

CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

WICBites: Launching and Evaluating a Bilingual English-Spanish Nutrition Education and
Recipe App

A thesis submitted in partial fulfillment of the requirements
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by
Erika Giroux
In Collaboration with
Vanessa Sanchez

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The thesis of Erika Giroux is approved by:

Yi Cai, Ph.D.

Date

Joy Ahrens, MPH, RD, CLE

Date

Annette Besnilian, EdD, MPH, RDN, FAND, Chair

Date

California State University, Northridge

DEDICATION

To family: Thank you for your continuous support and encouragement to follow my dreams!

To all of my committee members especially Dr. Besnilian, this thesis could not have completed without your continuous support and dedication. Thank you so much for all that you do!

To all participants who completed our surveys and evaluations. Thank you for all your helpful feedback and support!

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ABSTRACT

WIC BITES: LAUNCHING AND EVALUATING A BILINGUAL ENGLISH-SPANISH NUTRITION EDUCATION AND RECIPE APP

By

Erika Giroux

Master of Science

in Human Nutrition

The purpose of this project was to develop, launch, and evaluate a nutrition education app that would include recipes and nutrition education in both Spanish and English to meet the needs of the communities of California State University, Northridge students and Northeast Valley Health Corporation Women, Infants, and Children (WIC) participants. The context of the app came from previously developed cookbooks by Northeast Valley Health Corporation WIC program. Customer discovery survey was conducted with 12 participants to showcase the need for a bilingual nutrition education app. The app was launched in April 2021 and evaluation data was collected through surveys with 17 English-speaking and 23 Spanish-speaking participants. Results showed that the app was well-received by both groups. However, the Spanish-speaking group had an overall better mean percentage of responses, than the English-speaking group. the preliminary evaluation data shows that there is a need for bilingual nutrition education and healthy recipe app.

CHAPTER I

Introduction

Chronic disease due to obesity is an increasing problem in the United States (US). The ten leading causes of death in the US include heart disease, cancer, diabetes, and stroke, which have all been linked to obesity (Heron, 2019). According to the CDC, approximately 13.9% of children between the ages of 2 to 5 years old are obese. The rates of obesity increase as age increases, which makes it important for prevention to start early in life (Hales et al., 2017). Moreover, the groups with the highest rates of obesity include non-Hispanic black individuals (49.6%) and Hispanics (44.8%) (CDC, 2019).

Chronic diseases caused by obesity are one of the most debilitating and costly conditions and are also the most preventable. According to the CDC, chronic diseases that are avoidable through preventive care services account for 90% of annual 3.8 trillion dollars spent on healthcare (Centers for Disease Control and Prevention, 2021). This amount is expected to increase to \$42 trillion by the year 2030. If changes are not made, by 2030 those with chronic diseases are projected to spend \$8,600 per person in medical and productivity costs. Reports show that America can save \$6.3 trillion if improvements are made in prevention and treatment of chronic diseases. It has also been stated that if everyone in the country received recommended clinical care for the prevention and treatment of chronic diseases, then the healthcare system could save 1,100,000 lives annually (Richards Adams et.al, 2019). The best prevention for obesity-related chronic disease is a healthy diet (Erickson et al., 2016).

Factors that contribute to a healthy diet include environmental factors, accessibility, and knowledge (Brennan et al., 2014). Where someone lives, eats, learns, and socializes is a big

factor in the probability of suffering from obesity or chronic disease. Further, historical inheritance of inequity has molded the prevalence of chronic disease and obesity in underserved communities due to unfavorable conditions and lack of resources. Overall, the prevalence of obesity and chronic diseases is not only due to individual lifestyle choices but also due to causes that are historical, cultural, economic and social (Brennan et al., 2014). Vulnerable communities that are most susceptible to obesity should be the focus when implementing nutrition education programs (Erickson et al., 2016).

Childhood obesity is increasing in the US and is disproportionately higher in low-income households (Centers for Disease Control and Prevention, 2021). Individuals who are overweight or obese during childhood are more likely to become obese adults who suffer from obesity-related chronic diseases, compared to normal weight children (Biro & Wien, 2010). According to the American Academy of Pediatrics, attitudes about foods and eating behaviors are formed early in life. Therefore, it is important for parents to serve a variety of healthy foods to children to help develop healthy food habits to later combat obesity-related chronic diseases. (Preventing childhood obesity in early care and education programs, 2020). Nutrition education can help in the prevention of nutrition related chronic diseases beginning in childhood (Erickson et al., 2016). Children who regularly consume low-quality meals, such as fast food, are more likely to experience obesity compared to children who are served home-cooked meals with fruits, vegetables, whole grains, and lean proteins (An, 2017; Jia et al., 2021). One program that helps combat childhood obesity in underrepresented communities is the Special Supplemental Nutrition Program for Woman, Infants, and Children (WIC) (Sekhobo, 2017).

WIC serves low-income families which are most affected by obesity and nutrition related

diseases by providing nutrition education and promoting healthy eating to pregnant, postpartum, or breastfeeding women as well as infants up to the age of 5. By providing nutrition education, counseling, healthy recipe options, and other resources to buy health foods to this population, obesity and the health risks it presents can hopefully be prevented throughout participants' lives (Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), n.d.).

Of those in the WIC program, Hispanic children displayed higher rates of obesity compared to other ethnicities (Sekhobo, 2017). Therefore, it has been suggested that nutrition education should be targeted to this community. Having accessible nutrition education is key in the prevention of obesity and chronic diseases (Erickson et al., 2016). Because cell phone usage in America is at 96%, with 69% of U.S. digital media time coming from app usage, having an accessible nutrition education app is warranted (Carroll, 2017). Specifically, this app must contain information in both Spanish and English so that it is usable by the large Hispanic population enrolled in the WIC program.

Statement of the Problem

Obesity and related chronic diseases continue to be one of the leading causes of death in America. Prevention in the form of education and accessibility to resources that facilitate health and well-being, and healthier habits can help save lives and reduce healthcare spending annually. Research shows that nutrition education has helped increase fruit and vegetable consumption in overweight and obese adults (Wagner, 2016). A majority of the individuals affected by obesity and related chronic diseases are non-white individuals, with African Americans and Hispanic individuals being most affected (Overweight & Obesity, 2020).

There are many barriers that affect the accessibility to healthier food options and nutrition

and healthy diet education (Truman & Elliott, 2019). More individuals are looking for accessible ways to obtain a healthier diet and improve their overall health. With the obesity epidemic steadily increasing, specifically in underrepresented groups, inclusive information in both English and Spanish and more readily accessible nutrition education is warranted and should be implemented (Snowden et al., 2016). The WIC population includes pregnant and postpartum mothers and children up to the age of five. By providing healthy recipe options to this population, obesity and the health risks it presents can hopefully be prevented throughout participants' lives (Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), n.d.). Because of this, the WIC population lends itself to be a good starting point for launching a health and nutrition education app.

Project Questions

In order to evaluate the effectiveness and use of the app, it was hypothesized that using an app will provide numerous accessible resources and recipes for the WIC and CSUN communities. The following questions guided the project:

1. What suggestions and recommendations were gathered to fulfill the need for an app through customer discovery surveys?
2. What suggestions, observations or comments do the Spanish-speaking and English-speaking participants have to guide any changes to the recipes or the app?

Purpose

The purpose of this project was to create, implement, and evaluate a nutrition education app to help prevent obesity with a focus in underrepresented communities which are most affected by obesity and obesity-related diseases. In this project evaluators documented the

development, analysis, evaluation, and marketing of the nutrition app among community members.

Definitions

1. Medical Nutrition Therapy: Process in which a Registered Dietitian uses evidence-based research to determine a nutrition-diagnosis, therapy and counseling for disease management (Klemm, 2021).
2. Registered Dietitian: Food and nutrition experts who work in the health care setting and commonly provide nutrition services to improve conditions such as diabetes, hypertension, and heart disease (Ellis, 2020).
3. Women Infant and Children (WIC): A supplemental nutrition program that services underrepresented communities for women who are pregnant, 6 months postpartum and not breastfeeding, or 1 year postpartum and fully breastfeeding; infants; and children up to the age of 5 years that provides nutrition education and supplemental food products designed to help fill nutrition gaps (*Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)*, n.d.).
4. App: an application made and designed for a mobile device such as a smartphone (Merriam-Webster, n.d.)
5. Smartphone: a cellular phone that includes addition software functions such as email and internet (Merriam-Webster, n.d.)

1. Limitations

This project will contribute to developing the most efficient and effective nutrition education app that is culturally sensitive and includes information in both English and Spanish;

however, certain limitations exist.

1. Participants completing customer discovery survey may not be randomly selected
2. The app may not be reachable to those without the accessibility to an app or phone.
3. The customer discover survey may not be taken by those who cannot read or understand English or Spanish.

CHAPTER II

Review of Literature

Chronic disease due to obesity is an increasing problem in the United States (Heron, 2019). This chapter will evaluate current research regarding nutrition and chronic disease, the role of WIC in helping prevent obesity, the effectiveness of health apps, and what apps are currently available to consumers to help with making healthier nutrition and recipes choices.

Obesity: Causes and problems related to obesity

Obesity is an ongoing issue that is steadily rising in the United States (Bell et al., 2019). It is a predictor to chronic diseases such as cardiovascular disease, cancers, diabetes and in some, mortality (World Health Organization, 2002). There are many complex determinants of obesity. Such determinants include physiological factors such as physical inactivity, overeating, or genetics, and sociocultural factors such as race and ethnicity. Obesity has been found to affect certain demographic groups at a larger rate (Bell et al., 2019). Woman, people with low socioeconomic status, underrepresented minority groups, and rural residence in areas with limited resources are more greatly affected by obesity. Other factors that can predetermine the prevalence of obesity include things such as the area where one lives and the populations income, poverty rate, and racial composition (Stringhini et al., 2017; Taveras et al., 2013).

Obesity-Related Diseases

Many of the leading diseases in the United States' can be prevented through proper nutrition (Heron, 2019; World Health Organization, 2014). Associations between high diet quality and lower risk of cancer, type 2 diabetes, neurodegenerative diseases and cardiovascular disease and mortality has been seen in research studies (Schwingshackl & Hoffman, 2014). As

research continues, nutrition therapy is becoming more and more important to a larger number of chronic diseases (Russell, 2019). Bergman and Brighenti (2020) showed that targeted nutrition therapy can positively affect a multitude of chronic diseases, including cardiovascular disease, chronic lung disease, obesity, cancer, diabetes, and liver or kidney disease.

Obesity Prevalence

According to the Office of Minority Health (n.d.), Hispanic women are more prevalent to being overweight or obese, with data showing 78.8 percent of Hispanic women being overweight or obese as compared to 64 percent of non-Hispanic white women. Data from 2018 shows that Hispanic women were 1.2 times more likely to be obese than non-Hispanic white women. When it comes to Hispanic children, data from 2013-2016 shows that Hispanic children were 1.8 times more likely to be obese compared to non-Hispanic white children. Data from 2017 showed that high school students who were Hispanic were 50 percent more likely to be obese compared to non-Hispanic white youth.

Disparities between ethnic and racial groups has been extensively researched with finding showing that certain groups are affected more heavily and are more prone to obesity and related chronic diseases (Adams et.al, 2019). Disparities due to diet are multi-faceted and are said to be associated with demographic and psychosocial factors and barriers faced to obtain healthy foods (Satia, 2009).

African Americans are more likely than non-Hispanic whites to be impacted from chronic diseases and are 1.4 times more likely to be obese. The disparities between groups predetermines African Americans and Hispanics to be more prone to a reduce of income due to loss of productivity because of chronic disease. These disparities also cause African Americans

and Hispanics to have a higher cost for health care and medical expenses due to chronic disease, costing the nation \$3.3 trillion annually. These numbers are expected to rise to \$42 trillion by the year 2030 (National Science Foundation, 2017).

A study investigated the demographic and psychological components that influence the diet quality among African Americans adults found that higher empty calorie foods, lower fruit and vegetable, dairy and protein consumption was seen in those with higher barriers to healthy eating (Adams et.al, 2019). To determine the differences between participants in the study, diet quality was assessed using the Healthy Eating Index (HEI). The study concluded that culturally appropriate interventions, barriers to healthy eating, and more nutrition education is needed targeted to the African American community. Boggs et al. (2013) noted that because of the inequity in disease incidence and comorbidities, genetic predisposition, and the unique modifying factors between racial and ethnic groups, resources should be allocated to high-risk groups such as Hispanics (Boggs et al., 2013).

A similar cross-sectional study done by Kirby et al. (2012) explored the relationship between community racial/ethnic composition and obesity risk found that living in a predominately Hispanic community accounted for a 21% and 23% increase in the prevalence of obesity in Hispanics and non-Hispanic whites. Kirby et al. (2012) stated that community related risk factors must be taken into account when it comes to risk of becoming obese that take into account environment and social norms of different racial and ethnic communities.

Furthermore, a study done to examine the association between obesity, obesogenic environments, and structural racism by country-level racial composition found that racial inequality in poverty, homeownership and poverty were correlated to higher obesity rates. (Bell

et al. 2019). Bell et al. (2019) found that county racial composition was a determinant to the prevalence of obesity and that there should be targeted interventions to improve obesogenic environments. Additionally, lower income areas are less likely to have access to adequate and high-quality healthcare, further complicating their ability to have access to information on how to eat healthy (Abbas et al., 2017). Expansion of healthcare in these areas to include education on nutrition will help to combat the obesity epidemic according to research studies (Medicine et al., 2012).

Moreover, due to coronavirus SARS-CoV-2 (COVID-19) and stay at home orders that have been in place throughout the United States and globally, there has been a significant disruption in people's everyday lives, affecting dietary habits (Pearl, 2020). A particular study done in Poland to investigate dietary choices and habits during the COVID-19 lockdown conducted a cross-sectional online survey of adult Poles. Results showed that over 43% and nearly 52% reported eating and snacking more. Almost 30% and over 18% experienced weight gain and loss. The study also noted how dietary habits had changed with a decrease in fruit and vegetable consumption and increase in fast food consumption (Sidor & Rzymiski, 2020).

Ruiz-Roso et al. (2020) investigated COVID-19 confinement and changes in adolescent's dietary trends in Italy, Spain, Chile, Colombia and Brazil through an anonymous online survey done on 820 adolescents and found that COVID-19 confinement did influence dietary changes. Modified consumption of fried foods, sweets, vegetables, fruits, and legumes were seen. Nutrition education was stated to be an important factor to help dietary habits and adjusted recommendations are warranted for future pandemics (Ruiz-Roso et al., 2020). A similar study done to investigate changes in physical activity and diet during the COVID-19 pandemic found

that due to increased stress and depression during quarantine, unhealthy eating habits have been more frequently seen. The study demonstrated that global action supporting healthy diet and physical activity is essential (Mattioli et.al., 2020). Overall, studies have shown that the COVID-19 pandemic has uprooted schedules and lead to an increase in unhealthy food habits and increase in the need for nutrition education (Mattioli et.al., 2020; Pearl, 2020; Ruiz-Roso et al., 2020; Sidor & Rzymiski, 2020).

Obesity Solution

According to the CDC, solutions to the obesity epidemic should focus on programs which disseminate evidence-based health information, community efforts which focus on building an environment that supports healthy living, and creating personal lifestyles which support long-term healthy living (U.S. Department of Health & Human Services, 2020). One of the best ways to combat obesity is through medical nutrition therapy with a registered dietitian (RD) (Russell, 2019). Research by The Academy of Nutrition and Dietetics has shown that nutrition therapy with an RD can encourage weight loss and reduces overall medical cost for the patient and insurance companies (Academy of Nutrition and Dietetics, 2009). However, the average cost of meeting with a registered dietitian is \$75 per hour, and potentially more depending on where one lives (Davison et al., 2004). Furthermore, it can be difficult to schedule a meeting with one, especially if one does not have access to reliable transportation. As stated before, the Hispanic population is more likely to experience poor nutritional health, but is also more likely to be impoverished and have difficulty with transportation (Askim-Lovseth & Aldana, 2010; Bell et al., 2019).

Women, Infants, Children (WIC)

The WIC program serves over half the children born in the United States and as such is in a unique position to positively affect rising obesity levels. Through the promotion of nutrition education, WIC can give advice to mothers about healthy recipes that can be made with WIC foods that are given to specifically address nutrient-deficiencies (Sekhobo, 2017). However, this information can be hard to disseminate with meetings once every month to three months. Currently, NEVHC WIC uses an app called the “California WIC App” which is how participants in the program can access information about their benefits and upcoming appointments (California Department of Public Health, 2021). According to a study completed earlier this year., 83% of WIC participants in California find the WIC app helpful (Au et al., 2021). Furthermore, Bensley et al. (2014) demonstrated that a majority of WIC participants prefer for nutrition information to be given through technology, such as mobile phone applications. However, the current WIC app does not include any information about nutrition education or healthy recipes (Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), n.d.).

Mobile Phone App Utilization and Effectiveness

Utilization

Approximately 58% of mobile phone owners have downloaded at least one health and nutrition app, with 68% of the users opening the app at least once per day (Carroll et al., 2017). Furthermore, a qualitative analysis done to reduce Hispanic children’s obesity risk factor in the first 100 days of life stated that mothers expressed interest in mobile technology as intervention for nutrition education (Baidal et.al, 2015). However, there is few mobile apps that provide health information in Spanish, according to the evaluator’s personal research of the Apple and

Google app stores (Apple, 2021; Google, 2021).

Effectiveness

Phone apps for weight loss contribute to a significant decrease in body mass (Flores Mateo et al., 2015; Rathbone & Prescott, 2017). Carroll et al. (2017) found that those who used health apps were more likely to report intentions to improve fruit consumption, increase physical activity, and achieve weight loss. Furthermore, individuals who had downloaded health apps were more likely to meet physical activity guidelines (Carroll et al., 2017). Specifically looking at those who have prediabetes, an intervention was used to assess the effectiveness of reducing diabetes using a fully automated intervention, including an app. The intervention improved blood glucose levels, BMI, triglyceride and cholesterol levels, and overall diabetes risk for participants. This further supports the use of app-based interventions for people with chronic disease, such as prediabetes (Block et al., 2015).

Current Literature on Nutrition Based Apps

While Villenger et al. (2019) conducted a systematic review and meta-analysis that determined that app-based nutrition interventions to change nutrition behaviors and nutrition related health outcomes were effective; the population studied was only English speakers and the apps reviewed were only in the English language (Villenger et.al, 2019). A similar study done to determine the usage of features of popular nutrition-related mobile apps found that there is a clear interest and opportunity for nutrition-based apps. Functions of nutrition apps such as apps that record food intake had high usage. However, this app did not include the percent usage between different demographic groups and did not evaluate apps in both the English and Spanish language (Franco et.al, 2016).

Another study conducted by Samoggia and Riedel (2020) assessed nutrition-focused mobile apps and its influence on consumers healthy food behavior and nutrition knowledge found that nutrition-information apps can be effective in surpassing barriers consumers have for eating healthy and can increase self-confidence when approaching healthy food. This study, however, also did not mention the demographic of users or if there were any variants between primarily Spanish speaking individuals in the acceptability of these apps and nutrition information. Various studies have been conducted on app usage and the beneficial effects of nutrition-based apps, however, the studies have not evaluated apps in a different language nor if the apps were still accepted by a different population, for example, the Hispanic population that is primarily Spanish speaking (Samoggia & Riedel, 2020).

The Gap

The obesity epidemic is increasing in the United States and affects the Spanish-speaking population in greater rates than the English-speaking population (Bell et al., 2019; Stringhini et al., 2017; Taveras et al., 2013). There have been defined correlations between obesity and chronic diseases, such as type 2 diabetes mellitus, cancer, and cardiovascular disease (Schwingshackl & Hoffman, 2015). According to the CDC, solutions to the obesity epidemic should focus on disseminating evidence-based health information (U.S. Department of Health & Human Services, 2020). While one of the best ways to gain this information is through medical nutrition therapy with a Registered Dietitian, this can be too costly for impoverished populations (Russell, 2019; Davidson et al., 2004). Phone applications with nutrition information been shown to be desired among the Spanish-speaking population and have shown to be effective intervention strategies for obesity and obesity-related chronic diseases (Baidal et.al, 2015; Flores

Mateo et al., 2015; Rathbone & Prescott, 2017). However, health apps are much more prevalent than Spanish app, demonstrating a need for a bilingual evidence-based nutrition app (Apple, 2021; Google, 2021).

CHAPTER III

Methodology

The purpose of this study was to develop, launch, and evaluate the WICBites app that would give users access to recipes, videos, and nutrition information in both Spanish and English. It was specifically designed for mothers looking for quick and easy recipes and nutrition information. Further, it was done to create a bilingual nutrition education app, a resource to help combat the growing obesity epidemic in the United States and educate individuals on how to live healthier lives. It was important to create a resource in both Spanish and English due to the limited resources in Spanish available and high demand for a resource that provides nutrition information and recipes in Spanish. The recipes included in this app were designed to be easy to follow and enjoyable to the consumer. Findings showed high demand and acceptability of the app, with users claiming they would create the recipes provided. Customer discovery allowed the evaluators to better streamline what should be added to the app and the needs of the consumer. Various meetings were held with the CSUN Marilyn Magaram Center and WIC to discuss the distribution of the app to the community. This chapter outlines the projects materials and instruments used, process and procedure of launching the app, and consultations with experts about launching the app. Qualitative data was utilized to evaluate the app as this was perceived as a more descriptive way to estimate the effectiveness and gather suggestions to further improve the project.

Participants

The target audience for this project included mothers and individuals of the CSUN community. The main characteristics of the participants included mothers between the ages of

27-50 with children between the ages of 1 to 5 that spoke either primarily English or primarily Spanish. The specifics of the participants will be discussed in this section.

A customer discovery questionnaire was conducted first to demonstrate the need for a nutrition education app. According to Bosman et al. (2020), customer discovery is defined as “the process of understanding the value proposition of a venture by identifying customers and understanding their needs.” With this in mind, the evaluators developed a 11-question survey which helped to identify the need for a nutrition education app and the suggestions made by the community to make the app desirable. The customer discovery questionnaire served to answer the first project question of “what suggestions and recommendations were gathered to fulfill the need for an app through customer discovery surveys?”. The questionnaire was then distributed to 12 English-speaking individuals through the website SurveyMonkey.

Once the app was launched, a bilingual evaluation was created and given to members of the CSUN community and friends and family of the evaluators. The evaluation survey served to answer the second question of “what suggestions, observations or comments do the Spanish-speaking and English-speaking participants have to guide any changes to the recipes or the app?”. The survey was created to help evaluate the acceptability of the app within the community and to help the evaluators learn how to improve the app to increase acceptability and effectiveness. The evaluation was translated in English and Spanish and was distributed to 23 Spanish-speaking individuals and 17 English-speaking individuals. All participants were between the ages of 20-45 and had at least one child under the age of 6. The survey was given out through a link and the app was shown to participants by having them download it if they had an Android phone, or through a website with a demo of the app if they had an Apple phone. The

participants were given 1 week to allow them to navigate through all parts of the app before being asked to submit the evaluation.

Materials and Instruments

To conduct this project, the first step was the selection of the platform where the app would be created and launched. The platform of the app was selected to be Buildfire. Research was conducted originally by Jose Serrano, who started the project during his dietetic internship (Serrano, 2019). Buildfire was selected due to ability to include all of the functionalities needed for the app.

Due to the COVID-19 pandemic, in person surveys were not able to be conducted so an online based survey was the most appropriate to collect survey responses. To distribute the customer discovery and feedback surveys, the website SurveyMonkey was utilized. The customer discovery survey asked 11 qualitative questions aimed at answering project question 1 “What suggestions and recommendations were gathered to fulfill the need for an app through customer discovery surveys?”. The survey was distributed to individuals within the CSUN community through SurveyMonkey and the responses were used to help develop the app. To evaluate the effectiveness and utilization of the app, a qualitative 9-questions bilingual evaluation survey was created to answer project question 2 “What suggestions, observations or comments do the Spanish-speaking and English-speaking participants have to guide any changes to the recipes or the app?” The evaluation was distributed to friends and family of the evaluators, and individuals in the CSUN community through SurveyMonkey. Responses were used to determine the effectiveness of the app, and to generate ideas for further improvement.

Project Design

Given the specificity of the populations, one evaluator focused on the Spanish-speaking group and the other focused on the English-speaking group (See Appendix D). The app took months to develop and launch, ensuring that both areas of the app, the Spanish section and the English section, were mirrors of each other ensuring both groups received the same information.

Procedures: Determining Platform for the WICBites app

To begin to develop the app, platforms where the app could be built were assessed by dietetic intern Jose Serrano during his dietetic internship program development project (Serrano, 2019). The platform needed to support the recipes with ease of navigation for consumers of the app. The platform also needed to allow easy maintenance for admins of the app to be able to add recipes and additional information when needed. The platform also needed to support future additions to the app such as the ability to cross reference recipes in search of macronutrient and micronutrient adequacy across all recipe combinations to suggest consumer their ideal menu combination options to achieve nutrition adequacy for themselves and their children and personalized profiles. Financially, the platform also needed to be within budget for NEVHC and the Marilyn Magaram Center as well as lower the cost of operation for WIC Cookbooks by moving to a mobile platform.

After conducting research on mobile-app platforms, two platforms were reviewed as potential services to use to build the app, AppyPie and Builtfire. AppyPie was reviewed, but found to have terrible customer service, lack of Spanish resources, and a difficult platform to work on. The recipe layout on AppyPie would not be able to be modified through web support which would lead to roadblocks in the future. The lack of availability of Spanish recipes on this platform was also a dealbreaker since having Spanish resources was very important. On the

contrary, Buildfire had responsive customer service and a workable modular web design. The recipes would be able to be modified and most important, it allowed for the availability of Spanish recipes. Because of these reasons, Buildfire was chosen as the best platform to develop the app.

Procedures: Development and Evaluation of the WICBites App

The process of creating the app began when the Northeast Valley Health Corporation (NEVHC) WIC office contacted the Marilen Magaram Center and asked for assistance in getting their healthy living cookbooks and links to nutrition education. Participants of the WIC program had been frequently asking for access to WIC cookbooks. Due to the pandemic, participants had been unable to go to WIC clinics in person and pick up the cookbooks that were available. When attempting to mail cookbooks to participants, WIC staff had noticed that it was difficult and expensive to distribute their cookbooks to all the participants requesting healthy and kid-friendly recipes. Participants were looking for an easier way to access healthy recipes for their families especially during a global pandemic. Additionally, participants wanted an easy way to access nutrition education information on their phone.

NEVHC was already partnered with CSUN through the dietetic internship program which allowed students from CSUN's master's in human nutrition program to rotation through WIC to gain community-based hours for the dietetic internship. A dietetic intern, Jose Serrano, was first put in charge of creating the app and determining the platform for the app. In July of 2020, Jose trained and provided the steps to Erika and Vanessa to be able to navigate and add content to the app. This then allowed the CSUN interns to assess, implement, help launch and evaluate the app as a collaboration was already made with NEVHC. Having dietetic interns with

nutrition knowledge and app expertise is necessary to complete this project.

To determine the need for developing the app, customer discovery was conducted to determine the effectiveness of such apps and the usability of them. During the customer discovery, it was found that phone usage and app usage was steadily increasing. More and more people are turning to their phones for their nutrition education (Stansberry et al., 2020).. As online platforms for health such as telehealth are on the rise due to the global pandemic, a nutrition education app seemed warranted. An app would allow NEVHC to deliver nutrition education and recipes in an effective manner so that participants would be able to locate information at the tip of their fingertips where ever they are. It was suggested by NEVHC WIC that since a majority of WIC participants utilize cell phones and apps, it would be easy for them to download and use the WIC app.

Because a large percentage of WIC participants were exclusively Spanish speakers, it was important to develop an app that contained both English and Spanish options. When doing further research on nutrition education apps, the evaluators noticed a lack of nutrition education apps with Spanish nutrition education and recipes. The need for the conduction of evaluations to determine the acceptability of a bilingual nutrition-based app was evident. The cookbooks developed for WIC participants followed these guidelines and contained various recipes that are culturally sensitive to the Hispanic Community.

To further investigate the need for a bilingual nutrition education app, a customer discovery survey was developed (Appendix B). The goal of the customer discovery survey was to investigate the need of the app and how many individuals would be interested in downloading such an app. The questions were selected that would allow the evaluators to gather the

information needed to demonstrate the need. The questions were:

1. Do you have an Apple or Android Cellular device?
2. What are barriers that are keeping you from eating healthy?
3. What are your most used apps on your phone?
4. How long do you spend cooking per week?
5. How often do you eat out?
6. Do you enjoy subscription-based apps?
7. Do you find it difficult to find relevant information to help your health goals?
8. Do you believe healthy diets are catered to your eating habits/culture?
9. Do you find it difficult to make a change?
10. Do you wish you had more guidance for your health goals?
11. What are some ways you like to receive your nutrition education?

Procedures: Building the WICBites app

Once the mobile-app platform was found and solidified, an account was made to begin creating the app. Cookbook recipes needed to be modified to be able to be added to the mobile-app platform. Contact was made with Director of WIC Program, Joy Ahrens to obtain digital copies of recipes from the WIC cookbooks. Once pdf. files of WIC cookbooks were received, a way to translocate the recipes to the app was evaluated. A systematic system or coding recipes to the mobile-app platform to be easily read by consumers was made by dietetic intern Jose Serrano. Coding information was made into a procedure manual so that future interns and volunteer app admins would be able to easily upload new recipes to the app. Images were also obtained for the recipes. Images of each recipe had to be sized specifically to fit the app by a

graphic designer, Paula Golden, so that the images adequately depicted the final product of the meal. The app was named “WIC Bites”. The idea for the name came about with the concept that individuals can access not only cooking information (food bites) but also educational tips for their overall family's wellbeing (education bites).

After the procedure manual was created and all resources were allocated to be uploaded to the app, the environment for the app was developed. This included a welcome screen and an English and Spanish screen selection. The app was made to contain both English and Spanish screens where you can navigate to either or screen to find information in the language selected. Recipes and information would be allocated in the accurate location, with mirror images and information of each other. Folders were created where the information would be placed for each feature. Source code table design made it possible for nutrition facts to be added without needing and external server for images in the recipes section.

To discover the fastest and most efficient manner to upload recipes to the app, different methods of adding recipes to the app were tested. It was found that copying and pasting the recipes from Word to WIC Bites was not possible since the formatting was changed when copying and pasting. Html knowledge would be needed to fix the formatting. The fastest method for adding recipes to the app was found to be a hybrid between direct input of the information in the nutrition facts label and using a word/html converter for the ingredients and preparation section, copying the source code and replacing it on the app source code. The total time with to add a recipe to the app was approximately 16 to 17 minutes.

Since the addition of a nutrition education feature was also requested, a resource to add nutrition education and video links for NEVHC WIC feed on YouTube and handouts was

created. In this section of the app, WIC handouts and videos on various nutrition concepts and information were added so that consumers of the app would be able to also receive information through the app in both English and Spanish. A conference call with Buildfire help the evaluators change the internal structure to make the app more efficient and allow for placement of an additional icon for handouts.

A logo design was made for the WIC Bites app. The logo design was later modified to be able to showcase both NEVHC WIC and the CSUN Marilyn Magaram Center. The new logo was uploaded to the WIC Bites app. Intro messages were made in both Spanish and English.

Procedures: Launching the App

To begin launching the app, all app functions had to be completed. This included recipes, nutrition education, home screen. Next, a plan had to be chosen that best fit what functions were needed from the app including app experience and app analytics. Buildfire has three plans to choose from – growth, business and enterprise. Each included different functionalities. It was decided that the business plans best fit what was wanted from the app.

The business plan includes more advanced functions on the app such as allowing the app to be used on more devices such as iPad app and Android tablet. This was specifically important knowing that various participants use an iPad or Android to view and use their apps. The business plan also included more security and access which includes behavioral user tagging, in app purchasing, app access code, and private app sections. App experience such as customer user registration and onboarding screens and app analytics such as app feature specific analytics, advanced push notification analytics and user timeline are also included in this plan. More notification functions were allowed with this plan such as advanced push notifications and group

subscription notifications, which are features that be beneficial as the app is improved.

Once a plan was chosen and purchased, an app developer profile had to be made on both Google Play for Android and Apple. Creating a profile on Google Play included making an organizational profile for the Marilyn Magaram Center. Once the profile was created which asked for a \$25 fee, steps to launch the app were made through Buildfire. Buildfire required an evaluation period of 3-5 business days to ensure the app followed specific guidelines to be suitable to be published. To make a profile for the Apple store, a D-U-N-S or Data Universal Numbering System number for the organization was needed. The D-U-N-S number is a unique number that identifies the organization. To acquire the D-U-N-S number, California State University, Northridge (CSUN) was contacted.

The evaluators had constant communication with the Buildfire team to ensure the app was launched successfully. The launch was approved and successfully launched on Google Play. To launch to the apple store proved to be more difficult as they required additional information including a D-U-N-S number which was difficult to gain access too. The evaluators reached out to several CSUN departments to gain access to the number but were informed that a number did not exist.

Procedures: Evaluating the App

To assess and determine the need for a nutrition education app like WICBites, a customer discovery questionnaire was created and distributed through the online survey platform, SurveyMonkey. Participants were recruited through CSUN students and members of the community, specifically mothers that would benefit from the app. The questions asked in the questionnaire included

1. Do you have an apple or android cellular device?
2. What are barriers that are keeping you from eating healthy?
3. What are your most used Apps on your phone?
4. How long do you spend cooking per week?
5. How often do you eat out?
6. How much do you currently spend on monthly subscription apps?
7. Do you enjoy subscription-based apps?
8. Do you find it difficult to find relevant information to help your health goals?
9. Do you believe healthy diets are catered to your eating habits/culture?
10. Do you wish you had more guidance for your health goals?
11. What are some ways you like to receive your nutrition education?

With the responses from the customer discovery questionnaire, the evaluators were able to gather information that indicate if the community wanted to see a nutrition education app and get a sense of what the community wanted to see on the app.

Once the app was launched, in order to evaluate the effectiveness of the app, questionnaires were distributed to customers in both Spanish and English. Two separate questionnaires were made and distributed to individuals who downloaded the app. One questionnaire in Spanish was distributed by one evaluator to the Hispanic population and another questionnaire in English was distributed by the second evaluator to those who spoke primarily English. The survey included a total of 8 questions. Questions asked included: “This app is easy to navigate.”, “The apps’s recipes are easy to follow.”, “I would watch videos for instructions on how to complete the recipes.”, “The recipes look like food my family would like.”, “This app is

very useful”., “I would recommend this app to someone else.”, “How often would you make recipes from this app?”, and “Are there any other features you would like to see added to the app?”. For statement questions, participants were able to select between: strongly agree, agree, neutral, disagree, and strongly disagree. The questionnaire helped to determine how well the app was being utilized by participants, as well as what areas to focus on when improving the app (See Appendix C).

1. This app is easy to navigate.
2. The apps’s recipes are easy to follow.
3. I would watch videos for instructions on how to complete the recipes.
4. The recipes look like food my family would like.
5. This app is very useful.
6. I would recommend this app to someone else.
7. How often would you make recipes from this app?
8. Are there any other features you would like to see added to the app?

Sample

The sample of participants were mothers between the ages of 27-50 who were CSUN volunteers and family and friends of CSUN volunteers who had downloaded the app. Instructions for how to complete the survey were sent to each participant of the questionnaire. Instructions included a link to the SurveyMonkey questionnaire, how to answer each question though a mobile device or computer, and how to send the responses in. Participants were asked to answer the questions through an online platform and hit send. The responses were then analyzed through SurveyMonkey.

CHAPTER IV

Results

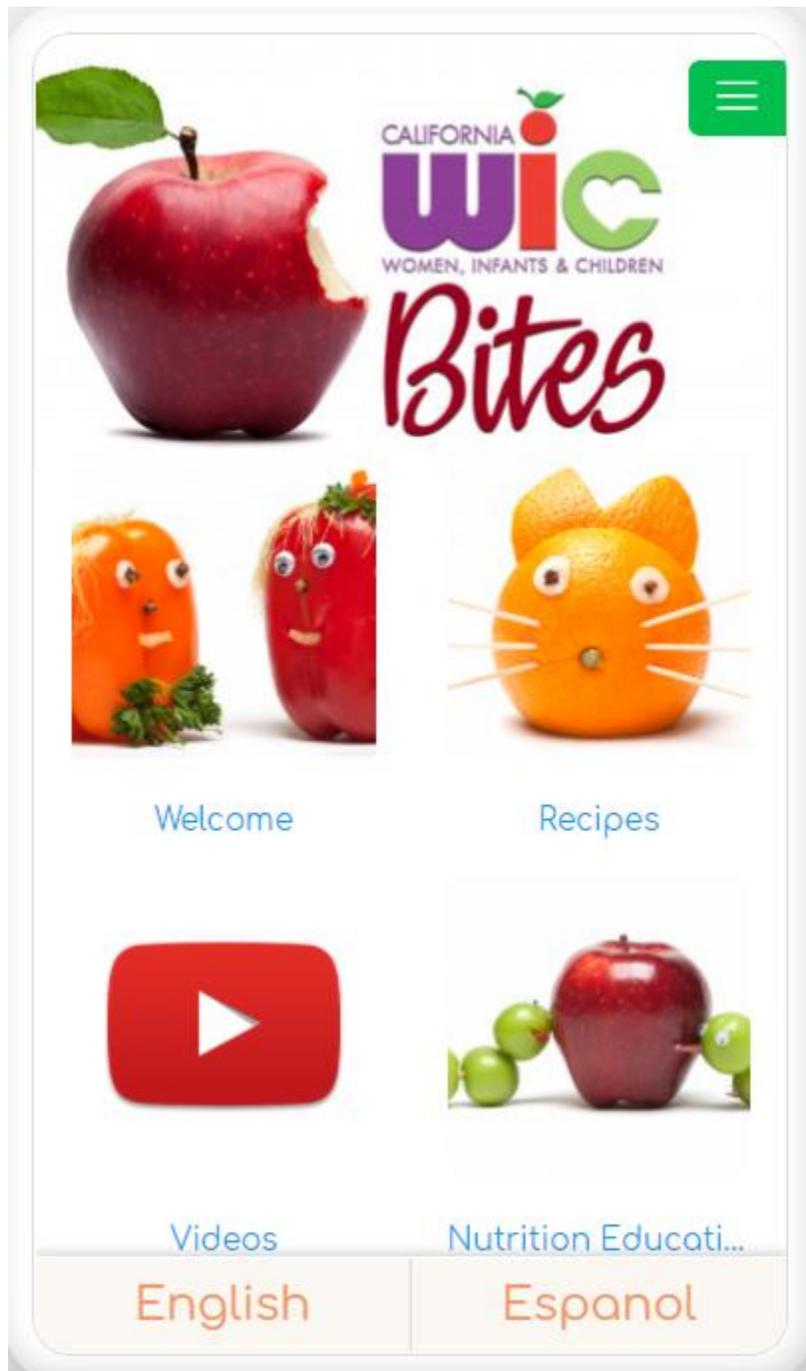
The purpose of this study was to develop, launch, and evaluate the WICBites app that would give users access to recipes, videos, and nutrition information in both Spanish and English, specifically designed for mothers looking for quick and easy recipes and nutrition information. The project was able to assess the need for the app, launch the app and obtain feedback and suggestions from users of the app. The evaluators conducted customer discovery and user surveys to determine the need and acceptability of the app. The following questions guided our project:

1. What suggestions and recommendations were gathered to fulfill the need for an app through customer discovery surveys?
2. What suggestions, observations or comments do the Spanish-speaking and English-speaking participants have to guide any changes to the recipes or the app?

App content

The app consists of over 50 recipes, including breakfast, lunch, dinner, snacks, and desserts categories, as well as several pages of nutrition education and over 100 YouTube videos for recipes. There is also a Welcome page which describes the purpose of the app. All information is translated in both English and Spanish. A photo of the first page is shown below. Please see appendix A for additional photos of the app.

Photo 1: First page of the bilingual nutrition education app



Results from the Customer Discovery Survey

For question 1 "Do you have an Apple or Android Cellular device?" 9 respondents said Apple and 3 respondent said Android. Varied responses came from the question "What are

barriers that are keeping you from eating healthy?” because this question was a fill in the blank question. Responses included “Sometimes unhealthy is the most convenient”, “Lack of time and laziness”, “Accessibility and money”, and “Stress, laziness, and cost”. For the question “What are your most used apps on your phone?”, 3 respondents said fitness and health, 11 responded social (Insta, Facebook, etc.), and 2 responded dating. For question “How long do you spend cooking per week?”, 3 respondents said about 1-2 hours per week, 3 respondents said about 3 hours per week, and 6 respondents said more than 3 hours per week. For question “How often do you eat out?”, 3 respondents said about once a week, 1 respondent said once a month, 2 respondents said a few times per months, and 6 respondents said a few times per week. For the question “Do you enjoy subscription-based apps?”, 8 respondents said yes and 4 respondents said no. For question “Do you find it difficult to find relevant information to help your health goals?”, 10 respondents said yes and 2 respondents said no. For question “Do you believe healthy diets are catered to your eating habits/culture?”, 2 respondents said yes and 10 respondents said no. For question “Do you find it difficult to make a change?” 12 respondents said yes and 0 respondents said no. For question “Do you wish you had more guidance for your health goals?”, 12 respondents said yes and 0 respondents said no. For question “What are some ways you like to receive your nutrition education?” responses varied and included “Through one-on-one counseling”, “Through websites on the internet”, “Through fitness and nutrition apps”, and “Through books”. The table below shows the mean % of each response of the customer discovery survey.

Table 1

Customer Discovery Survey Results

Survey Question	N (12)	Mean %
Q1: Do you have an apple or android cellular device?		
Apple	9	75.00%
Android	3	50.00%
Q3: What are your most used apps on your phone?		
Fitness/Health	4	33.33%
Social (Instagram/ etc.)	11	91.76%
Dating	2	16.67%
Q4: How long do you spend cooking per week?		
1-2 hours	3	25.00%
3 hours	3	25.00%
More than 3 hours	6	50.00%
Q5: How often do you eat out?		
About once a week	3	25.00%
Once a month	1	8.33%
A few times a month	2	16.67%
A few times a week	6	50.00%
Q6: Do you enjoy subscription-based apps?		
Yes	8	66.67%
No	4	33.33%
Q7: Do you find it difficult to find relevant information to help your health goals?		
Yes	10	83.33%
No	2	16.67%
Q8: Do you believe healthy diets are catered to your eating habits/culture?		
Yes	2	16.67%
No	10	83.33%
Q9: Do you find it difficult to make a change?		
Yes	12	100.00%
No	0	0.00%
Q10: Do you wish you had more guidance for your health goals?		
Yes	12	100.00%

No	0	0.00%
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Overall, the customer discovery survey results indicated that individuals frequently utilized apps on their phone including fitness and health apps. The customer discover survey also showed that individuals were interested in health apps and wanted more guidance when it came to eating healthy. A majority of respondents stated that they find it difficult to find relevant information to achieve their health goals further showing individuals interest in a resource that has health and nutrition information that is research-based. A majority of respondents also stated they did not feel that healthy diets are catered to their diet or culture showing the need for a resource that caters to a different culture such as a bilingual resource.

Once the app was launched, a survey in English and Spanish translation was conducted to determine the usage, effectiveness and suggested feedback for the app. This allowed the evaluators to answer the second project question “what suggestions, observations or comments do the Spanish-speaking and English-speaking participants have to guide any changes to the recipes or the app?” The survey was identical in both the English and Spanish language to ensure data was collected for the same information in both languages. This also allowed them to gather information from bilingual users. The surveys were administered in both English and Spanish and evaluated by the evaluators.

Results from the Evaluation Survey: Spanish

Choices on the Evaluation Survey included: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. For question one of the Spanish survey, 100% (23) of the participants stated they strongly agree with the statement “This app is easy to navigate.” For the question

“The apps’s recipes are easy to follow,” 91% (21) participants responded they strongly agree and 8% said they agreed. For question 3 “The recipes look like food my family would like,” 73% (17) responded they strongly agreed, 17% (4) responded they agreed, and 4% (1) responded neutral. For question 4 “I would watch videos for instructions on how to complete the recipes,” 82% (19) of respondents stated they strongly agreed, 13% (3) responded they agreed, and 4% (1) responded neutral. For question 5” This app is very useful,” 82% (19) responded they strongly agreed, 13% (3) responded they agreed, and 4% (1) responded neutral. For question 6 “I would recommend this app to someone else,” 86% (20) participants responded they strongly agreed, and 13% (3) responded they agreed. For question 7 “How often would you make recipes from this app,” 17% (4) responded 1-2 times/ month, 17% (4) responded 1-2 times/week, 60% (14) responded more than 3 times per week, and 4% (1) responded less than 3 times per week. For question 8 “Are there any other features you would like to see added to the app?” responses varied and included:

- “Would love to see one-on-one counseling added”
- “An option for consultations and questions”
- “Recipes for babies 6-12 months”
- “More categories, for example, fast foods for the busy mom.”
- “A feature that states how much time it takes to complete each recipe.”

For question 9 “Any other suggestions or comments” responses included “None” and “I like the app how it is now”

Table 2

Spanish WIC App Evaluation Survey

Survey Questions	N (23)	Mean %
Q1: This app is easy to navigate		
Strongly Agree	23	100%
Agree	0	0.00%
Neutral	0	0.00%
Disagree	0	0.00%
Strongly Disagree	0	0.00%
Q2: The apps's recipes are easy to follow.		
Strongly Agree	21	91.30%
Agree	2	8.70%
Neutral	0	0.00%
Disagree	0	0.00%
Strongly Disagree	0	0.00%
Q3: The recipes look like food my family would like.		
Strongly Agree	17	73.91%
Agree	4	17.39%
Neutral	1	4.35%
Disagree	0	0.00%
Strongly Disagree	0	0.00%
Q4: I would watch videos for instructions on how to complete the recipes.		
Strongly Agree	19	82.61%
Agree	3	13.04%
Neutral	1	4.35%
Disagree	0	0.00%
Strongly Disagree	0	0.00%
Q5: This app is very useful		
Strongly Agree	19	82.61%
Agree	3	13.04%
Neutral	1	4.35%
Disagree	0	0.00%
Strongly Disagree	0	0.00%
Q6: I would recommend this app to someone else.		
Strongly Agree	20	86.96%
Agree	3	13.04%
Neutral	0	0.00%
Disagree	0	0.00%
Strongly Disagree	0	0.00%
Q7: How often would you make		

recipes from this app?		
1-2 times per month	4	17.39%
1-2 times per week	4	17.39%
More than 3 times per week	14	60.87%
Less than 3 time per week	1	4.35%

Table 2 displays the results from the Spanish Evaluation Survey

More results shown in Appendix D

Overall results for the Spanish WIC App Evaluation Survey showed that the Spanish-speaking participants were overall satisfied with the app and enjoyed the context of the app. The participants utilized the app frequently and found the information on the app helpful. The participants enjoyed the recipes on the app and felt like it was something they would create frequently for their family. The feedback from the participants was positive and showed that the app was well received in this population.

Results from the Evaluation Survey: English

Table 3 displays results from the English evaluation survey. For statement 1 “The app is easy to navigate,” 1 person (5.88%) said they strongly disagree, 1 person (5.88%) said they were neutral, and 15 individuals (88.24%) agreed or strongly agreed. For the statement “The app’s recipies are easy to follow”, 1 individual (5.88%) strongly disagreed, 1 individual (5.88%) was neutral, and 15 individuals (88.24%) agreed or strongly agreed. For statement 3 “The recipes look like food my family would like”, 4 individuals (23.53%) disagreed or strongly disagreed, 2 individuals (11.76%) were neutral, and 11 individuals (64.71%) agreed or strongly agreed. For statement 4 “I would watch videos for instructions on how to complete the recipes”, 1 individual (5.88%) strongly disagreed, 2 individuals (11.76%) were neutral, and 14 individuals (82.35%) agreed or strongly agreed. For statement 5 “This app is very useful”, 1 individual (5.88%)

strongly disagreed, 2 individuals (11.76%) were neutral, and 14 individuals (82.35%) agreed or strongly agreed. For statement 6 “I would recommend this app to someone else”, 1 individual (5.88%) strongly disagreed, 4 individuals (23.53%) were neutral, and 12 individuals (70.59%) agreed or strongly agreed. Lastly, for statement 7 “How often would you make recipes from this app”, 4 individuals (23.53%) said 1-2 times per month, 7 individuals (41.18%) said 1-2 times per week, 3 individuals (17.65%) said more than 3 times per week, and 3 individuals (17.65%) said less than 1 time per month. See graphs of results from each question on attachment D.

Table 3

English WIC App Evaluation Survey

Survey Questions	N (23)	Mean %
Q1: This app is easy to navigate		
Strongly Agree	11	66.71%
Agree	4	23.53%
Neutral	1	5.88%
Disagree	0	0.00%
Strongly Disagree	1	5.88%
Q2: The apps’s recipes are easy to follow.		
Strongly Agree	10	58.82%
Agree	5	29.41%
Neutral	1	5.88%
Disagree	0	0.00%
Strongly Disagree	1	5.88%
Q3: The recipes look like food my family would like.		
Strongly Agree	7	41.18%
Agree	4	23.53%
Neutral	2	11.76%
Disagree	3	17.65%
Strongly Disagree	1	5.88%
Q4: I would watch videos for instructions on how to complete the recipes.		
Strongly Agree	6	35.29%

Agree	8	47.06%
Neutral	2	11.76%
Disagree	0	0.00%
Strongly Disagree	1	5.88%
Q5: This app is very useful		
Strongly Agree	7	41.18%
Agree	7	41.18%
Neutral	2	11.76%
Disagree	0	0.00%
Strongly Disagree	1	5.88%
Q6: I would recommend this app to someone else.		
Strongly Agree	8	47.06%
Agree	4	23.53%
Neutral	4	23.53%
Disagree	0	0.00%
Strongly Disagree	1	5.88%
Q7: How often would you make recipes from this app?		
1-2 times per month	4	23.53%
1-2 times per week	7	41.18%
More than 3 times per week	3	17.65%
Less than 3 time per week	3	17.65%

The last 2 questions of the survey were open-ended questions with varying answers. For question 8 respondents were asked “Are there any other features you would like to see added to the app?” 9 individuals either skipped the questions, or replied “none”, “no”, or N/A. Other responses are as follows:

- “I would like to be able to talk to a nutritionist.”
- “More nutrition education.”
- “More information about food.”
- “More recipes”
- “Customized nutrition plans”

- “More recipes. There does not seem to be very many”
- “Possibly information on how to read a food label.”
- “More recipe’s”

Lastly, for question 9 respondents were asked “Any other suggestions or comments?” 2 individuals skipped the question and 9 individuals said “none”. Other responses are as follows:

- “It would be nice to have meal planning and grocery lists”
- “Love the look of the app. Very fun for kids and moms”
- “Very fun and easy-to-use app!”
- “I would like to know more information that would benefit me”
- “The lizard on the apple enchilada is a little strange – I would change the picture”
- “Easy app to follow and very informative on nutrition”

Overall, the results showed that English-speaking participants reacted positively to the WICBites app. The evaluations displayed that a majority of individuals survey felt that the app was useful, easy to use, and the recipes looked palatable. Based on suggestions, there is also room to improve the app to make it more desirable.

Overall Results: Both Spanish and English

When it comes to the combined results of the evaluation survey, for question 1 which stated “this app is easy to navigate” 34 participants (85%) responded strongly agree, 4 participants (10%) responded agreed, one (2.5%) participant responded neutral and one (2.5%) participant responded strongly disagree. For the statement “the app’s recipes are easy to follow” 31 participants responded strongly agree (77.5%), 3 participants responded agree (7.5%), and one participant responded strongly disagree (2.5%). For the statement “The recipes look like

food my family would like”, 24 respondents responded strongly agree (60.00%), 8 respondents stated they agree (20.00%), 3 respondents stated they were neutral (7.50%), 3 respondents stated they disagreed (7.50%), 1 respondent stated they strongly disagreed (2.50%). For the statement “I would watch videos for instructions on how to complete the recipes” 25 respondents stated they strongly agreed (62.5%), 11 respondents stated they agreed (27.5%), 3 respondents stated they felt neutral (7.5%), and 1 participant stated they strongly disagreed (2.5%). For the statement “this app is very useful” 26 participants stated they strongly agreed (65%), 10 participants stated they agreed (25%), 3 participants stated they felt neutral (7.5%), and 1 participant stated they strongly disagreed (2.5%). For the statement “I would recommend this app to someone else” 28 respondents stated they strongly agreed (70%), 7 participants stated they agreed (17.5%), 4 participants stated they felt neutral (10%), and 1 participant stated they strongly disagreed. For the question “how often would you make recipes from this app?” 8 participants said 1-2 times per month (20%), 11 participants stated 1-2 times per week (27.5%), 17 participants said more than 3 times per week (42.5%), and 4 participants stated less than 3 times per week (10%).

Table 4

Combined English and Spanish WIC Evaluation Surveys

Survey Questions	N (40)	Mean %
Q1: This app is easy to navigate		
Strongly Agree	34	85.00%
Agree	4	10.00%
Neutral	1	2.50%
Disagree	0	0.00%
Strongly Disagree	1	02.50%
Q2: The apps’s recipes are easy to follow.		

Strongly Agree	31	77.50%
Agree	3	07.50%
Neutral	0	0.00%
Disagree	0	0.00%
Strongly Disagree	1	02.50%
Q3: The recipes look like food my family would like.		
Strongly Agree	24	60.00%
Agree	8	20.00%
Neutral	3	07.50%
Disagree	3	07.50%
Strongly Disagree	1	02.50%
Q4: I would watch videos for instructions on how to complete the recipes.		
Strongly Agree	25	62.50%
Agree	11	27.50%
Neutral	3	7.50%
Disagree	0	0.00%
Strongly Disagree	1	2.50%
Q5: This app is very useful		
Strongly Agree	26	65.00%
Agree	10	25.00%
Neutral	3	7.50%
Disagree	0	0.00%
Strongly Disagree	1	2.50%
Q6: I would recommend this app to someone else.		
Strongly Agree	28	70.00%
Agree	7	17.50%
Neutral	4	10.00%
Disagree	0	0.00%
Strongly Disagree	1	2.50%
Q7: How often would you make recipes from this app?		
1-2 times per month	8	20.00%
1-2 times per week	11	27.50%
More than 3 times per week	17	42.50%
Less than 3 time per week	4	10.00%

Table 4 shows the combined results from the Spanish and English Evaluation Surveys .Overall, the results showed that the app was accepted by both the English and Spanish speaking

participants. Both groups found the information to be valuable and the app to be something they would use. Both groups found the app to be easy to navigate and found the recipes to be easy to follow. For the food featured on the app, most participants stated it was recipes their family would consume. A majority of participants found the app to be useful and stated they would recommend the app to someone else. A majority of participants also stated they would use the app more than 3 times per week. The results showed promise for the app and showed that participants enjoyed the app and its content.

Results from the customer discovery survey and the bilingual evaluation suggest that the WICBites app is desirable within the community of mothers with children ages 1 to 5. Furthermore, many good suggestions were gathered in regards to how to expand and improve the app. Overall, the app seems better received by the Spanish-speaking community, as compared to the English-speaking community, further exemplifying the need for the bilingual aspect of the application.

CHAPTER V

Discussion

The purpose of this study was to develop, launch, and evaluate a bilingual nutrition education app to help combat the obesity epidemic. According to our findings, the app was well-received in both English-speaking and Spanish-speaking populations. Overall, most individuals would utilize the app and found the information to be helpful. Furthermore, most individuals would recommend the app to others and desire for more recipes and nutrition education to be added. However, the evaluators found that the app was received better with those individuals who are primarily Spanish speaking and viewed the Spanish version of the app. More Spanish-speaking individuals found the app to be easy to navigate, the recipes easy to follow, the recipes palatable, would watch the recipe videos, and overall found the app useful when compared to English-speaking individuals. The evaluators believe these findings may be because fewer apps are available to Spanish-speaking consumers as compared to English-speaking consumers. The results may be indicative of the lack of nutrition education targeted to the Spanish-speaking population and the need for more resources in this community.

Customer Discovery Surveys

The customer discovery survey showed that a majority of people had apple iPhones, demonstrating a larger need to launch the app on Apple devices. However, the process to launch an app on Apple is considerably more complicated as compared to launching an app on Android. Furthermore, the Buildfire platform provided the evaluators with a website address to use as a preview for the app, which could be utilized on any device. For these reasons, the evaluators decided to launch on Android, and will continue working on the app to launch on Apple.

Furthermore, it was found that a majority of individuals eat out only several times a week it may be they are cooking their other meals at home, find it difficult to reach their health goals, and wish they had more guidance for achieving their health goals. The evaluators felt that these findings demonstrated the need for the WICBites app and projected the future acceptability of the project.

Implications

This project is important for those looking for a bilingual nutrition education app that includes healthy and easy-to-follow recipes. Customer discovery and feedback surveys that include suggestions on how to improve a product are all significant tools that can be utilized to create an app that will provide what the app user is looking for overall. This app is important because the evaluations showed that consumers enjoyed and utilized the app's information. The evaluators kept in mind the gap in the market which included a bilingual app in Spanish and included valuable and culturally appropriate information that consumers can relate to and utilize. This included recipes that were typical in the Hispanic community and nutrition education in Spanish and English. Although there are various health and nutrition apps in the market, the app the evaluators launched contained information in both Spanish and English which is a valuable addition to the market, filling the gap and need for the Spanish speaking consumer.

This app resource can be utilized by health professionals as a tool to give to their clients and patients that will allow them to access healthy recipes and nutrition information online through an app. This resource will allow patients and clients of health professionals to have healthier recipes to control their consumption as well as nutrition education that will educate them on nutrition topics. The app can serve as a guide for these patients and clients when they

don't have access to their health professional and need further guidance. This app will be especially valuable for controlling chronic disease such as hypertension and diabetes. A strength of this project is the fact that all information on the app is in both Spanish and English allowing the app to be utilized by a larger audience. Therefore, health professionals with only Spanish-speaking patients and clients can refer them to this app. A strength of this project was the evaluation tools the evaluators used to gather information from participants. Both customer discovery and feedback questionnaires are important to ensure that the product contains information that is valuable to the consumer and to evaluate what areas of the project could be improved.

Limitations

This thesis project will add to the understanding of nutrition education apps, however certain limitations to the study exist. First, the evaluation only included participants from CSUN or that knew someone from CSUN. A follow-up evaluation should be conducted using individuals from different locations. Another limitation is that not many people know about the app. Future evaluations should be done by first promoting the app to a wider audience so that a wider variety of individuals can be evaluated.

Due to the COVID-19 pandemic occurring while the evaluators were investigating and gathering customer feedback, only a few participants were able to be gathered for the customer discovery survey and feedback questionnaire and participants were limited to those that could be reached via phone or email. More evaluations should be conducted on a larger population. Furthermore, the app was only launched on the android store through the Buildfire app. The app was also intended to be launched on the Apple store, however, due to certain roadblocks it was

unable to be launched to the Apple store for evaluation. This meant that users with androids were able to download the app and properly view it on their phone screens. Individuals with apple devices had to view the web-based version instead of the app version. Therefore, they had a different view of the app, which may have affected their responses.

Furthermore, due to the app launch being delayed due to launching issues, the timeline to gather evaluations were reduced. Further evaluations should be done with a larger timeline of participants downloading the app and utilizing the app so that evaluation is done on how the app is received over a period of time. For example, a follow-up done after one month of downloading the app and then after three months of downloading the app.

Conclusion

In conclusion, the evaluators found that the app is well-accepted in the English and Spanish-speaking communities, however there is room for improvement. One area that needs to be improved is accessibility. The evaluators met with CSUN's accessibility department to learn how to improve the app to accommodate multiple disabilities. The first area of improvement is keyboard accessibility. The app should be able to be navigated solely through the use of a keyboard in case the app is open and the device is plugged into an external keypad. Next, color contrasting should be adjusted to accommodate individuals with color blindness, Furthermore, the banner on the home page should be able to be controlled with stop and start buttons to allow individuals with disabilities time to read the information. Also, the links should be properly coded to indicate that the text is a link to an external page, provide a brief explanation as to what the link is to, indicate what language the text is in, and ensure that all links are connected to a direct location. Finally, all videos should be accompanied by captioning or transcripts that

explains what is happening in the video. Adding these additional services will greatly increase the accessibility of WICBites.

Further improvement can be done through advancement of app features. Customer surveys and evaluation surveys showed that customers have a desire for features such as one-on-one nutrition counseling with a registered dietitian, as well as additional recipes and health information. In the future, a chat function could be added to the app where dietetic interns and Marilyn Magaram Center students could provide nutrition education or answer questions through the chat to meet the needs app users. These improvements to the app could increase its value so it becomes more profitable in the future. Other features that were suggested during the evaluation surveys were a way to save recipes and a way to create a shopping list. The evaluators have come up with the idea of launching a new app, called PowerHealth, which will include these services as a continuation of our app WIC Bites to service this need.

Moreover, additional next steps for the app that the evaluators recommend are to continue adding recipes from WIC cookbooks that have not been added. New recipes should be added on a continuous bases so new information could be on the app. Also, nutrition information and education should be continuously added and updated. Dietetic interns from the class of 2021-2022 have been trained on how to update the app and add additional recipes and information to the app. Annual training for new interns will be necessary so that the app can be continuously updated to add additional recipes, features, and nutrition education. Future interns could also create more recipe videos to go along with the recipes added to the app.

Due to feedback from California WIC, it was decided that the name of the app would be changed to not include the word, WIC . The change of the app name would also allow the app to

be better tied to the MMC as well the WIC program. The new name has not been decided yet, however, the NEVHC WIC and CSUN MMC staff and interns are discussing new names. In the future, the name should be changed to something that would tie the app's purpose of nutrition education and the MMC and WIC together.

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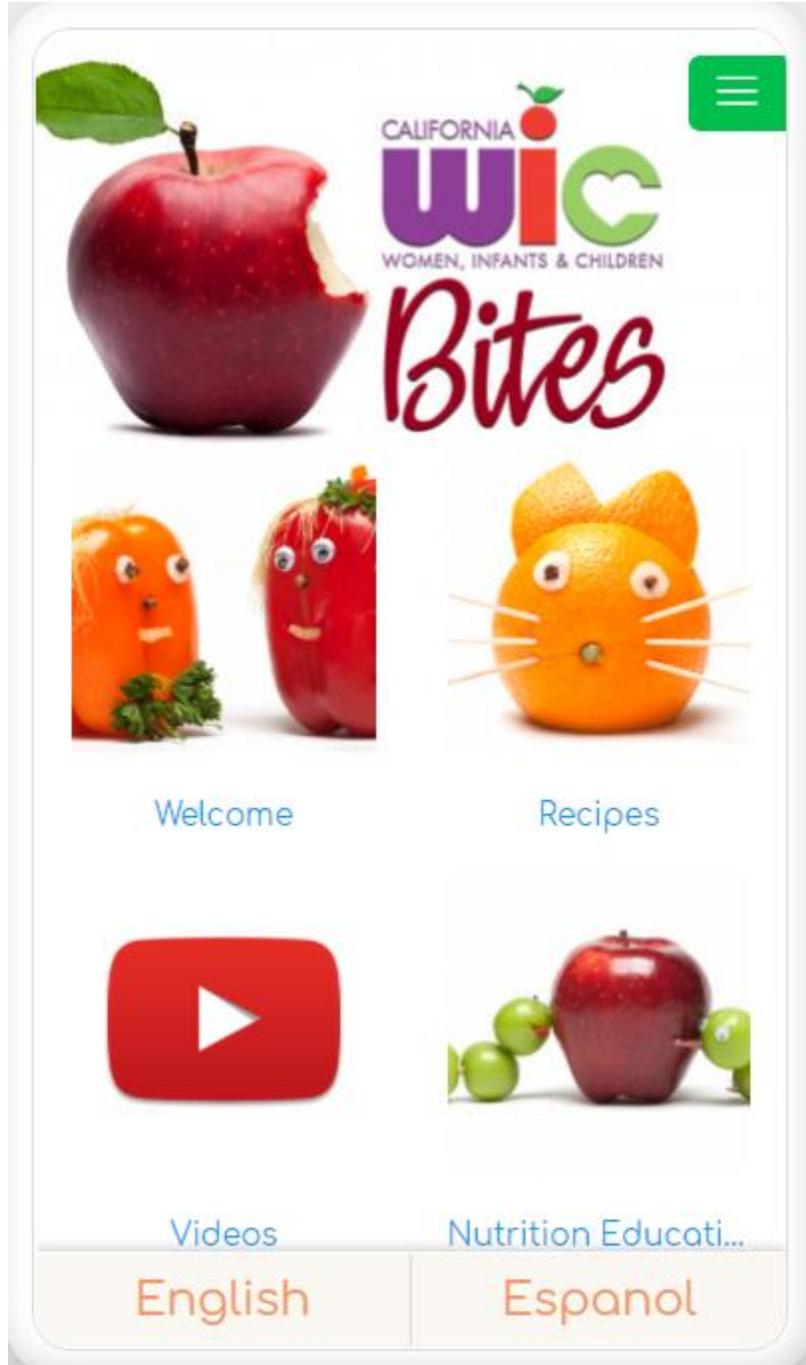
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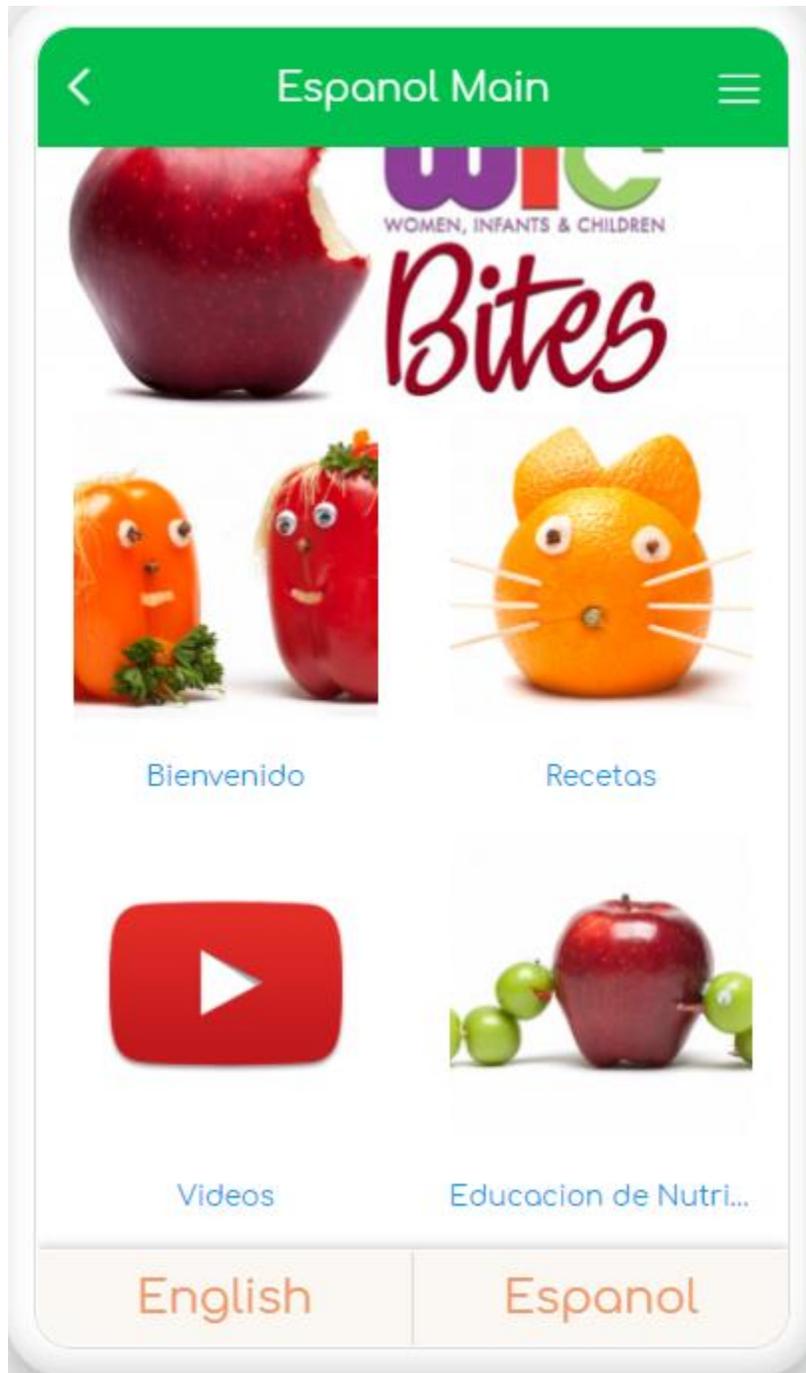
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APPENDIX A

Screenshots of WIC Bites App







Banana Berry Smoot...



Ingredients

- 1 cup soy milk
- 1 cup frozen strawberries
- 1 banana, quartered and frozen

Preparation

1. Puree all ingredients in a blender until smooth

Nutrition Facts

English

Espanol



Ingredientes

- 1 Taza de leche de soya.
- 1 Taza de fresas congeladas.
- 1 Platano, coratdo en coartos y congelado.

Preparacion

1. Licue todos los ingredientes en una licuadora hasta homogenizar.

English

Espanol

APPENDIX B

Customer Discovery Survey Questions

WIC App Customer Discovery Questionnaire

1. Do you have an apple or android cellular device?
 - A. Apple
 - B. Android
 - C. Other.. specify__
2. What are barriers that are keeping you from eating healthy?
3. What are your most used apps on your phone?
 - A. Fitness/ Health
 - B. Social (Instagram/ Facebook/ ect.)
 - C. Dating
 - D. Other
4. How long do you spend cooking per week?
5. How often do you eat out?
 - A. Everyday
 - B. About once per week
 - C. Once a month
 - D. A few times a month
 - E. A few times a week
 - F. Other (specify)_____
6. Do you enjoy subscription-based apps?
7. Do you find it difficult to find relevant information to help your health goals?

8. Do you believe healthy diets are catered to your eating habits/culture?
9. Do you wish you had more guidance for your health goals?
10. What are some ways you like to receive your nutrition education?

APPENDIX C

WIC Bites Questionnaire

Please rate the following statements on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

1. This app is easy to navigate.
2. The apps's recipes are easy to follow.
3. The recipes look like food my family would like.
4. I would watch videos for instructions on how to complete the recipes.
5. This app is very useful
6. I would recommend this app to someone else.
7. How often would you make recipes from this app?
 - a. 1-2 times/ month
 - b. 1-2 times/ week
 - c. More than 3 times per week
 - d. Less than 1 time per month
8. Are there any other features you would like to see added to the app?

Spanish Version

1. Esta aplicación es fácil de usar.
2. Las recetas en la aplicación son fáciles de entender y seguir.
3. Las recetas parecen comidas que a mi familia le gustaría comer.
4. Yo vería los videos para obtener instrucciones de cómo preparar las recetas
5. Esta aplicación es muy útil
6. Yo le recomendaría esta aplicación a otra persona

7. ¿Que seguido usarías las recetas de esta aplicación?
 - a. 1-2 veces por mes
 - b. 1-2 veces por semana
 - c. Más de 3 veces por semana
 - d. Menos de 3 veces por semana
8. ¿Hay otras funciones que le gustaría que se agreguen a la aplicación?

APPENDIX D

English Evaluation Survey Responses

Q1



Show Benchmark

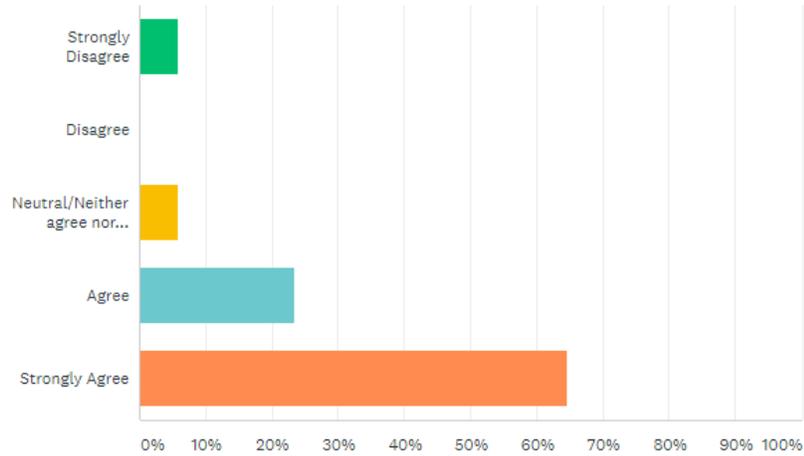


Customize

Save as

Please rank how much you agree or disagree with the following statement. This app is easy to navigate.

Answered: 17 Skipped: 0



ANSWER CHOICES	RESPONSES
Strongly Disagree	5.88% 1
Disagree	0.00% 0
Neutral/Neither agree nor disagree	5.88% 1
Agree	23.53% 4
Strongly Agree	64.71% 11
TOTAL	17

Q2

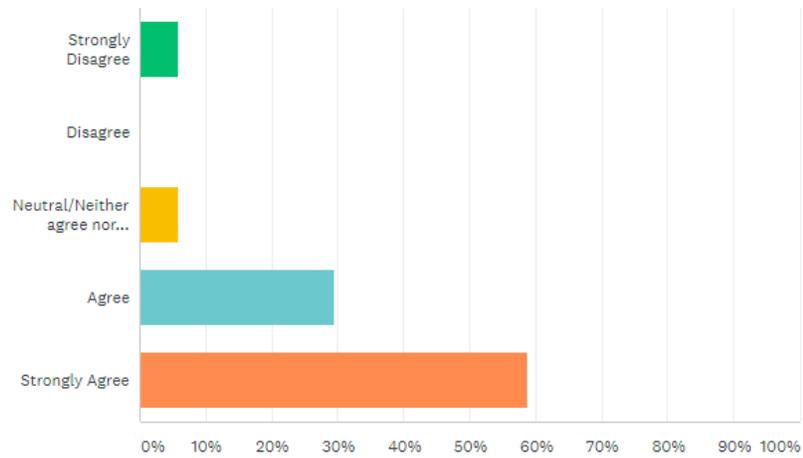


Customize

Save as ▼

Please rank how much you agree or disagree with the following statement. The app's recipes are easy to follow.

Answered: 17 Skipped: 0



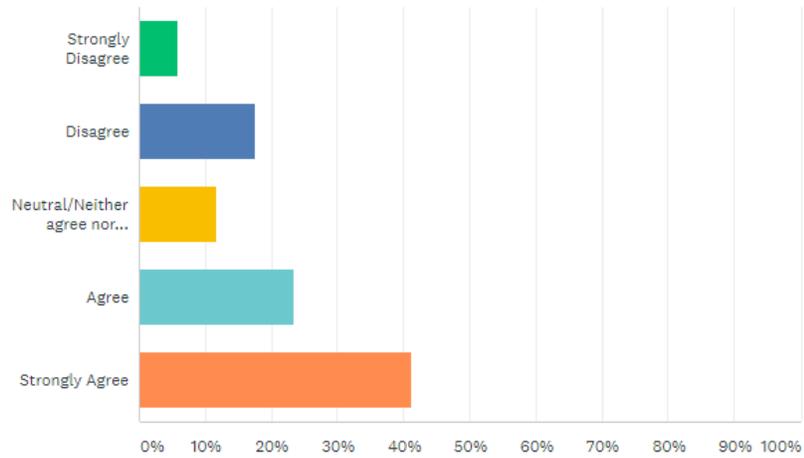
ANSWER CHOICES	RESPONSES
Strongly Disagree	5.88% 1
Disagree	0.00% 0
Neutral/Neither agree nor disagree	5.88% 1
Agree	29.41% 5
Strongly Agree	58.82% 10
TOTAL	17

Q3

Customize Save as

Please rank how much you agree or disagree with the following statement. The recipes look like food my family would like.

Answered: 17 Skipped: 0



ANSWER CHOICES	RESPONSES
Strongly Disagree	5.88% 1
Disagree	17.65% 3
Neutral/Neither agree nor disagree	11.76% 2
Agree	23.53% 4
Strongly Agree	41.18% 7
TOTAL	17

Q4

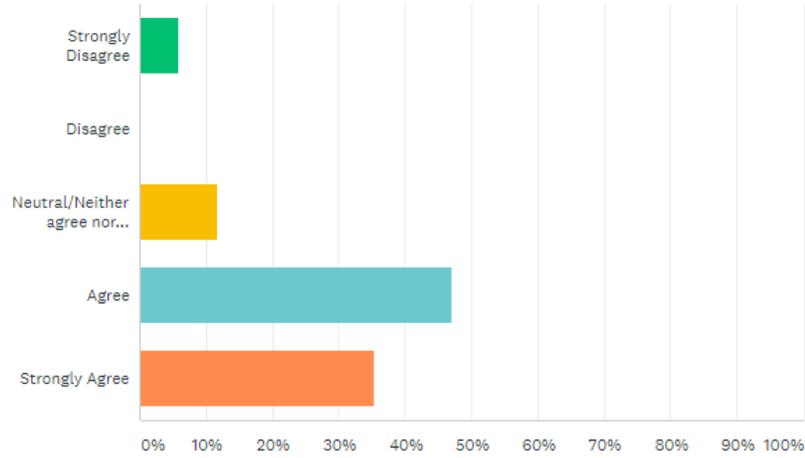


Customize

Save as

Please rank how much you agree or disagree with the following statement. I would watch videos for instructions on how to complete the recipes.

Answered: 17 Skipped: 0



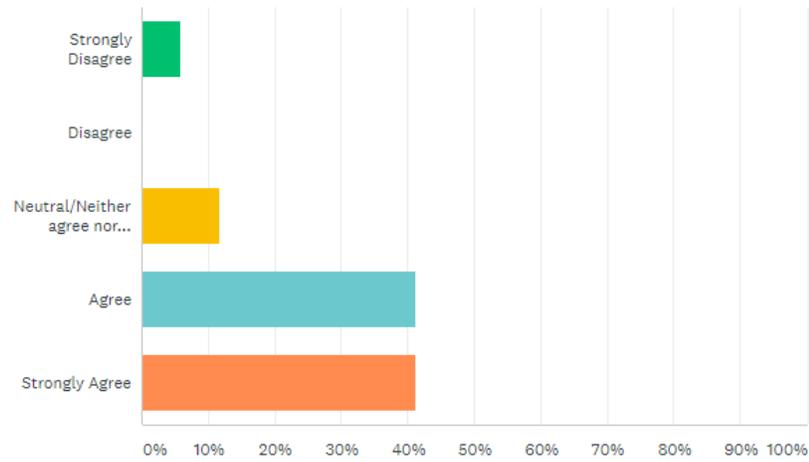
ANSWER CHOICES	RESPONSES
Strongly Disagree	5.88% 1
Disagree	0.00% 0
Neutral/Neither agree nor disagree	11.76% 2
Agree	47.06% 8
Strongly Agree	35.29% 6
TOTAL	17

Q5

 Customize  Save as

Please rank how much you agree or disagree with the following statement. This app is very useful.

Answered: 17 Skipped: 0



ANSWER CHOICES	RESPONSES
Strongly Disagree	5.88% 1
Disagree	0.00% 0
Neutral/Neither agree nor disagree	11.76% 2
Agree	41.18% 7
Strongly Agree	41.18% 7
TOTAL	17

Q6

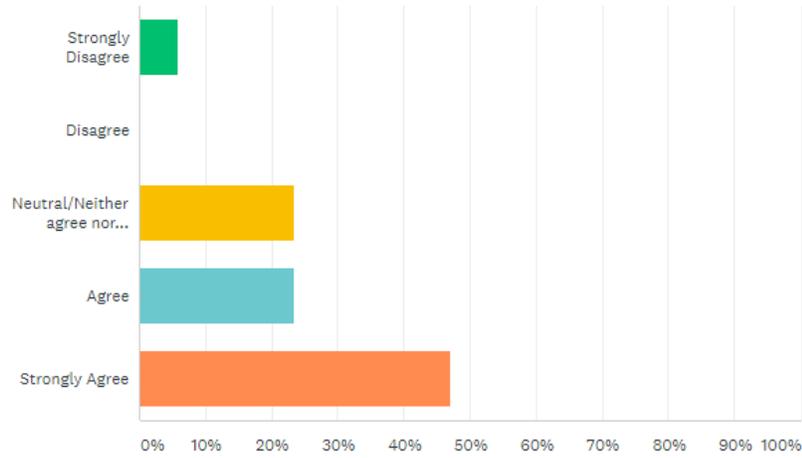


Customize

Save as ▾

Please rank how much you agree or disagree with the following statement. I would recommend this app to someone else.

Answered: 17 Skipped: 0



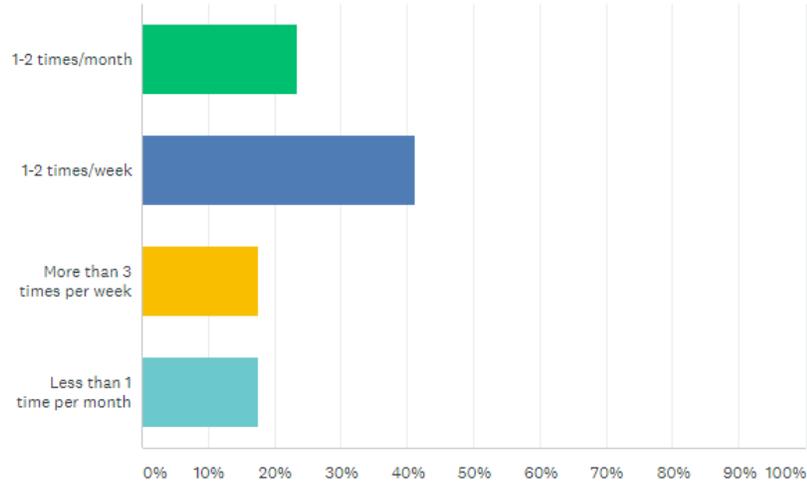
ANSWER CHOICES	RESPONSES
Strongly Disagree	5.88% 1
Disagree	0.00% 0
Neutral/Neither agree nor disagree	23.53% 4
Agree	23.53% 4
Strongly Agree	47.06% 8
TOTAL	17

Q7

 Customize  Save as

How often would you make recipes from this app?

Answered: 17 Skipped: 0



ANSWER CHOICES	RESPONSES
1-2 times/month	23.53% 4
1-2 times/week	41.18% 7
More than 3 times per week	17.65% 3
Less than 1 time per month	17.65% 3
TOTAL	17

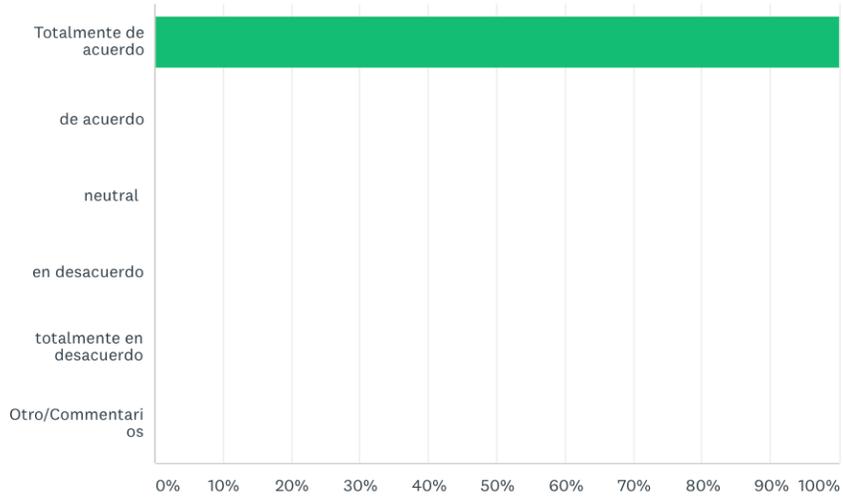
Spanish Evaluation Survey Responses

Q1

 [Customize](#) [Save as](#) 

Esta aplicación es fácil de usar.

Answered: 23 Skipped: 0



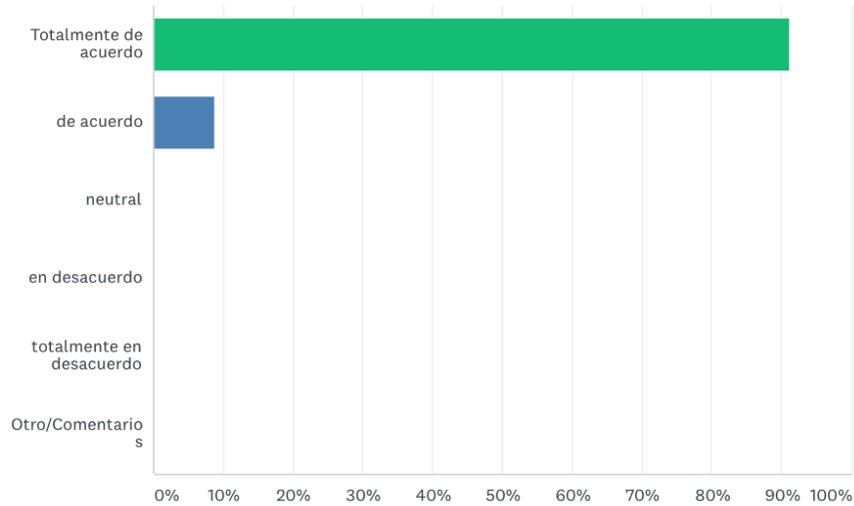
ANSWER CHOICES	RESPONSES	
▼ Totalmente de acuerdo	100.00%	23
▼ de acuerdo	0.00%	0
▼ neutral	0.00%	0
▼ en desacuerdo	0.00%	0
▼ totalmente en desacuerdo	0.00%	0
▼ Otro/Comentarios	Responses 0.00%	0
TOTAL		23

Q2

 **Customize** **Save as** 

Las recetas en la aplicación son fáciles de entender y seguir.

Answered: 23 Skipped: 0



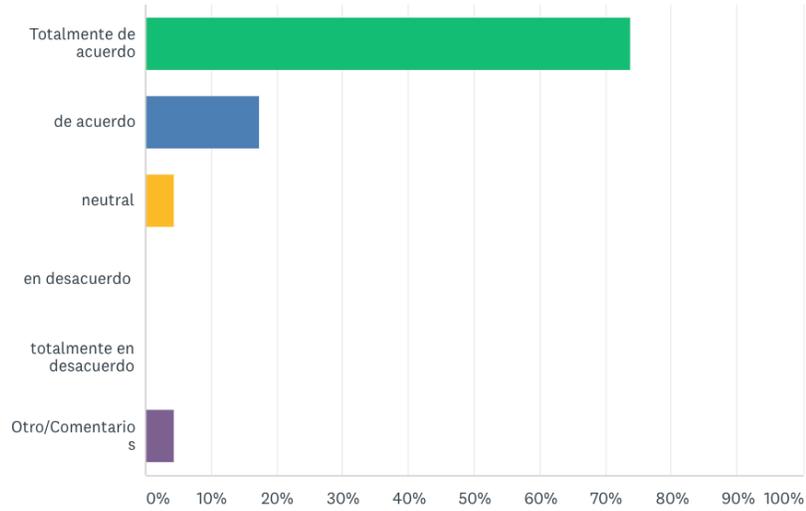
ANSWER CHOICES	RESPONSES
▼ Totalmente de acuerdo	91.30% 21
▼ de acuerdo	8.70% 2
▼ neutral	0.00% 0
▼ en desacuerdo	0.00% 0
▼ totalmente en desacuerdo	0.00% 0
▼ Otro/Comentarios	Responses 0.00% 0
TOTAL	23

Q3

 [Customize](#) [Save as](#) 

Las recetas parecen comidas que a mi familia le gustaría comer.

Answered: 23 Skipped: 0



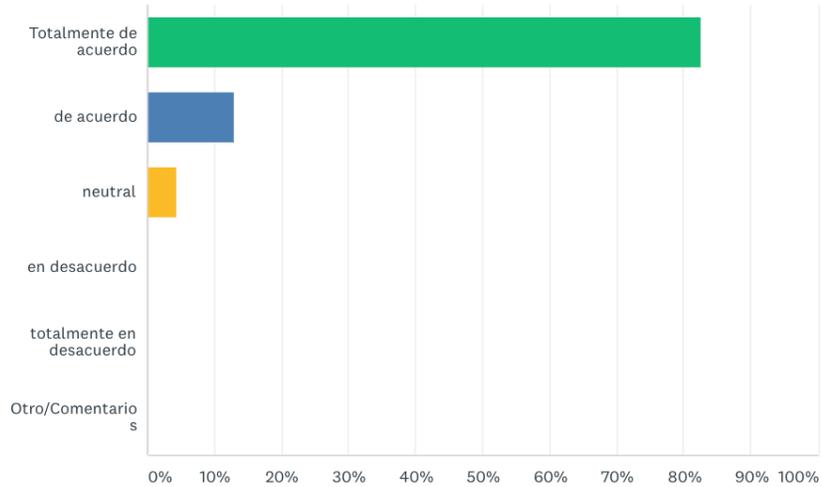
ANSWER CHOICES	RESPONSES	
▼ Totalmente de acuerdo	73.91%	17
▼ de acuerdo	17.39%	4
▼ neutral	4.35%	1
▼ en desacuerdo	0.00%	0
▼ totalmente en desacuerdo	0.00%	0
▼ Otro/Comentarios	Responses 4.35%	1
TOTAL		23

Q4

 [Customize](#) [Save as](#) 

Yo vería los videos para obtener instrucciones de cómo preparar las recetas

Answered: 23 Skipped: 0



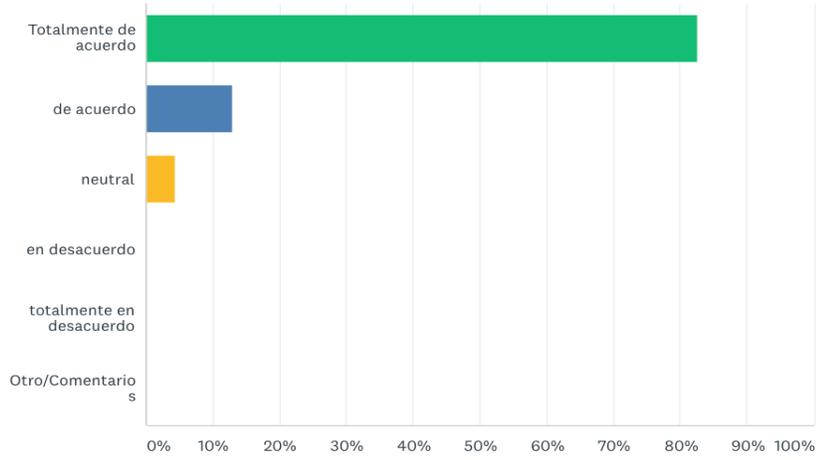
ANSWER CHOICES	RESPONSES	
▼ Totalmente de acuerdo	82.61%	19
▼ de acuerdo	13.04%	3
▼ neutral	4.35%	1
▼ en desacuerdo	0.00%	0
▼ totalmente en desacuerdo	0.00%	0
▼ Otro/Comentarios	Responses 0.00%	0
TOTAL		23

Q5

Customize Save as

Esta aplicación es muy útil

Answered: 23 Skipped: 0



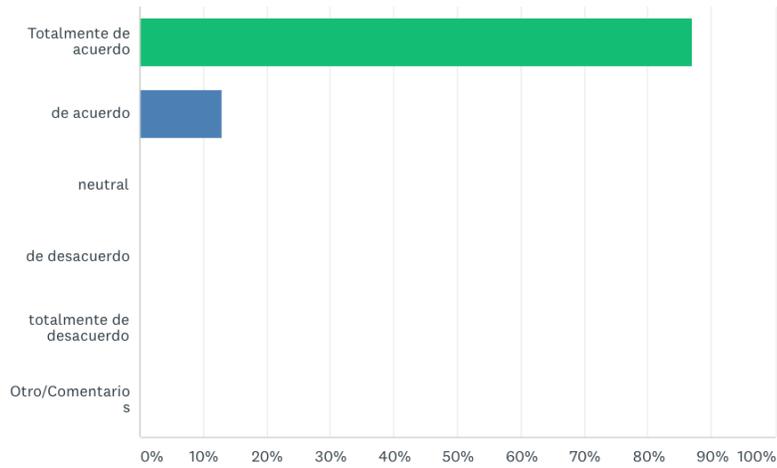
ANSWER CHOICES	RESPONSES	
Totalmente de acuerdo	82.61%	19
de acuerdo	13.04%	3
neutral	4.35%	1
en desacuerdo	0.00%	0
totalmente en desacuerdo	0.00%	0
Otro/Comentarios	Responses 0.00%	0
TOTAL		23

Q6

Customize Save as

Yo le recomendaría esta aplicación a otra persona

Answered: 23 Skipped: 0



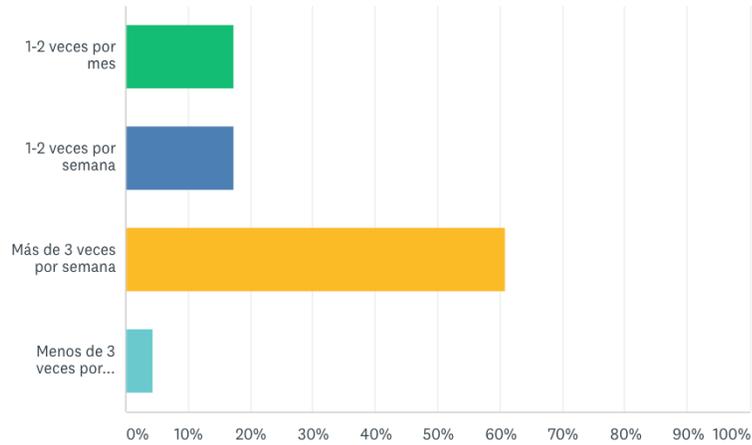
ANSWER CHOICES	RESPONSES	
▼ Totalmente de acuerdo	86.96%	20
▼ de acuerdo	13.04%	3
▼ neutral	0.00%	0
▼ de desacuerdo	0.00%	0
▼ totalmente de desacuerdo	0.00%	0
▼ Otro/Comentarios	Responses 0.00%	0
TOTAL		23

Q7

 Customize  Save as

¿Que seguido usarías las recetas de esta aplicación?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
1-2 veces por mes	17.39% 4
1-2 veces por semana	17.39% 4
Más de 3 veces por semana	60.87% 14
Menos de 3 veces por semana	4.35% 1
TOTAL	23