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Development of Balanced Budget Bites and Feasibility Evaluation

Holly Hansen

South Dakota State University, hhansen_15@outlook.com

Kendra Kattelman

South Dakota State University, kendra.kattelman@sdstate.edu

Kathryn Morrison

South Dakota State University

Becky Jensen

South Dakota State University

Hailey Millner

South Dakota State University

See next page for additional authors

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Author

Holly Hansen, Kendra Kattelman, Kathryn Morrison, Becky Jensen, Hailey Millner, Addison Reimer, Jen Sip, Brittany Canfield, and Cydney Chamberlain

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School of Health and Consumer Sciences

South Dakota State University

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Balanced Budget Bites was created by the collaboration of work by the Food and Resource Management students for the Spring 2021 semester for assisting in the financial portion of the intervention, in addition to the authors listed above.

Abstract

Objective: Balanced Budget Bites was created to educate individuals of Feeding Brookings about different cooking techniques, food safety, meal planning, budgeting, and financial resources in the Brookings, SD area while highlighting lower-cost food items. **Participants and Recruitment:** The target audience of Balanced Budget Bites were individuals that participated in Feeding Brookings that were recruited for four weeks via a flyer and a posting of the flyer on Feeding Brookings' Facebook page. **Method and Implementation:** Participants of Feeding Brookings completed a pre-survey before taking Balanced Budget Bites to assess their skills, confidence, and knowledge related to nutrition and finance. The online curriculum consisted of three learning modules with nutrition and finance videos, activities, and handouts to go along with each module. Participants completed a post-survey at the end of the course, which consisted of the same questions as the pre-survey, to assess their changes in skills, confidence, and knowledge related to nutrition and finance. **Results:** Statistical analysis of Balanced Budget Bites was not feasible, given only 7 participants completed the online course in its entirety; however, results of Balanced Budget Bites aligned with results of previous studies that used video technology to assess individuals' confidence, skills, and knowledge of nutrition. Participants of Balanced Budget Bites were able to learn about how to add foods to common items that came in their food boxes from Feeding Brookings to increase the nutrients in meals with limited additional cost. **Conclusion:** Balanced Budget Bites was a positive experience for members of the Feeding Brookings community. It was created as an online learning curriculum and made available during COVID-19, which has caused increased stress on many Americans.

Keywords: Nutrition, finance, Balanced Budget Bites, COVID-19, food bank, Feeding Brookings

Development of Balanced Budget Bites and Feasibility Evaluation

Food environments include physical, economic, policy, and socio-cultural conditions that affect the choices of food, beverages, and nutritional status of people (Thompson et al., 2019). Food environments influence food security or food insecurity. The USDA measures food security based on a continuum of four levels ranging from high food security to very low food security. *High* food security is defined when households had or have no anxiety or problem regarding acquiring adequate food consistently. *Marginal* food security involves households having anxiety or problems at times regarding consistently acquiring adequate food with no reduction in the quality, quantity, and variety of food intake was not reduced substantially. *Low* food security is where there had to be reductions in the quality, desirability, and variability of diets but not the quantity of food. *Very low* food security is where the eating patterns of one or more members of the household were changed due to the lack of money and other resources (USDA, 2021). Households in the low food security and very low-security level of the food security continuum are considered to be food insecure (USDA, 2021).

According to the USDA, the national average of the US households in 2020 that were food secure was 89.5%, leaving 10.5% to be food insecure, which is 38.3 million people (2021). Of the 10.5% that were food insecure, 6.6% were of low food security, and 3.9% were of very low food security. This equals 9.4 million adults and 6.1 million children. A total of 584,000 children lived in households where one or more children were food insecure; this was 0.8% of the children in the nation. All households with children, households with children under 6, households with children headed by a single parent, households with Black, non-Hispanic, and Hispanic owners or renters, and households that had incomes 185% of the poverty threshold had a prevalence of food insecurity above the national average of 10.5% (USDA, 2021).

People that are food insecure tend to express more challenges in the accessibility, availability, and utilization of resources than individuals that are not food insecure (Niles et al., 2020). Those that do not have adequate funds or resources for food may have limited food

choices, such as choosing canned or frozen over fresh fruits and vegetables. Access and availability of different foods can be different based on other geographical locations of individuals in terms of food insecurity. Many people that are food insecure also find themselves living in a food desert. A food desert can be defined as a location where there is limited access to affordable, healthy foods, such as fruits and vegetables, due to not having grocery stores near the home or easily accessible (Food Empowerment Project, 2021).

Food insecurity can contribute to chronic disease by influencing food choices. Adults that are food insecure tend to consume fewer fruits, vegetables, and dairy products compared to adults who are food secure (Christian et al., 2020). Fruits and vegetables contain many of the needed vitamins and minerals along with antioxidants and phytochemicals. Dairy products contain many of the fat-soluble vitamins and calcium needed for the metabolism of fat and growth. Low-income populations affected by food insecurity have statistically higher rates of obesity, type 2 diabetes, cardiovascular disease as well as other diet-related conditions. (Food Empowerment Project, 2021). Many of the foods that are accessible and available to individuals that are food insecure tend to contain higher amounts of calories, added sugar, and are highly processed, which contribute to many of the diet-related conditions commonly found in individuals that are food insecure.

Food Banks have been started in many communities to lessen the impact of food insecurity. Feeding Brookings, a branch of Feeding America, in Brookings, South Dakota is one of the many food banks available. Feeding Brookings began in 2010 as part of the mission of the Ascension Lutheran Church in Brookings, South Dakota, and serves individuals in need. Feeding Brookings gives away food every Thursday. Being affiliated with Feeding America, volunteers of Feeding Brookings take monetary donations to purchase foods, such as apples and hamburger, at lower prices than at a typical grocery store (Feeding Brookings, 2021). Items such as cereal, laundry detergent, toiletry items, tortillas, and canned meats are common staples found in boxes from Feeding Brookings. Feeding Brookings has a “Food of the Month”

that is highlighted in each food box that is given out. According to the feedingbrookings.org Website, Feeding Brookings served 2426, 2595, and 2180 people in March, February, and January, respectively, and a majority of the people served were aged 18-59 (Feeding Brookings, 2021).

Other researchers have found that video technology, in addition to printed recipes, had a positive correlation with confidence and knowledge associated with nutrition. Surgenor et al. examined the impact of video technology on cooking with 141 individuals that were randomly assigned to one of four interventions using a recipe card only or a recipe card and different levels of video demonstrations. Outcomes of this study involved four themes: improved comprehension of the cooking process, real-time assurance in the cooking process, assisting the acquisition of new cooking skills, and enhancing the enjoyment of the cooking process (2017).

The study by Surgenor et al. was also used to study the intention of people to prepare food from basic ingredients using printed recipes only and combinations of printed recipes and video technology. All participants completed an adapted food and cooking skills survey at home prior to the start of the randomized control trial. This was to help determine a baseline of confidence in food and cooking skills. At the end of the trial, participants were asked questions regarding confidence in food and cooking skills, how cooking the lasagna made them feel, difficulty of making lasagna, and what likelihood they would make lasagna at home from basic ingredients (Lavelle et al., 2016). Lavelle et al. found that participants verbally stated they would be able to make lasagna at home from basic ingredients and gained confidence doing so with the use of food demonstration videos.

Black et al. wanted to determine the effect of video technology on cooking skills, intake of fruits and vegetables, nutrition knowledge, and confidence in nutrition. This study analyzed data from 1,859 veterans from the United States that completed questionnaires that asked about learning new recipes, confidence that the cooking class would help them to achieve their

health goals, and whether or not this course taught them new techniques. Outcomes from this study were that US veterans were able to learn new kitchen techniques, increase their confidence in reaching health goals, and learn new recipes (2018).

The COVID-19 pandemic has had multiple negative effects on people, both nutritional and financial. Some people that were considered to be food insecure before the pandemic have seen a decrease in their level of food security. Household food insecurity has increased from 11% in 2018 to 38% in March of 2020 (Wolfson and Leung, 2020). Those that had a decrease in salary or lost their jobs face a financial burden and struggle to provide nutritious food for their families. In times of need, especially with the COVID-19 pandemic, individuals must use their funds towards things other than their nutrition first. Feeding Brookings gives away boxes with a variety of foods that can be eaten for basic nutrition. These foods can be a base to add other low-cost food items such as canned or frozen fruits and vegetables along with seasonings for additional nutrition and a way to make a person's monthly salary for food go a long way.

Based on the identified need, an online nutritional and financial curriculum, Balanced Budget Bites, was created to educate individuals of the community about different cooking techniques, food safety, meal planning, budgeting, and community financial resources. The main focus of Balanced Budget Bites was to teach individuals how to cook nutritious and balanced meals while living on a budget. Other focuses Balanced Budget Bites took into consideration were food safety, cooking skills, and learning how to make money last through meal planning, budgeting, and adding nutrients to a ready-prepared food item. To accomplish this, Balanced Budget Bites partnered with Feeding Brookings to be able to reach individuals who could benefit from participating in the online nutritional and financial curriculum.

Methods

Balanced Budget Bites development and delivery was a collaboration between Nutritional Science graduate students/Nutrition and Dietetic Interns and Program Director, Consumer Affairs Family Resource Management students and professor, and Feeding Brookings. Balanced Budget Bites consisted of a series of three online learning modules planned around the category of food items included in the Feeding Brookings food boxes. Balanced Budget Bites utilized South Dakota State University's Traininghouse online learning platform to deliver the curriculum to a convenience sample of individuals recruited from the Feeding Brookings program.

Target Audience and Recruitment

The target audience for Balanced Budget Bites was individuals in and around the Brookings, South Dakota area that attend Feeding Brookings to pick up food. In order to be eligible to participate, individuals must have been at least 18 years old. Approval from South Dakota State University's Institutional Review Board was obtained prior to recruitment and consent prior to participation. Recruitment flyers were created, printed, and handed out by volunteers of Feeding Brookings. The recruitment flyer for Balanced Budget Bites was also posted on Feeding Brookings' public Facebook page. Recruitment for participants for Balanced Budget Bites was four weeks. A total of 500 copies of the recruitment flyer were printed and handed out to members of the community.

Interested participants were directed to send an email to the principal investigator to be enrolled in the course. After the initial email stating interest in participating in the course, further instructions were sent to the prospective participants on how to create an account in South Dakota State University's Traininghouse and access the course. Balanced Budget Bites was open and accessible from June 1, 2021, until August 1, 2021. Individuals that voiced interest in completing the course received messages three times while the course was available as a reminder to sign up and take the course. After the course closed, data was able to be collected

and analyzed. Those who provided contact information were provided a \$10 electronic gift card for participation in the study.

Pre- and Post-Survey

A pre-survey and post-surveys were developed to assess changes in knowledge of food safety, cooking techniques, knife skills, budgeting, making goals, and meal planning. A portion of the survey questions came from the Expanded Food and Nutrition Education Program (EFNEP) adult questionnaire developed by the USDA (2020). Other questions came from the iCook curriculum, which was developed in 2016 as an obesity prevention intervention (White et al., 2016). The pre-survey consisted of a set of demographic questions along with another set of questions to assess knowledge and skills in nutrition and finance prior to participating in Balanced Budget Bites. The post-survey consisted of the same questions as the pre-survey, except for the demographic questions, and included questions asking what was good, bad, and things to change about the course if it was implemented again. The post-survey was used to assess change in knowledge and skill in nutrition and finance after taking the course. Responses to questions on the surveys were on a seven-point continuum from poor to excellent, with one choice being not applicable.

Curriculum Description and Objectives

Balanced Budget Bites had nutritional and financial objectives for the course overall and more specific objectives for each of the three modules. The content for the nutritional component was developed by Nutrition and Exercise Science master's students, and undergraduate Family Resource Management students created content for the financial component. The objectives for the overall course are listed in table 1. Table 2 lists the specific objectives associated with each learning module, with respective activities to achieve each objective.

Table 1**Table of overall nutritional and financial objectives for Balanced Budget Bites**

Nutritional Objectives	Financial Objectives
Participants will be able to increase their knowledge of food safety.	Participants will be able to identify community resources that can support family resource management.
Participants will be able to increase their confidence in meal preparation techniques.	Participants will be able to develop a spending plan that supports family resource management.
Participants will be able to increase their confidence using specific cooking skills.	Participants will be able to create a food budget, meal plan, and shopping list for themselves and/or their family.
Participants will be able to increase their awareness of ways to add nutrients to a ready-prepared food item.	

Each of the three modules contained various activities associated with the nutrition and financial content of each module. Module one consisted of a food demonstration and recipe for vegetable soup with lentils, a spices/seasonings handout, hand hygiene handout, family resource management video, budget expense form, and a goal-setting sheet. Module two consisted of a honey-lime chicken enchilada food demonstration video and recipe, a handout on preparing avocados, storing leftovers, community resource video, and a handout about Brookings, South Dakota community resources. Module three consisted of a food demonstration video and a recipe for a quick and easy chili, a handout about different knives and their uses, a cooking temperature handout, a budgeting financial video, and a handout for tips on creating a budget. The educational components were developed to require a minimum time commitment from the participants. The time required to complete Balanced Budget Bites educational components, watch all three food demonstration videos, and watch all three financial videos was about an hour.

Table 2

Summary of each of the three modules with the objectives and nutritional and financial activities associated with each

Module	Name of Module	Objectives	Nutrition and Financial Activities
1	Soup, Handwashing, and Resource Management	Participants will be able to identify at least one ingredient they can add to canned soup to increase its nutrients.	Vegetable Soup with Lentils Food Demonstration Video
		Participants will be able to recognize that canned food items can be part of a healthy meal.	Vegetable Soup with Lentils Recipe
		Participants will be able to identify at least one possible consequence of poor handwashing.	Spices/Herbs Handout
		Participants will be able to demonstrate and understand the importance of handwashing.	Handwashing Handout
		Participants will be able to identify at least two alternative herb/spices to substitute for salt in a recipe.	Resource Management Video
		Participants will gain an understanding of family and food resource management and why it is important.	Budget Expense Form
		Participants will learn what SMART goals are and be able to create them for themselves and their family.	Goal Setting Sheet
		Participants will learn what a spending plan is and be able to create one to ensure resource and food security.	
2	Enchiladas, Storing Leftovers, and Community Resources	Participants will be able to recognize that canned meats can be a part of a healthy meal.	Chicken Enchiladas Demonstration Video
		Participants will be able to identify one tip for selecting and storing an avocado.	Honey Lime Chicken Enchiladas Recipe
		Participants will be able to list how many days leftovers can be safely stored in the refrigerator.	Avocado Tips Handout
		Participants will be able to understand a budget sheet and be able to create their own budget.	Storing Leftovers Handout
		Participants will be able to understand all the available community resources in and around Brookings, including their phone number, services they provide, and their website.	
3	Chili, Cooking Temperatures, and Food Budgets	Increase confidence in meal preparation.	Quick and Easy Chili Demonstration Video
		Increase confidence with specific cooking skills.	Quick and Easy Chili Recipe
		Increase awareness on ways to add nutrients to a ready-prepared food item.	Know Your Knives Handout
		Participants will be able to identify the proper temperature to safely cook raw beef and chicken.	Cooking Temperatures Handout
		Participants will be able to recognize at least two differences between different types of knife cuts: dicing, chopping and mincing.	Budgeting for Meals Video
		Participants will be able to list at least two frozen or canned vegetables that can be used as a substitute for fresh.	Food Budgeting Tips Handout
		Participants will be able to calculate price per ounce of food while shopping.	
		Participants will be able to understand tips to help them keep their budget while shopping and preparing meals.	

Implementation

Planning of Balanced Budget Bites began in December of 2020 and was ready to go live on Traininhouse on June 1, 2021. Planning for the course involved multiple steps, including a tour of the Brookings Commercial Kitchen to assess the layout for filming the cooking demonstrations, numerous zoom meetings, research for the survey questions and learning objectives, development of the three learning modules, IRB approval, and recruitment.

Food demonstration videos of Balanced Budget Bites ended up being filmed two times. It was determined that the first filming of the videos was not going to be able to be used due to unexpected background noise. The Brookings Commercial Kitchen, where the videos were filmed the first time, is next to a local eating establishment that was busy the night of filming. The second filming of the food demonstrations took place in one of the food labs in Wagner Hall on South Dakota State University campus. This second filming was successful with little to no background noise. The only background noise during the second round of filming was from the induction burner and ovens that were utilized during the cooking process.

In order to be able to recruit participants for Balanced Budget Bites, approval from South Dakota State University's IRB was needed. Upon approval, recruitment began right away. A recruitment flyer was created and distributed to individuals that picked up food from Feeding Brookings for the four weeks of recruitment. The recruitment flyer for Balanced Budget Bites was also posted on Feeding Brookings's Facebook page.

Numerous planning meetings were scheduled to plan Balanced Budget Bites. There were planning meetings that involved everyone. There were also learning sessions taught by South Dakota State University's Extension for the creators of Balanced Budget Bites to learn about Traininghouse and how to edit it with information associated with Balanced Budget Bites.

Results

Seven of the 28 individuals initially interested in participating in Balanced Budget Bites completed the course in its entirety. Participant demographics are shown in Table 3. The age range of participants was 26-40 years old, with one participant over 45 years old. The average household size of participants of Balanced Budget Bites was four. Of all the participants, the highest level of education was a bachelor's degree. According to race, three participants consider themselves White/Caucasian, two consider themselves Asian, and one each of Black/African American and Asian/Caucasian. According to ethnicity, six participants consider themselves white, and one non-white. Four of the seven participants use English as their first language, and one of the seven was eligible for public assistance.

Figure 1 reports the overall change in nutrition and financial knowledge. Figures 2a-2o and 3a-3b show changes in knowledge and confidence from pre-survey to post-survey, respectively. A change in knowledge of the importance of handwashing and not thawing food on the counter was found according to changes in survey responses.

One of the obstacles that Balanced Budget Bites faced was the number of participants. There were 28 individuals that voiced interest in participating, and of those 28, seven completed the course in its entirety. For the nutritional portion of the course, participants liked the recipes and cooking handouts and appreciated that the recipes were easy to cook, economical, and healthy. For the financial component, participants stated they liked the worksheets, helpful tips, and the importance of proper planning and management.

Participants were asked in the post-survey about what was disliked and should be changed or improved if Balanced Budget Bites was implemented again. The negative comments about the course were mainly regarding technological issues. Multiple participants commented that they would have liked Balanced Budget Bites to be more detailed in both the nutritional and financial content. Another participant commented that the Balanced Budget Bites should have more topics on self-reliance compared to available community services.

Figure 1

Overall nutrition and financial knowledge at the beginning and end of Balanced Budget Bites.

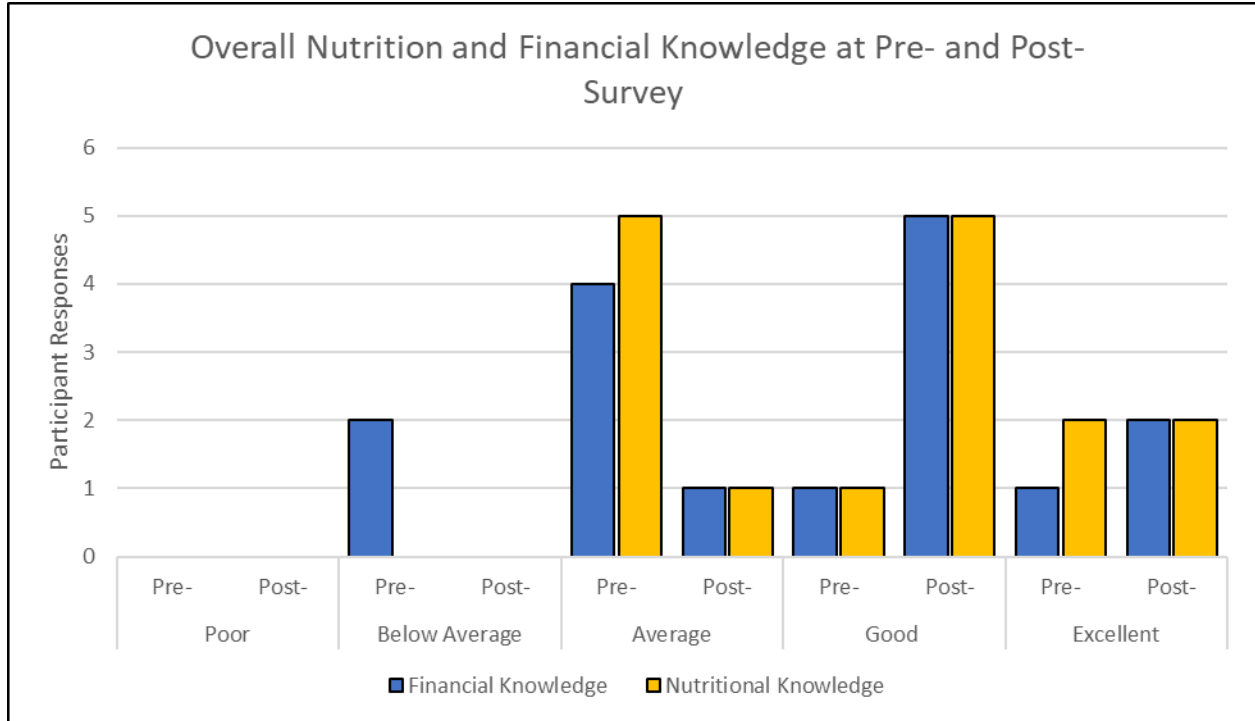


Table 3**Participant demographics**

		n
Age, years	26-30	2
	31-35	2
	36-40	2
	>45	1
	18-20	0
	21-25	0
	41-45	0
# Individuals in household, including self	4	3
	2	2
	1	2
	3	0
	5	0
	> 5	0
Education	Bachelors Degree	4
	Masters Degree	2
	Associates Degree	1
	High School Diploma	0
	PhD	0
	GED	0
	Other	0
Race	White/Caucasian	3
	Asian	2
	Black/African American	1
	Asian and White/Caucasian	1
	Native American	0
	Black/African American and White/Caucasian	0
	Native American and White/Caucasian	0
	Hawaiian/Pacific Islander	0
	Native American and African American	0
	Other	0
Ethnicity	Non-White	1
	White	6
English as first language	Yes	4
	No	3
Eligibility for public assistance	Yes	1
	No	6

Figures 2a-2o

Changes in participants' responses from pre- to post-survey about nutrition and financial knowledge.

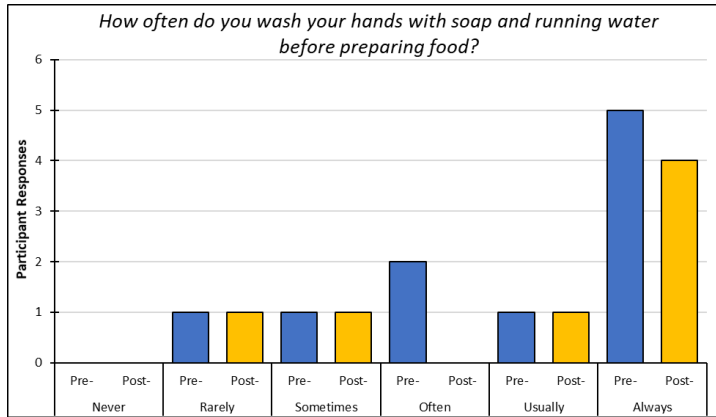


Figure 2b

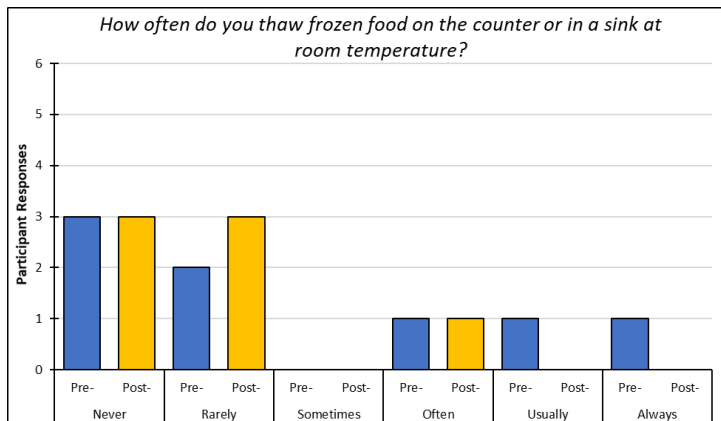


Figure 2c

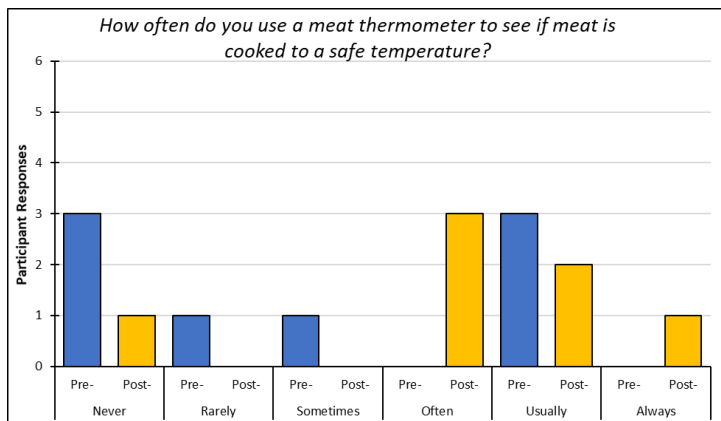


Figure 2d

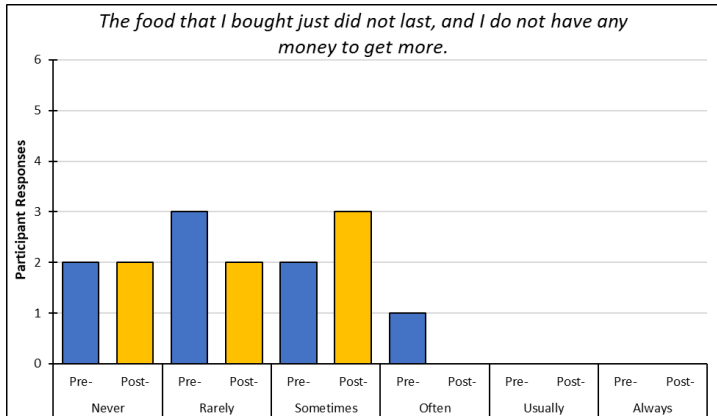


Figure 2e

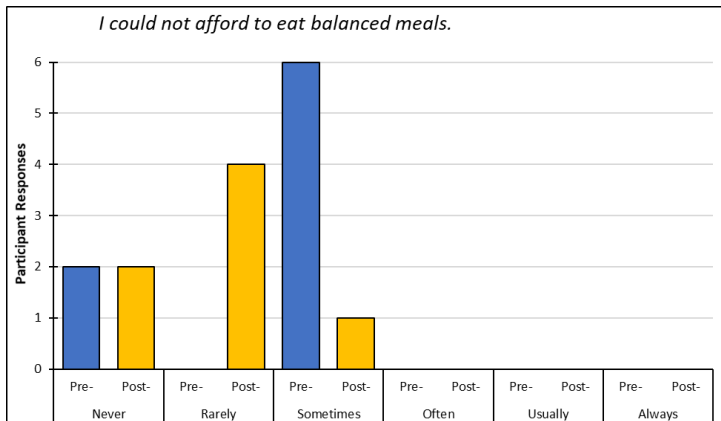


Figure 2f

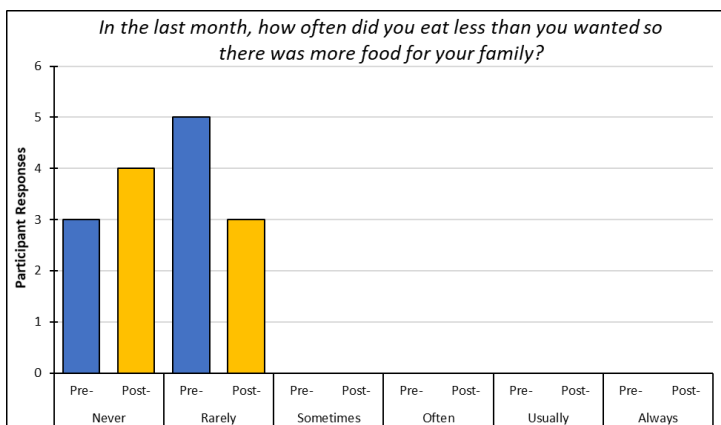


Figure 2g

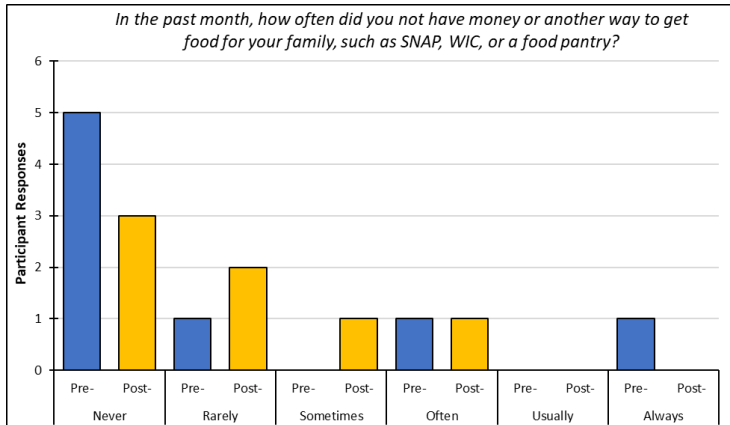


Figure 2h

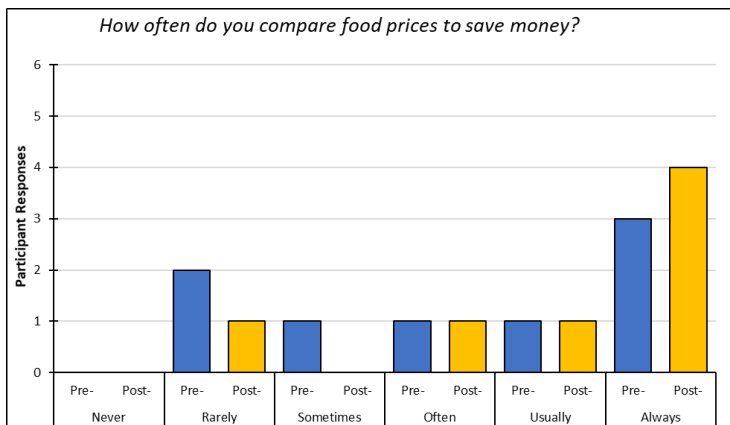


Figure 2i

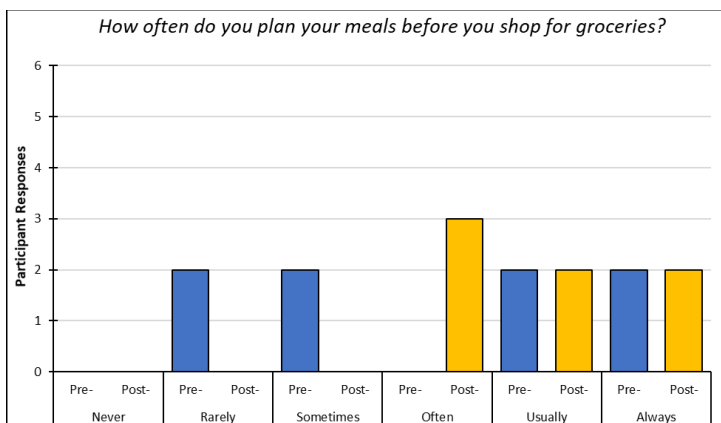


Figure 2j

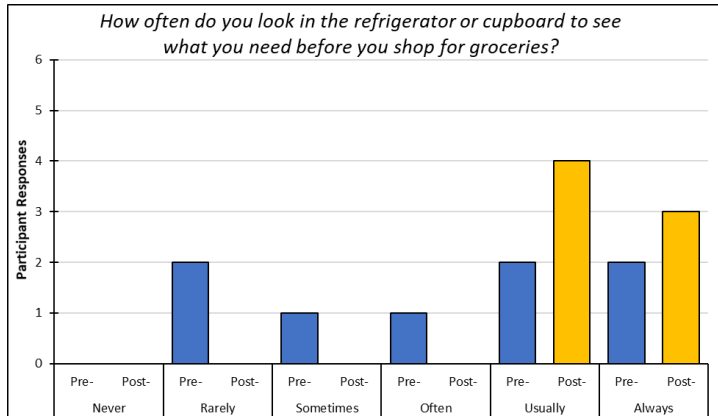


Figure 2k

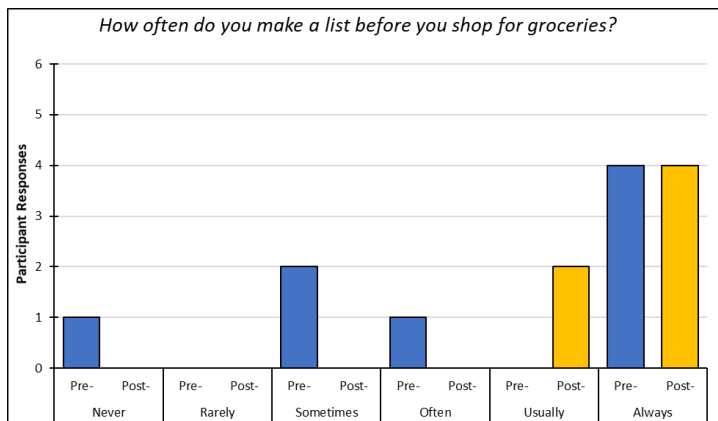


Figure 2l



Figure 2m

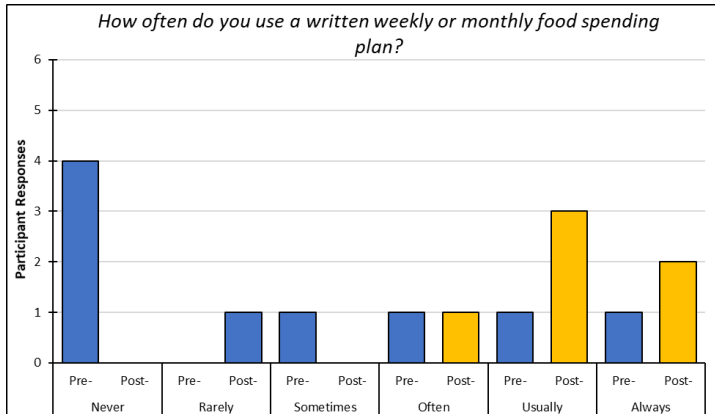


Figure 2n

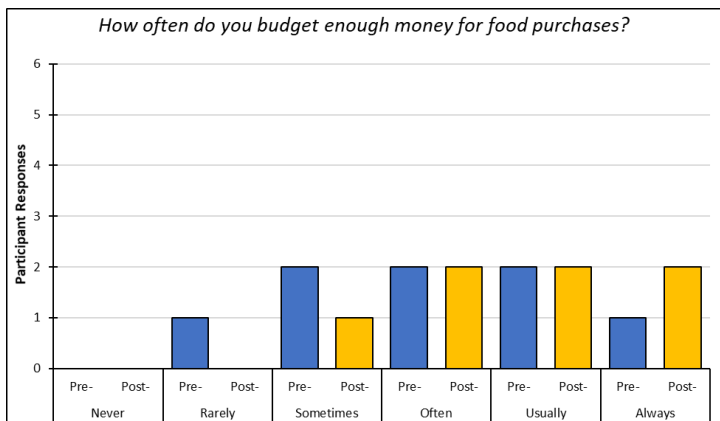
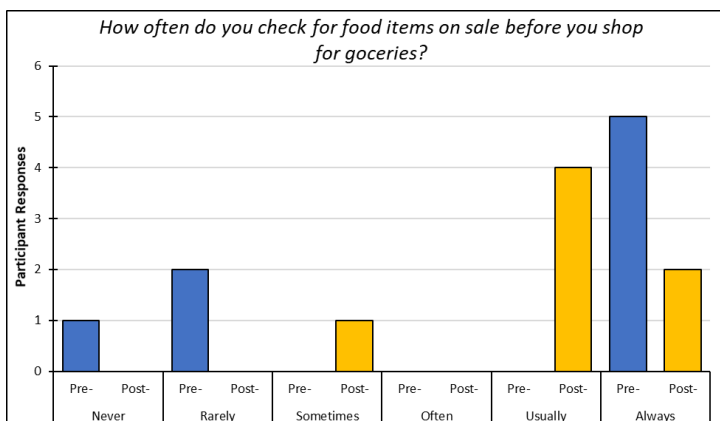


Figure 2o



Figures 3a and 3b

Changes in participants' responses of confidence in various meal preparation techniques/cooking skills and making food healthier using different cooking methods.

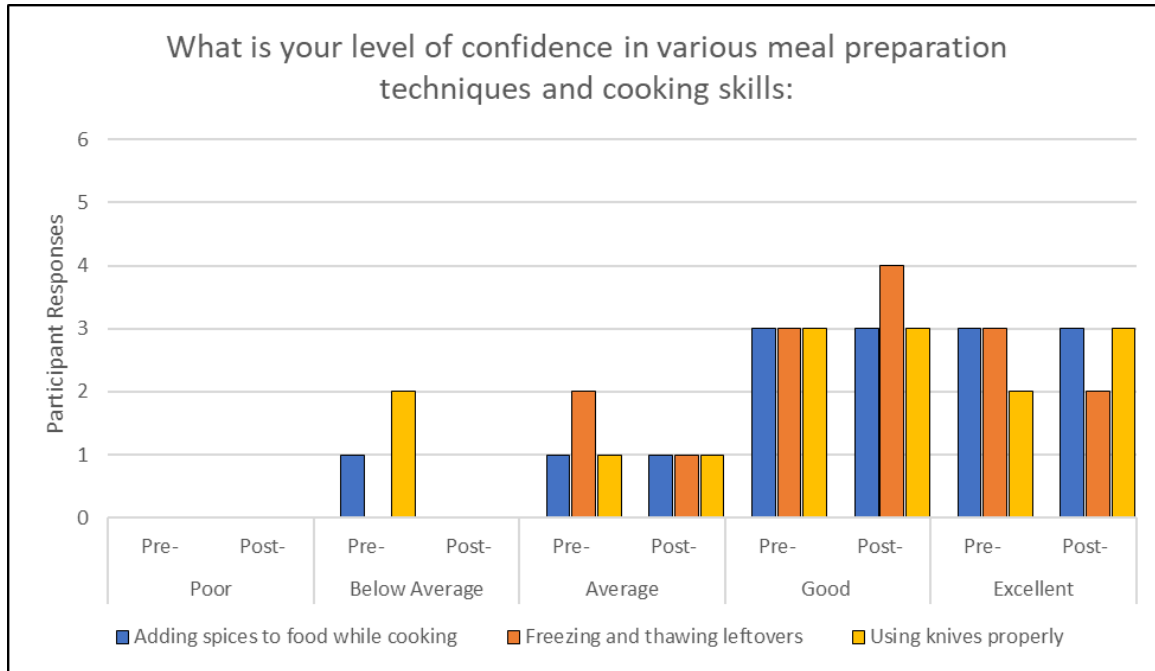
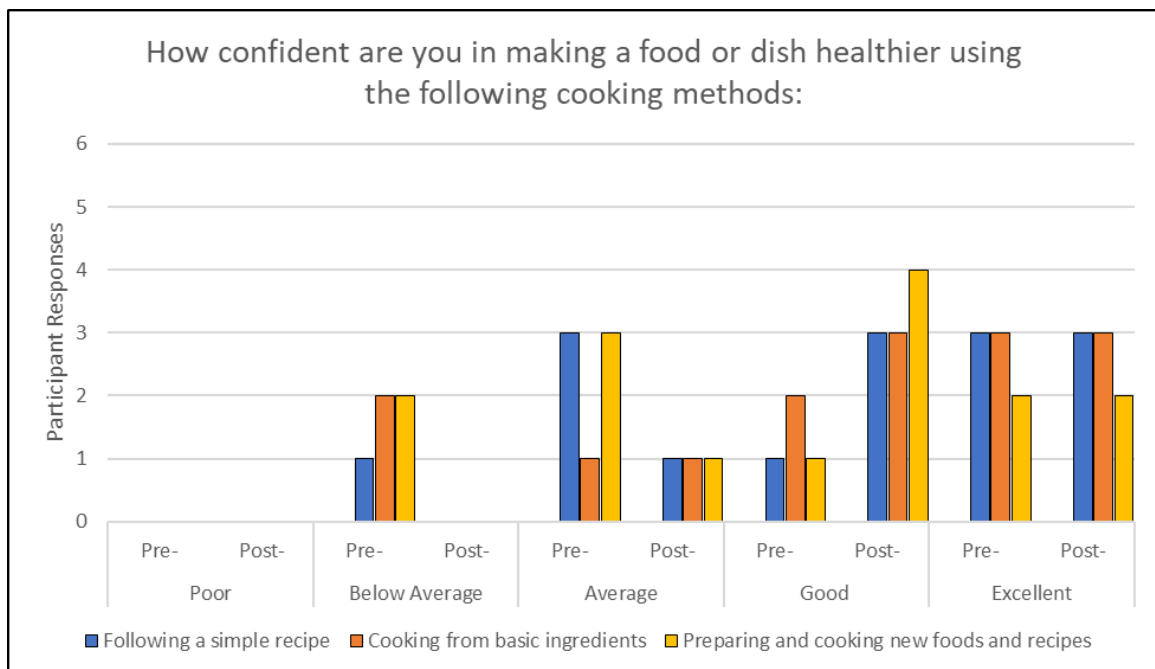


Figure 3b



Discussion

Participants of Balanced Budget Bites were able to learn about how to add foods to common items that came in their food boxes from Feeding Brookings to increase the nutrients in meals with limited additional cost. Participants were provided with financial resources to develop a spending plan, create a food budget, meal plan, shop for groceries, and identify resources in and around the Brookings community to support themselves and their families. Participants were able to learn about and increase confidence in food safety and meal preparation techniques, cooking skills, and adding nutrients to ready-prepared food items.

Balanced Budget Bites had many strengths. Each of the three learning modules spotlighted food(s) that were financially feasible to make and that were nutritious at the same time. Not only were the recipes economical and nutritious, but they were also easy to make with minimal preparation and steps involved. The recipes associated with the food demonstrations highlighted specific food(s) that came in the food boxes from Feeding Brookings. The time required to complete Balanced Budget Bites educational components, watch all three food demonstration videos, and watch all three financial videos was about an hour.

The overall outcomes of Balanced Budget Bites were positive, from both a nutrition and financial standpoint. Participants appreciated the recipes, handouts, tips, and community resources. Participants showed an increase in knowledge of topics from the course according to the scores from the pre-survey to the post-survey. Although there were not enough responses for a statistical analysis, results from Balanced Budget Bite aligned with results from similar studies that used video technology to assess changes in confidence, skills, and knowledge in nutrition.

Limitations

Time for recruitment was a limitation along with the method of recruitment. Recruitment for Balanced Budget Bites was four weeks. The primary method of recruitment used flyers that were printed and handed out by Feeding Brookings' volunteers, and the second method was the

flyer posted to Feeding Brookings' public Facebook page. Balanced Budget Bites recruited 28 individuals from Feeding Brookings who were interested in participating, but only seven of those people completed the course in its entirety. Due to the small number of participants, there was limited qualitative feedback.

Conclusion

Balanced Budget Bites was a positive experience for members of the Feeding Brookings community. The Balanced Budget Bites online course was created and made available as an online learning curriculum for convenience. Participants now have resources to help increase their confidence, skills, and knowledge of both nutrition and finance. If Balanced Budget Bites were to be implemented again, the length of time and method of recruitment needs to be considered. The recruitment period needs to be longer than four weeks, with a greater use of online platforms to reach more potential participants needs to be considered.

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