mg</td><td>1200mg</td></tr>
<tr><td>Iron</td><td colspan="2">18mg</td><td colspan="2">8mg</td><td colspan="4">8mg</td></tr>
<tr><td>Potassium</td><td colspan="4">2600mg</td><td colspan="4">3400mg</td></tr>
</table>

(Mozaffarian, 2021; U.S. Department of Agriculture, n.d.-a; U.S. Department of Agriculture, n.d.-b; US Food and Drug Administration, 2020; and U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2020)

Appendix C

Dietary Adjustments Related to Chronic Disease

Nutrient	CKD	CKD receiving HD
Total Fat (g)	(Total Calories x 0.3) / 9 to (Total Calories x 0.4) / 9	(Total Calories x 0.3) / 9 to (Total Calories x 0.4) / 9
Saturated Fats (g)		
Cholesterol (mg)		
Sodium (mg)	2000mg	2000mg
Dietary Fiber (g)	20 to 25g	20 to 25g
Added Sugar (g)		
Protein (g)	(Weight Lbs x 0.45359237) x 0.8 to (Weight Lbs x 0.45359237) x 1	(Weight Lbs x 0.45359237) x 1.2 to (Weight Lbs x 0.45359237) x 1.3
Calcium (mg)	1400 to 1600mg	1400 to 1600mg
Potassium (mg)	2000mg	2000mg

Nutrient	CVD, CHD, CAD	HF
Total Fat (g)		
Saturated Fats (g)	(Total Calories x 0.07) / 9	
Cholesterol (mg)	200mg	
Sodium (mg)	1500mg	1500mg
Dietary Fiber (g)		
Added Sugar (g)	No Value	
Protein (g)		
Calcium (mg)		
Potassium (mg)		

Nutrient	High Cholesterol	HLD
Total Fat (g)		
Saturated Fats (g)		(Total Calories x 0.07) / 9
Cholesterol (mg)	200mg	200mg
Sodium (mg)		
Dietary Fiber (g)		
Added Sugar (g)	No Value	No Value
Protein (g)		
Calcium (mg)		
Potassium (mg)		

Appendix C (continued)

Dietary Adjustments Related to Chronic Disease

Nutrient	HTN	BMI ≥ 30	T2DM
Total Fat (g)			
Saturated Fats (g)		(Total Calories x 0.07) / 9	(Total Calories x 0.07) / 9
Cholesterol (mg)		200mg	200mg
Sodium (mg)	1500mg	1500mg	
Dietary Fiber (g)			
Added Sugar (g)		No Value	No Value
Protein (g)			
Calcium (mg)			
Potassium (mg)			

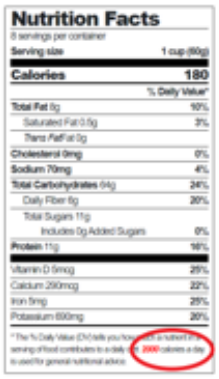
(Appel, 2021; Hennekens & Lopez-Sendon, 2021; Perreault & Laferrère, 2020; Rosenberg, 2020; U.S. National Library of Medicine, 2021)

Appendix D

Poster for Patients to Self-Refer for Participation

Call or text 413-387-5537 to be **seen today** or to schedule an appointment

PROJECT TO REDUCE CHRONIC DISEASE IN THE AFRICAN AMERICAN POPULATION



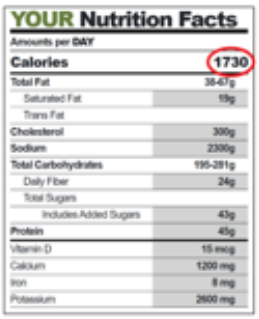
-Did you know that the values on Nutrition Facts labels are for 2000 calorie a day diets?

-MOST people don't need exactly 2000 calories a day and nutrient needs change depending on sex, age, and health.

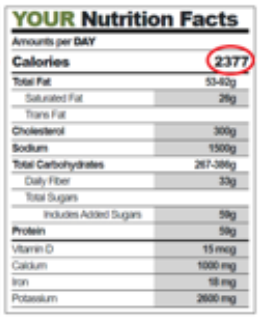
-Figuring out how much of the fat, carbs, protein, and vitamins in a food contribute to your daily needs is hard.

How many calories and nutrients to YOU need each day?

Less than 2000 calories?



More than 2000 calories?



- YOUR Nutrition Facts label contains your total daily needs making it easier to know which foods fit into a healthy diet for you.

Eligibility:
-African American adults
-Aged 19 or over
-Not pregnant or breastfeeding

Participation:
-Take a 7 question survey
-Provide age, sex, height, weight activity level, and chronic diseases
-Set 1 goal for healthy food choices
-15 minutes

Get a printed YOUR Nutrition Facts label & access to it on your phone!

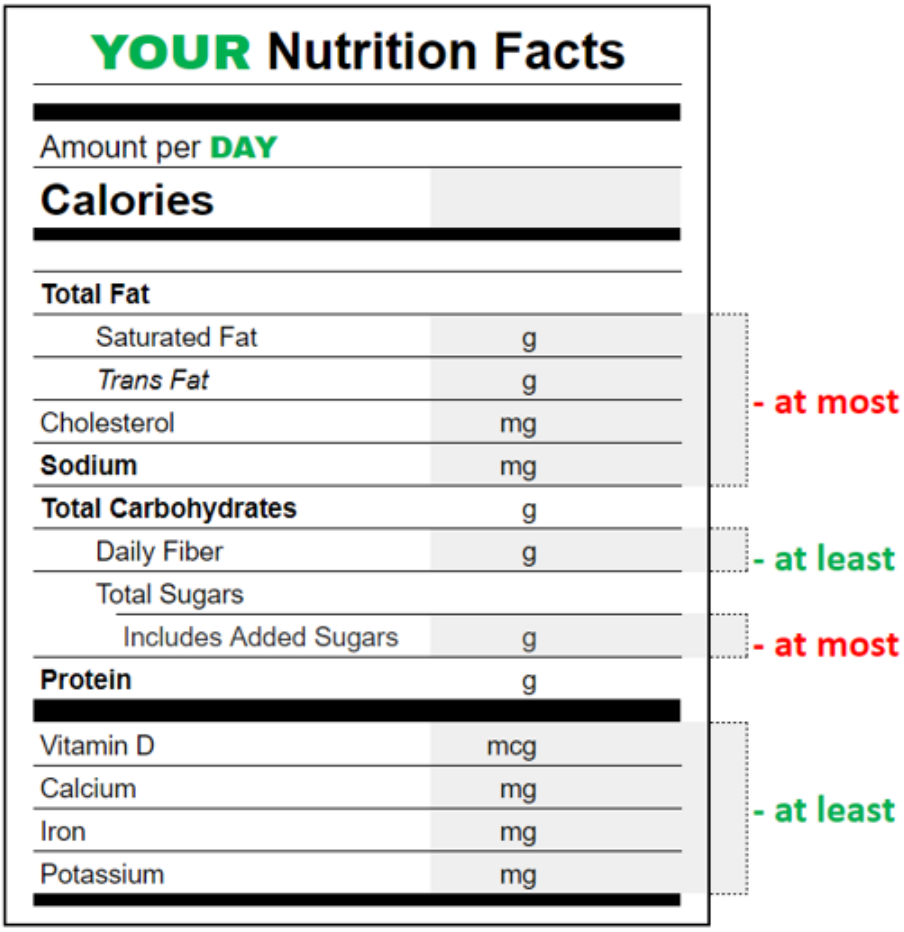
Call or text 413-387-5537 to be **seen today** or to schedule an appointment

Appendix E

Pamphlet Page 1 Graphic One

For participants who haven't developed any of the chronic diseases included in this project

STEP 1. Use **YOUR** Nutrition Facts label
to help chose the balance of the nutrients **YOUR** body needs*



Take a picture with your phone for easy use while shopping!

*These recommendations are calculated on your specific needs and should not be used by others. They only include diagnoses discussed; If you have other diagnoses, check with your medical doctor before using this advice.

*People who take insulin should follow recommendations from their endocrinologist for carbohydrate consistent meals.

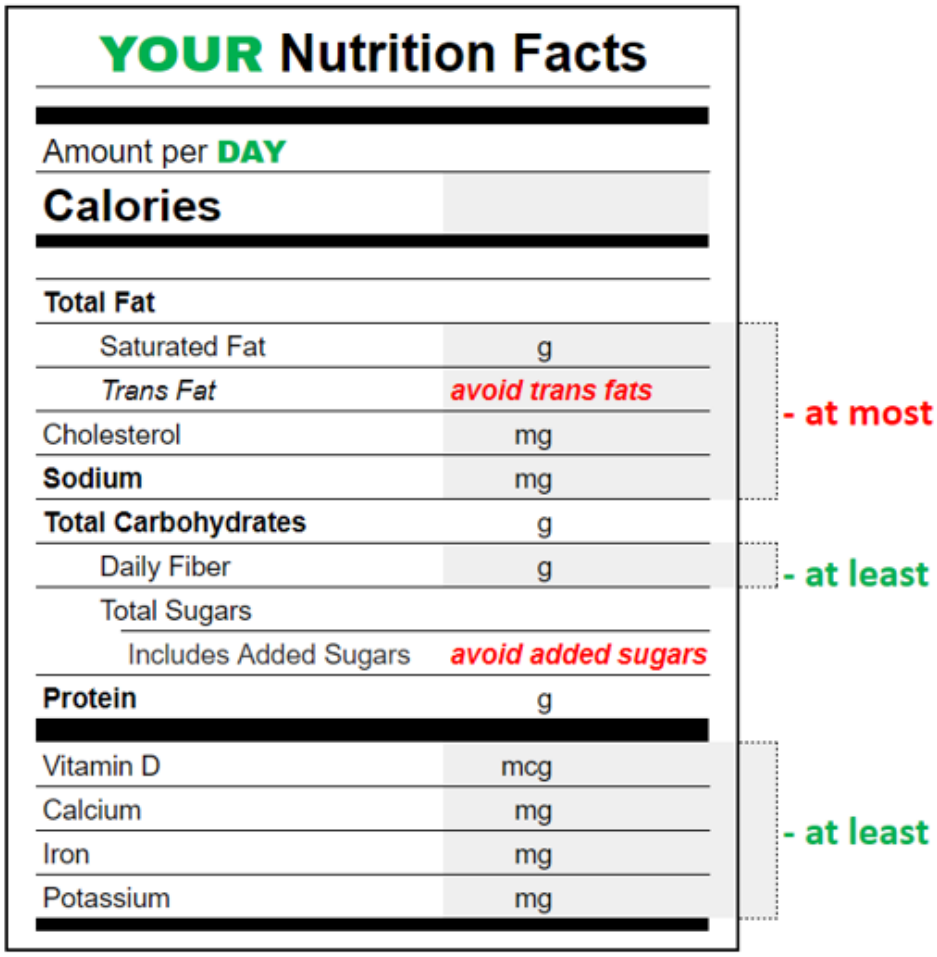
*People with kidney disease should review recommendations with their nephrologist for individualized adjustments and for nutrient needs not listed on Nutrition Facts

Appendix E (continued)

Pamphlet Page 1 Graphic Two

For participants with coronary vascular disease, hyperlipidemia, or hypercholesteremia

STEP 1. Use **YOUR** Nutrition Facts label
to help chose the balance of the nutrients **YOUR** body needs*



Take a picture with your phone for easy use while shopping!

*These recommendations are calculated on your specific needs and should not be used by others. They only include diagnoses discussed; If you have other diagnoses, check with your medical doctor before using this advice.

*People who take insulin should follow recommendations from their endocrinologist for carbohydrate consistent meals.

*People with kidney disease should review recommendations with their nephrologist for individualized adjustments and for nutrient needs not listed on Nutrition Facts

Appendix E (continued)

Pamphlet Page 1 Graphic Three

For participants with BMI greater than 30 or Type 2 Diabetes

STEP 1. Use **YOUR** Nutrition Facts label
to help chose the balance of the nutrients **YOUR** body needs*

YOUR Nutrition Facts

Amount per **DAY**

Calories

Total Fat		
Saturated Fat	g	- at most
Trans Fat	*avoid trans fats*	- at most
Cholesterol	mg	- at most
Sodium	mg	- at most
Total Carbohydrates	g	
Daily Fiber	g	- at least
Total Sugars		
Includes Added Sugars	*avoid added sugars*	
Protein	g	
Vitamin D	mcg	- at least
Calcium	mg	- at least
Iron	mg	- at least
Potassium	mg	- at least

Avoid sugar sweetened drinks including natural fruit juices

Take a picture with your phone for easy use while shopping!

*These recommendations are calculated on your specific needs and should not be used by others. They only include diagnoses discussed; If you have other diagnoses, check with your medical doctor before using this advice.

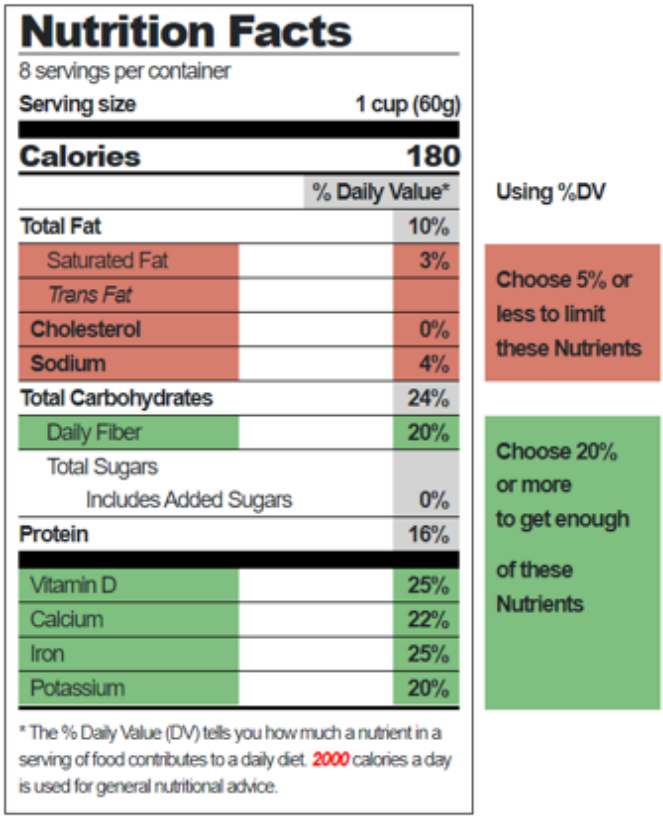
*People who take insulin should follow recommendations from their endocrinologist for carbohydrate consistent meals.

*People with kidney disease should review recommendations with their nephrologist for individualized adjustments and for nutrient needs not listed on Nutrition Facts

Appendix E (continued)

Pamphlet Page 2

STEP 2. Use Daily Value % (DV%) on food labels for a quick reference of nutrient amounts that **YOUR** body needs



Nutrition Facts

8 servings per container

Serving size	1 cup (60g)
Calories	**180**
	% Daily Value*
Total Fat	10%
Saturated Fat	3%
Trans Fat	
Cholesterol	0%
Sodium	4%
Total Carbohydrates	24%
Daily Fiber	20%
Total Sugars	
Includes Added Sugars	0%
Protein	16%
Vitamin D	25%
Calcium	22%
Iron	25%
Potassium	20%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. *2000* calories a day is used for general nutritional advice.

Using %DV

Choose 5% or less to limit these Nutrients

Choose 20% or more to get enough of these Nutrients

STEP 3. Learn More about Diets you can follow to improve **YOUR** health

The diets with checked boxes below are recommended for you.
Research on your own or ask your healthcare provider for more information.

- ☐ Mediterranean Diet
- ☐ DASH Diet
- ☐ Vegetarian Diet
- ☐ Low Carb Diet

Appendix E (continued)

Pamphlet Page 3

STEP 4. Don't let the claims on the package fool you.
Read the Nutrition Facts label and list of ingredients.

Ingrediants are listed in order of most to least. A food is made moslty of the first ingretiants

The front of this box looks like it's ALL healthy…
but sugar is the third ingrediant. Each serving has
8g of sugar which is **2 teaspoons of sugar**

Kraft has isn't using artificial ingredients
… but each serving has **710mg of salt**

Spaghettios claims it has 20% of daily vegetables and a Healthy Kids Entrée…
but the only vegetable is tomato paste and each serving has **1050mg of salt**

Appendix F

Warnings Added to Your Nutrition Facts

DIAGNOSIS	WARNING
Coronary Vascular Disease, Coronary Artery Disease, or Coronary Heart Disease	-Avoid Trans Fats -Avoid Added Sugars
Diabetes (Type 2)	-Avoid Trans Fats -Avoid Added Sugars -Avoid sugar sweetened drinks including natural fruit juices
Hypercholesterolemia (High Cholesterol)	-Avoid Trans Fats -Avoid Added Sugars
Hyperlipidemia	-Avoid Trans Fats -Avoid Added Sugars
BMI $\geq$ 30	-Avoid Trans Fats -Avoid Added Sugars -Avoid sugar sweetened drinks including natural fruit juices

(Appel, 2021; Hennekens & Lopez-Sendon, 2021; Perreault & Laferrère, 2020; Rosenberg, 2020; U.S. National Library of Medicine, 2021)

Appendix G

Diet Recommendations

Diagnosis	Diet Recommendations
Chronic Kidney Disease	-Mediterranean Diet
Chronic Kidney Disease receiving Hemodialysis	-Mediterranean Diet
Coronary Vascular Disease, Coronary Artery Disease, or Coronary Heart Disease	-Mediterranean Diet -DASH Diet -Vegetarian Diet -Low Carb Diet
Diabetes (Type 1)	-Mediterranean Diet
Diabetes (Type 2)	-Mediterranean Diet
Heart Failure	-Mediterranean Diet -DASH Diet
Hypercholesterolemia (High Cholesterol)	-Mediterranean Diet -DASH Diet -Vegetarian Diet -Low Carb Diet
Hyperlipidemia	-Mediterranean Diet -DASH Diet
Hypertension (High Blood Pressure)	-Mediterranean Diet -DASH Diet
BMI $\geq$ 30	-Mediterranean Diet -DASH Diet
None	-Mediterranean Diet

(American Diabetes Association, American Heart Association, National Kidney Foundation, National Heart Lung Blood Institute, US Department of Health & Human Services, and the US Food & Drug Administration)

Appendix H

Budget

Item	Cost
Images for poster for patients to self-refer to project	$ 49.99
Printing and lamination of posters for patients to self-refer for participation (2)	$ 29.75
Preprinted graphic pages 2-3 (60 each)	$ 74.21
Portable color printer	$ 244.36
Printing ink	$ 45.68
Printing paper	$ 3.18
Total Costs	$ 447.17

Appendix I

Brief Action Planning Intervention

Step 1: Review **Your Nutrition Facts** graphic with patient, pointing out most relevant nutrient(s) or calories that patient would benefit from focusing on based on health status and patient's preference

Steps 2: Elicit a behavior from patient by asking, " Will you use this tool to make healthy food choices for the next two weeks?

Patient Response:

- Yes – go to Step 3.
- Not sure – offer idea of how they can use it.
    - Example: Read food labels when shopping and preparing meals, and don't choose foods added sugars / keep total daily calories below _____ / keep sodium below____
    - –If patient plans to use tool, go to Step 3.
- No – Do you mind discussing your diet with your primary care provider?
    - If agreeable, send message to provider to address diet at next visit.

Step 3: Assist patient to create a SMART goal (specific, measurable, achievable, relevant, time bound).

- Have patient repeat back goal "I will use Your Nutrition Facts and compare to food labels when shopping or cooking and _____ for the next two weeks."

Step 4: Check confidence level – how confident are you that you will carry out your plan on scale of 0 (not at all) – 10 (totally confident)?

- 0-6, Ask "what would make it a 7?"
    - Assist patient in restating goal they have confidence level of 7 or greater in achieving.
- 7-10 – go to Step 5.

Step 5: Plan accountability – make plan for follow up on success and plan for next goal.

- Encourage participant to discuss with their PCP at next appointment.
- Encourage participants to request referral to Dietician from PCP if they want more information or support in selecting healthy foods.

Appendix J

Pre/Post Intervention Questionnaire

	Questions	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
1.	I am confident I can change my diet habits to eat healthier					
2.	I know how many calories I need each day for my current weight					
3.	I know how many grams/milligrams of nutrients I need each day to eat healthy					
4.	I can tell if a food is healthy for me by reading the **Nutrition Facts Label**					
5.	I can tell if a food is **NOT** healthy for me by reading the **Nutrition Facts Label**					
6.	I can tell if a food is healthy for me by reading the **ingredients label**					
7.	I can tell if a food is **NOT** healthy for me by reading the **ingredients label**					