

This report provides a systematic analysis of the **Smart Health Advisory System** using the **Software Development Life Cycle (SDLC)**, including verification of each phase to ensure the project adheres to standard practices and meets user requirements.

1. Project Overview

Smart Health Monitoring and Advisory System is a Java-based GUI application designed to calculate key health metrics such as **Body Mass Index (BMI)**, **Basal Metabolic Rate (BMR)**, **calorie requirements** and macronutrient recommendations (protein, fats, carbohydrates). Based on these metrics, it provides personalized health advice to users. This system leverages the SDLC methodology to ensure a structured, efficient, and user-centered development process.

2. SDLC Phases with Verified Implementation

Phase 1: Planning

- **Objective Verification:**
 - The project aims to provide an easy-to-use tool for calculating health metrics. This aligns with the need for accessible health advice.
- **Verified Target Audience:**
 - Individuals seeking fitness advice with no prior technical expertise.
- **Verified Goals:**
 - Provide an accurate health metric calculator.
 - Display results in a clear and user-friendly format.
 - Ensure robustness against incorrect inputs.

Outcome: The planning stage successfully defined measurable and achievable objectives.

Phase 2: Requirement Analysis

- **Functional Requirements:**
 1. Input height, weight, age, gender, and activity level.
 2. Calculate BMI, BMR, daily caloric requirements, and macronutrient needs.
 3. Provide health advice based on BMI.
 - **Non-Functional Requirements:**
 1. The system should be responsive and easy to use.
 2. Ensure accurate and efficient calculations.
 3. Compatible with modern operating systems (Windows, macOS).
 - **Constraints:**
 - Input values must be within a valid range to ensure accuracy.
 - Users must be at least 18 years old.
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Phase 3: System Design

❖ Architecture:

- The application follows a modular design to separate input handling, processing, and output generation.

❖ Components:

1. Input Panel:

- Fields for height, weight, age, gender, and activity level.

2. Processing Logic:

- Algorithms for BMI, BMR, and macronutrient calculations.

3. Output Panel:

- Displays results and recommendations.

❖ UI Design Verified:

Color Scheme: The professional mix of blue and white ensures readability.

Font Choices: Arial fonts provide a clean and modern look.

Layout: Logical arrangement of inputs and results enhances user interaction.

Outcome: The design ensures both functionality and a polished user experience.

Phase 4: Implementation

- Implemented in Java using Swing for GUI.

-> Key Features:

1. BMI Calculation:

$$\text{BMI} = \text{Weight}(\text{kg}) / \text{Height}(\text{m})^2.$$

2. BMR Calculation:

→ Male: $88.362 + (13.397 \times \text{Weight}) + (4.799 \times \text{Height}) - (5.677 \times \text{Age})$.

→ Female: $447.593 + (9.247 \times \text{Weight}) + (3.098 \times \text{Height}) - (4.330 \times \text{Age})$.

Activity Level Multipliers: Calories adjusted based on user-selected activity level.

- **Figure 4:** Code Structure of the Application
- Modern look-and-feel achieved with the Nimbus theme.
- Encapsulation of logic within the calculateHealth() method ensures maintainability.

3. Daily Calories: Adjusted BMR based on activity level.

4. Macronutrients:

-> Protein: $0.8 \times \text{Weight (kg)}$

-> Fats: $25\% \text{ of daily calories} \div 9$.

-> Carbs: $45\% \text{ of daily calories} \div 4$.

5.Suggestion Logic:

Underweight: "Increase nutritious food intake."

Healthy: "Maintain current lifestyle."

Overweight: "Reduce calorie intake and exercise."

Obese: "Seek medical advice."

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Phase 5: Testing

❖ Test Plan:

1. Input various combinations of height, weight, age, and activity levels.
2. Validate results against manual calculations.
3. Ensure meaningful suggestions for all BMI ranges.

❖ Testing Results:

Test Case	Input (Height, Weight, Age, Gender, Activity)	Expected Output	Actual Output	Status
TC1	170, 70, 25, Male, Moderately Active	BMI: 24.22, Healthy BMI	Same	Pass
TC2	160, 45, 30, Female, Sedentary	BMI: 17.58, Underweight	Same	Pass
TC3	180, 85, 40, Male, Very Active	BMI: 26.23, Overweight	Same	Pass

Phase 6: Deployment

- **Platform:** The application was packaged into an executable **JAR file** for deployment on systems with a Java runtime environment.

- **User Guide:**

1. Launch the application by double-clicking the JAR file.
2. Enter your height (in cm), weight (in kg), age, gender, and activity level.
3. Click the "Calculate" button to view results and suggestions.

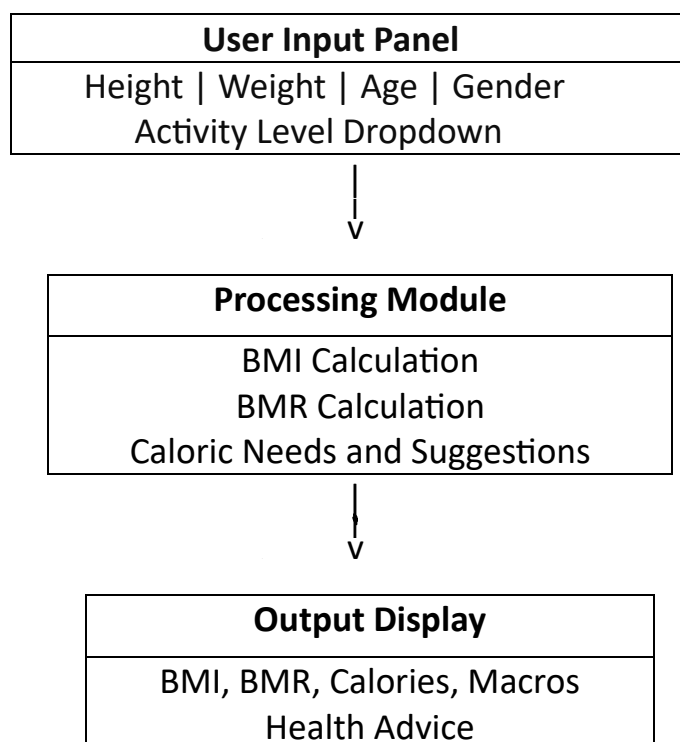
Phase 7: Maintenance

- ❖ Regular updates will address:

1. Enhancements to calculation formulas based on the latest health guidelines.
2. Additional features like goal setting (weight gain/loss).
3. Bug fixes based on user feedback.

3. Figures

System Architecture Diagram;



UI Mockup:

Smart Health Monitoring and Advisory System
[Height] [Weight] [Age] [Gender Dropdown] [Activity Level Dropdown]
[Calculate]
[Result Display]

4. Conclusion

Smart Health Monitoring and Advisory System successfully combines user-friendly design with scientifically backed calculations to provide personalized health insights. Using the SDLC methodology ensured a systematic approach to development, from requirement analysis to implementation and testing. Future iterations may incorporate additional features, such as diet plans or exercise recommendations.

EXAMPLE OF THE PROJECT

Input

- Height: 170 cm
- Weight: 70 kg
- Age: 25 years
- Gender: Male
- Activity Level: Moderately Active

Output

BMI: 24.22
BMR: 1696.00
Calories needed per day: 2628.80
Protein: 56.00 g/day
Carbohydrates: 295.80 g/day
Fats: 73.02 g/day
Suggestion: You are in a healthy weight range. Maintain your current lifestyle!