TOPIC: DIET AND NUTRITION MANAGEMENT SYSTEM

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COLLEGE OF COMPUTING AND INFORMATION SCIENCES
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A Proposal submitted to the College of Computing and Information Sciences in Partial fulfilment of the Requirements for the Award of a Degree of Bachelors of Information Systems and Technology of Makerere University. Option: Systems Development

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1   Introduction

Information systems are concerned with data capture, storage, analysis, and retrieval. These are vital to assist decision-making in a short time frame, potentially allowing decisions to be made and practices to be action-ed in real-time. In the context of diet and nutrition management, nutritional health systems allow for accurate and efficient analysis of food ingredients as well as patient nutrient intake which assists in ensuring that selected food combinations offer the desired nutrients for a particular meal or diet order.

1.1   Background

Dietary deficiency is more accountable for the overall death toll on the global scale than other factors such as tobacco, high blood pressure, or any other health risk, as indicated in the new scientific study. "Poor diet is an equal opportunity killer," [1]. Low levels of healthy food consumption, such as whole grains, in contrast to too many unhealthy foods, including sweetened beverages, account for one in every five deaths globally, "We are what we eat and risks affect people across a range of demographics, including age, gender, and economic status," [1].

Poor diets were behind the 10.9 million deaths, or 22% of all deaths among adults in 2017, with cardiovascular disease (CVD) as the foremost cause, trailed by cancers and diabetes. They also resulted in 255 million disability-adjusted life years (DALYs), equalling the sum of years lost and years lived with disability. Poor diet statistically represents 16% of all DALYs among adults globally. The findings of the study dictate that while the impact of individual dietary factors varies across countries, three dietary factors – low

intake of whole grains, as well as fruits, and high consumption of sodium – accounted for more than 50% of diet-related deaths and 66% of DALYs. The other 50% of death and 34% of DALYs were tied to high consumption of red meat, processed meats, sugar-sweetened beverages, and trans fatty acids among other foods. There is an urgent and compelling need for changes in the various sectors of the food production cycle, such as growing, processing, packaging, and marketing [1].

Uganda has shown limited progress toward achieving the diet-related non-communicable disease (NCD) targets. Furthermore, it has shown no progress towards achieving the target for obesity, with an estimated 10.4% of adult (aged 18 years and over) women and 2.3% of adult men living with obesity. Uganda's obesity prevalence is lower than the regional average of 20.7% for women and 9.2% for men. At the same time, diabetes is estimated to affect 5.6% of adult women and 5.6% of adult men [2]. The motivation for feeding should not only be to stop hunger, but also to increase the general awareness of the nutritional value of the food ingested.

1.2   Problem statement

Improper diet and nutrition are caused by inconsistent intake of healthy foods. Other causes include improper meal timings, under or overeating, not having enough healthy foods, and nutritional ignorance. Experts have revealed that only 10% of children below the age of five years are eating recommended healthy foods and this includes frequenting eating nutritious meals and eating on time. This has left the majority 90% eating non-nutritious foods which have resulted in increasing numbers of childhood malnutrition and obesity[3]. "People are eating a lot of unhealthy foods that don't contribute to manufacturing of blood in the body which has made them become sicker." [3]. We therefore intend to contain this problem by developing a diet and nutrition management system which will guide the targeted populace categories majorly students to maintain a healthy selection of well-balanced meals daily.

1.3   Objectives

1.3.1   General Objectives

To develop a diet and nutrition management system that will provide students with timely suggestions on the food they should consume to remain healthy.

1.3.2   Specific Objectives

To identify the requirements for a Diet and Nutrition Management System in order to understand what the the-would-be users of the system would want.

To design a model and implement the system that will be used to assist in maintaining healthy diet meal patterns.

To test and validate the system.

1.4   Justification.

Improper diet and nutrition is a constant challenge to many students which adversely exposes them to risks like obesity, digestive problems, and chronic illnesses. From the listed effects, our system intends to;

- Increase the awareness on the dire consequences of improper diet and nutrition

- provide a practical means to improve feeding patterns daily.

- customize a system to the needs of Students Population.

1.5   Scope

Our research will be focused on locally grown foods in Uganda that consist a balanced diet and specific chronic illnesses like Diabetes, obesity, pressure and cancer. We will major on Makerere University. We intend to sample several students from colleges such as CEDAT, COCIS, and CHUSS in order to know the foods they regularly eat.

1.6 Significance

The system we aim to build will help the elderly remind them when to best consume their meals. Athletes, through consuming the right foods will receive the required food values thus boosting their sports performance. Pregnant mothers will be able to sustain a healthy pregnancy through appropriate meals for both the unborn baby and the expectant mother. Students will be able to register an improvement in their overall mental health, especially regarding memory retention and the intelligence quotient. People with chronic illnesses will realize the nutritional value of eating suitable foods and as a result, reduced disability-adjusted Life years. As far as academia is concerned, it will assist to refine the focus of the research on the diet and nutrition context and predict any challenges that may arise out of it.

2 Literature review

According to Wikipedia (2019), Dietary management simply means providing nutritional options for individuals and groups with diet concerns through the supervision of food services. Information systems have made it easier for accurate and efficient nutritional analysis of feeding habits and patterns.

This section focuses on the exploration of different solutions developed by researchers to alleviate the problem of poor eating habits among university students. We reviewed similar systems regarding the problems faced by students when they skip meals or even fail to eat at the right time. The solution we aim to provide for this problem is to develop a diet and nutrition management system that will provide students with timely reminders, food suggestions, and nutrition literature.

We realized that so much research has been done by researchers from the field of nutrition science where a person is trained to provide information regarding the types and quantities of food the people eat. This field draws information from other areas such as biology, chemistry, and social sciences (Sriram, 2020).

The review is comprised of works that have been done to find the solution to the problem and we were able to sample various systems. We singled out systems that were closely related to our research problem and we noted the strengths and weaknesses of the solutions. By studying these systems, we were able to find the deficiency in the solutions regarding our problem and stated ways in which the solutions can be tailored to satisfy our target group. The features of the reviewed systems are compared with those of the proposed system in Table 1.

2.1 Existing Systems

2.1.1 MantraCare

MantraCare is a Ugandan-based web application that provides consultation services with dieticians on belly fat reduction and weight loss dieting plans, exercises, and foods.
Strength of the System:

- Video calls or chat sessions with the best dieticians.

- Affordable diet consultation.

Weaknesses of the System:

- It does not have timely reminders.

- It does not offer food suggestions.

2.1.2 LifeSum

LifeSum is a fitness app that lets you decide what a healthy lifestyle means to you. It has plenty of recommendations and suggestions, but they are always pointing toward the goal you want. It has several features which include:

- Simple tracking of meals (including barcode scanning), exercises, habits, weight, and body measurements.

- A wide range of diets to choose between, including Keto and High Protein.

- Favorites- save your favorite food, exercises, meals, and recipes.

- Meal plans – 1 to 3 weeks of preplanned, easy-to-cook meals.

- Support for macros and net carbs.

- Detailed nutritional information

- Food, meal, and day ratings.

- Weekly life score- what's gone well and how you can improve.

- Hundreds of healthy and tasty recipes.

- Integrates with Apple Health, Google Fit, Samsung Health, Apple Watch, RunKeeper, Fitbit, Withings, Samsung wearables, Wear OS and Google Assistant.

Strength of the System:

- The ability to integrate with different technologies for example Google fit, and Apple Watch among others.

Weaknesses of the Systems:

- Limited food suggestions.

- Not fully accessible to all people since it's for paying.

2.1.3   My Plate Calorie Counter

This app provides you with the fastest way to lose weight and improve your overall health (Livestrong.com). They use the world's largest food database to provide you with calorie counts, nutritional information, and serving sizes for lots of foods. You can also access an 8-week meal plan and recipe suggestions.
   Strength of the system:

- They provide you will a lot of statistics about the way you eat.

- You can also customize the way you eat depending on your health goals and this includes the weight you wish to gain.

Weaknesses of the system:

- Most of the suggested foods such as Southwestern Pancakes, chocolate Almond protein cocoa, and many others are alien to our target group.

- If you want to get most of the app such as your highest caloric foods, daily goals, and many others, you have to pay.

2.1.4   Fitbit

Fitbit is a fitness tracker that helps you track your daily activity, exercise, sleep, weight, and food intake. It has a variety of features which include:

- Tracking of steps, distance, calories burned, active minutes, and hourly activity.

- Tracking of sleep duration and quality, including light, deep, and REM stages.

- Tracking of weight and BMI.

- Tracking of food intake, including calories, protein, carbohydrates, fat, and more.

- Tracking of water intake.

- Setting and tracking of fitness goals.

- Integration with the Fitbit app, which offers personalized insights, challenges, and social features.

- Integration with other apps and devices, such as MyFitnessPal, Strava, and Google Fit.

Strength of the system:

- It has a wide range of features for tracking various aspects of health and fitness.

- It has integration with other apps and devices, which allows for seamless tracking and analysis of data.

Weaknesses of the system:

- It does not have timely reminders or food suggestions.

- It is not fully accessible to all people, as it requires the purchase of a Fitbit device.

2.2 Proposed System

The proposed system aims to address the deficiencies in the existing systems by providing timely reminders, food suggestions, and nutrition literature to university students. It will also have the following features:

- Personalized meal and exercise plans based on individual goals and preferences.

- Integration with popular fitness and nutrition apps and devices, such as MyFitnessPal and Fitbit

- Customizable notifications and reminders for meals, exercises, and other health-related activities.

- Comprehensive nutrition information and literature for various diets and health goals.

- Suggestions for healthy and affordable meal options based on the student's location and preferences.

- Integration with local food delivery services to make it easier for students to access healthy meals.

The proposed system aims to provide a comprehensive and personalized solution for improving the eating habits and overall health of university students. By addressing the deficiencies in existing systems and offering a wide range of features and services, we believe the proposed system has the potential to make a significant impact on the health and well-being of students.

Table 1: Comparison of features in existing systems and the proposed system

System	Timly reminders	Food suggestions	Nutrition literature
MantraCare	No	No	N/A
LifeSum	No	Limited	N/A
My Plate Calorie Counter	No	Limited	N/A
Fitbit	No	No	N/A
Proposed system	**Yes**	**Yes**	**Yes**

References

[1] Health Data. New study finds poor diet kills more people globally than tobacco and high blood pressure. 2019.

[2] Global Nutrition Report. Uganda nutrition profile, n.d.

[3] New Vision. Only 10