An Evaluation of the Break up with Salt Community-Based Hypertension Education Program

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AN EVALUATION OF THE BREAK UP WITH SALT COMMUNITY-BASED HYPERTENSION EDUCATION PROGRAM

A Thesis
Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Master of Science

in

The School of Nutrition and Food Sciences

by
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B.Sc., Universidad Technologica Centroamericana (2018)
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ABSTRACT

Introduction: Hypertension is a primary risk factor for heart disease and stroke, and contributes to renal disease, premature death, and disability. More recently, hypertension has also been identified as a risk factor for serious symptoms or as an underlying cause of death from Covid-19. Break up with salt (BUWS) is a 4-session, community-based nutrition education program of the LSU AgCenter, developed in response to the Covid-19 pandemic, to help Louisiana’s adults prevent or manage hypertension. The BUWS curriculum focuses on the DASH diet, healthy food selection and preparation skills, and physical activity and stress management. BUWS was piloted in a virtual format, from Fall 2020 through Spring 2021, with small groups of participants from around the state.

Goal: To determine if participation in BUWS influences food consumption and related behaviors among participants.

Methods: Program participants were recruited in 5 Louisiana parishes, by nutrition extension agents trained on the program and evaluation. A pre/post/follow-up e-survey design was used to assess participant change immediately following the fourth session and at 3-months. Survey items covered food consumption from key categories, food preparation, food/product label use, physical activity/sedentary behaviors, perceived stress and health, and participant demographics. The Wilcoxon’s-signed rank test for partially matched data was used for analysis of most items.
**Results:** Among 32 participants, 13 pre/post matched surveys were completed; there were too few follow-up surveys for meaningful analysis. This participant group was predominantly female (92%), middle aged (88%), and White/Caucasian (50%) or Black/African American (40%). Statistical testing at p<0.05 demonstrated positive change in whole grain bread consumption (p <0.04), sodium intake (p <0.04), sitting time (p< 0.03), use of Nutrition Facts labels (p< 0.016), packing meals for times away from home (p <3 ×10⁻⁷), and asking about ingredients/substitutions in foods prepared outside the home (p<0.004). Participants gave BUWS a rating of 3 or higher.

**Conclusion:** This study demonstrated that the BUWS program had a positive influence on behaviors that help reduce hypertension risk and improve hypertension management. For greater substantiation, BUWS should be re-piloted with a larger number of participants and follow-up assessments and conducted face-to-face as well as virtually.
INTRODUCTION

Hypertension is a major public health issue throughout the world. Commonly referred to as high blood pressure, hypertension is diagnosed in adults when blood pressure is consistently measured at or above 130/80 mm Hg (1). Hypertension is a problem because it is a primary risk factor for heart disease and stroke, and contributes to renal disease, premature death, and disability (2). More recently, hypertension has also been identified as a risk factor for serious COVID-19 symptoms or as an underlying cause of death from covid-19 (3). In 2019, the World Health Organization estimated that globally, 1.13 billion people have hypertension (4). In the U.S. overall, approximately 32% of adults have reported being told by a health professional that they have high blood pressure (5). However, this rate tends to be higher in the southern states.

In Louisiana, the rate of hypertension among adults is approximately 39%, among the highest in the country (3), and heart disease is the leading cause of death (2). Throughout the US, hypertension is more prevalent among Black adults than White adults. In Louisiana, the rate of hypertension among Blacks is 42.2% vs. 38.1% among Whites (5). Furthermore, Louisiana’s population is approximately 62% White and 32% Black or African American, whereas the US Black or African American population is approximately 13% (5). So, hypertension is a particularly devastating issue for Louisiana.

Hypertension is not usually the result of any one factor or a given incident. Rather, it tends to be the result of a variety of factors. Hypertension risk has a genetic component. Risk to hypertension also increases with age and with being male. Among the risk factors that can be controlled or managed by an individual are smoking/tobacco
use, excessive alcohol consumption, bodyweight (overweight or obesity), diet (overall composition as well as sodium and potassium content), physical activity/inactivity and fitness, stress, and sleep – time and quality. And just as these are considered controllable risk factors for hypertension, hypertension is considered a controllable risk factor for heart disease and stroke (2). Hypertension management is fundamental to health promotion and health equity in Louisiana.

Break up with salt is a new community-based, nutrition education program, developed by nutrition and extension experts within the LSU AgCenter Nutrition Program. It is a four-class series designed to help Louisiana’s adults manage or prevent hypertension by developing knowledge and skills to reduce key, controllable risk factors.

**Session 1: Understanding Hypertension and How to Form Heart Healthy Habits**

**Session 2: Understanding the DASH Diet to help manage High Blood Pressure**

**Session 3: Dash in for Groceries**

**Session 4: Mastering Meals with Flavor**

The curriculum focuses on the DASH diet and related food selection and cooking methods, while also integrating goal setting and habit formation techniques, and guidance on physical activity and stress management. The Break up with salt program was piloted between Fall 2020 and Spring 2021, with small groups of participants from around the state. Most pilot participants also participated in a program outcome evaluation. The goal of this study was to determine if participation in Break up with salt positively influences food consumption and related behaviors among participants. The objectives of this study were to measure changes among participants in:
a) consumption of key foods/food categories.

b) key food selection behaviors.

c) food preparation methods.

d) physical activity and perceived stress, sleep, and health.
LITERATURE REVIEW

The average North American diet is high in fats, sodium, high glycemic load starches, and sugars (7). This type of eating routine puts consumers at risk for obesity, diabetes, hypertension, and other chronic diseases and conditions. Yet, decades of research have established that people can alter their diet and reduce their risk to chronic disease. The DASH diet in particular, is recommended for the management or prevention of hypertension (8).

The Dietary Approaches to Stop Hypertension (DASH) diet was developed during the 1990s. In 1992, the National Institutes of Health (NIH) began a series of studies through which they were able to determine that dietary intervention, even in the absence of medication, could effectively diminish systolic blood pressure by 6 to 11 mm Hg. This reduction was seen in both hypertensive and normotensive individuals (9). Later, in a randomized controlled experiment, participants adopting the DASH diet reduced their systolic blood pressure by an average of 7.7 mm Hg and reduced their diastolic blood pressure by an average of 3.6 mm Hg (10).

Other studies confirmed a direct relationship between increased consumption of sodium (as well as cholesterol), and an increased risk of hypertension (9). The DASH Diet and the Dietary Guidelines for Americans 2020–2025 recommend capping sodium intake at 2300 mg each day. The American Heart Association supports this cap but has suggested an “ideal limit” of 1500 mg sodium/day to reduce circulatory strain for most adults (12). These outcomes pushed the DASH diet as the principal mode of diet therapy and, along with other lifestyle alterations, the principle non-pharmacologic treatment for hypertension (8).
The Dash Diet

The Dash diet focuses on foods from approximately eight food categories and advocates no more than 2300 mg sodium/day (Table 1). The DASH diet recommends meals and snacks are composed from vegetables, fruits, whole grains, lean meats/poultry/fish, low-fat dairy items, nuts, seeds, and legumes, monounsaturated and polyunsaturated oils, with limited sodium and limited sweets. Furthermore, the DASH diet emphasizes consumption of minimally processed and fresh food. As such, the DASH diet is a long-term approach to routine healthy eating; it was developed to mitigate hypertension but is also effective for cardiovascular and general wellbeing (7).

The Dash diet does not include any special foods. Like the Dietary Guidelines for Americans, the DASH diet sets daily/weekly targets for consumption of foods within a food category (8). An example of a 2,000 calorie DASH food plan based on Dietary Guidelines is presented in Table 1.

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Daily Servings¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>6-8</td>
</tr>
<tr>
<td>Meats. Poultry and fish</td>
<td>6 or less</td>
</tr>
<tr>
<td>Vegetables</td>
<td>4-5</td>
</tr>
<tr>
<td>Fruit</td>
<td>4-5</td>
</tr>
<tr>
<td>Low-fat or fat free dairy products</td>
<td>2-3</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>2-3</td>
</tr>
<tr>
<td>Sodium</td>
<td>2,300 mg*</td>
</tr>
<tr>
<td>Nuts, seeds, dry beans, and peas</td>
<td>4-5</td>
</tr>
<tr>
<td>Sweets</td>
<td>5 or less</td>
</tr>
</tbody>
</table>

*Adopted from National Heart Lung and Blood Institute, Dash Eating Plan (14).
¹Standard service size USDA, DHHS.

A multicenter randomized trial by Sacks et al., demonstrated that the Dash diet was more effective at reducing blood pressure than an average American diet at a low
sodium level. Also, the study found that the Dash diet significantly reduced the systolic blood pressure at varying levels of sodium restriction, and significantly reduced diastolic blood pressure at high and moderate sodium levels (15). Maddock et al., supported these finding. Analyzing data from the National Survey of Health and Development (a British population) this group demonstrated that a DASH diet reduces the risk of stroke, heart failure, and heart disease. (16). The study of Mackenbach et al., provided support by suggesting that people who could access foods that align with the Dash diet, had lower prevalence of hypertension (17).

**Nutrition Labels and Food Selection**

Knowing the components of the Dash diet is only part of the diet issue. To eat in accordance with DASH, a person must know how to select foods and how to prepare or request preparation of foods that align with the DASH principles.

In 1990, the US Congress passed the Nutrition Labeling and Education Act, which required the producers of most foods regulated by the FDA to display specific nutrition information on product labels. Since the initial legislation, the Nutrition Facts label has undergone several revisions (18), but the purpose remains the same. The Nutrition Facts label is in place to help consumers make better, more informed food choices (19). For example, the sodium content of each serving of a given food product is [now] clearly stated on the Nutrition Facts label. A consumer who is trying to reduce dietary sodium could use that information to determine if the food product is appropriate for him/her (19).

The Nutrition Facts label was created for consumers, from those with diet sensitive chronic diseases such as cardiovascular disease, hypertension, or diabetes, to
those who want to select foods to help maintain good health, to those who just want more information when making food decisions (4). However, very few consumers comprehend the information on the label or understand how to apply this information to improve their food choices and dietary habits (19).

In a four week randomize control study, Cliona et al., review how participants view and use Nutrition Facts label when grocery shopping. This study demonstrated that the nutrition label was used more frequently for cereals, snack foods, breads, and oils than for other food products. This study also found that participants who read and used the nutrition food label, purchased healthier food products (20).

Nutrition Facts labeling of food products has been introduced as a tool to help people make better food decisions based on certain factors that could affect their health, such as the calorie content and serving size. Helping consumers to understand and use the nutrition label is central to helping them make educated food decisions while shopping (17). For hypertension management, this is particularly true for the sodium in the food products (10). The BUWS curriculum includes a focus on the nutrition label. The label lesson is presented in a virtual classroom setting and is integrated into a virtual grocery store tour.

**Food Preparation**

Over the decades, time has become a critical factor in how people prepare or access their food. In the United States overall, consumption of meals prepared outside the home (e.g., fast food, cafeterias, restaurants, convenience foods), has increased and home food preparation has decreased. It has also been reported that as time-saving approaches towards daily food acquisition has increased, cooking skills have
diminished (21). Lack of cooking knowledge, confidence, and skills can limit at-home preparation of healthy meals and may explain in part, the trend towards decreased cooking (21). A recent review of cooking interventions supports the view that when adults learn more about how to plan and prepare meals at home, and as their food skills improve, so does diet quality, sense of wellbeing, and weight status (22).

Cooking skills and utilization of these skills at home is related to a more beneficial eating routine in the short and long term. For instance, in an investigation of Swiss consumers, individuals with better cooking skills reported utilization of more vegetables and less comfort food (23). In another investigation, targeting adults in the United States, higher frequency of preparing supper at home was associated with lower utilization of fat and sugar (22). This is consistent with an earlier report demonstrating that in the US, meals obtained outside the home contain more fat, yet less micronutrients, when contrasted with self-prepared meals (24). Similarly, many of the meals prepared outside the home are high in calories, fat, salt, and sugar, and don't contain the suggested servings of vegetables (25).

It has been noted that better cooking ability is related to better food decisions. One study demonstrated that teens who consistently engage in family meal preparation activities make better dietary decisions, such as increased consumption of leafy greens (26). Another study reported that females with higher cooking abilities ate more vegetables than those with lower cooking abilities. Culinary skills allow you to prepare a wide range of foods and dishes, increasing the variety and selection of food and it has been suggested that cooking abilities empower individuals to plan and prepare healthier meals and to include a greater variety of foods in their meals (23).
The high prevalence of diet-related chronic disease here in Louisiana (27), coupled with the positive correlations among home meal preparation, dietary quality, and health, suggest the value of teaching and encouraging food/cooking skills in our communities. This is particularly true for programs that promote compliance with dietary recommendations and address the specific nutritional needs of the individuals for whom meals are being created, while also recognizing the contextual factors and barriers facing the target population (28). The Break up with salt cooking/food skills lessons focus on these issues.

**Stress, Covid-19, Physical Activity**

Given the relationship between certain lifestyle dimensions and hypertension, it appears that nutrition, physical activity, and stress management education are all important to consider for prevention and non-pharmacological management of high blood pressure (29). Stress has a direct influence on the autonomic nervous system and arterial pressure (30). But it could also have an indirect influence on cardiovascular risk, by triggering unhealthy behaviors such as smoking or substance abuse. However physical activity and exercise helps to both mitigate stress and to keep blood pressure within normal parameters.

In a case control study of the association between hypertension and stress in adults, Bhelkar et al., determined that high stress is significantly associated with hypertension, overweight and obesity, and lack of physical activity as well as being a factor for hypertension (31). Similarly in a cohort of black adults, Spruill et al found that perceived stress was associated with risk of hypertension and that management of stress is important to decrease risk of hypertension (32). Covid-19 infection has links to
hypertension and to stress. A recent study has demonstrated that Covid-19 (coronavirus) has the potential to increase stress and anxiety, due to both the fear of contracting the virus and also the confusion as to how the epidemic will affect us socially and economically (33). A study by Panchal et al., suggested that the economic impact of Covid-19 on our society is associated with anxiety and phycology distress among the population and could affect mental health for many years after the pandemic (34).

Physical activity has psychological, physiological, and metabolic benefits. It is, for example, inversely associated with anxiety, risk of chronic disease and related conditions, and excess body weight. It is directly associated with physical functioning, productive sleep, and a healthy immune system. The Physical Activity Guidelines for Americans suggests that these benefits emerge as physical activity increases (up to a certain point). The Guidelines recommend that adults get 150 to 300 minutes (2.5 to 5 hours) a week of moderate-intensity, or 75 to 150 minutes (1.25 to 2.5 hours) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate and vigorous-intensity aerobic exercise. Notably, these recommendations are based on research that has also determined that any amount of physical activity is beneficial and is better than no physical activity (35).

Daily exercise of any amount has a positive effect on individuals with high blood pressure, and routine physical activity will help prevent blood pressure from increases typically associated with aging (37). Daily exercise also helps with weight maintenance and coping with stress, both of which are effective means of controlling blood pressure (28,38). Hyun and colleagues found that individuals who participated in moderate to
intense physical activity were more likely to also have higher DASH diet compliance scores, which compounds the benefit of physical activity on blood pressure management (39). The BUWS conveys strategies for increasing physical activity and managing stress.

**Concept and Underlying Theory**

Break up with salt is a series of four classes through which participants learn strategies to manage or prevent hypertension/high blood pressure through changes in food selection, meal planning, grocery shopping, cooking, and label reading routines. The practical nature of each session is aimed at providing participants with information, skills, and confidence to integrate principles of the DASH diet into daily food and fitness related behaviors. As such, this program aligns with aspects of both Self-Efficacy Theory and the Theory of Planned Behavior.

The Theory of Planned Behavior (TPB) is based on behavioral intent, which is informed by the perceived probability that an individual’s action will have the intended effect.

Self-Efficacy Theory (SET) suggests that self-efficacy, defined as the conviction that one can successfully execute the behavior needed to achieve a particular outcome (40), is the most important precondition for behavioral change. At its essence, SET asserts that behavior is strongly influenced by confidence in the ability to perform the behavior (40).
The two theories converge around perceived behavioral control, the degree to which a person believes that they control any given behavior.

The TPB suggests that perceived behavioral control influences intent and intent influences behavior. The SET suggests that confidence influences perceived behavioral control. Break up with salt is designed to increase the ability of participants to change (to develop healthier) behaviors.
MATERIAL AND METHODS

Program description: Break up with salt (BUWS) is a series of four classes, generally conducted weekly, by LSU AgCenter Nutrition Agents who received training on BUWS delivery. This program helps individuals learn strategies to manage or prevent hypertension/high blood pressure through meal planning, diet, grocery shopping, cooking, and label reading. Each of the four classes focuses on a different topic. Lesson 1: Understanding Hypertension and How to Form Heart Healthy Habits. This session provides an overview of hypertension, of controllable vs. uncontrollable risk factors, and how to lower blood pressure by making small lifestyle changes. Lesson 2: Understanding the DASH Diet to Help Manage High Blood Pressure. This session focuses on describing and adapting the dash diet as a routine eating style. It also covers the Nutrition Facts label and how to use nutrition label information to select foods for better blood pressure management. Lesson 3: Dash in for Groceries. This lesson is a virtual grocery store tour for practicing label reading and selecting healthier foods; foods that align with the DASH diet. Lesson 4: Mastering Meals with Flavor. This session focuses on preparation methods and use of seasonings to create flavorful but lower sodium dishes and meals. A 3-month follow-up reunion session is suggested as part of the program design.

The BUWS participant evaluation was developed to track changes in controllable hypertension risk factors related to diet (food consumption, preparation, salt intake, fat intake, Nutrition Facts label use), physical activity, sedentary behaviors, stress management and sleep quality. A pre, post, follow up survey design was used. The pre-survey was used to collect data before the start of the program; a post-survey design
was used to collect data immediately following the fourth session, to track short-term progress. A follow-up survey was used approximately 3 months after the end of the program to track longer-term progress.

The BUWS was originally developed in the spring of 2020, for face-to-face presentation. By summer 2020, when covid-19 intensified and it became clear that programs could no longer be conducted with traditional methods, the curriculum was reformatted for virtual presentation. This involved streamlining the sessions and the participant survey, while maintaining the key components of both. LSU AgCenter Institutional Review Board (IRB) approval for Exemption from Institutional Oversight was obtained: IRBAG-20-0013, 19-Aug-2020.

Participants: The BUWS was developed for adults with hypertension and/or adults who have a family member with hypertension; however, it was open to any adult in Louisiana interested in learning more about hypertension prevention/management. The BUWS pilot targeted adults in the parishes served by LSU AgCenter nutrition agents. Study participants were those who registered for the BUWS community-based hypertension education program and who agreed to participate in the evaluation process.

Recruitment of participants: The BUWS pilot program was publicized and promoted by LSU AgCenter extension Nutrition Agents through newsletters, newspapers, Facebook, and local email lists. Word-of-mouth was also used to market the program to health professionals and other community contacts, and permission was received to post flyers in strategic community locations (e.g., hospitals, libraries,
government offices or websites). There was no charge to enroll in the BUWS pilot program. However, potential participants were asked (though not required) to:

✓ Sign the Consent form.

✓ Commit to attend and participate in each of the four program sessions.

✓ Complete a pre- and post-program participant evaluation survey.

✓ Agree to be contacted in 3 months for additional follow-up.

**Agent Training:** Any nutrition agent interested in conducting the BUWS program was required to attend a training. An agent training was held on-line, over a 2-hour period, on two consecutive days. Day 1 covered curriculum content. Each of the 4 program sessions was reviewed in terms of objectives, script, support/audience engagement activities (e.g., food demos), and session handouts. Day 2 focused on operational aspects of the program e.g., marketing, registration, and on facilitation of the participant evaluation. A summary of evaluation activities is presented below.

<table>
<thead>
<tr>
<th>Evaluation Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prior to program participation start date:</strong></td>
</tr>
<tr>
<td>✓ Participant registration form is collected from facilitating nutrition agent.</td>
</tr>
<tr>
<td>✓ Participant consent form is collected from facilitating nutrition agent. (Note: this does not obligate BUWS program participant to participate in BUWS program evaluation process).</td>
</tr>
<tr>
<td>✓ Pre-program e-survey link is sent to facilitating nutrition agent, who then sends it to individuals registered for BUWS program.</td>
</tr>
<tr>
<td><strong>After the fourth BUWS program session has concluded:</strong></td>
</tr>
<tr>
<td>✓ Post program participant survey link is sent to facilitating nutrition agent.</td>
</tr>
<tr>
<td>✓ Facilitating nutrition agent sends post-program e-survey link to each individual who participated in the BUWS program.</td>
</tr>
<tr>
<td><strong>At [approximately] 3-months post-program:</strong></td>
</tr>
<tr>
<td>✓ A follow up participant survey link is sent to facilitating nutrition agent.</td>
</tr>
<tr>
<td>✓ Facilitating nutrition agent sends follow up e-survey link to each individual who participated in the BUWS program. (The follow up participant survey was to be coordinated with a follow-up “reunion” session, organized by facilitating agent).</td>
</tr>
</tbody>
</table>
The Participant Survey

The participant survey consists of items primarily reflecting participant outcomes. The pre-survey also included demographic items. Core items included indicators of foods/eating patterns associated with the DASH diet, physical activity/inactivity, food/product labels, food selection, and perceived stress and health (Table 2). Most of the questions were adopted from standard tools such as the Behavior Risk Factor Surveillance System (BRFSS), the National Health and Nutrition Examination Survey (NHANES), and the STEPwise approach to surveillance (WHO STEPS). Some measures were adopted from validated, but less common tools such as the Food Skills and Cooking Skills Confidence Measures (adapted from the U.K. National Diet and Nutrition Survey) (41) and the Perceived Stress Scale (42). Some items and the overall survey structure were based on tools previously used for evaluation of Louisiana-based programs with similar adult populations. The participant surveys were conducted electronically/on-line (Appendix A).

Core survey categories and demographics items:

   a) Food and beverages: The questions in this section asked about the frequency of consumption of specific foods and beverages related to the Dash diet. Items included: fruit; vegetables (dark green and red/yellow/orange); whole grain breads and whole grains; processed meats; nuts; beans or legumes; sugar sweetened beverages; and water. These consumption questions were framed in terms of the previous day, for example: “Yesterday, how many times did you eat: Fruits (include fresh, frozen, or canned fruit; do not include juice)”. Response choices for food items
were: 0, 1, 2, 3 or more, or don’t remember. Response choices for [drinking] beverage items were 0-1, 2-3, 4-5, 6 or more, or don’t remember (Table 2, item1).

Questions about fat and salt intake were asked as, “Are you currently watching or reducing your fat intake or changing the type of fat you use?” and “are you currently watching or reducing your sodium or salt intake?” Response choices were yes, no, I don’t know/not sure. If the answer was yes, then the follow-up question, “If yes, what are you doing?” was asked. For the fat item, response choices were “Selecting low or fat-free dairy products (milk, yogurt); Eating less high fat foods (for meals, snacks, or desserts); Using oil in place of solid fat for cooking and/or baking; Other”. The sodium item response choices were “Not adding salt to cooking or to food at table; Selecting low sodium foods/food products; Seasoning with salt alternatives (spices, herbs, salt substitutes); Other.” Both items instructed the participant to “check all that apply.” (Table 2, items 3-4).

b) **Physical activity and sitting:** This section covered two questions about physical activity: “In a typical week, on how many days do you do any type of physical activity that causes an increase in breathing or heart rate?” Response options were 0, 1, 2, 3, 4, 5, 6, 7. If an option other than “0” was selected, the participant was asked the follow-up question, “For the number of days reported above, on average, how much time per day do you generally spend doing these physical activities?” This was an open-ended item where the participant was asked to type in hours and/or minutes. A third question in this section was about sedentary behavior. This item asked, “On a typical day, how much time do you usually spend sitting?” This question was also open-ended
such that the participant recorded the number of hours and/or minutes (Table 2, items 5-6).

c) **Perceived stress, sleep, and health:** This section of the program survey was focused on perceived stress, quality of sleep, and quality of health. Participants were asked to rate the amount of stress in their life. Response options ranged from 1=no stress, to 6=extreme stress. Participants were then asked to rate their ability to handle stress. Response options ranged from 1=I can shake off stress, to 6=my stress is eating away at me. Quality of sleep was addressed as a rating from “excellent” to “poor” over a 5-point scale. All three of these items were framed in terms of the past 30 days. Quality of health was also addressed as a rating on a 5-point scale from “excellent” to “poor”, but it was framed in terms of the past 3 months (Table 2, items 7-9).

d) **Food acquisition:** These items covered questions associated with eating away from home and obtaining or using food information. The survey asked about the frequency, during the past week, of eating meals that were prepared outside the home. Response options were 0, 1-3, 4-6, 7-9, 10 or more. It then asked, “When you eat foods prepared away from home, do you ask about the ingredients or possible substitutions or alternative seasoning?” The response options were No, never; Yes, sometimes; Yes, usually; Yes, always (Table 2, item 10-11).

Several items related to routine food acquisition activities were included to measure participant’s confidence to:
• determine which foods are the healthier options when selecting foods from restaurants, food stands, fast food outlets, vending machines etc.
• determine which item is the healthier option when choosing between similar food items in the grocery store.
• distinguish between “every day” foods and “occasional” foods.

Responses were captured on a Likert scale from 1 to 5 where 1 is not at all confident, and 5 is completely confident (Table 2, item 14).

Regarding the Nutrition Facts label, the survey included a general item on the frequency with which participants read and use this label in general while shopping for foods i.e., “How often do you use the Nutrition Facts label when deciding to buy a food product?” Responses were captured on a 5-point ordinal scale, with the terms: Never, Rarely, Sometimes, Most of the time, Always. The more specific question, “How often do you look for nutrition information on the Nutrition Facts label when you buy each of the following types of foods (snacks; breakfast cereals; salad dressings; packaged seasonings; prepackaged meats; canned/frozen foods; breads, tortillas, prepackaged grain products; milk, yogurt, cheese, ice cream; juices/other beverages)” was also asked. The same response options, Never, Rarely, Sometimes, Most of the time, Always, were given, but the additional response option, “I don’t buy” was also provided (Table 2, item 16-17).

e) **Food preparation:** This section focused on food preparation methods and skills, that support dietary management of blood pressure. Two items dealt with food preparation behaviors. These items were, “Typically, do you prepare main meals at
home, using herbs and spices in place of salt for seasoning?” and “On days that you go to work, school, take road trips or are just out and about/away from home, do you prepare and pack your own meals or snacks?” Response options for both items were, “No, never; Yes, sometimes; Yes, usually; Yes, always (Table 2, item 12-13). 

Several items dealt with confidence in food preparation skills. These included confidence in knife skills e.g., in ability to “slice, dice, mince, chop, and peel vegetables, herbs and spices;” in ability to “select and use herbs and spices for your food”; and in ability to “prepare healthy meals at home”. Responses to each of these items were captured on a Likert scale from 1 to 5 where 1 is not at all confident, and 5 is completely confident (Table 2, item 14).

f) Blood Pressure: Participants were asked to provide their blood pressure reading from the last time it was measured. If the participant knew her/his reading, the follow-up question, “how long ago was this” was asked. Response options were today/this week; 1-4 weeks ago; more than a month ago; don’t remember (Table 2, item 18).

Demographics: Demographic items (pre-program survey only), were standard items used to capture basic demographic information such as gender, age, level of education, and level of food security, race/ethnicity, and neighborhood (rural, urban, suburban). The pre-program survey also included a general item asking, “what if anything do you consider to be your biggest barrier to healthy eating?”. Participants could report that they have no barriers, or they could write in their response. The BUWS participant surveys are included as appendix C.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Survey Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Yesterday how many times did you eat: a) vegetables c) Fruits d, e) whole grains f) processed meats g) nuts or seeds h) legumes.</td>
</tr>
<tr>
<td>2.</td>
<td>Yesterday how many times did you drink: a) sweetened beverages b) water</td>
</tr>
<tr>
<td>3.</td>
<td>Are you currently watching or reducing your fat intake or changing the type of fat you use?</td>
</tr>
<tr>
<td>4.</td>
<td>Are you currently watching or reducing your sodium or salt intake?</td>
</tr>
<tr>
<td>5.</td>
<td>In a typical week, on how many days do you do any type of physical activity that causes an increase in breathing or heart rate?</td>
</tr>
<tr>
<td>6.</td>
<td>On a typical day, how much time do you usually spend sitting?</td>
</tr>
<tr>
<td>7.</td>
<td>During the past 30 days, how would you rate (a) the amount of stress in your life; (b) your ability to handle stress?</td>
</tr>
<tr>
<td>8.</td>
<td>During past 3 months how would you rate your quality of sleep?</td>
</tr>
<tr>
<td>9.</td>
<td>During the past 3 months, how would you rate your Health?</td>
</tr>
<tr>
<td>10.</td>
<td>During the past week, how many meals (breakfast, lunch, or dinner) did you eat that were prepared away from home?</td>
</tr>
<tr>
<td>11.</td>
<td>When you eat foods prepared away from home, do you ask about the ingredients or possible substitutions or alternative seasoning?</td>
</tr>
<tr>
<td>12.</td>
<td>Typically, do you prepare main meals at home, using herbs and spices for seasoning?</td>
</tr>
<tr>
<td>13.</td>
<td>On days that you go to work, school, take road trips or are just out and about/away from home, do you prepare and pack your own meals or snacks?</td>
</tr>
<tr>
<td>14.</td>
<td>How confident are you in your ability to: a) Slice, dice, mince, chop, and peel vegetables, herbs, and spices? b) Select and use herbs and spices for your food? c) Prepare healthy meals at home?</td>
</tr>
<tr>
<td>15.</td>
<td>How confident are you in your ability to: a) Determine which foods are the healthier options when selecting foods from restaurants, food stands, fast food outlets, vending machines etc.? b) Determine which item is the healthier option when choosing between similar food items in the grocery store? c) Distinguish between “every day” foods and “occasional” foods?</td>
</tr>
<tr>
<td>16.</td>
<td>How often do you use the Nutrition Facts label when deciding to buy a food product?</td>
</tr>
<tr>
<td>17.</td>
<td>How often do you look for nutrition information on the Nutrition Facts label when you buy each of the following types of foods? a) Snacks: b) Breakfast cereals; c) Salad dressings/fats/oils; d) packaged seasonings; e) Pre-packaged; f) Canned/frozen vegetables; g) Breads, tortillas, prepackaged grain products; h) Milk, yogurt, cheese, ice cream; i) Juices, fruit drinks, teas, soda, waters.</td>
</tr>
<tr>
<td>18.</td>
<td>What was your blood pressure the last time it was measured?</td>
</tr>
</tbody>
</table>
**Cognitive interview process:**

Typically, a cognitive interview is used as a pre-testing process, to identify question-response issues with survey/questionnaire items (43). The BUWS survey cognitive interview process was conducted in mid-August 2020. A total of five participants were recruited to reflect the anticipated age, race, and educational diversity of program participants (Figure 1).

<table>
<thead>
<tr>
<th>Cognitive Interview Participants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ 2 Rural</td>
</tr>
<tr>
<td>• 35-60 years old</td>
</tr>
<tr>
<td>• Black/African American</td>
</tr>
<tr>
<td>• 1 male; 1 female</td>
</tr>
<tr>
<td>➢ 2 Suburban</td>
</tr>
<tr>
<td>• 35-60 years old</td>
</tr>
<tr>
<td>• White/Caucasian</td>
</tr>
<tr>
<td>• 1 male; 1 female</td>
</tr>
<tr>
<td>➢ 1 Suburban</td>
</tr>
<tr>
<td>• 60+ years old</td>
</tr>
<tr>
<td>• 1 Black/African American</td>
</tr>
<tr>
<td>• 1 female</td>
</tr>
</tbody>
</table>

Figure 1. Demographics of Cognitive Interview Participants

A brief introduction of the research and the purpose of the cognitive interview was explained to the interview participants. They were then asked to complete the pre-program survey; they were assured that their responses would not be recorded or saved, and their names would not be used. The survey completion time was between 6-8 minutes. After completion, the researcher reviewed the survey with the participant, item by item, to determine if each item was understandable and interpreted by the participant as it was intended to be, and to identify any uncomfortable language. The
Break up with salt participant survey was found to be acceptable and understandable for the most part; as a result, only minor changes to the survey were made.

**Data Analysis**

BUWS program participation was limited. Participation in the program evaluation was even more limited. So, it was important to use a statistical test that could accommodate all available data. A corrected version of the Wilcoxon signed rank test, the Wilcoxon signed rank test for partially matched data (44), was used to conduct the analysis of core survey items. The Wilcoxon signed test is a nonparametric test that considers the null hypothesis (H0) and the alternative hypothesis (H1). As applied to BUWS participant data, the two hypotheses for each survey question can be illustrated as:

- **H0**: There is no [behavior/confidence/perception] change that is described in the question.

- **H1**: The number of people experiencing the [behavior/confidence/perception] change described in the question is increasing (or decreasing).

This test is suitable for most core survey item response types (ordinal, Likert, numerical) because the testing direction in the alternative hypothesis is either “increasing” or “decreasing,” depending on the intended outcome for each survey question. This test was applied to survey items 1-16. The p-value level associated with the Wilcoxon signed rank test was set at p<0.05.
• Where the p-value was less than or equal to 0.05, the null hypothesis was rejected, and it was concluded that the data support the alternative hypothesis with the significant level 95%.

• Conversely, where the p-value was larger than 0.05, it was concluded that there is no significant evidence from the data to reject the null hypothesis.

The implementation of the Wilcoxon signed rank test for partially matched data was conducted using the `pm.Wilcox.Test` function, in the `roburrank package` (45) from R open software (46).

This analysis focused on two time points (pre and post). Though included in the evaluation design, follow-up data was practically non-existent; therefore, follow-up data was not considered. No secondary tests were necessary or used. As part of the survey, participants were asked, “What was your blood pressure the last time it was measured?” The participants were then asked, “How long ago was this;” they were provided with 4 response options:

• Today/this week
• 1-4 weeks ago
• More than a month ago
• Don’t remember

This item was considered on an individual basis. The values reported at pre, and post program were compared, as were responses about where and when their blood pressure was taken. This item was intended as a follow-up indicator of blood pressure management.
Descriptive statistics were used to characterize the study population in terms of age, gender, location, education, race/ethnicity, and level of food security. Basic descriptive statistics, numbers and percentages, were also used to quantify responses that described participant changes associated with sodium or fat intake, and their reported barriers to healthy eating.
RESULTS

A total of 32 participants completed the Break up with salt (BUWS) pilot program; however, only 13 of these participants completed the pre and post program surveys. The program was implemented at 7 program sites, most of which presented the curriculum over a 4-week period. The following results refer to the participants/participant outcomes over this short term. Demographics refer to the entire group of participants; participant outcomes refer to the group of participants who completed pre and post surveys.

Demographics:

The BUWS program pilot was implemented at 7 locations covering all regions of the state (Appendix C). There was a total of 32 participants, though only 26 provided demographic information. The group of participants providing this information was 92% female, and most participants (76.9%) were between the ages of 35 and 64 years. The racial/ethnic distribution of the group was 50% White; 10% Black/African American; 3.8% Hispanic or Latino; 3.8% American Indian or Alaska Native and 3.8% other. Among this group, 34.5% had some type of college degree, and 23% of the participants had at least a high school education. A little less than half (48%) of the participants resided in an urban area and a little more than half (52%) lived in a rural area. Most participants (96%) reported being food secure (Table 3). +

In addition to a food security item, participants were asked about their barriers to healthy eating. Approximately half (48%) reported that they had barriers. Among those reporting barriers:

- 27% indicated that they did not know what to cook or what a healthy meal is.
• 27% indicated that they did not know how to prepare healthy meals.
• 18% indicated that money/finances were a barrier.
• 18% indicated that time was a barrier for them.
• 9% indicated that they overeat sweets and sugars.

Table 3. Demographics of Program and Evaluation Participants.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Numbers (n=26)</th>
<th>(%)</th>
<th>Louisiana*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>92%</td>
<td>~51%, Females</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
<td>7.6%</td>
<td>~49% Male</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34</td>
<td>3</td>
<td>11.5%</td>
<td>Median age= 36.2</td>
</tr>
<tr>
<td>35-50</td>
<td>9</td>
<td>34.6%</td>
<td></td>
</tr>
<tr>
<td>51-64</td>
<td>11</td>
<td>42.3%</td>
<td>62.0% White</td>
</tr>
<tr>
<td>65%</td>
<td>3</td>
<td>11.5%</td>
<td>32% Black or African American</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black or African American</td>
<td>10</td>
<td>38.4%</td>
<td>24% Bachelor degree or higher</td>
</tr>
<tr>
<td>White</td>
<td>13</td>
<td>50%</td>
<td>85% High school graduate or higher</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>1</td>
<td>3.8%</td>
<td></td>
</tr>
<tr>
<td>American Indian or Alaska</td>
<td>1</td>
<td>3.8%</td>
<td></td>
</tr>
<tr>
<td>Native</td>
<td>1</td>
<td>3.8%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Food Security</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Secure</td>
<td>25</td>
<td>96%</td>
<td>21% Food Insecure</td>
</tr>
<tr>
<td>Food Insecure</td>
<td>1</td>
<td>3.8%</td>
<td></td>
</tr>
<tr>
<td><strong>High level education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or equivalent</td>
<td>6</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Some college or vocational</td>
<td>5</td>
<td>19.2%</td>
<td></td>
</tr>
<tr>
<td>school</td>
<td>4</td>
<td>15.3%</td>
<td></td>
</tr>
<tr>
<td>2-year degree</td>
<td>4</td>
<td>15.3%</td>
<td></td>
</tr>
<tr>
<td>4-year degree</td>
<td>5</td>
<td>19.2%</td>
<td></td>
</tr>
<tr>
<td>Some graduate work/graduate</td>
<td>2</td>
<td>7.6%</td>
<td></td>
</tr>
<tr>
<td>degree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer not to say</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neighborhood</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>13</td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>12</td>
<td>48%</td>
<td></td>
</tr>
</tbody>
</table>

*Louisiana census April 2020
Food Consumption

The Wilcoxon sign rank test was used to compare pre- to post-program consumption frequency (times per day) of items from each of the food or beverage categories in the participant survey. The results of this comparison, for the direction of change used for the Wilcoxon test, are provided in Table 4. The only significant change (increase) was for whole grain breads (p=0.04).

Table 4. Pre to Post Frequency of Food and Beverage Consumption.

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Pre-survey mean</th>
<th>Post-survey mean</th>
<th>Direction of change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a.</td>
<td>Dark green vegetables</td>
<td>1.5</td>
<td>1.5</td>
<td>Increase</td>
<td>0.22</td>
</tr>
<tr>
<td>1b.</td>
<td>Orange, yellow, or red vegetables</td>
<td>1</td>
<td>1.2</td>
<td>Increase</td>
<td>0.09</td>
</tr>
<tr>
<td>1c.</td>
<td>Fruit</td>
<td>1</td>
<td>0.84</td>
<td>Increase</td>
<td>0.86</td>
</tr>
<tr>
<td>1d.</td>
<td>Whole grain breads</td>
<td>1.1</td>
<td>1.3</td>
<td>Increase</td>
<td>0.04*</td>
</tr>
<tr>
<td>1e.</td>
<td>Whole grain cereals</td>
<td>0.7</td>
<td>0.7</td>
<td>Increase</td>
<td>0.28</td>
</tr>
<tr>
<td>1f.</td>
<td>Processed meats</td>
<td>0.7</td>
<td>0.6</td>
<td>Increase</td>
<td>0.92</td>
</tr>
<tr>
<td>1g.</td>
<td>Nuts and seeds</td>
<td>0.5</td>
<td>0.9</td>
<td>Increase</td>
<td>0.07</td>
</tr>
<tr>
<td>1h.</td>
<td>Beans and legumes</td>
<td>0.6</td>
<td>0.5</td>
<td>Increase</td>
<td>0.51</td>
</tr>
<tr>
<td>2a.</td>
<td>Sweet beverages</td>
<td>1.4</td>
<td>1.4</td>
<td>decrease</td>
<td>0.10</td>
</tr>
<tr>
<td>2b.</td>
<td>Water</td>
<td>3.3</td>
<td>3.7</td>
<td>Increase</td>
<td>0.41</td>
</tr>
</tbody>
</table>

*p<0.5, n=13

*Wilcoxon sign rank test for increase or decrease
Survey items 3 and 4 (Table 2) dealt with sodium and fat intake. Based on the Wilcoxon test, there was a significant increase in the number of participants who reduced sodium intake, but no change in amount or types of fat consumed by this group of participants (Table 5). However, among individual participants, those 9 reduced fat intakes 5 (55%) reported that they now eat less high fat foods, and 4 (44%) reported that they now select low or fat free dairy products. Among 12 participants who reported reduce sodium consumption, 6 (50%) reported that they no longer add salt to cooking or food at the table, and 6 (50%) reported selecting low sodium foods and seasoning with salt alternatives. Individuals who reduced sodium consumption indicated that they are now:

- not adding salt to cooking or food at the table (reported by 6) (50%),
- selecting low sodium foods and seasoning with salt alternatives (reported by 6), (50%).

Table 5. Participant Changing in Fat and Sodium Consumption Behavior

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Pre-Survey #</th>
<th>Post-Survey #</th>
<th>Pre-survey mean</th>
<th>Post-survey mean</th>
<th>Direction of Change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Reducing your fat intake</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>Increase</td>
<td>0.08</td>
</tr>
<tr>
<td>4.</td>
<td>Reducing your sodium intake</td>
<td>7</td>
<td>6</td>
<td>12</td>
<td>1</td>
<td>Increase</td>
<td>0.04*</td>
</tr>
</tbody>
</table>

*p<0.05, n=13

¹Wilcoxon sign rank test for increase or decrease
Physical Activity and Sitting

Items 5 and 6 (Table 1) asked about time spent being physically active and time spent sitting. There was a significant reduction ($p=0.03$) in the time/day these participants spent sitting; however, there was no detectable change in the time each week that these participants spent being physically active (Table 6).

Table 6. Physical Activity and Sedentary Behavior

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Pre-Survey mean</th>
<th>Post-Survey mean</th>
<th>Direction of Change$^1$</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Hours per week of physical activity</td>
<td>1.6 hr</td>
<td>1.4 hr</td>
<td>Increase</td>
<td>0.06</td>
</tr>
<tr>
<td>6.</td>
<td>Sitting time per day</td>
<td>6 hr</td>
<td>5 hr</td>
<td>decrease</td>
<td>0.03*</td>
</tr>
</tbody>
</table>

*p<.05, n=13

$^1$Wilcoxon sign rank test for increase or decrease

Perceived Stress

Items 7(a) and 7(b) (Table 1) asked participants to rate their stress (amount and ability to handle it) using a Likert scale from 1 (lowest) to 6 (highest). The pre- to post-program comparison for the tested direction of change is presented in Table 7 There was no detectable change in either item.

Table 7. Stress

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Pre-Survey mean</th>
<th>Post-Survey mean</th>
<th>Direction of Change$^1$</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7a.</td>
<td>Amount of stress</td>
<td>3.2</td>
<td>3.6</td>
<td>decrease</td>
<td>0.59</td>
</tr>
<tr>
<td>7b.</td>
<td>Ability to handle stress</td>
<td>2.4</td>
<td>2.9</td>
<td>Increase</td>
<td>0.43</td>
</tr>
</tbody>
</table>

*p<.05, n=13

$^1$Wilcoxon sign rank test for increase or decrease
Sleep and Health Perceptions

Items 8 and 9 (Table 1) asked participants to rate their quality of sleep and health, on a 5-point scale from poor to excellent. There was no detectable rating change, pre- to post- program, in either item (Table 8).

Table 8: Participant rating on Quality of Sleep and Health.

<table>
<thead>
<tr>
<th>Category</th>
<th>Quality of Sleep</th>
<th>Direction of change¹</th>
<th>P-value</th>
<th>Quality of Health</th>
<th>Direction of Change¹</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Survey #</td>
<td>Post-Survey #</td>
<td></td>
<td>Pre-Survey #</td>
<td>Post-Survey #</td>
<td></td>
</tr>
<tr>
<td>Good to Excellent</td>
<td>6</td>
<td>6</td>
<td>Increase</td>
<td>0.87</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Fair to Poor</td>
<td>7</td>
<td>7</td>
<td></td>
<td>8</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05 n=13
¹Wilcoxon sign rank test for increase or decrease

Food Acquisition

Item 10 (Table 2) asked the participant about numbers of meals eaten away from home. The pre-program mean during the past week was 3.58; the post program mean was 2.8. This was not a significant change, p=0.45. However, participants reported a large, significant pre- to post- program shift (Table 8) in packing their food when they will be away from home (Table 1, item 13). At pre-program, 23% reported packing their own food; at post-program, all participants (100%) packed food when they were going to be away from home.
Items 11-12 (Table 2) dealt with food ingredients, substitutions, and seasonings. When asked about ingredients and substitutions, 61% of participants at the pre-program time point responded that they never ask about food ingredients or substitutions when eating away from home. By the post survey time point, this dropped significantly ($p = 0.004$) to 7.6% of participants. That is, by end of program, 92% of participants asked about ingredients or substitutions at least sometimes, when eating away from home. Participants were asked about using herbs and spices in place of salt for seasoning. At the pre survey time point, 76% of the participants answered yes, they usually use seasonings other than salt. At the post survey time point, this increased to 92%. However, this change was not significant (Table 9).

Table 9. Ingredients and Substitutions, Herbs and Spices, Pack food when away

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Direction of change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Ask ingredients and substitution away from home</td>
<td>Increase</td>
<td>$&lt; 0.01^*$</td>
</tr>
<tr>
<td>12.</td>
<td>Herbs and spices in place of salt for seasoning</td>
<td>Increase</td>
<td>0.90</td>
</tr>
<tr>
<td>13.</td>
<td>Pack their own food</td>
<td>Increase</td>
<td>$3 \times 10^{-7^*}$</td>
</tr>
</tbody>
</table>

*p<.05, n=13  
$^1$Wilcoxon range test for increase or decrease

**Confidence in Food Preparation and Selection**

Items 14 and 15 (Table 1) asked participants to rate their confidence in food/meal preparation skills, on a scale from 1 (low) to 5 (high). There were no significant changes
in this area. But, with the exception of knife skills (item 14a) confidence in skills that support healthy meal preparation and food selection appears to be trending up (Table 10).

Table 10. Confidence in Food Skills

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Pre-Survey mean</th>
<th>Post-Survey mean</th>
<th>Direction of Change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>14a.</td>
<td>Slice, dice, mince, chop, and peel vegetables, herbs and spices?</td>
<td>4.6</td>
<td>4.2</td>
<td>Increase</td>
<td>0.46</td>
</tr>
<tr>
<td>14b.</td>
<td>Select and use herbs and spices for your food</td>
<td>3.3</td>
<td>3.92</td>
<td>Increase</td>
<td>0.43</td>
</tr>
<tr>
<td>14c.</td>
<td>Prepare healthy meals at home</td>
<td>3.4</td>
<td>3.9</td>
<td>Increase</td>
<td>0.11</td>
</tr>
<tr>
<td>15a.</td>
<td>Determine which foods are the healthier options when selecting foods from restaurants, food stands, fast food outlets, vending machines etc.</td>
<td>3.3</td>
<td>4.08</td>
<td>Increase</td>
<td>0.15</td>
</tr>
<tr>
<td>15b.</td>
<td>Distinguish between “every day” foods and “occasional” foods</td>
<td>3.6</td>
<td>3.8</td>
<td>Increase</td>
<td>0.42</td>
</tr>
</tbody>
</table>

p<.05, n=13

1Wilcoxon range test for increase or decrease

**Nutrition Facts Label**

Item 16 (Table 2) asked participants show often they use and read the Nutrition Facts label. There was a significant pre to post increase in the frequency of using and reading the Nutrition Facts label among participants, when they are grocery shopping. (Table 11)

Items 17 (Table 2) asked participants how often they use and read the Nutrition Facts label to select specific foods while grocery shopping. Significance change in
frequency of using Nutrition Facts label was found for canned frozen vegetables like beans or fruits (Table 11).

Table 11. Nutrition Facts Label

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Direction of Change¹</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.</td>
<td>Use Nutrition Facts label</td>
<td>Increase</td>
<td>0.02*</td>
</tr>
<tr>
<td>17a.</td>
<td>Read Snacks (chips, crackers, popcorn, cookies, candies)</td>
<td>Increase</td>
<td>0.69</td>
</tr>
<tr>
<td>17b.</td>
<td>Breakfast cereals</td>
<td>Increase</td>
<td>0.11</td>
</tr>
<tr>
<td>17c.</td>
<td>Salad dressings/fats/oils</td>
<td>Increase</td>
<td>0.05</td>
</tr>
<tr>
<td>17d.</td>
<td>Packaged seasonings</td>
<td>Increase</td>
<td>0.72</td>
</tr>
<tr>
<td>17e.</td>
<td>Pre-packaged (canned, deli-style) meat, fish, seafood, or poultry</td>
<td>Increase</td>
<td>0.16</td>
</tr>
<tr>
<td>17f.</td>
<td>Canned/frozen vegetables, beans, or fruits</td>
<td>Increase</td>
<td>0.01*</td>
</tr>
<tr>
<td>17g.</td>
<td>Breads, tortillas, pre-packaged grain products (e.g., microwavable rice, mac &amp; cheese)</td>
<td>Increase</td>
<td>0.16</td>
</tr>
<tr>
<td>17h.</td>
<td>Milk, yogurt, cheese, ice cream</td>
<td>Increase</td>
<td>0.14</td>
</tr>
<tr>
<td>17i.</td>
<td>Juices, fruit drinks, teas, soda, waters</td>
<td>Increase</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*p<0.05, n=13
¹Wilcoxon sign rank test for increase or decrease

Blood Pressure

Among the 13 participants, only 10 provided pre and post blood pressure readings. Of this group, at the pre-program time point, 2 participants reported a healthy blood pressure level. As a group, the number of participants reporting a healthy blood pressure at post program did not change (Table 12). The time frames in which the BP
reading was taken was reported, but varied among participants, both pre and post, from "today," to "more than a month ago". As such, the reported values provided no insights.

Table 12. Blood pressure category, for each participant

<table>
<thead>
<tr>
<th>Participants</th>
<th>Pre-program blood pressure value</th>
<th>Post-program blood pressure value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>Normal</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>4</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>5</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>7</td>
<td>High</td>
<td>Normal</td>
</tr>
<tr>
<td>8</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>9</td>
<td>Normal</td>
<td>High</td>
</tr>
<tr>
<td>10</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>
DISCUSSION AND CONCLUSION

The purpose of this study was to determine if participation in Break up with salt positively influences food consumption and related behaviors among participants. This was achieved by evaluating pre to post program changes in consumption and selection of foods and food products related to the DASH diet; with food preparation or acquisition to support a lower sodium diet; and with changes in physical activity, perceived stress and health, and sleep quality. Knowledge or skill building to enable these outcomes is a foundational program component (40). So, the participant evaluation also included items to assess changes in confidence in associated skills. Results from the pilot program show that the program has a positive influence on participants.

The number of program participants completing the 4-session curriculum (a total of 32) was small, and the number of participants completing pre and post program surveys was even smaller (n=13). The original study design included a 3-month follow-up survey to be completed in conjunction with a reunion class. However, only 2 participants completed the follow-up survey, too few for meaningful analysis. The study sample, though small, is reasonably representative of Louisiana’s adult population for age and race/ethnicity. But, as a group, study participants had a higher level of education, a greater percentage of rural dwellers, and greater food security than Louisiana as a whole. Also, the study sample was predominantly female.

Over the study period, for this group of participants, there was no change in food and beverage consumption, except for the whole grain breads category which significantly increased. It is possible that during the BUWS program, participants learned to associate whole grain bread with healthy food choices and changed their
general perception of bread, which, as reported elsewhere (47), is sometimes viewed as an unfavorable food. Changes in the other food categories might need more time. Participants reported a significant reduction in sodium intake. BUWS focused on the relationship between sodium and hypertension, as well as on shopping for and preparing foods with less sodium. Participants appear to have learned these lessons, with approximately half of them reporting these specific behaviors.

There were not improvements in physical activity, stress, or the ability to handle stress among these participants. However, there was a significant decrease in the amount of time these participants spent sitting, which has a direct association with hypertension (48). Because sitting, physical activity, and stress are closely related (36), it is possible that given more time, physical activity will increase, and stress will decrease among these participants.

Overall, there were some improvements in behaviors associated with food selection and preparation skills. There was a significant pre to post increase in the frequency that participants asked about food ingredients or possible substitutions when acquiring foods prepared away from home, and in packing their own food when they were going to be away from home. Yet, there was no reported change in the number of meals participants ate away from home. It is possible that participants considered their packed meals to be foods eaten away from home.

In general, the frequency of reading and using the Nutrition Facts label when grocery shopping, which is directly associated with food selection (20), increased significantly over the program period. However, except for canned or frozen vegetables, this increase was not seen for specific food products. It could be that there
were too few participants typically purchasing items from any of the specific food categories to see a significant improvement.

Confidence in food skills did not increase during this program. Pre-program confidence levels in knife skills, using herbs and spices, and preparing healthy meals was above the midpoint of the rating scale, so additional improvement might have been difficult to achieve through a virtual program. It’s possible that these types of skills are better suited to in-person workshop-style sessions.

Highly motivated people who are truly concerned about their food are more likely to make healthier behavior changes than those who are less motivated (49). BUWS participants were motivated to register for and attend program sessions, and in the end, over the short-term, participants reported improvements in some key behaviors that will help them to manage their hypertension long-term. Documented improvements included reduction in sodium consumption, sitting time, increased consumption of whole grain bread, packing meals for times away from home, asking about ingredients and substitutions for foods prepared outside the home, and Nutrition Facts label reading when grocery shopping. All participants (100%) reported that they would recommend this program to others. The results from this pilot indicate that the BUWS program can positively influence participant behaviors.
This study has several limitations:

1. **Sample size:** the sample size was small, only 13 completed the pre and post survey; the choice of statistical tests for analysis was limited. Only the Wilcoxon signed rank test was used.

2. **Sample composition:** the participant group was not entirely representative Louisiana’s adult population. Compared to Louisiana as a whole. A greater percentage of the BUWS participants were female, were rural, achieved a higher education level, and had greater food security. This limits the generalizability

3. **Response bias:** Participant responses could have been bias since data was self-reported. This process relies on the participant’s memory and honesty when answering each question. Participants might remember in general, but it is possible that amounts or timeframes might not have been accurate.

4. **Online Survey:** The program and survey processes were conducted online. Although the survey was field tested prior to use, there would have been no real-time opportunity for participants to ask questions or get clarification about a survey item if it was not clear.

5. **Timeframe of the classes:** The four classes were conducted during a four-week period. During this short time frame, it was difficult to see large changes in targeted participant behaviors. These were expected to have strengthened by the 3-month follow-up.
Next Steps:

1. Re-pilot the program with a larger number of participants, and a more representative group composition.

2. Review survey for clarity of specific items (e.g., packing food for time away from home).

3. Incorporate blood pressure measurements into first, last, (and follow-up) program sessions, to get more consistent blood pressure readings.

4. Expand the program pilot to in-person sessions and to other southern states for a more comprehensive study population.
APPENDIX A. BREAK UP WITH SALT PARTICIPANT SURVEY

NAME__________________________

HTN – participant evaluation survey

The first few questions are about food and beverages. To answer these questions, please think about all the foods or beverages you consumed yesterday. This includes meals and snacks, at home and away from home. Please respond to these questions in terms of how many times – not portions or servings.

1. Yesterday, how many times did you eat:
   (a) Fruit (include fresh, frozen, or canned fruit; do not include juice)
   0 1 2 3 or more don’t remember
   (b) Dark green vegetables such as broccoli, greens, romaine, chard, or spinach
   0 1 2 3 or more don’t remember
   (c) Orange, yellow, or red vegetables such as sweet potatoes, pumpkin, carrots, winter squash, bell peppers, or beets
   0 1 2 3 or more don’t remember
   (d) Whole grains such as whole wheat, rye, or corn bread; grits, oats, brown rice; or whole grain breakfast cereals
   0 1 2 3 or more don’t remember
   (e) Processed meats, poultry, or fish such as pre-cooked, pre-seasoned, canned, sliced and packaged deli style products
   0 1 2 3 or more don’t remember
   (f) Nuts or seeds such as almonds, peanuts, walnuts, pecans, sunflower, sesame, or pumpkin seeds
   0 1 2 3 or more don’t remember
   (g) Beans or legumes such as lentils, split peas, black-eyed peas, kidney, pinto, or lima beans
   0 1 2 3 or more don’t remember
2. Yesterday, how many times did you drink:

Sugar sweetened beverages such as regular soda, fruit drinks, sweet tea, sports or energy drinks (e.g., Koolaid™, lemonade, Gatorade™, Red Bull™). Do not include 100% fruit juice, diet drinks, or artificially sweetened drinks

0-1  2-3  4-5  6 or more  don't remember

Now think about soups, salad dressings, and fried foods (meats, chicken, fish, potatoes, or vegetables). And think about cheeses, snacks and desserts like chips and crackers, cakes and pies, ice cream and candy. These foods are usually made with fats, oils, or salt.

3. Are you currently watching or reducing your fat intake or changing the type of fat you use?
   o Yes
   o No
   o Don't know/not sure

   If yes, what are you doing? (check all that apply)
   o Selecting low or fat-free dairy products (milk, yogurt)
   o Eating less high fat foods (for meals, snacks, or desserts)
   o Using oil in place of solid fat for cooking and/or baking
   o Other

4. Are you currently watching or reducing your sodium or salt intake?
   o Yes
   o No
   o Don't know/not sure

   If yes, what are you doing?
   o Not adding salt to cooking or to food at table
   o Selecting low sodium foods/food products
   o Seasoning with salt alternatives (spices, herbs, salt substitutes)
   o Other

The next few questions are about routine “life” activities.

5. In a typical week, on how many days do you do any type of physical activity that causes an increase in breathing or heart rate?

   0  1  2  3  4  5  6  7

   [If 0 Skip to #6]

5(a). For the number of days reported above, on average, how much time per day do you generally spend doing these physical activities.

   _______ hours and/or _______ minutes
6. This question is about sitting, sitting at home, at work, with friends, at a desk, as transportation, playing games, watching television, at the computer, on the phone. Do not include time spent sleeping.

   On a typical day, how much time do you usually spend sitting?

   Hours: _______  Minutes: _______

7. During the past 30 days, how would you rate your ability to handle stress? Please use a scale of 1 to 6, where 1 means that you can 'shake off stress', stress is not a problem for you; and 6 means that your stress is 'eating away at you'; it is a problem for you.

   1  2  3  4  5  6
   I can shake off my stress  My stress is eating away at me

8. During the past 30 days, how would you rate your quality of sleep?
   - excellent
   - very good
   - good
   - fair
   - poor

9. During the past 30 days, how would you rate your Health?
   - excellent
   - very good
   - good
   - fair
   - poor

10. During the past week, how many meals (breakfast, lunch or dinner) did you eat that were prepared away from home? Please count fast food places, restaurants, grocery stores, convenience stores, vending machines, food trucks or food stands. Please do not count meals prepared and eaten at other people's homes.

    0  1-3  4-6  7-9  10 or more

11. When you eat foods prepared away from home (restaurants, take-away, grocery deli, etc.), do you ask about the ingredients or possible substitutions or alternative seasoning?

    No, never  Yes, sometimes  Yes, usually  Yes, always
12. Typically, when you prepare main meals at home, do you use herbs and spices for seasoning?

<table>
<thead>
<tr>
<th></th>
<th>Not at all confident</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slice, dice, mince, chop, and peel vegetables, herbs and spices?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Select and use herbs and spices for your food?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Prepare healthy meals at home?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Now think specifically about **food preparation**...

13. Using a scale of 1 to 5 where 1 is the lowest, the least it could be, and 5 is the highest, the most it could be, **how confident are you** in your ability to...

<table>
<thead>
<tr>
<th></th>
<th>Not at all confident</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slice, dice, mince, chop, and peel vegetables, herbs and spices?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Select and use herbs and spices for your food?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Prepare healthy meals at home?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Now think specifically about **food selection for managing your blood pressure**...

14. Using a scale of 1 to 5 where 1 is the lowest, the least it could be, and 5 is the highest, the most it could be, **how confident are you** in your ability to...

<table>
<thead>
<tr>
<th></th>
<th>Not at all confident</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine which foods are the healthier options when selecting foods from restaurants, food stands, fast food outlets, vending machines etc.?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Determine which item is the healthier option when choosing between similar food items in the grocery store?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Distinguish between “every day” foods and “occasional” foods?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
15. The Nutrition Facts label on many food products list the amounts of things like calories, sodium, fat, cholesterol, fiber, vitamins, and minerals in the product. **How often** do you use the Nutrition Facts label when deciding to buy a food product?  

Never  | Rarely  | Sometimes  | Most of the time  | Always  | I don't buy  
---|---|---|---|---|  
(If Never skip to #17)  

16. Now think about the types of food products you buy using the Nutrition Facts label. **How often** do you look for nutrition information on the Nutrition Facts label when you buy each of the following types of foods?  

<table>
<thead>
<tr>
<th>Type of food</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Most of the time</th>
<th>Always</th>
<th>I don't buy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snacks (chips, crackers, popcorn, cookies, candies)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakfast cereals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salad dressings/fats/oils</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packaged seasonings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-packaged (canned, de-styke) meat, fish, seafood, or poultry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canned/frozen vegetables, beans, or fruits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breads, tortillas, pre-packaged grain products (e.g. microwaveable rice, mac &amp; cheese)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk, yogurt, cheese, ice cream</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juices, fruit drinks, teas, soda, waters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. What was your blood pressure the last time it was measured? ____ / ____  

17(a). **How long ago was this?**  

Today/this week | 1-4 weeks ago | more than a month ago | don't remember
**Demographic items:**

18. Which of the following statements best describes the food eaten in your household in the last 3 months?
   - [ ] Enough of the kinds of food we want to eat
   - [ ] Enough but not always the kinds of food we want to eat
   - [ ] Sometimes not enough to eat
   - [ ] Often not enough to eat

19. What is the highest level of education you have completed?
   - [ ] High School or equivalent
   - [ ] Some College or vocational school
   - [ ] 2-year degree
   - [ ] 4-year degree
   - [ ] Some graduate work and/or graduate degree
   - [ ] Prefer not to say

20. How would you categorize your neighborhood?
   - Rural
   - Suburban/Urban

21. What is your gender?
   - [ ] Male
   - [ ] Female
   - [ ] Other
   - [ ] Prefer not to say

22. Which one of these groups best represents your race/ethnicity? (mark all that apply)
   - White
   - Pacific Islander
   - Hispanic or Latino
   - American Indian or Alaska Native
   - Black or African American
   - Other
   - Asian
   - Not sure/Prefer not to say

23. Which of the following is your age group?
   - [ ] 18-34
   - [ ] 35-50
   - [ ] 51-64
   - [ ] 65+

...
This is the last item:

24. What, if anything, do you consider to be your biggest barrier to healthy eating?
   o I have no barriers ___
   o Type/write in:

                                ____________________________
                                ____________________________

   Thank you!
APPENDIX B. IRB APPROVAL

TO: Goellnitz, Elizabeth A
LSUAG / Dept. of Nutrition and Food Sciences
Michael Keenan
FROM: Chair, Institutional Review Board
DATE: 19-Aug-2020
RE: IRB-AG-20-0013
TITLE: An Evaluation of Break-up with Salt
Community-Based Hypertension Education
Program
SUBMISSION TYPE: Initial Application
Review Type: Exempt
Risk Factor: Minimal
Review Date: 19-Aug-2020
Status: Approved
Approval Date: 19-Aug-2020
Approval Expiration Date: 18-Aug-2023
Re-review frequency: (three years unless otherwise stated)
Number of subjects approved: 100
LSU Proposal Number:

By: Michael Keenan, Chair

Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the
Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of
human subjects.
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in
the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration
date, upon request by the IRB office (irrespective of when the project actually begins); notification
of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the
study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the
individual participants, including notification of new information that might affect consent.

6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.


8. SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc. Approvals will automatically be closed by the IRB on the expiration date unless the PI requests a continuation.

* All investigators and support staff have access to copies of the Belmont Report, LSU’s Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents.

Mike Keenan O 225-578-1708
209 Knapp Hall
Baton Rouge, LA 70803

O 225-578-1708
P 225-578-4443
References:


33. Lucini, Daniela, et al. “Stress Management at the Worksite: Reversal of Symptoms Profile and Cardiovascular Dysregulation.” Hypertension (Dallas, Tex.: 1979),


VITA

Helena Salgado was born in Tegucigalpa Honduras. She received her Bachelor of Nutrition degree in Universidad Tecnologica Centroamericana, Honduras 2018. In August 2019, Helena began the Master of Science program at Louisiana State University in the School of Nutrition and Food Sciences with a concentration in Human Nutrition. She planned to receive her master degree this December 2021.