

SaveEat: A Nutrition with Budget Tracking App

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Abstract—Due to the effectiveness of nutrition-tracking mobile applications, these applications continue to see growth. While they support users in managing their nutritional needs, it is important to recognize that healthy foods generally cost more than fast, processed options. This disparity poses a significant challenge for maintaining a healthy diet, particularly for individuals with busy schedules. To address this issue, a viable solution is proposed: enhancing nutrition-tracking applications with integrated budgeting features. This approach aims to enable users to make informed decisions about their nutrition and budget simultaneously. This paper introduces the development of SaveEat, an application that combines nutrition and budget tracking. The usability and effectiveness of the SaveEat application are evaluated using an accessibility survey with 20 participants, employing the System Usability Scale (SUS) as the primary metric. The average score obtained from the SUS findings was 69.25, which suggests a moderate level of usefulness with significant potential for enhancement. While the application helps users manage their money and nutrition, there are noticeable variations in user satisfaction, indicating areas where the functionality and interface design should be improved.

CCS Concepts • Software and its engineering~Software creation and management~Designing software~Software design engineering

Keywords—Nutrition Tracking, Budget Management, Dietary Decision-Making, System Usability Scale (SUS), Financial Dietary Planning, Health and Well-being, Technology-Assisted Nutrition, Affordable Healthy Eating

1 INTRODUCTION

Mobile applications that track nutrition have been rather popular in recent years, providing users with an easy way to keep tabs on their eating habits. The difference in cost between rapid processed foods and nutritious alternatives, however, continues to be a problem. Healthy foods options generally cost more than fast and processed choices [1]. People with busy schedules, who frequently put convenience before dietary considerations, are most affected by this problem. The integration of budgeting tools into nutrition-tracking applications presents a viable solution to this problem, enabling users to make well-informed decisions that are in line with their budgetary restrictions and nutritional objectives.

In consideration of this, the researchers provide SaveEat, an innovative mobile application that combines budgeting with nutrition tracking. SaveEat offers full support for managing one's financial and nutritional well-being, with the goal of transforming the way users approach their eating decisions. This integration of budget management with dietary tracking aims to address the challenge of accessing nutritious food within financial constraints, making healthy eating more attainable and sustainable. By providing real-time insights into spending and nutritional information, SaveEat empowers users to make choices that optimize both their health and their wallets.

A budget application is an application of software that assists individuals in tracking their income and expenses and, in many situations, in creating a budget [2]. This functionality is essential as it supports users in planning and adhering to a dietary regime that aligns with their economic capacity. Incorporating such features into the SaveEat application ensures that it not only aids in nutritional intake monitoring but also enhances financial literacy and management—key components for making lasting lifestyle changes. The application is designed to be intuitive, catering to those who might be overwhelmed by the complexities of nutrition and financial planning, thereby simplifying the journey towards improved well-being.

2 REVIEW OF RELATED LITERATURE

Well being and health have been an important topic in recent years, with the increasing varieties of food being available to cater the ever-growing population of society. These foods can come as healthy and unhealthy foods which can affect the nutrition of each individual, hence affecting the wellbeing and quality of life. An important factor to consider is how certain external and internal factors affect the continuous decisions of a person.

This paper aims to provide an extensive review of the factors on why people tend to resort to unhealthy foods by discussing the composition of Unhealthy foods, convenience of unhealthy foods, and also how the financial condition of an individual affects their diet. This will establish a connection between budget and food. Moreover, by discussing these topics, more insights will be introduced which will be useful to the development and design of the application, SaveEat.

2.1 The Convenience of Unhealthy Foods

The way an individual acquires food is a key factor due to the number of ways it can be done, which involves the individuals' decision. Convenient foods usually are easy to prepare or acquire which are favored by certain individuals with multiple responsibilities, hence eliminating the long amount of time needed to prepare a meal that typically involves planning and grocery shopping.

Foods that are convenient are usually processed, making it quick and easy to prepare. The purpose of processing a food is to add shelf life and to make it delicious. Using additives along with preservatives help achieve this. Though it adds shelf life to the food, chemicals found in these are unhealthy, with continuous consumption that leads to health complications [3]. Moreover, most processed foods lack nutrients because of the additives added and industrial processes it underwent, this can be called Ultra-processed foods. These foods, although delicious, are usually high in salt, fats, sugars, and oils[4]. An example of these foods are sweetened breakfast cereals, soda, flavored potato chips, energy drinks, and instant noodles [5].

Eating ultra-processed foods can have significant negative effects on health. Consistent intake of these foods is associated with dietary nutrient profiles that predispose individuals to non-communicable diseases such as obesity, diabetes, cardiovascular diseases, and various types of cancer. In addition to increasing the risk of these diseases, ultra-processed foods may contribute to poor dietary quality and are associated with undernutrition and micronutrient deficiencies, particularly in infants, children, and adolescents. Ultra-processed foods often contain high levels of added sugars, fats, and salts, which can lead to higher energy intake and weight gain. Moreover, the prevalence of these foods may reduce the time and motivation for preparing fresh meals, impacting overall well-being and positive human health [6].

Samoggia and Riedel examine the impact of a nutrition information application on consumers' healthy food behaviors and their knowledge of healthy foods [7]. Utilizing popular diet and nutrition applications, the study focuses on an app that interprets product labels to evaluate ingredient quality and nutritional content, tailoring recommendations based on individual user data like age and physical activity. Despite limited scientific backing for such applications' efficacy in promoting healthy eating, this study employs the Health Belief Model (HBM) and the Trans-theoretical Model (TTM) to frame its analysis. Data was gathered from 143 consumers out of 7,000 contacted, who completed both initial and follow-up questionnaires incorporating HBM and TTM constructs, such as stages of change and self-efficacy in healthy eating.

The demographic profile of respondents was diverse, averaging 38 years of age, and varied in education, income, and geographic distribution. Results indicate that nutrition-information applications significantly reduce perceived barriers to healthy eating, enhance users' confidence, and increase both their subjective and objective knowledge of healthy foods. Moreover, the study supports incorporating social and familial influences into the theoretical framework to better understand application effectiveness. Recommendations for future application development suggest collaboration among behavioral scientists, marketers, nutritionists, and developers to optimize application impact [7].

Although most delicious and convenient foods are easy to prepare or obtain, these foods contain harmful additives that are not healthy. Healthy foods on the other hand, may require extra cost, or energy to acquire, making unhealthy foods favorable.

The study on the influence of convenience and price on the purchase of ultra-processed foods at supermarkets used data from the Brazilian Household Budget Survey, analyzing 55,970 households [8]. It found that ultra-processed foods are cheaper and more frequently purchased at supermarkets compared to other food stores. The study revealed that price reductions in these foods lead to increased calorie purchases, while the convenience of buying multiple items in one location also increases consumption of these products. These findings are relevant to the SaveEat application's objectives, as they highlight the importance of price and convenience in dietary choices [8]. This insight supports SaveEat's development, aiming to help users make healthier and budget-conscious food choices, countering the typical draw towards affordable, convenient, but less nutritious food options.

2.2 Financial Condition and Diet

French et al. highlights a significant correlation between household income and diet quality, suggesting that lower-income households tend to have a poorer diet compared to higher-income households [9]. Using a 14-day food purchase receipt data from 202 urban households, the researchers evaluated the quality of food purchases based on the Healthy Eating Index 2010 (HEI 2010), measuring diet diversity and healthfulness.

The findings indicate that lower-income households had lower HEI total scores and lower subscores in specific food categories, such as vegetables and dairy, and a higher proportion of grocery dollars spent on less healthful items like frozen desserts. Conversely, higher-income households showed higher diet quality with greater spending on vegetables and dairy products [9].

This study has a direct connection on the SaveEat application, which integrates nutrition tracking with budgeting. It reinforces the idea that lower-income households face significant barriers to maintaining a healthy diet due to cost constraints and different purchasing patterns. By incorporating budgeting features, SaveEat can help users from lower-income backgrounds manage their food expenses while making healthier choices.

2.3 Existing Solutions

There are many digital solutions for individuals to track their budgets and nutritional intake separately. With these applications, users are presented with a variety of options to manage these conveniently. These solutions offer diverse features and functionalities aimed at enhancing users' well-being. This section reviews some of the existing applications in the market, highlighting their strengths and limitations in budget and nutrition tracking.

For nutrition, there are applications such as MyFitnessPal [10], Macros [11], and Lose It! [12], that offers solutions to users for tracking their food intake. MyFitnessPal stands out as a leading calorie counter, boasting an extensive database of over 11 million foods, including restaurant items [10]. It enables users to track their calorie intake, macronutrients, and exercise, alongside features like barcode scanning and recipe importing. While praised for its versatility and convenience, concerns arise from potential inaccuracies in user-submitted entries and difficulties in editing serving sizes. Macros serves as a versatile tool for nutrient tracking and meal planning, offering easy calculation of calorie intake and food tracking registration [11]. While allowing the users to monitor their carbohydrate, protein, and fat intake, it provides users with a comprehensive approach to balanced nutrition. Lose It! Is a user-friendly calorie counter offering personalized recommendations tailored to individuals like age, weight, and goals [12]. With their expert-verified food database, including verified restaurants and brand-name foods, users can easily track their intake. While the app fosters an active community and provides reminders for meal logging, difficulties may arise in logging homemade meals or calculating nutrition, and navigating the interface may pose challenges. Additionally, Lose It! lacks the capability to track micronutrients.

For budget, there are applications such as You Need A Budget (YNAB) [13] and Wallet by Budgetbakers [14]. YNAB is a budgeting application that allows users to allocate every dollar earned to categories, prioritizing proactive planning for future expenses over merely tracking their past transactions [13]. Its strengths lie in its ability to link various financial accounts and its emphasis on forward-looking budgeting strategies. However, the application's relatively high price compared to other budgeting applications may deter some users, and its design caters specifically to individuals who are actively engaged and committed to budgeting. Wallet by Budgetbakers is a budgeting application that aids users in effectively managing their finances through expense tracking, savings goal setting, and customizable budgets. Offering insightful reports, it simplifies the budgeting process and provides users with a clear overview of their financial status. Although, some users may find the process of adding expenses unnecessarily complex, detracting from the overall user experience.

To the best of the researchers' knowledge, there is currently no single application that combines both budget and nutrition tracking comprehensively. The SaveEat application fills an important gap in existing solutions, providing users with a unified platform to manage their financial and nutritional goals effectively. By integrating these functionalities, the proposed application seeks to empower users to make informed decisions that enhance their overall well-being and financial stability.

3 METHODOLOGY

To develop and assess the effectiveness of the SaveEat application, a two-fold methodology was employed. First, the SaveEat application was developed with integrated features for both nutrition and budget tracking, designed to assist users in making informed food choices within their financial constraints. This application was engineered using agile development methodologies to ensure functionality meets the evolving needs of its user base.

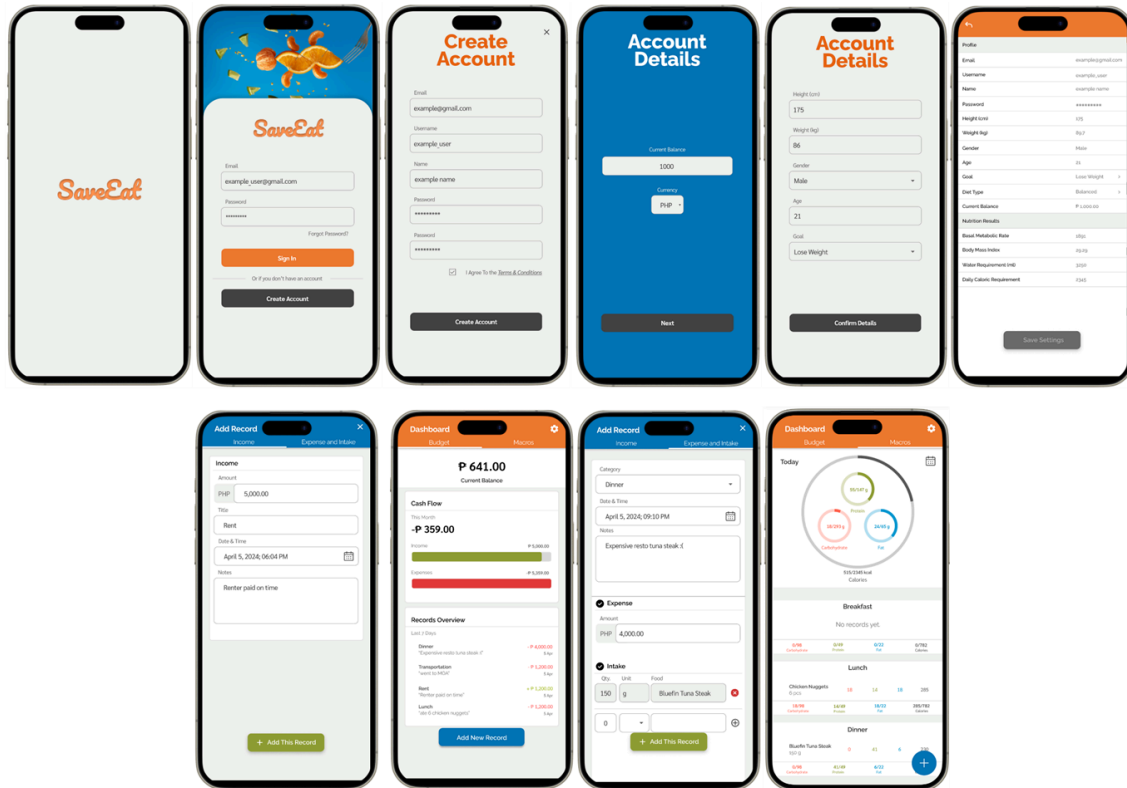


Figure 1: Overview of User Interface

When SaveEat launches, users are greeted with a splash screen featuring the application's logo, providing the users an indication that the application is initializing. Following this, users are prompted to log in by entering their email and password. For new users, the option to create an account is available via the "Create Account" button. Upon selection, users are directed to the "Create Account" screen where they can input their account details and agree to the application's terms and conditions.

Once the user has successfully met the requirements, they are guided to the account details screen. Here, they begin by configuring their monetary settings, including their budget and preferred currency. Additionally, they are prompted to input their personal profile details, essential for tailoring their nutritional plan to their specific needs and goals.

Upon completion of inputting their details, users are directed to the dashboard. This is the main screen of the application that presents the users with two tabs: the budget and macros tab. The budget tab tracks the user's budget along with a short description of where their money is being spent. The macros tab tracks the fat, carbohydrates, protein content, and calories of the user's meals each day, providing a more comprehensive view than just the last meal. It also includes a short description of each meal and when it was consumed.

Users can easily record their income, expenses, and food intake by accessing the "Add Record" page from the dashboard, shown through a blue plus icon positioned at the bottom right corner of the screen. Here, on the income tab, users can input their income amount, payer details, date and time, and any relevant details on the description. The amount they input here on the income tab will then be added to their current balance shown on the budget tab on their dashboard.

On the expense and intake tab, users can select from predefined categories such as "non-food", "breakfast", "lunch", and "dinner", along with respective date, time, and description. For additional flexibility, users are given the option to choose between recording expenses, food intake, or both. Opting for expense only enables users to input the amount of money spent, which will then be deducted from their budget. On the other hand, selecting intake only allows users to search for a good item and add it to their records. The estimated nutritional values of the food item are retrieved from an external Application Programming Interface (API) known as the Food Database API by Edamam [15]. For users selecting both, they may add all details.

The rationale behind these options of selecting either food intake or expenses, or both comes from how: (1) by providing the option of recording expenses only, users can track their financial transactions, even in instances where food consumption hasn't occurred, allowing them to monitor non-food-related payments; (2) enabling users to record intake only allows them to track food consumption, regardless of whether the food was purchased or acquired through other means, such as gifts or pre-stocked items they personally cooked; and (3) presenting users with the option to record both intake and expenses align closely with the application's goal of enabling comprehensive tracking of both food and monetary intake, ensuring a seamless user experience.

3.1 DATA GATHERING METHOD

Following the development of the application, a comprehensive survey was disseminated to evaluate user satisfaction and the application’s impact on their dietary and budgeting practices. The survey was conducted using Google Forms, providing a scalable and user-friendly platform to gather feedback. Participants were recruited from various demographics to ensure a wide range of insights.

3.1.1 DATA GATHERING PROCEDURE

The survey included questions related to usability, effectiveness in managing nutrition and budget, and overall satisfaction with the application. Specifically, the System Usability Scale (SUS) was used as a metric to measure the application’s usability and effectiveness comprehensively.

System Usability Scale (SUS)
1. I think that I would like to use the SaveEat app frequently
2. I found the SaveEat app unnecessarily complex.
3. I thought the SaveEat app was easy to use.
4. I think that I would need the support of a technical person to be able to use the SaveEat app.
5. I found the various functions in the SaveEat app were well integrated.
6. I thought there was too much inconsistency in the SaveEat app.
7. I would imagine that most people would learn to use the SaveEat app very quickly.
8. I found the SaveEat app very cumbersome to use.
9. I felt very confident using the SaveEat app.
10. I needed to learn a lot of things before I could get going with the SaveEat app.

Fig 2: System Usability Question Set

Data collected from this survey will be analyzed to refine the application further, ensuring it effectively aids users in achieving their dietary and financial goals.

4 RESULTS AND DISCUSSION

The evaluation of the SaveEat application involved 20 participants who utilized the application and subsequently completed a usability survey implemented through Google Forms, using the System Usability Scale (SUS) as the primary metric to measure the application's usability and effectiveness.

Participant 1	65
Participant 2	62.5
Participant 3	65
Participant 4	70
Participant 5	72.5
Participant 6	70
Participant 7	65
Participant 8	77.5
Participant 9	80
Participant 10	50
Participant 11	65
Participant 12	70
Participant 13	67.5
Participant 14	70
Participant 15	80
Participant 16	77.5
Participant 17	70
Participant 18	75
Participant 19	65
Participant 20	67.5
Average	69.25

Figure 3: SUS Results

The System Usability Scale (SUS) was employed to evaluate the usability of the SaveEat application among a cohort of 20 participants. Each participant was asked to complete a standardized SUS questionnaire subsequent to their interaction with the application. The responses were then subjected to the SUS methodology, wherein each score, initially on a scale from 0 to 100, was converted to reflect various degrees of usability. The analysis of these scores revealed an average SUS score of 69.25 for the SaveEat application, indicating a moderate level of usability which, while functional, suggests substantial room for enhancement.



Figure 4: SUS Acceptability Score [16]

This average SUS score, slightly below the industry benchmark of 70 which typically signifies good usability, indicates that the application is moderately effective yet exhibits significant variance in user satisfaction. This score implies that while certain users find the application to adequately meet their needs, others encounter difficulties with specific facets of its interface or

functionality. Such variance could be attributable to inconsistencies within the application's design or to certain features not being universally intuitive.

Given the application's objective to facilitate effective management of nutrition and budget for its users, it is paramount that both aspects are optimally user-friendly and supportive. Proposed improvements could include simplification of the user interface, enhancement of intuitive access to key functionalities, and augmentation of the responsiveness and precision of the tracking tools.

5 CONCLUSION

In conclusion, the SaveEat application's development and examination resulted in positive results. The software received a remarkable average System Usability Scale (SUS) score of 69.25, indicating great usability. The aim of the application is to help users make guided dietary decisions within budgetary limitations. Even though everyone's experiences were different, there was a high level of satisfaction in general, and those who used the application said that would be likely to suggest it to others who required health and budgetary assistance. The integration of budget and food tracking features proved useful in assisting users in making healthful choices while respecting their budgets. The application's continued growth and success depend heavily on constant improvement based on user feedback, ensuring that it changes to successfully fulfill the needs of users. These results imply that SaveEat has the potential to enhance the lives of users by offering practical ways for managing expenditures and nourishment.

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