FoodForCare: An Android Application for Self-Care with Healthy Food

Natnicha Suthumchai, Sirin Thongsukh, Pacharamai Yusuksataporn, Songsri Tangsripairoj
Faculty of Information and Communication Technology
Mahidol University
Nakhon Pathom, Thailand
{natnicha.sut, sirin.tho, pacharamai.yus}@student.mahidol.ac.th and songsri.tan@mahidol.ac.th

Abstract—**Recently, there are many people who ignore health concerns especially in their eating habits. This has made the number of diseases found in society, especially non-communicable diseases (NCDs) such as diabetes, hypertension, and cancer drastically increase every year. The number of patients having these diseases, could be reduced by paying more attention to the food that they eat and nutrition that they receive. Accordingly, the researchers would like to propose FoodForCare, an Android application for self-care with healthy food. The main purpose is to help users have better eating habits and a healthier lifestyle. FoodForCare provides functions for users to keep their daily personal health and food records of food intake. The users can see an analysis of nutrition and calories per day and whether it is sufficient or not. This application can give an overview on food calories and nutrition so that they can eat wisely. Finally, the development of this application hopes to help Thai people in order to manage their total nutrition and calories taken for a healthier lifestyle and will directly decrease the number of people who are getting diseases caused from a disorder of food and nutrition.**

Keywords—android application; healthy food; NCDs; nutrition; self-care

I. INTRODUCTION

Nowadays, the majority of people do not pay attention to food that they eat due to a lack of time and ignorance of health conditions. However, health care especially with food topics tends to have an influence on some groups of healthy people in society. Food causes the body to gain nutrition and is essential to life. Healthy food is important for the system inside the body because the food choices each day affect the health condition. Good nutrition is an important part of leading a healthy lifestyle [1].

In addition to healthy food, self-care is another action of humans that can cause a healthy lifestyle [2]. People can take care of themselves by using the knowledge of self-care, which means that they should learn to control, deliberate and self-initiate the food consumed and calories burned each day. Especially for patients, self-management is very important and crucial for them to get rid of their illness.

Non-communicable diseases (NCDs) [3] are the diseases that are not caused by bacteria or infection through touching or carriers, but are caused by the result of lifestyle and the risky behaviors in eating. NCDs have become the number one cause of deaths in Thailand with more than 300,000 fatalities each year [4]. NCDs consist of Diabetes Mellitus, Cardiovascular and Cerebrovascular Diseases, Cancer, Hypertension, Obesity, etc. Thus, people would be able to have a healthy life without diseases and reduce the risk of NCDs if they usually exercise and eat nutritional food daily.

Recently, technology devices such as smart phones and tablets have an impact on everyday lives. The significant growth is a mobile application often used every day. Lately, many people tend to use a mobile phone instead of a personal computer. Android is one of the most popular operating systems in the world. Especially in Thailand, Android has the highest proportion of Thai mobile operating system market share [5]. Hence, the researchers use this opportunity to make use of all of this information by creating an application on Android mobile devices.

Therefore, FoodForCare is developed to support users, especially patients with NCDs diseases, to record their eating habits. Also, analyze nutrition and calories each day for users to be able to maintain their food intake and heal their ill health condition. The list of food in the application was got from various books such as healthy food [6][7], food for diabetic patients [8][9], and food that use to prevent from diseases [10]. Lastly, the researchers would like to encourage people to pay more attention to the food that they eat. According to the statement "We are what we eat" refers to people having a healthy well-being with the food that they eat everyday.

II. BACKGROUND AND RELATED WORK

A. Self-Care by Healthy Food and Weight Control

Self-care [11] is an act when people intend to take care of themselves with respect to physical, mental and emotional health. They may use self-care to prevent themselves from illnesses, try to lose weight, or challenge their self to be healthier. The researchers are focusing on Self-care with nutritional food. Food is the topic that people often overlook, they are too busy or do not have time to consider eating healthy and nutritional food. They usually substitute it with fast food or a snack loaded with sugar instead of a regular nutritional meal. The lack of adequate nutrition will cause people to encounter with many diseases.

People can easily self-check their body measurement by having weight control, which can be defined by Body Mass Index (BMI) [12], Basal Metabolic Rate (BMR) [13], and Total Daily Energy Expenditure (TDEE) [14]. All of these can be calculated by weight, height, age, gender and the daily activities of that person. It is essential to know the overall body status to be aware of health conditions and body metabolism.

B. Survey existing applications

A number of existing applications related to food, diet and calories control were explored. Nine interesting applications closely related to the development of FoodForCare are briefly discussed as follows. Table I displays feature comparison of the nine applications with FoodForCare which are CalTracker[15], Calories Diary[16], FoodiEat[17], Kcal Check Calories[18], Calories Counter[19], Low Calories Recipe[20], Food That Help Your Body Heal[21], My Diet Diary[22], and Clean Food[23].

Table I. Feature Comparison of Applications

Feature / Application	Calculate BMI	Calculate BMR	Calculate TDEE	Calculate standards calories	Analyze total calories of each day	Weight History	Healthy Food	Food for Patients	Food Guide	Nutrition Information	Nutrition Analysis	Challenge	Notification	Share Facebook
CalTracker	✓	✓		✓	✓									✓
Calories Diary	✓	✓		✓	✓				✓					
FoodiEat	✓			✓	✓	✓				✓				✓
Kcal check calories	✓	✓		✓	✓									
Calories counter by fatsecret				✓	✓					✓				
Low calories recipes							✓							
Food that help your body heal							✓	✓						✓
My diet diary	✓			✓	✓				✓	✓	✓			
Clean Food														
FoodForCare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Most of the applications have only some basic features such as record, calculate and analyze calories in each day. However, all applications surveyed still had some weak points. Many applications do not provide nutritional information, clean food and a food guide. It would be more convenient for users to use one application like FoodForCare that can provide all features.

C. Related work

S. Kasim et al. [24] described an Android application created with the main purpose to help users managed their calories consumed per day. It would help ensure users receive a better and healthier life and decrease the diseases problem. The significant advantage of this application is that it can compare calories eaten and burned in a day. Moreover, S. B. Ahire et al. [25] discussed the ontology semantic framework that would suggest Health Care system to give accurate information based on user input. It helps society to have a healthy food by categorizing and suggesting knowledge of food and sensible amounts of exercise by using a decision tree algorithm.

L. J. Paiva et al. [26] discussed the strategies that would change the increasing number of NCDs patients. A lack of knowledge in nutrition information leads to an unhealthy diet. They introduced the Knowledge-Attitude-Behavior (KAB) Model, which focuses on behavioral change in diet that may be caused by a lack of time or money, habits, social norm, and available technologies. Furthermore, S. Scerri et al. [27] described the review of systems and challenges in the area of human computer interaction (HCI) to give a better way to reduce the risk of health problems. The purpose is to enhance the usage of computer technologies with nutrition and human health.

III. SYSTEM DESIGN

Fig. 1. FoodForCare System Architecture

As shown in Fig. 1, the FoodForCare system has two main actors, which are the user who can use the application by connecting to the Android device with Wi-Fi or a 3G Internet connection and the administrator who can use PC to maintain the database on a web server through a web browser.

The FoodForCare application requires the user to register as a member by giving their personal information and log-in to use the application. The application has seven main features, as described below:

1) *Profile* – This feature enables users to manage the profile that is stored on the application and see recorded weight history.
2) *My Diary* – This feature helps users record daily food intake and allows users to see analysis of monthly calories consumed and daily nutrition gained compared with standards.
3) *Food List* – This feature provides users with the information of each food menu with kcal, proteins, carbohydrates, and fats in various type of categories such as healthy food, normal food and food for diabetic, hypertension and cancer patients.
4) *Food Guide* – This feature supplies users with informative tips that user can be used to gain benefits.
5) *Body Measurement* – This feature helps users track the measurement of the body from weight, height, age, gender, and activities with BMI, BMR and TDEE calculation.
6) *Notification* – This feature enables users to set the date and time as a reminder to note the time to record food intake.

7) Challenge – This feature allows users to challenge themselves to be healthy by using the recorded data that users note over a 7-days calories controlled period. Users who can accomplish the challenge could share the success on Facebook.

IV. USER INTERFACE

Examples of the FoodForCare user interfaces are presented in this section. The design was created to fit with everyday usage and provides user with ease of use. All the elements such as icons, position and pictures are appropriately related to features and attractiveness of the interface.
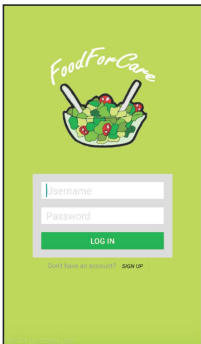
Fig. 2. Log-in
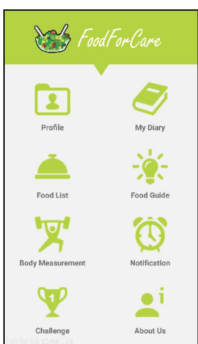
Fig. 3. Main Page

Fig. 4. Weight History

Firstly, in Fig. 2 the user has to log-in to use the application. FoodForCare has many features for the user to use as shown in Fig. 3. Users can edit the profile and update the record of weight history, which can help the user check weight loss progression as shown in Fig. 4.
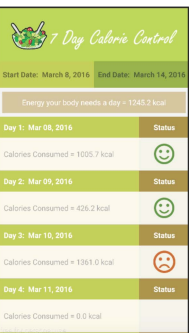

Fig. 5. Food List

Fig. 6. Food Details

Fig. 7. Challenge

In Fig. 5, there are various types of Thai food categories for the user to choose, most of them are food for patients and healthy food. Users can search menu from the list and see the list of food sort by Thai name, English name and Calories. Each food has carbohydrates, proteins, and fats provided as shown in Fig. 6. Besides, FoodForCare has a challenge feature for the user to challenge themselves in eating healthy by controlling the consumed calories for 7-days. The challenge activity will be set for 7-days since the start date and generate good and bad status displays for the user. If the user accomplishes his 7-days calories control challenge, there will be a share button for the user to share the success on Facebook.
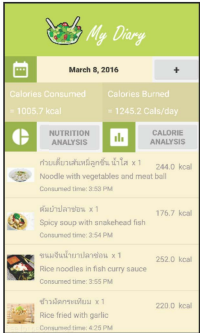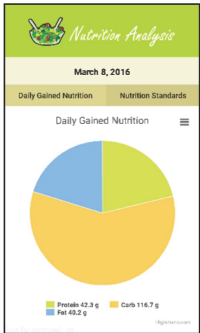

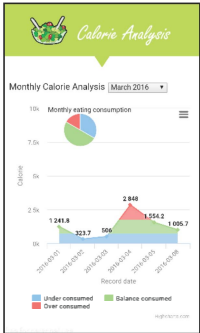Fig. 8. My Diary

Fig. 9. Nutrition Gained

Fig. 10. Calories Analysis

In Fig. 8, users can record the consumed food each day in diary. The application will calculate daily nutrition gained in a day for users as shown in Fig. 9. Also, there will be a standard amount of nutrition that the user should get in a day based on the BMR provided. In Fig. 10, there is monthly analysis of calories for user to check under, balance, and over consumed calories.

Moreover, FoodForCare has a body measurement page for the user to check the overall body status. Users can set a date and time to send a notification to remind the time to record in the food diary. Besides, FoodForCare offers food guides for the user who would like to know food tricks and tips for diabetic, cancer, and hypertension patients.

V. IMPLEMENTATION

The software tools used for implementation are listed below:

- Android Studio 1.5.1: for implementing the main system with JAVA and XML language.
- Netbeans 8.1: for developing database and server using PHP, SQL language and stored in web hosting.
- Highcharts and Facebook SDK libraries: for demonstrating charts and ability to log-in and share on Facebook.
- Adobe Photoshop and free source websites: for getting images and icons in the application.

VI. EVALUATION AND RESULTS

The evaluation of FoodForCare aims at measuring the satisfaction of users. Details of the evaluation method and evaluation results are described below.

- Introduced and provided basic information for users to understand concept of the application.
- Demonstrated the application to the users step-by-step.
- Let the users used the application and asked them to answer a paper based survey form.

The survey form consists of questions asking the users about their personal information, medical problems, smart phone usage, interest in healthy food, experience in record consumed food.

50 participants were volunteers to use FoodForCare which took place at Golden Jubilee Medical Center, Nakhon Pathom, Thailand. Majority of participants are in the age of 20 -30 (50%). Number of female participants (54%) are more than male (46%). Also, 70% of participants use Android device and 58% of them use smart phone more than 3 hours a day. More than half of them (56%) do not have any medical problems, though there are a few of them who are having NCDs. According to the survey results, 90% of them are interested in eating healthy food and lose weight by eating nutritional food but only 28% of them have ever record their calories gained and food consumed.

The researchers let them answer some questions regarding to the usage of FoodForCare as shown in Fig. 11. 35 participants (or 70%) voted Excellent for the user interface design and 41 (22+19) participants (or 82%) agreed that it has benefits and advantages especially for patients who control calories in their food. Nevertheless, 7 of them (or 14%) found that it is actually hard to use the application in their daily life because they are too lazy to daily record their food intake.
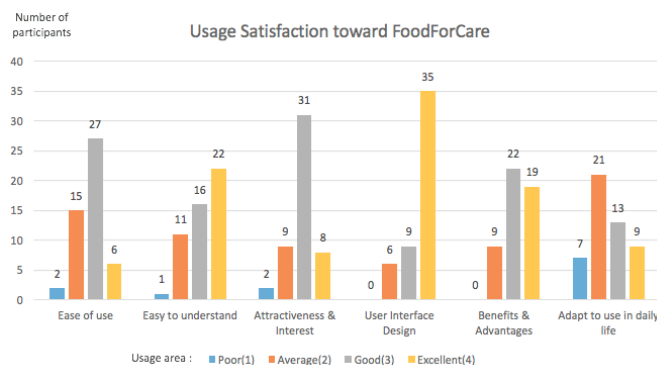

Fig. 11. Usage Satisfaction toward FoodForCare

Overall, most of the participants are satisfied with the application. Some of them gave suggestion and comments about wanting more menu inside food list and it would be more interesting to have list of restaurants that sell healthy food and food for patients.

VII. CONCLUSION

In conclusion, our project aims to introduce the idea of self-care with healthy food by having an android application that help improved eating habit of people to be better. FoodForCare plays a role as an application that provides user with features such as record food intake, analysis of calories consumed, body measurement based on calculation of user's BMR, etc. That means, user could know his body measurement status, calories consumed in each day, and learned to aware or maintain with the consequence. All in all, the application could help reduce the number of patients who get the diseases from eating disorder and change behavior of people to have a healthier eating habit.

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