

# **Nutrition App Using Gemini AI: Your Comprehensive Guide To Healthy Eating And Well-Being**

Nutritionist AI is an innovative web application designed to provide personalized dietary recommendations and nutritional advice using the advanced capabilities of Google's Gemini AI models. The app leverages artificial intelligence to analyze user data, dietary preferences, and health goals, delivering tailored meal plans, nutritional insights, and wellness tips. The primary aim of Nutritionist AI is to promote healthier eating habits and improve overall well-being through intelligent and data-driven recommendations.

## **Scenario 1: Tailored Meal Planning**

Many individuals struggle with creating healthy and satisfying meal plans that align with their specific dietary needs and preferences. Nutritionist AI addresses this challenge by generating personalized meal plans based on user input. Users can provide information about their dietary restrictions, allergies, health conditions, activity levels, and taste preferences. The AI then crafts a week-long meal plan complete with recipes and grocery lists, ensuring nutritional balance, variety, and enjoyment tailored to each user's lifestyle.

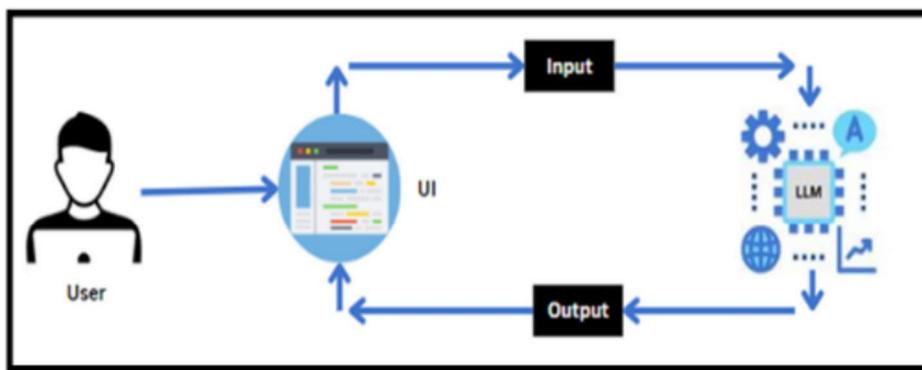
## **Scenario 2: Dynamic Nutritional Insights**

Understanding the nutritional content of food is essential for making healthy choices. Nutritionist AI provides users with dynamic nutritional insights about individual food items, meals, and snacks. By uploading food images or entering food names, users instantly receive detailed information on macronutrients (protein, fat, carbohydrates), micronutrients (vitamins, minerals), and calorie content. This empowers users to make conscious decisions about their food intake and track their progress toward their nutritional goals.

### **Scenario 3: Virtual Nutrition Coaching**

Receiving personalized guidance from a nutrition expert can be costly and time-consuming. Nutritionist AI democratizes access to nutritional expertise by offering virtual nutrition coaching. The AI acts as a virtual coach, providing users with personalized advice, answering nutrition-related questions, and offering ongoing support throughout their wellness journey. This interactive coaching experience helps users stay motivated, make sustainable lifestyle changes, and achieve long-term health improvements.

### **Technical Architecture**



### **Project Flow**

- User interacts with the Streamlit UI to enter text prompts, upload images, or fill in dietary preferences.
- User input is collected from the UI and transmitted to the backend using the Google API key stored securely in a .env file.
- The input is forwarded to the Gemini Pro or Gemini Flash model via API calls.
- The Gemini model processes the input and generates a personalized output.
- The results are displayed dynamically on the frontend.

To accomplish this, we have to complete all the activities listed below:

- **Requirements Specification**
  - Create a requirements.txt file to list the required libraries.
  - Install the required libraries.
- **Initialization of Google API Key**
  - Generate Google API Key.
  - Initialize Google API Key.
- **Interfacing with Pre-trained Model**
  - Load the Gemini Pro or Gemini Flash pre-trained model.
  - Implement a function to get Gemini response.
  - Implement a function to read uploaded image content.

- Write prompts for the Gemini model.
- **Model Deployment**
- Integrate with the web framework (Streamlit).
  - Host the application.

## Prior Knowledge

You should have a basic understanding of the following topics before working on this project:

- Large Language Models (LLMs)
- Google Generative AI
- Streamlit
- Prompt Engineering
- LangChain (optional, advanced integration)

**LLMs & Google GenAI:**

Familiarity with Large Language Models and foundational concepts in Google Generative AI will help you understand how prompts are processed and responses are generated.

🔗 [Google Vertex AI Generative AI Learning Resources](#)

**Streamlit:**

Ability to create interactive web applications using Streamlit's components, state management, and layout.

🔗 [Streamlit Documentation](#)

**Google Generative AI (Gemini API):**

Knowledge of how to authenticate, send prompts, and receive responses using Google's Gemini API.

🔗 [Google Gemini API Cookbook](#)

**LangChain:**

Understanding how to orchestrate LLMs with memory, tools, and chaining for advanced functionality.

🔗 [LangChain Python Docs](#)



## Project Structure

Create the Project folder which contains files as shown below:

Project Executable Files	
 .env	M
 Nutrition_app.py	U
 requirements.txt	M

- .env file: It securely stores the Google API key.
- Nutrition\_app.py: It serves as the primary application file housing both the model and Streamlit UI code.
- requirements.txt: It enumerates the libraries necessary for installation to ensure proper functioning.
- Additionally, ensure proper file organization and adhere to best practices for version control.

## Milestone 1: Requirements Specification

Specifying the required libraries in the requirements.txt file ensures seamless setup and reproducibility of the project environment, making it easier for others to replicate the development environment.

### Activity 1: Create A Requirements.Txt File To List The Required Libraries

```
≡ requirements.txt
1   streamlit
2   google-generativeai
3   Pillow
4   python-dotenv
```

- **streamlit**: Streamlit is a powerful framework for building interactive web applications with Python.
- **google-generativeai**: Python client library for accessing the Generative AI API, facilitating interactions with pre-trained language models like Gemini Pro.
- **python-dotenv**: Python-dotenv allows you to manage environment variables stored in a .env file for your Python projects.
- **Pillow**: A Python Imaging Library (PIL) fork, used for opening, manipulating, and saving many different image file formats (e.g., for uploaded food images).
- **io (built-in)**: Python standard library module for handling input/output operations, such as working with in-memory file objects.
- **os (built-in)**: Python standard library module for interacting with the operating system, including reading environment variables and file paths.

## Activity 2: Install The Required Libraries

- Open the terminal.
- Run the command: pip install -r requirements.txt
- This command installs all the required libraries listed above.

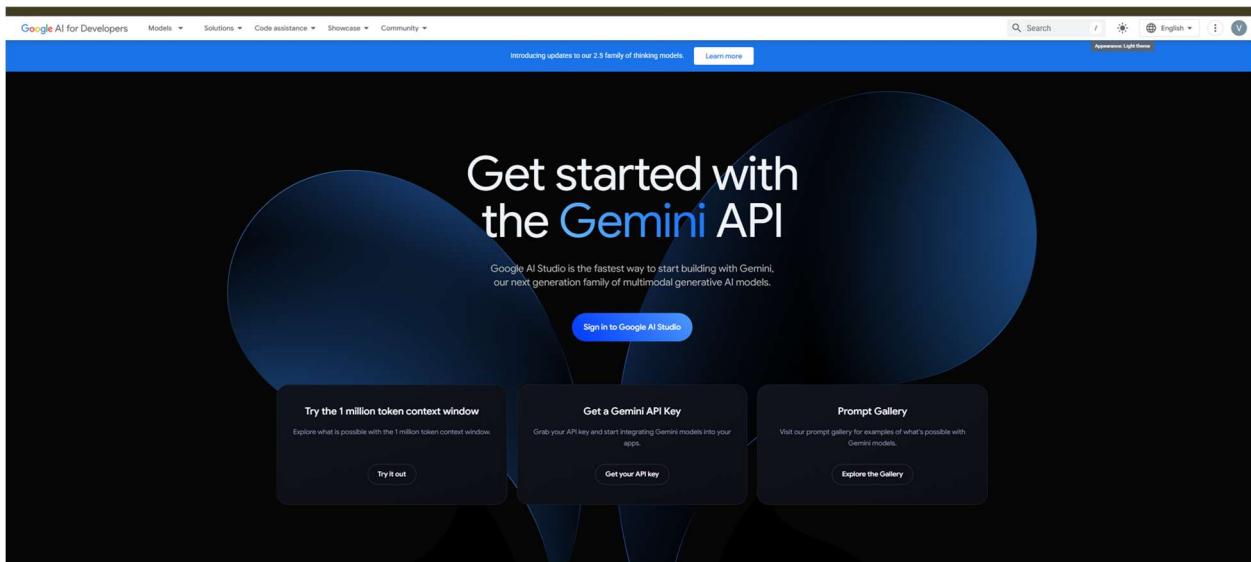
## Milestone 2 : Initialization Of Google API Key

The Google API key is a secure access token provided by Google, enabling developers to authenticate and interact with various Google APIs. It acts as a form of identification, allowing users to access specific Google services and resources. This key plays a crucial role in authorizing and securing API requests, ensuring that only authorized users can access and utilize Google's services.

### Activity 1 : Generate Google API Key

Click the provided link to access the following webpage.

Link: <https://ai.google.dev/aistudio>



Click on "Get an API key in Google AI Studio".

The screenshot shows the Google AI Studio interface. At the top, there's a navigation bar with 'Get API key', 'Studio', 'Dashboard', 'Documentation', and a user icon. Below the navigation, the main area has a header 'API Keys'. Underneath, it says 'Quickly test the Gemini API' and provides an 'API quickstart guide' with a curl command. A code editor-like box contains the curl command. Below the code, there's a note 'Use code with caution.' and a message 'Your API keys are listed below. You can also view and manage your project and API keys in Google Cloud.' A table lists one API key entry:

Project number	Project name	API key	Created	Plan
...	...	...	...	Free

Now click on "Create API key".

Copy the API key.

## Activity 2 : Initialize Google API Key

```
my_api_key = <'Enter your google api key here'>
```

- Create a .env file and define a variable named my\_api\_key.
- Assign the copied Google API key to this variable.
- Paste the API key obtained from the previous steps here.

## Milestone 3: Interfacing With Pre-Trained Model

To interface with the pre-trained model, we'll start by creating an app.py file, which will contain both the model and Streamlit UI code.

### Activity 1: Load The Gemini Pro or Gemini Flash Model

```
🐍 Nutrition_app.py > ...
1 import streamlit as st
2 import google.generativeai as genai
3 from PIL import Image
4 from dotenv import load_dotenv
5 import os
6
7 load_dotenv()
8 my_api_key = os.getenv("my_api_key")
9 genai.configure(api_key=my_api_key)
10
```

This code snippet is for initializing a nutrition app application using Streamlit, an open-source app framework, and Google Generative AI services. The script starts by loading environment variables from a .env file using the load\_dotenv() function from the dotenv package. It then imports necessary libraries: streamlit for creating the web app interface, os for accessing environment variables, google.generativeai for utilizing Google's Generative AI capabilities, and PIL.Image for image processing. The genai.configure() function is called to set up the Google Generative AI API with the API key retrieved from the environment variables, ensuring secure and authorized access to the AI services.

## Activity 2: Implement A Function To Get Gemini Response

- The function get\_gemini\_response takes the input prompt, uploaded image (if any), and additional user text, and sends them to the Gemini model.
- It uses the generate\_content method of the selected Gemini model to generate a response.
- The function supports two modes:
  - If an image is uploaded, the image is included in the prompt and Gemini Vision is used.
  - If only text is provided, the prompt is sent to Gemini Pro/Flash.
- The generated response is returned as text and displayed in the Streamlit UI.

### **Activity 3: Implement A Function To Read The Image And Set The Image Format For Gemini Model Input**

- The function `process_uploaded_image` handles the uploaded food image.
- It reads the uploaded file's bytes and stores them in a dictionary with the MIME type and byte data.
- The resulting dictionary is returned as a list (e.g., `image_parts`), ready to be passed as input to the Gemini Vision model.
- This setup ensures that uploaded images are properly formatted for image-based nutrition analysis.

### **Activity 4: Write A Prompt For The Gemini Model**

- The variable `input_prompt` is a multi-line string designed to instruct the nutritionist AI on how to respond.
- It guides the model to provide detailed nutritional insights or generate meal plans based on the provided image or text input.
- Prompts are customized depending on the selected scenario (meal planning, nutritional analysis, or coaching), ensuring relevant and clear responses.

## **Milestone 4: Model Deployment**

We deploy our Nutritionist AI model using the Streamlit framework, a powerful tool for building interactive data applications quickly and easily. Streamlit allows us to create a responsive web interface where users can input text prompts, upload images, and receive real-time responses from the Gemini AI model, providing an intuitive and engaging experience.

### **Activity 1: Integrate With Web Framework**

Nutritionist AI Application:

- The Streamlit application is initialized with a custom page title, layout, and header describing the app's purpose.
- A sidebar radio button allows users to choose between three scenarios:
  - **Tailored Meal Planning:** Collects dietary preferences and generates a week-long meal plan with recipes.
  - **Dynamic Nutritional Insights:** Upload a food image or enter a food name to receive a detailed nutritional breakdown.
  - **Virtual Nutrition Coaching:** Enter questions to receive personalized nutrition advice in a chat-like interface.
- Input elements include text fields for user queries, text areas for preferences, and a file uploader for uploading food images.

- Uploaded images are displayed using the PIL library with appropriate captions.
- Buttons like "Generate Meal Plan" or "Analyze Nutrition" trigger API calls to the Gemini model, and the resulting responses are displayed dynamically within the app.
- Session state is used for storing conversation history in the virtual coaching scenario, creating an interactive and persistent chat experience.

## Activity 2: Host The Application

Launching the Application:

- To host the application locally, open a terminal in your project directory and run:

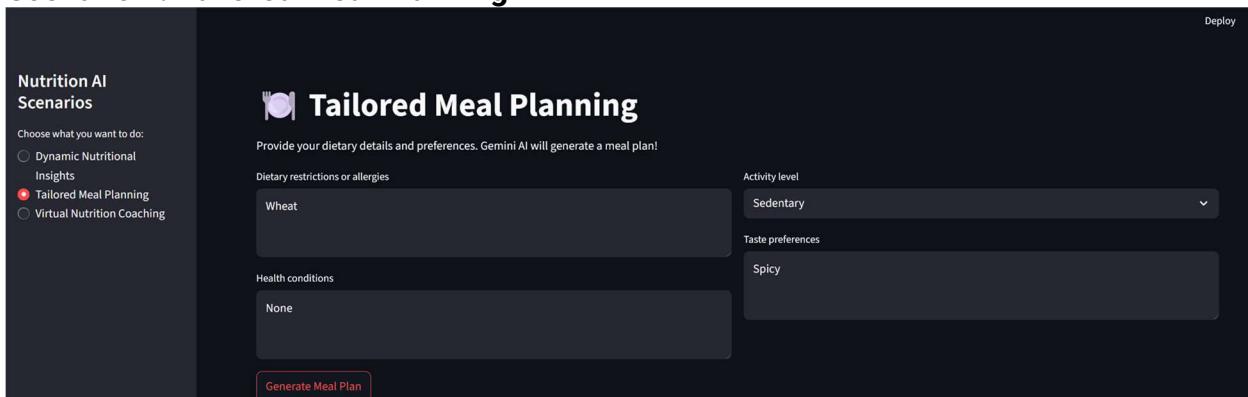
```
PS C:\Users\Vibho\OneDrive\Documents\Google Project> streamlit run Nutrition_app.py
>>>

You can now view your Streamlit app in your browser.

Local URL: http://localhost:8501
Network URL: http://192.168.1.12:8501
```

- Once Streamlit runs successfully, a web page will open automatically in your default browser, presenting the Nutritionist AI interface with three main options:
  - Generate a personalized meal plan.
  - Analyze nutrition information of food items.
  - Chat with the AI nutrition coach.
- For deployment to the cloud, connect your GitHub repository to Streamlit Community Cloud and deploy directly with one click, making the app accessible online to anyone with the link.

## Scenario 1: Tailored Meal Planning



In this scenario, the application collects the user's dietary restrictions, allergies, health conditions, activity level, and taste preferences to generate a personalized meal plan. By leveraging Gemini's advanced language modeling capabilities, the app crafts a comprehensive week-long meal plan that ensures nutritional balance and variety,

complete with suggested recipes and a grocery list. This empowers users to plan their meals effectively and align their diet with their personal health and lifestyle goals.

**Your Personalized Meal Plan** ☺

## Week-Long Spicy Wheat-Free Meal Plan (Sedentary Lifestyle)

This meal plan focuses on delicious, spicy, wheat-free meals suitable for a sedentary lifestyle. Portion sizes can be adjusted based on individual needs.

**Grocery List:**

**Produce:**

- 1 red onion
- 2 bell peppers (1 red, 1 green)
- 2 cloves garlic
- 1 jalapeño pepper
- 1 pint cherry tomatoes
- 1 bunch cilantro
- 1 lime
- 1 avocado
- 1 sweet potato
- 1 head broccoli
- 1 can diced tomatoes (undrained)
- Spinach (1 large bag)
- 1 cucumber

**Protein:**

- 1.5 lbs boneless, skinless chicken breasts
- 1 lb ground turkey
- 1 can black beans (rinsed and drained)
- 1 can black beans (rinsed and drained)
- 1 can chickpeas (rinsed and drained)
- 15 eggs

**Grains/Alternatives:**

- Quinoa (1 cup)
- Brown rice (.1 cup)

**Dairy/Alternatives:**

- Coconut milk (1 can)
- Greek Yogurt (plain, unsweetened, 1 container)

**Pantry:**

- Olive oil
- Salt
- Black pepper
- Chili powder
- Cumin
- Paprika
- Cayenne pepper
- Garlic powder
- Onion powder
- Coconut aminos (or soy sauce, if soy is tolerated)
- Rice vinegar

**Day 1:**

- **Breakfast:** Scrambled eggs (2) with diced jalapeño and a side of sliced avocado.
- **Lunch:** Chicken & Black Bean Salad: Grilled chicken breast (4oz) mixed with black beans, diced red onion, bell pepper, cilantro, lime juice, and a pinch of chili powder.

**Nutrition AI Scenarios**

Choose what you want to do:

- Dynamic Nutritional Insights
- Tailored Meal Planning
- Virtual Nutrition Coaching

• Lunch: Chicken & Black Bean Salad: Grilled chicken breast (4oz) mixed with black beans, diced red onion, bell pepper, cilantro, lime juice, and a pinch of chili powder.

• Dinner: Spicy Turkey Chili: Ground turkey, diced tomatoes, black beans, corn, chili powder, cumin, and a touch of cayenne pepper, served with a dollop of Greek yogurt.

Deploy :

**Day 2:**

- Breakfast: Sweet Potato and Egg Scramble: Diced sweet potato sautéed with 2 eggs, a pinch of cumin and paprika.
- Lunch: Leftover Spicy Turkey Chili.
- Dinner: Sheet Pan Chicken and Veggies: Chicken breast (4oz), broccoli florets, cherry tomatoes, and bell pepper tossed in olive oil, garlic powder, onion powder, salt, pepper, and a sprinkle of cayenne pepper, roasted until cooked through.

**Day 3:**

- Breakfast: Greek yogurt with berries (if desired) and a sprinkle of chia seeds.
- Lunch: Chicken & Black Bean Salad (leftover).
- Dinner: Quinoa Bowl with Spicy Chickpeas: Cooked quinoa topped with spiced chickpeas (cumin, chili powder, paprika), diced cucumber, and a drizzle of coconut aminos.

**Day 4:**

- Breakfast: Scrambled eggs (2) with spinach and a sprinkle of chili flakes.
- Lunch: Leftover Quinoa Bowl.
- Dinner: Spicy Chicken Stir-fry: Chicken breast (4oz) stir-fried with broccoli, bell peppers, and a spicy sauce made from coconut aminos, rice vinegar, garlic, ginger (if tolerated), and chili garlic sauce.

**Day 5:**

- Breakfast: Greek yogurt with a side of sliced avocado.
- Lunch: Leftover Spicy Chicken Stir-fry.
- Dinner: Brown Rice with Spicy Black Bean Burgers: Homemade black bean burgers (mashed black beans, spices, egg) pan-fried and served on a bed of brown rice.

**Day 6:**

- Breakfast: Sweet potato and egg scramble (leftover or repeat).
- Lunch: Leftover Brown Rice with Black Bean Burgers.
- Lunch: Leftover Quinoa Bowl.
- Dinner: Spicy Chicken Stir-fry: Chicken breast (4oz) stir-fried with broccoli, bell peppers, and a spicy sauce made from coconut aminos, rice vinegar, garlic, ginger (if tolerated), and chili garlic sauce.

**Day 5:**

- Breakfast: Greek yogurt with a side of sliced avocado.
- Lunch: Leftover Spicy Chicken Stir-fry.
- Dinner: Brown Rice with Spicy Black Bean Burgers: Homemade black bean burgers (mashed black beans, spices, egg) pan-fried and served on a bed of brown rice.

**Day 6:**

- Breakfast: Sweet potato and egg scramble (leftover or repeat).
- Lunch: Leftover Brown Rice with Black Bean Burgers.
- Lunch: Leftover Quinoa Bowl.
- Dinner: Spicy Chicken Stir-fry: Chicken breast (4oz) stir-fried with broccoli, bell peppers, and a spicy sauce made from coconut aminos, rice vinegar, garlic, ginger (if tolerated), and chili garlic sauce.

**Day 7:**

- Breakfast: Scrambled eggs (2) with diced bell pepper.
- Lunch: Leftover Chicken and Vegetable Curry.
- Dinner: Simple Salad with grilled chicken breast (4oz) and a spicy vinaigrette (olive oil, lime juice, chili powder, cumin).

Recipe Notes: Adjust spice levels to your preference. Feel free to substitute vegetables based on availability and preference. Ensure all chicken is cooked thoroughly to an internal temperature of 165°F (74°C).

Disclaimer: This meal plan is a suggestion and may not be suitable for everyone. Consult with a registered dietitian or healthcare professional before making significant dietary changes, especially if you have any underlying health conditions.

## Scenario 2: Dynamic Nutritional Insights

**Nutrition AI Scenarios**

Choose what you want to do:

- Dynamic Nutritional Insights
- Tailored Meal Planning
- Virtual Nutrition Coaching

**Dynamic Nutritional Insights**

Upload an image of food or input its name for detailed nutritional analysis.

Food item name (optional)

Upload an image...

Drag and drop file here  
Limit 200MB per file • JPG, JPEG, PNG

Analyze Nutrition

Deploy

This scenario enables users to receive detailed nutritional breakdowns of their meals or individual food items. Users can either upload images of food or enter food names directly into the app. The application then utilizes the Gemini model to analyze the input and instantly display a comprehensive report on macronutrients (protein, fat, carbohydrates), micronutrients (vitamins, minerals), and calorie content. This allows

users to make more informed dietary choices and monitor their nutritional intake with ease.

Nutrition AI Scenarios

Choose what you want to do:

- Dynamic Nutritional Insights
- Tailored Meal Planning
- Virtual Nutrition Coaching

 **Dynamic Nutritional Insights**

Upload an image of food or input its name for detailed nutritional analysis.

Food item name (optional)

Aubergine and sesame noodles

Upload an image...

Drag and drop file here  
Limit 200MB per file • JPG, JPEG, PNG

Browse files

Aubergine-and-sesame-noodles-6138de6.jpg 98.8KB

The `use_column_width` parameter has been deprecated and will be removed in a future release. Please utilize the `use_container_width` parameter instead.



**Nutrition AI Scenarios**

Choose what you want to do:

- Dynamic Nutritional Insights
- Tailored Meal Planning
- Virtual Nutrition Coaching



Analyze Nutrition

Uploaded Image

### Nutrition Analysis

It's impossible to give an exact macronutrient, micronutrient, and calorie breakdown for the pictured food without knowing the specific ingredients and quantities used in the recipe. The image shows a dish of noodles with eggplant, a sauce (likely containing sesame and possibly other ingredients like soy sauce or tahini), and sesame seeds. Scallions/green onions are also visible.

However, I can provide an *estimation* based on common ingredients and typical serving sizes. This is just an approximation, and the actual nutritional values could vary significantly depending on the recipe.

**Estimated Macronutrient Breakdown (per serving, assuming a ~1.5 cup serving size):**

- Calories: 400-550 (This range accounts for variations in noodle type, sauce richness, and amount of eggplant)
- Carbohydrates: 60-80g (Primarily from the noodles)
- Protein: 15-25g (From the eggplant, possibly some protein in the sauce depending on its ingredients)
- Fat: 15-30g (From the sauce – sesame oil, tahini, or other oils would contribute significantly)

**Estimated Micronutrient Breakdown (per serving, approximate and highly variable):**

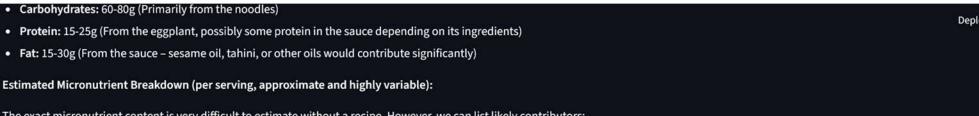
The exact micronutrient content is very difficult to estimate without a recipe. However, we can list likely contributors:

- Vitamin K: From the eggplant.
- Potassium: From the eggplant.

**Nutrition AI Scenarios**

Choose what you want to do:

- Dynamic Nutritional Insights
- Tailored Meal Planning
- Virtual Nutrition Coaching



Deploy

**Estimated Micronutrient Breakdown (per serving, approximate and highly variable):**

The exact micronutrient content is very difficult to estimate without a recipe. However, we can list likely contributors:

- Vitamin K: From the eggplant.
- Potassium: From the eggplant.
- Fiber: From the noodles and eggplant.
- Iron: Potentially from the eggplant and sesame seeds.
- Magnesium: Potentially from the sesame seeds.
- Calcium: Potentially from sesame seeds (If tahini is present).
- Vitamin E: Potentially from the sesame seeds and oil.
- B Vitamins: Potential contributions from various ingredients.

To obtain a precise nutritional analysis:

To get accurate macronutrient and micronutrient information, one would need:

1. **The exact recipe:** This includes the specific types and quantities of noodles, eggplant, sauce ingredients (including amounts of oil, soy sauce, tahini etc.), sesame seeds, and any other vegetables used.
2. **A nutrition analysis tool:** Many online tools or apps (e.g., Cronometer, MyFitnessPal) allow you to input ingredients and quantities to calculate the nutritional values of a dish.

Disclaimer: This is an educated guess. For accurate nutritional information, consult a registered dietitian or use a nutrition analysis tool with a complete and accurate recipe.

## Scenario 3: Virtual Nutrition Coaching

**Nutrition AI Scenarios**

Choose what you want to do:

- Dynamic Nutritional Insights
- Tailored Meal Planning
- Virtual Nutrition Coaching

 **Virtual Nutrition Coaching**

Ask any nutrition-related question to your AI coach.

Type your question here...

How to lose 10 kgs in 3 months ?

Ask Coach

Deploy

The virtual nutrition coaching scenario provides users with interactive, AI-powered guidance on their nutrition-related questions. Through a chat-like interface, users can

type questions about diet, meal timing, nutritional facts, and healthy habits. The application responds with personalized advice generated by the Gemini model, simulating the experience of consulting a professional nutritionist. This feature helps users stay motivated, make sustainable changes, and navigate their wellness journey with expert-level support.

The screenshot shows a dark-themed application window titled "Nutrition AI Scenarios". On the left sidebar, there's a list of options: "Dynamic Nutritional Insights" (unchecked), "Tailored Meal Planning" (unchecked), and "Virtual Nutrition Coaching" (checked). The main content area has a header ">You: How to lose 10 kgs in 3 months ?" and a "Coach" response: "It's great that you're setting a goal for yourself! Losing 10kg (22 pounds) in 3 months is ambitious, and while it's possible for some, it's crucial to approach it safely and sustainably. Rapid weight loss can sometimes be detrimental to your health. Let's explore a healthy and effective approach together." Below this, a "Before we discuss a plan, I need to emphasize that I'm a nutrition coach, not a doctor. It's essential to consult your physician or a registered dietitian before starting any significant weight loss program, especially one aiming for this level of weight loss in such a short timeframe. They can assess your health status, identify any potential risks, and help determine if this goal is appropriate for you." A note says "Assuming your doctor gives you the green light, here's a framework for healthy weight loss:" followed by a numbered list of 8 steps: 1. Focus on a Balanced Calorie Deficit, 2. Prioritize Whole Foods, 3. Incorporate Regular Exercise, 4. Manage Stress, 5. Prioritize Sleep, 6. Stay Hydrated, 7. Seek Support, and 8. Be Patient and Consistent. A final note at the bottom encourages a sustainable approach and consulting a healthcare professional.