Mobile Application for Basic Nutrition Tracking: The Bite Balance

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ABSTRACT - The article introduces Bite Balance, an Android application coded in Kotlin in Android Studio, which assists one to track the daily intake of foods in order to achieve desired health goals. The application is user-friendly with a simplified interface, where users can track the calorie, vitamin, and mineral intake.Users are free to use stored foods or introduce their favorite foods, the application consolidating similar nutritional content.

BiteBalance is utilized for various purposes of health like weight loss, muscle building, or overall well-being, as well as custom recommendations and meal planning advice. One of the strongest features of this app is that with it, one can use it to offer individual balanced meals based on personal macro and micronutrient needs, and push individuals toward healthy and sustainable food consumption.Through visualization techniques and morning reports, the user will be informed about their eating patterns and make well-informed decisions in order to assist in long-term health benefit. In addition to assisting personal well-being, BiteBalance also assists in the United Nations Sustainable Development Goals (SDGs) goals of Goal 2: Zero Hunger and Goal 3: Good Health and Well-being. By decreasing diet-disease and food insecurity through the dissemination of awareness on correct eating and nutrition knowledge, the app contributes to a healthier and food-secure world.

Keywords: Kotlin, SDGs, Nutrition Tracking, Calorie and Nutrient Analysis, Personalized Health Recommendations, Sustainable Diet

I.   INTRODUCTION

Over the years, there has been a sharp rise in health-related issues like obesity, malnutrition, and other chronic diseases associated with unhealthy eating habits. Several people find it difficult to have a balanced diet, and they are ignorant about the nutritional value of the food they are taking. A number of individuals struggle to maintain a balanced diet, and they are unaware of the nutritional content of the food they consume. Technology, especially mobile applications, offers a powerful solution to address these issues. BiteBalance, an Android application based on Kotlin, is intended to help users monitor their daily food consumption, fulfill their nutritional requirements, and eventually lead a healthier lifestyle. With the functionality of tracking calories, vitamins, and minerals intake during the day, the application renders immediate feedback on food consumption by users so that they are able to understand their eating habit and adjust accordingly.

The BiteBalance application is designed with a simple interface that enables users to input their meals with ease and monitor their nutritional intake. It has an in-built food database, thus easily allowing users to search for regularly eaten foods, and the users can also manually enter what they want to call custom foods. The nutritional value of a meal, whether calories, vitamins, or minerals, is calculated automatically by the app. Furthermore, it offers users personalized meal suggestions based on their goals and preferences, such as weight loss, muscle gain, or overall health. This feature ensures all users get tailored advice and meal plans that meet their unique lifestyle and health aspirations.

BiteBalance exactly fits the United Nations Sustainable Development Goals (SDGs), especially SDG 2: Zero Hunger, as much as raising knowledge of food security and nutrition. The app encourages better food consumption and helps people understand the need of an equalizer meal. Being capable of diminishing the possibility of dietrelated disorders such as diabetes, high blood pressure, and heart disease equally helps in support of SDG 3: Good Health and Well-being.

BiteBalance has an important role to enhance the health outcomes by enabling the users to track their nutrition, thus supporting global initiatives to improve access to healthy food as well as overall health. By doing so, it enables people

to reach their health objectives and helps establish a healthier and more sustainable society.

II. LITERATURE REVIEW

With the rise of health awareness and speedy digital growth, food technology has become a great ally in empowering people to gain control over their health. BiteBalance is positioned at this critical nexus, utilizing mobile technology to promote healthy eating, as well as a sustainable and conscious lifestyle. Through the integration of customized nutrition monitoring, intelligent food advice, and easy-to-use interfaces, the app enables users to make informed food choices, closing the gap between technology and well-being in daily life.

The research article "Mobile Apps for Human Nutrition: A Review" by Muzamil Ahmad and colleagues (2020) describes how junk food can cause a lot of diseases such as weak bones, low IQ, anemia, obesity, and heart disease. It also describes how consumption of junk food, missing meals, or taking meals at odd times can be detrimental to our health. With too much work pressure in lives, people do not find enough time to go to doctors or nutritionists. To assist with this, numerous mobile apps have been developed to monitor energy levels and give advice on healthy diets. [1]

The study of Rodrigo Zenun Franco and co-authors (2020) investigated some of the most popular smartphone apps available for tracking food consumption and improving dietary habits. The popular smartphone applications allow users to track food intake, including meals, nutrients, and provide informative feedback on users' eating habits. The study found out that most applications offer functions like calorie counting, meal planning and fitness tracking. They give real-time feedback so that users can make healthier choices[2]. This shows how much assistance mobile apps are for diet control and general well-being.

The increase in usage of diet-tracking apps highlights their increasing role in health management.

The study by Mila Zečević and colleagues (2020) analyzed users' reviews of diet-tracking apps on Google Play. They reviewed over 72,000 reviews for 15 apps to understand what users enjoyed and did not enjoy.

The research discovered that the majority of users were satisfied with the apps, awarding them an average of 4.4 out of 5. Positive comments appreciated the simplicity of the app and the effective tracking. Complains were centered on added charges, bugs, and challenges in adding new foods. The research indicates that diet apps are useful but there is room for improvement to make them even more effective for users.[3]

The research conducted by Antonella Samoggia and Bettina Riedel (2019) investigated the impact of nutrition-information apps on users' healthy food behavior and nutrition knowledge. The study employed health behavior theories such as the Health Belief Model (HBM) and the Transtheoretical Model (TTM) to explain how individuals utilize these apps and what drives them.

The use of the application in the study helped users through scanning packaged food labels, assessing ingredients, and suggesting healthier alternatives depending on personal information like age and activity level. Outcomes showed that users were more certain about the choice of healthy foods, had fewer health barriers to eat healthy, and improved both perceived and actual nutrition knowledge. The study further showed the huge role played by social and family influence towards instilling healthy behavior and suggested incorporating these into the future app design for enhanced efficiency[4] .

III. PROBLEM STATUS

Most popular food and nutrition apps including MyFitnessPal and Lose It! offer functional features like barcode scanning, calorie counting, and food databases. But most such advanced features—like detailed nutrient analysis, meal planning, and customized recipes—are behind pay walls of paid subscription. Ad-supported freemium versions are also prevalent, which can be a nuisance to access. For example, MyFitnessPal has very complete tracking but only premium users have access to some features, while Lose It! provides a less complete database and fewer free devices.

Yet another common issue is that such software is usually intimidating to new users, with busy interfaces and too many choices. Additionally, most are pioneering in the fact that they use user inputted food information, which can cause imprecision or inconsistency of the nutritional information. These are reasons that make it difficult for users to keep their health goals, and thus more efficient, more accurate, and more userfriendly nutrition tracking software are required.

IV. METHODOLOGY

The BiteBalance app was developed with a modular architecture focusing on user-centric design principles and Agile development. The app is therefore flexible, responsive to users' needs and instant feedback and iterations can be received by the users for every step in the development of the application. With a modular architecture, the BiteBalance app system can be outlined within manageable and discrete modules at various levels where the developers can code encapsulated software modules without affecting the overall architecture. The system is made possible by three main functional modules, which are User Interface, Diet & Nutrition Advice, and Recipe Management. These functional modules allow for a

user flow that is both seamless and intuitive. The backend functionality contains user profile management, least possible use of internal memory for data storage, and least possible file-based data management techniques that enables the application to perform well even when there is zero connectivity or where connectivity is negligible.

Each module was developed with the correct separation of concerns that allows for higher maintainability and scalability of code. The implementation was created with Android Studio and Kotlin was chosen as the development programming language as it includes modern features and provides easy access for development on an Android platform. The UI components of the project were developed to Android's XML-based.

MODULE 1: HOMEPAGE AND USER AUTHENTICATION

The initial port of entry for BiteBalance users will be the secure registration or login page. In registering, users will be asked to sign in with an email address and password, which will establish a local profile for their use of the app. Next, they will be asked to enter dietary goals and preferences such as setting a daily caloric amount, weight objectives, and dietary limitations (eg. vegetarian, low carbohydrate). These are stored locally and utilized in personalizing the user experience in the future.

Once logged in successfully, users will be able to enter the Home Dashboard section where they will participate in a daily interaction. Home Dashboard is designed to be a productive place of daily activity where users can glimpse a clear visual outline, and overview of their health data. Users can view key indicators of their health data such as, total calories taken, hydrated levels, natural ability for activity. Filter portions and food types from meal category activities (breakfast, lunch, dinner, snack, etc.) with ease. The home page/user interface is, by design, simple, intuitive, and designed for user accessibility through user feedback, and immediate user access to principal diet advice, lost recipes, and individual profile adjustments. Users shall get feedback on daily consumption at their convenience, enabling the app to guide users to be conscientious of health development. By and large, the home page is made to provide both new and current users with interaction with the app without unnecessary delay and confusion.

Module 2: Nutrition and Diet Advice

This module is the intelligent hub of the BiteBalance app by delivering personalized and actionable dietary guidance in accordance with each user's profile. The users are asked to provide important health and lifestyle parameters while registering, such as age, gender, height, weight, eating habits (e.g., vegetarian, gluten-free), fitness objectives (e.g., weight reduction, muscle building, maintenance), and exercise level (sedentary, moderate, active). These parameters are then calculated to generate a tailored nutritional plan that conforms to the individualized goals of the user.

BiteBalance utilizes pre-set nutritional guidelines and algorithmic reasoning to establish daily recommended macronutrient intake (carbohydrates, proteins, fats) and significant micronutrients (e.g., iron, calcium, vitamin D). Based on daily food records, the app dynamically adjusts these recommendations and suggests modifications, such as alterations in portion size, replacement of unhealthy meals with healthy alternatives, or supplementing particular food groups to compensate for weaknesses.

Apart from numerical guidance, the module is very focused on educational support. It has a series of short tutorials, infographics, and brief videos that tackle helpful topics such as:

- How to decode and make sense of food nutrition labels.
- Basic meal preparation tips for healthy eating.
- Smart shopping tips for buying healthy foods at a low cost.
- Identifying sneaky sugars or processed foods in everyday snacks.

It is not just to indicate what ought to be eaten by users but why they should do so, enabling possible sustainable change in behavior. These learning content are presented in an engaging, non-intrusive format—through images, pop-up tips, or motivational triggers—to encourage habitual interaction.

Furthermore, the module also sometimes generates wellness tips based on user behavior. For instance, if a user habitually ingests huge quantities of sodium, the application can display the user with suggestions like "Try to replace processed snacks with fresh fruits or unsalted nuts this week." The context-driven suggestions make the experience flexible and personalized.

The system also considers real-world variation. For example, if the user records minimal physical activity for a couple of days, the app will make meal suggestions to fit lower caloric needs in order not to overeat. Conversely, if there is more activity, it may recommend energy-dense meals or water drinking reminders.

Finally, all the guidance is presented in straight, easy-to-understand language, focused on positive encouragement. Rather than simply pointing out unhealthy choices, BiteBalance encourages users with supportive statements and feedback messages to form healthy, long-term eating patterns.

MODULE 3: RECIPE MANAGEMENT SYSTEM

The recipe management module enables users to browse through a large range of healthy recipes that are suitable for their dietary requirements. Recipes can be categorized based on calorie count, ingredients, or type of meal, making it easy for users to locate the best fit for them. Users can also upload their own recipes, adding to the community and

the app's content. Every recipe also comes with nutritional information, preparation step-by-step, and ratings from users, allowing users to easily experiment with new dishes and make the right choices regarding their eating habits.

1. Recipe Browsing and Discovery

In essence, the module provides access to a vast library of nutritious recipes, carefully organized to accommodate a wide range of nutritional needs and dietary requirements. Users can search and browse recipes according to parameters that include:

- Calorie value (e.g., low-calorie meals with less than 300 kcal)
- Ingredients (e.g., recipes containing oats, spinach, or tofu)
- Meal type (e.g., breakfast, lunch, dinner, snacks)
- Diet type (e.g., vegan, low-carb, diabetic diet)

This helps users to easily and quickly find suitable meals without having to browse unnecessary information. The filter system is natural language and adjustable, making it possible for combinations (e.g., "high-protein + dinner + under 500 kcal").

2. Nutritional Information and Guidance

Each recipe includes full nutritional data, including:

- Calories
- Macronutrients (carbohydrates, proteins, fats)
- Micronutrients (vitamins and minerals, where available)
- Recommended portion size and servings

These values are inputted from standard nutritional databases or contributor-entered values. This enables users to make food choices and become more accurate in recording their intake when tracking meals.

3. Step-by-Step Preparation Instructions

To assist users of all skill levels, each recipe includes:

- Preparation time and cooking time
- Number of servings
- Step-by-step instructions for cooking
- Utensils or tools needed
- Visuals (optional photos of stages of preparation or finished product)

The instructions are kept brief and beginner-friendly, so even those with no cooking experience can prepare meals with ease. This aligns with the app's overall objective of making healthy eating accessible to everyone.

4. Contribution by the Community and Personalized Recipes

One basic aspect of the module is that it allows users to upload recipes of their own. This allows them to:

- Post personal or cultural recipes to the community
- Enter ingredient quantities and get automatic or manual nutrition estimates
- Include prep steps and add optional cooking tips
- Add photos of the completed dish or prep stages

- Tag recipes with correct categories so that they are searchable

MODULE 4: SMART HYDRATION TRACKER

This module monitors and governs daily water consumption by taking individual health factors such as age, weight, weather, and activity level into account. Bite Balance astutely calculates every user's personal daily water requirement and offers timely reminders and graphical progress bars to keep them on track. Whether a sports person in need of higher hydration levels or an office-goer looking to maintain constant intake, the app keeps users wake and aware of their hydration requirements.

To complement even healthier habits, the module has educational hints on tips for hydration, warnings for signs of potential dehydration, and a history log to see previous water intake patterns.

SUPPORTING MODULE

The app possesses certain supporting aspects to improve overall performance. The user profile system allows individuals to update personal information, establish new dietary goals, and track health progress. It also provides premium features such as expert advice and detailed analysis.In order to deal with data efficiently, BiteBalance stores logs and individual information locally using SQLite for offline functionality. Firebase takes care of synchronizing data across devices with real-time updates and secure user information. These supporting modules give an uninterrupted, secure, and safe experience to all users.
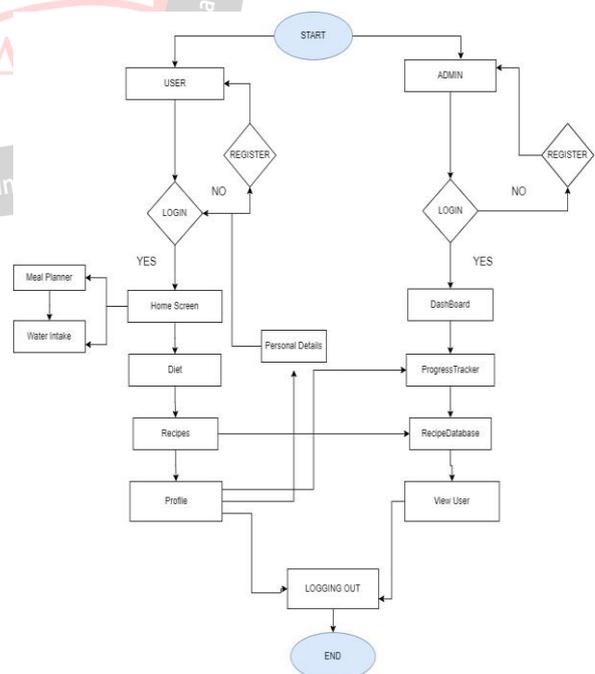

Figure 1: Flow Diagram of Proposed System

This flowchart illustrates how a health and diet management system functions for both Admins and Users. Users can register or log in. Once logged in, they proceed to the Home

Screen, where they can utilize features such as Diet, Meal Planner, and Water Intake. From the Diet page, they can view Recipes. Admins log in or register, and upon logging in, they are presented with the Dashboard. From there, they can monitor user progress and view the Recipe Database, where they can also see user details. Both Admins and Users can edit their Profile or Personal Details and then log out to complete their session.
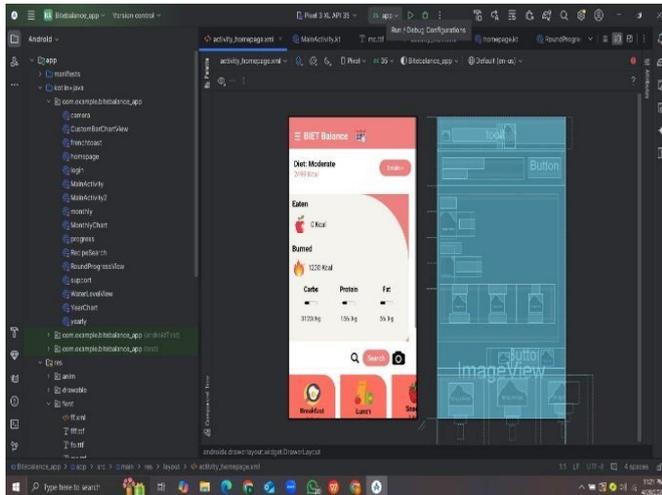
V.   IMPLEMENTATION

Figure 2: Home Page

The image above is the Home Page UI of the BiteBalance mobile application that was developed in Kotlin in Android Studio. The UI includes a clean and simple design and presents meaningful information demonstrating key health metrics for users, such as calories consumed and burnt as well a macronutrient breakdown (carbs, proteins, and fats). Users can see their food intake, such as "Chikki," and interact with a centralized "+" button icon which they will use to log their food and meals. Users will use the bottom navigation call to easily see their food into like breakfast, lunch, and snacks.
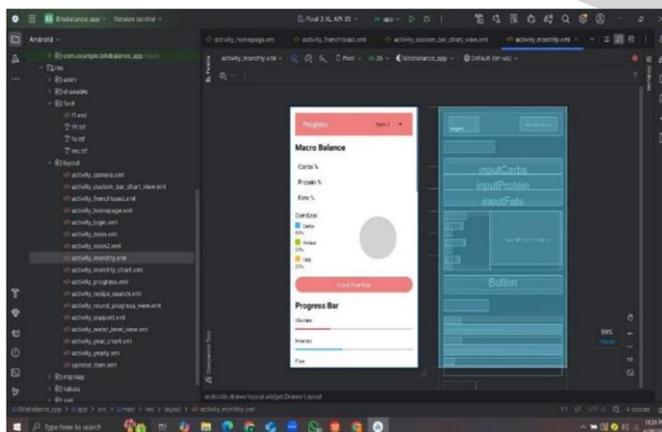

Figure 3 :Progress Overview Page

The screen depicts the Progress Overview Page, developed on Android Studio, from the BiteBalance application. The screen displays the user's Macro Balance of carbohydrate, protein, and fat, indicating the amount as a percentage,

which will help the user track their nutrition. A placeholder for the circular chart will be a visual representation of calories consumed. Below the chart will be a progress bar section for targeting other important nutrients like water and fats.
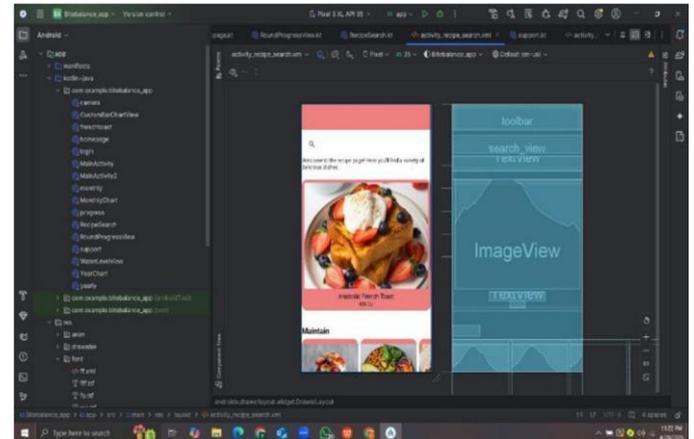

Figure 4:Receipe Management Page

The above image depicts the Recipe Management Page of the BiteBalance app, built in Android Studio. The UI has a top search bar that allows the incorporation of keywords or ingredients to find recipes. Next is a large ImageView of a visually appealing plate of food, like "French Toast," along with a title and short description. Then it has somewhat of a scrollable list of recipe options, under multiple categories like "Maintain", allowing users to see what meals to eat depending upon what their dietary goal is.

VI.   CONCLUSION

BiteBalance provides a simple, functional way to monitor food and nutrition that flips some of the typical issues with current methods on their head by offering required features such as calorie tracking,   analysis of micronutrients,   and personalized dietary advice—without needing   subscribers   or advertising. Prioritizing usability and functionality, the app enables users to construct well-balanced diets in support of their health goals and overall wellness. Combining a user-friendly interface with powerful tracking capabilities, BiteBalance is useful for both beginners and professionals. Features including meal planning, importing recipes, and water intake tracking also provide additional utility and make the app a comprehensive tool for anyone seeking to establish a healthier lifestyle. Through the emphasis on user feedback and maintaining the interface's simplicity, BiteBalance encourages long-term use and aids in the cultivation of sustainable health behaviors. It's not an app—it's a virtual companion for everyday wellness.

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