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**1210716**

# AI-Powered Meal Recognition and Recipe Assistant

Your Bridging Food Discovery  
with Smart Technology

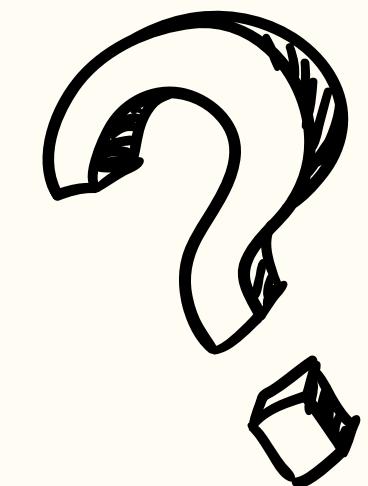
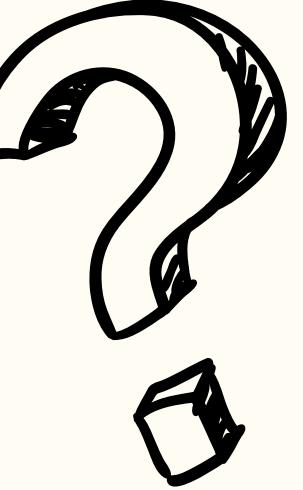
Dr. Yazan Abu Farha

Saturday, Feb 14th, 2026



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What  
is  
**Meallens**



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**MealLens is an AI-powered  
mobile application**

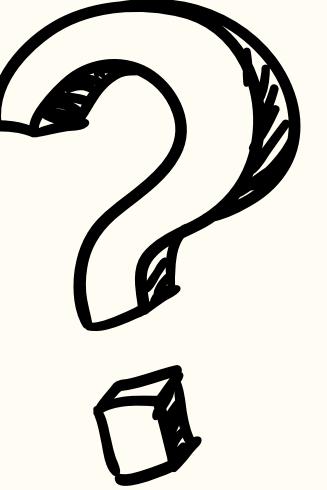
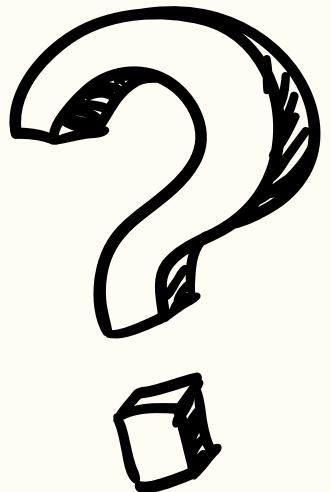
**Recognizes meals from  
images instantly**

**Provides recipes and  
cooking details**

**Helps users discover and  
prepare meals easily**

L

**what led  
us to  
Meallens**



**Identifying meals and finding  
recipes is often difficult**

**Current apps lack complete  
integrated solutions**

**MealLens provides instant AI-powered  
meal recognition and guidance**

# Related Applications

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**AI Photo  
Recipe  
Identifier**



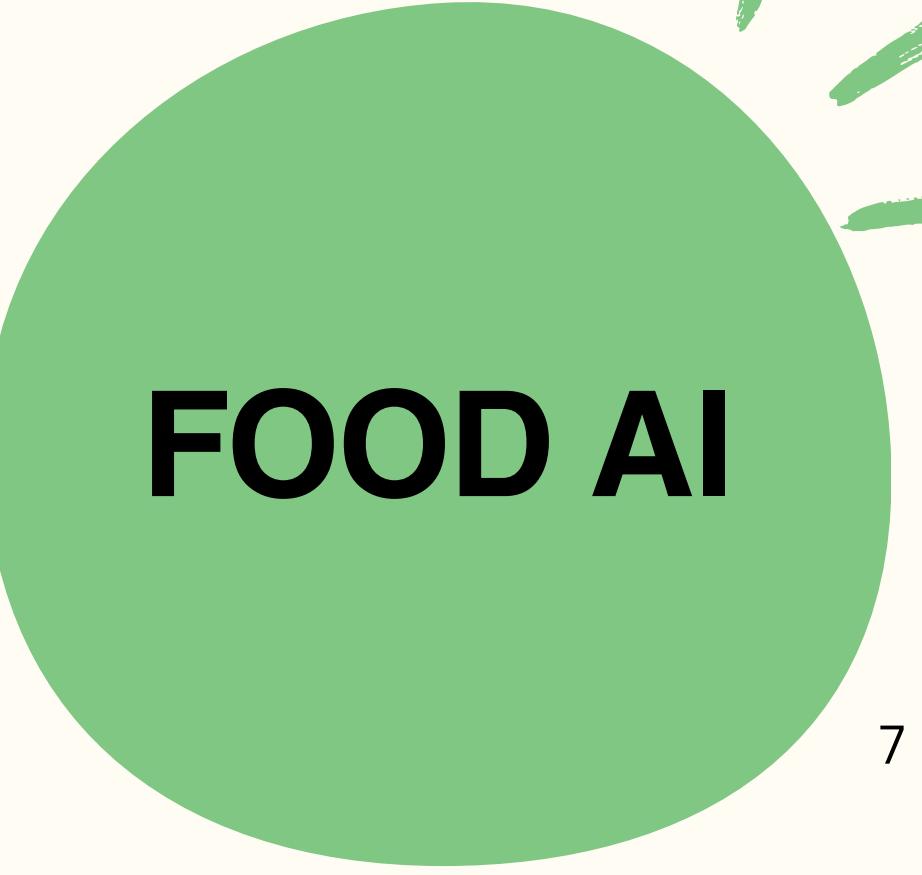
**SideChef**



**ingreGenius**



**ChefMate AI**



**FOOD AI**

# Related Applications Comparison

Feature	AI Photo	ChefMate AI	ingreGenius	SideChef	FOODAI	Our Application
Take Photo	✓	✓	✓	✓	✓	✓
Upload Photo	✓	✓	✓	✓	✓	✓
Image Recognition	✓	✓	✓	✓	✓	✓
Ingredient Identification	✓	✓	✓	✓	✓	✓
Recipe Suggestions	✓	✓	✓	✓	✓	✓
Nutrition Information	✗	✗	✓	✓	✓	✓
Step-by-Step Instructions	✗	✗	✓	✓	✓	✓
User Preferences	✗	✓	✓	✓	✓	✓
Shopping List	✗	✗	✗	✓	✗	✗
Voice Assistance	✗	✗	✗	✓	✗	✓
Social Sharing	✗	✗	✗	✓	✗	✓
Photo Cropping/Editing	✓	✗	✗	✓	✗	✓
Photo History	✓	✗	✓	✓	✓	✓
Cooking Time	✗	✗	✓	✓	✓	✓
Edit Recipe	✗	✗	✗	✓	✗	✗
Save Recipes	✓	✓	✓	✓	✓	✓
Allergen Detection	✗	✗	✗	✗	✗	✓
AI assistant	✗	✗	✗	✗	✗	✓

# Application

# Features of Meallens





# Authentication & Access

Sign Up

Sign In

Continue as  
Guest

Profile  
Management



# Image Processing & Recognition

Take  
Photo

Upload Photo

Photo Cropping  
& Rotation



# Recipe & Cooking Support

## Recipe Retrieval

Ingredients  
list

Step-by-Step  
Instructions

Nutrition  
Information

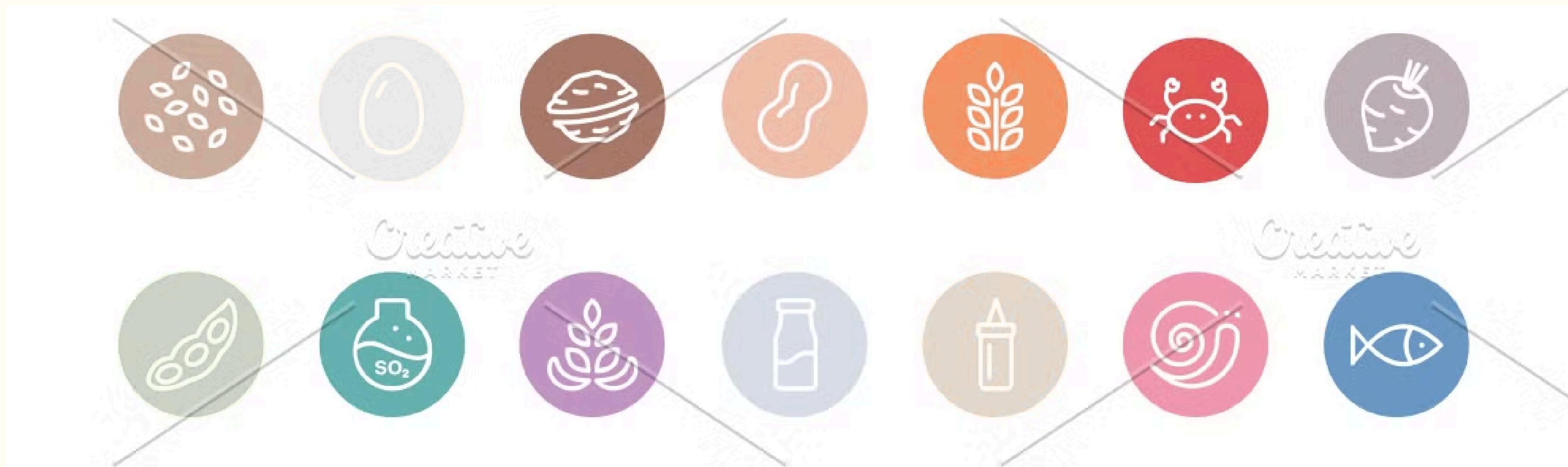


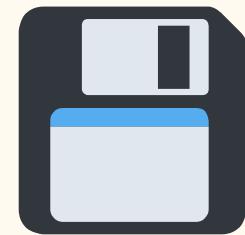
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# Safety & Awareness

## Allergen Detection





# Personalization & History

Save  
Recipes

Search  
History

User  
Preferences

# Advanced



# Features



# Accessibility & Interaction

Text-to-Speech

Social Sharing

AI Assistant



# Administration



# Features



1

# Management Dashboard

Data  
Statistics

View Users  
Feedback

Data  
Management

2

# Web Platform Development

Website  
Access



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# Mobile Features





**Camera &  
Gallery Access**

**Touchscreen  
Interface**

**Internet  
Connectivity**



# Service Features



**Cloud  
Backend**

**Multi API  
Integration**

**Real time  
Updates**

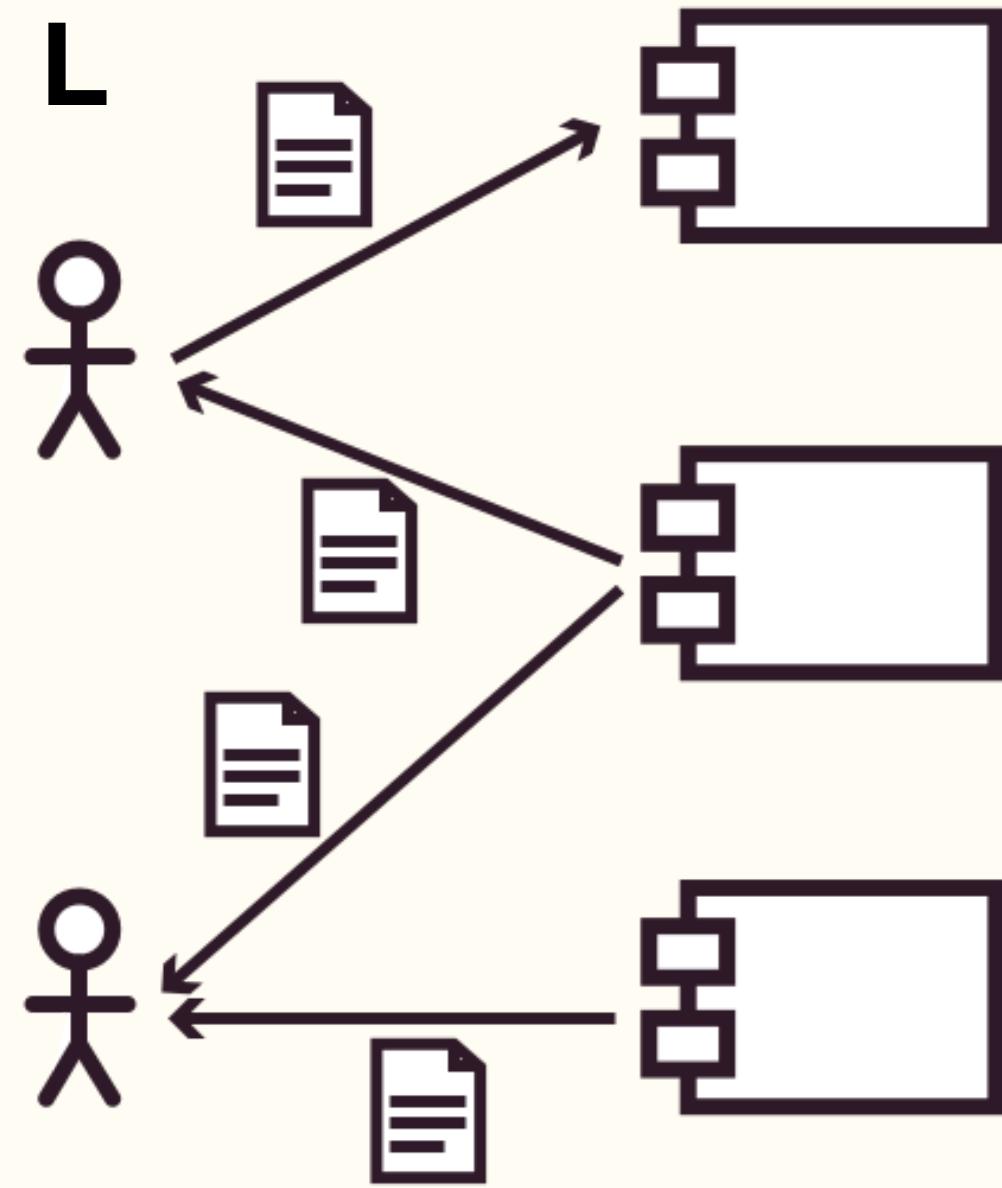
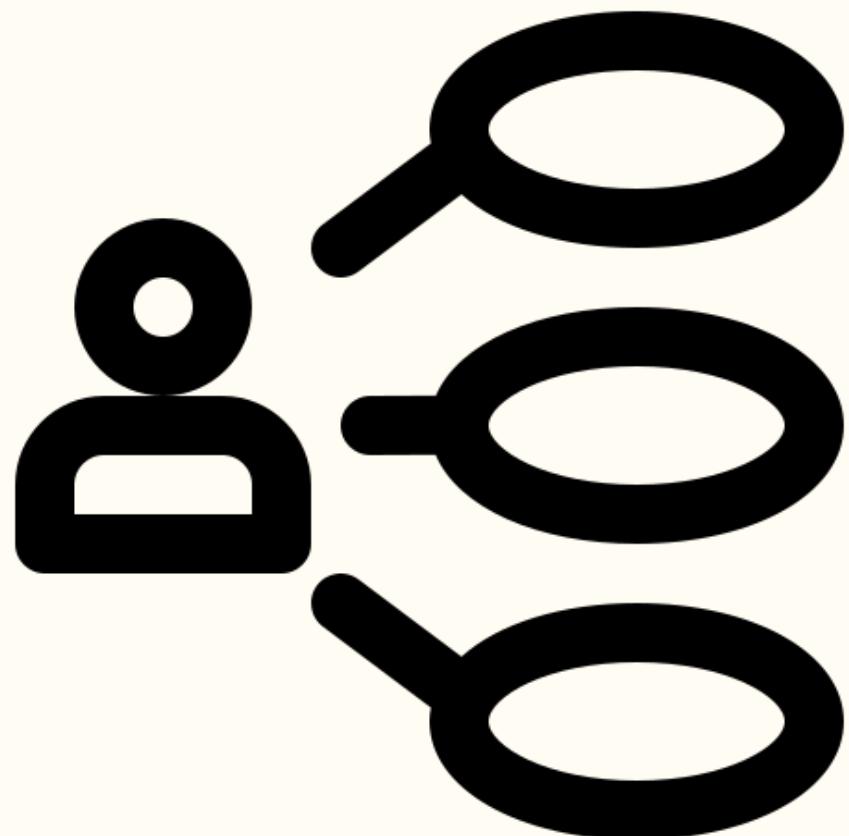
**Scalable  
Architecture**

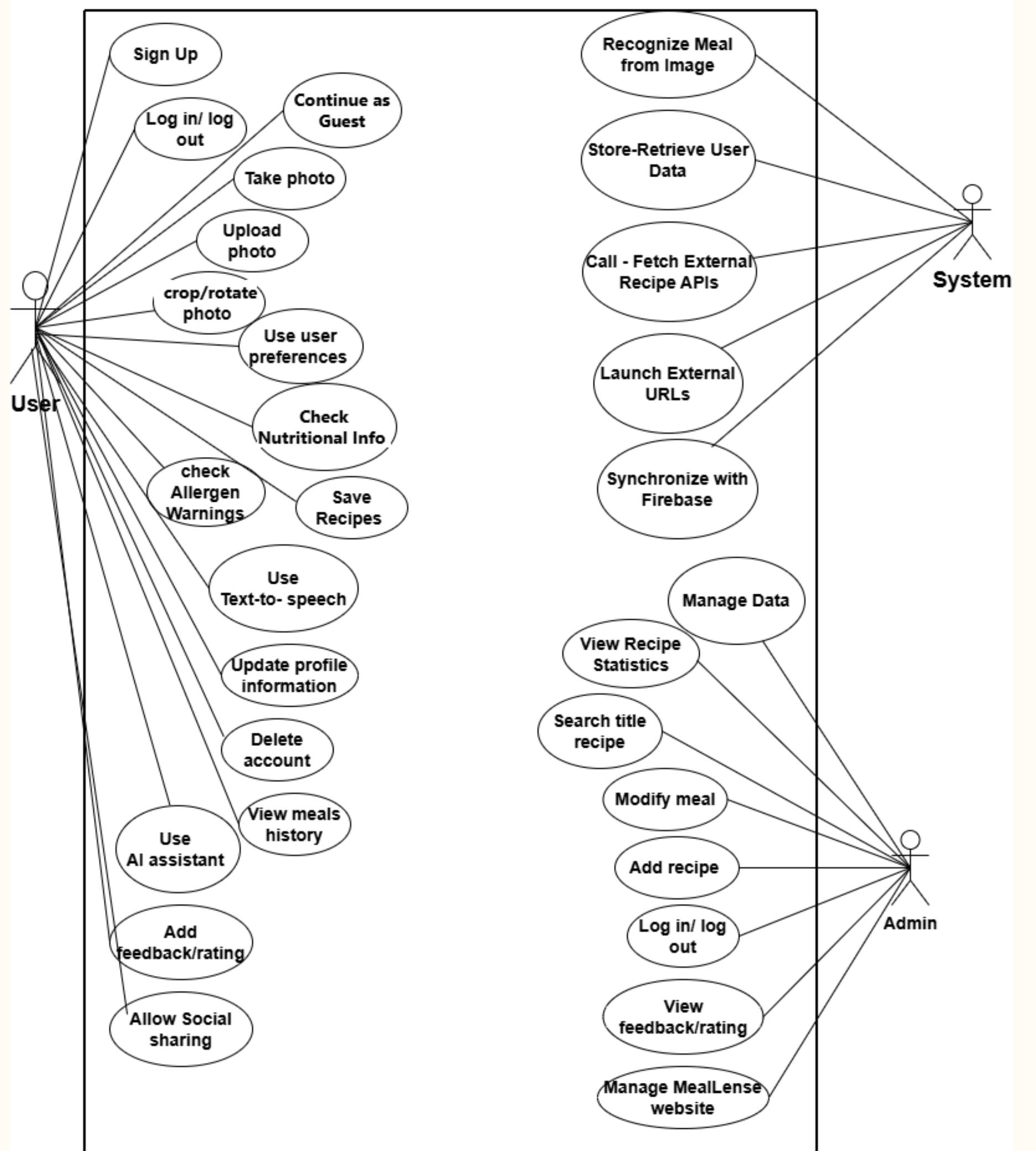


# Use

# case

# diagram





# Meallens Dataset

# Dataset Construction

Built a multi-source food image dataset

- Arabic meals
- International dishes
- Popular desserts

- Public food datasets
- Manually collected images  
(Google and online sources)

image count

61,906

meal categories

223







<b>Dataset Name</b>	<b># Meals Collected</b>	<b># Of images</b>
<b>Arabic food 101</b>	<b>19</b>	<b>2831</b>
<b>Multi-Class Food Image</b>	<b>3</b>	<b>451</b>
<b>UEC FOOD 256</b>	<b>56</b>	<b>6876</b>
<b>Cakes Dataset</b>	<b>3</b>	<b>597</b>

Dataset Name	# Meals Collected	# Of images
Food-101	32	10,783
Sri Lankan Food	11	1100
Food Image Classification	3	493

<b>Dataset Source</b>	<b># Meals Collected</b>	<b># Of images</b>
<b>Google and online sources</b>	<b>96</b>	<b>38,775</b>
<b>Meals collected from datasets</b>	<b>127</b>	<b>23,121</b>
	<b>223</b>	<b>61,906</b>

# Image Classification Service Used In **MealLens**

# Azure Custom Vision Platform



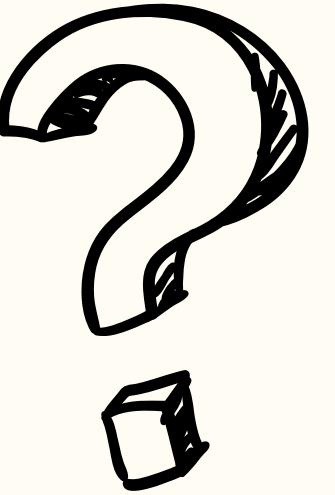
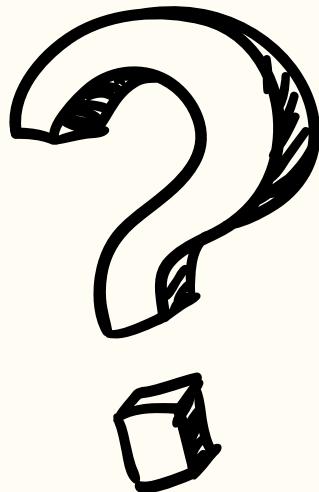
# **Cloud-based AI service from Microsoft Azure**

**Uses Automated Machine  
Learning (AutoML) for  
training**

**Provides training, testing,  
and deployment tools**

**Supports single-label and  
multi-label classification**

# Why Azure Custom Vision



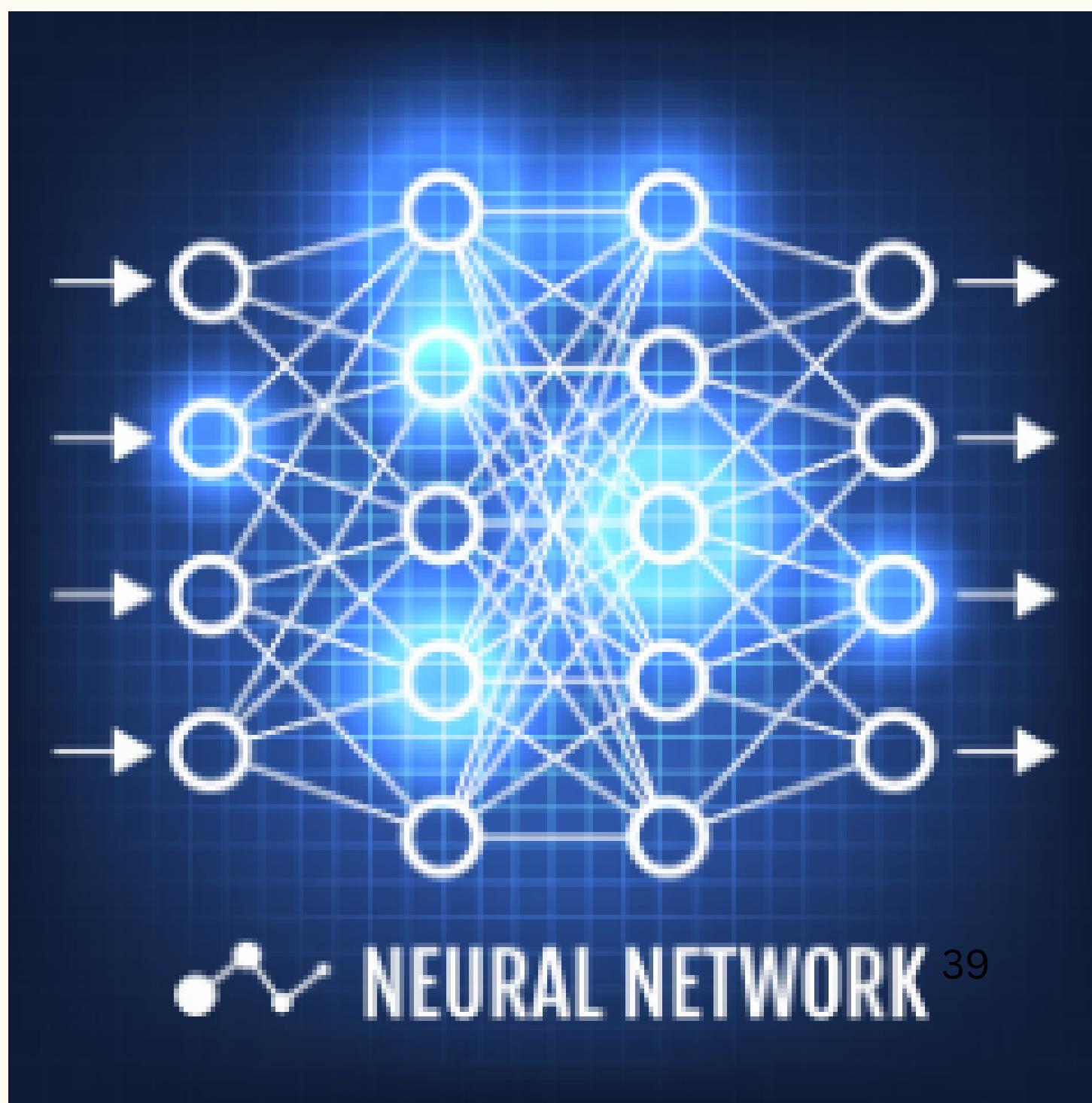
**Supports large-scale  
image datasets**

**Offers built-in evaluation  
tools**

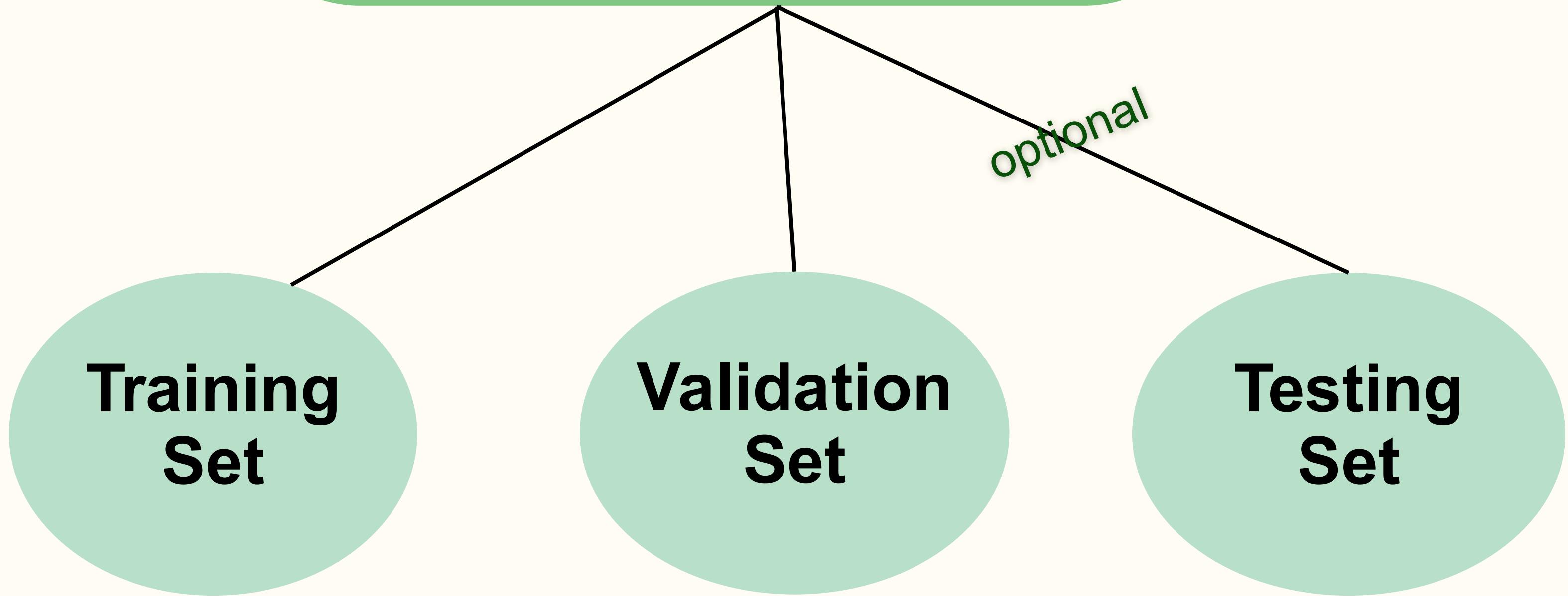
**Generates ready-to-use APIs  
for mobile apps**

**Supports bulk upload and  
tagging**

# Architecture Selection Process

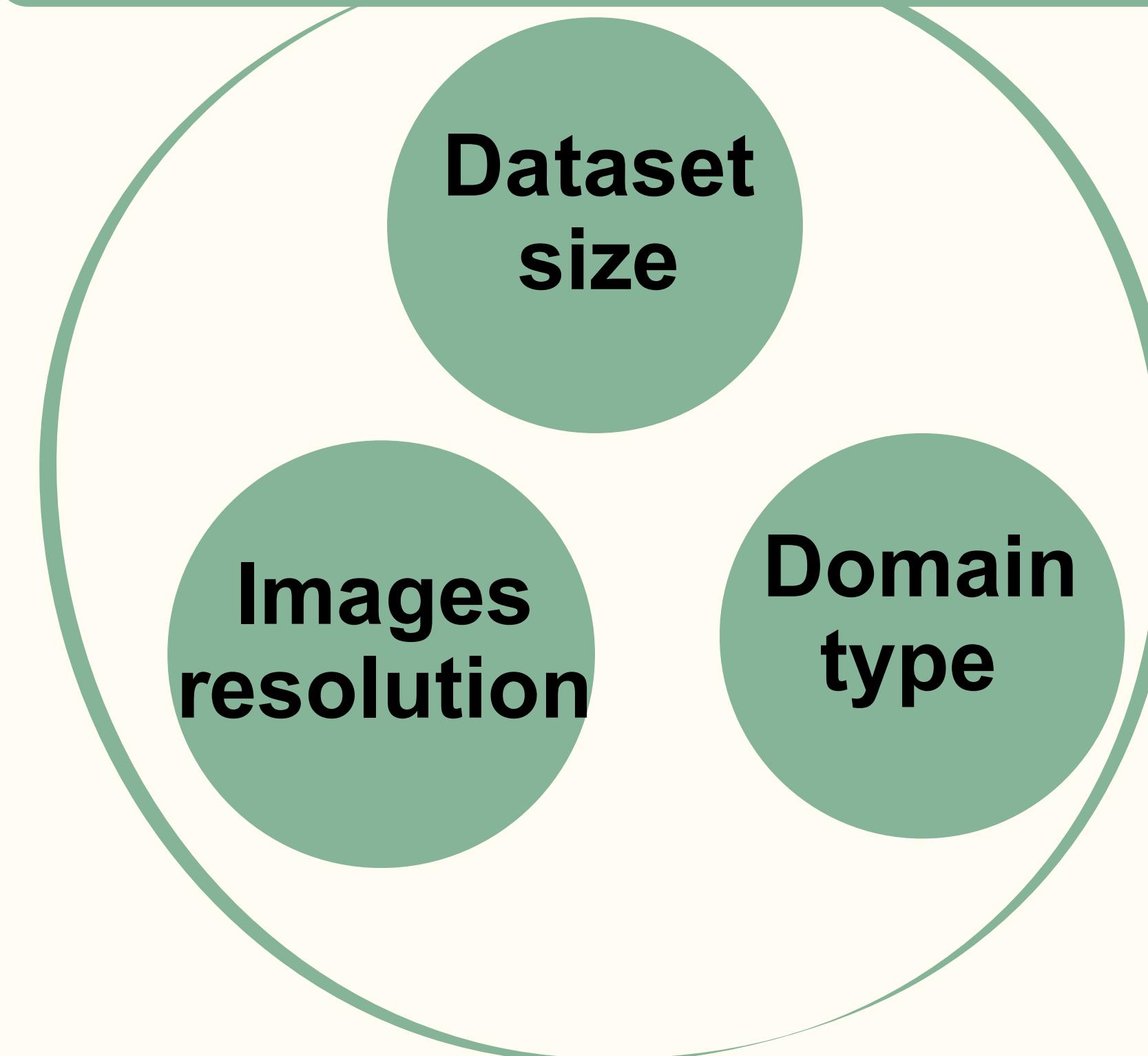


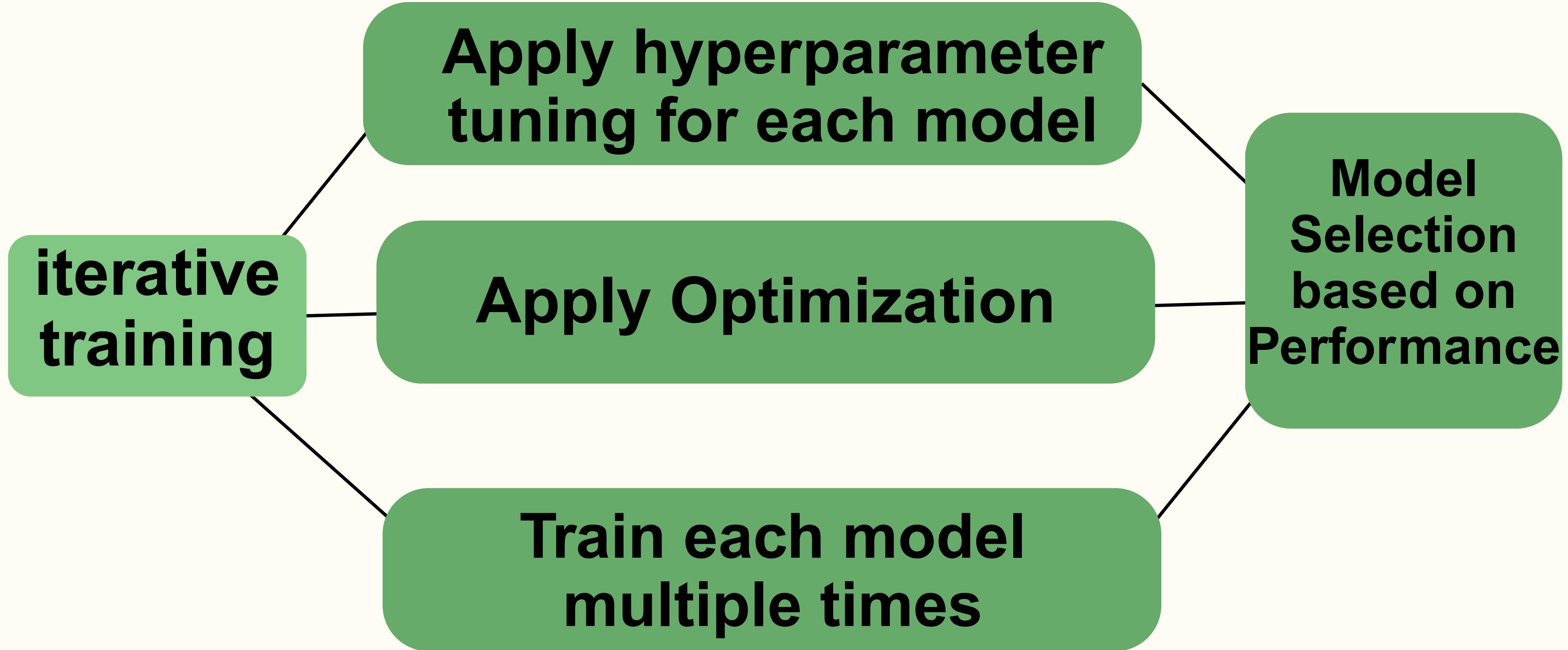
**Custom Vision Model**  
Divides all images in all tags  
into



# AutoML explores multiple state-of-the-art architectures

**Selection process based on**





# Image Recognition Process Using Custom Vision

# Feature Extraction

1

The model scans the image  
pixel by pixel

2

Automatically extracts important  
visual features

Colors

Textures

Edges and  
shapes

Patterns of  
ingredients<sup>44</sup>

# Classification Process

1

Extracted features are compared with learned patterns

2

The model checks similarity with all meal categories

3

Calculate probabilities for each possible meal

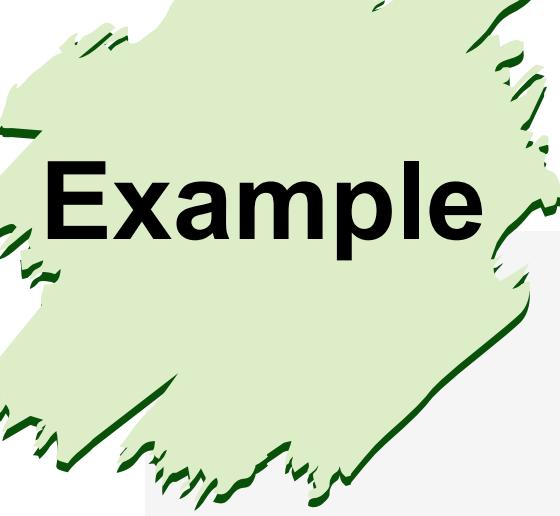
4

Ranked list of predictions is generated

**Model Output**

**Top  
predicted  
meal**

**Confidence  
score for  
each result**



# Example



Image URL

<https://www.shutterstock.com/image-1>



or

Browse local files

File formats accepted: jpg, png, bmp

File size should not exceed: 4mb

Using model trained in

Iteration

Iteration 9

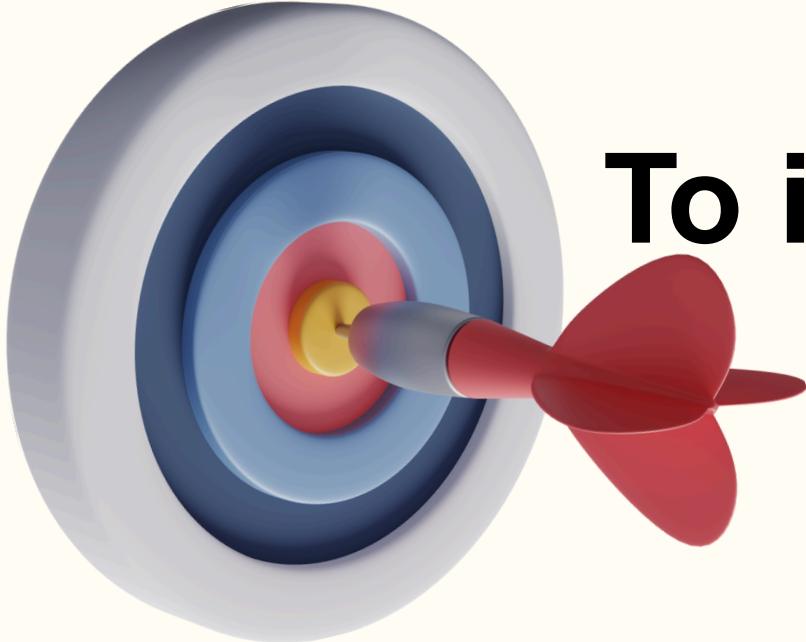
Predictions

Tag	Probability
Qatayef	74.8%
Stuffed Onion	3.9%
Znoud El Sit sweet	3.1%
Moon cake	2.4%
Chinese pumpkin pie	1.8%

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# Experiment



**To investigate the effect of training dataset size on meal classification performance**

**Fast-Food dataset was used**

**Five meal classes were selected**

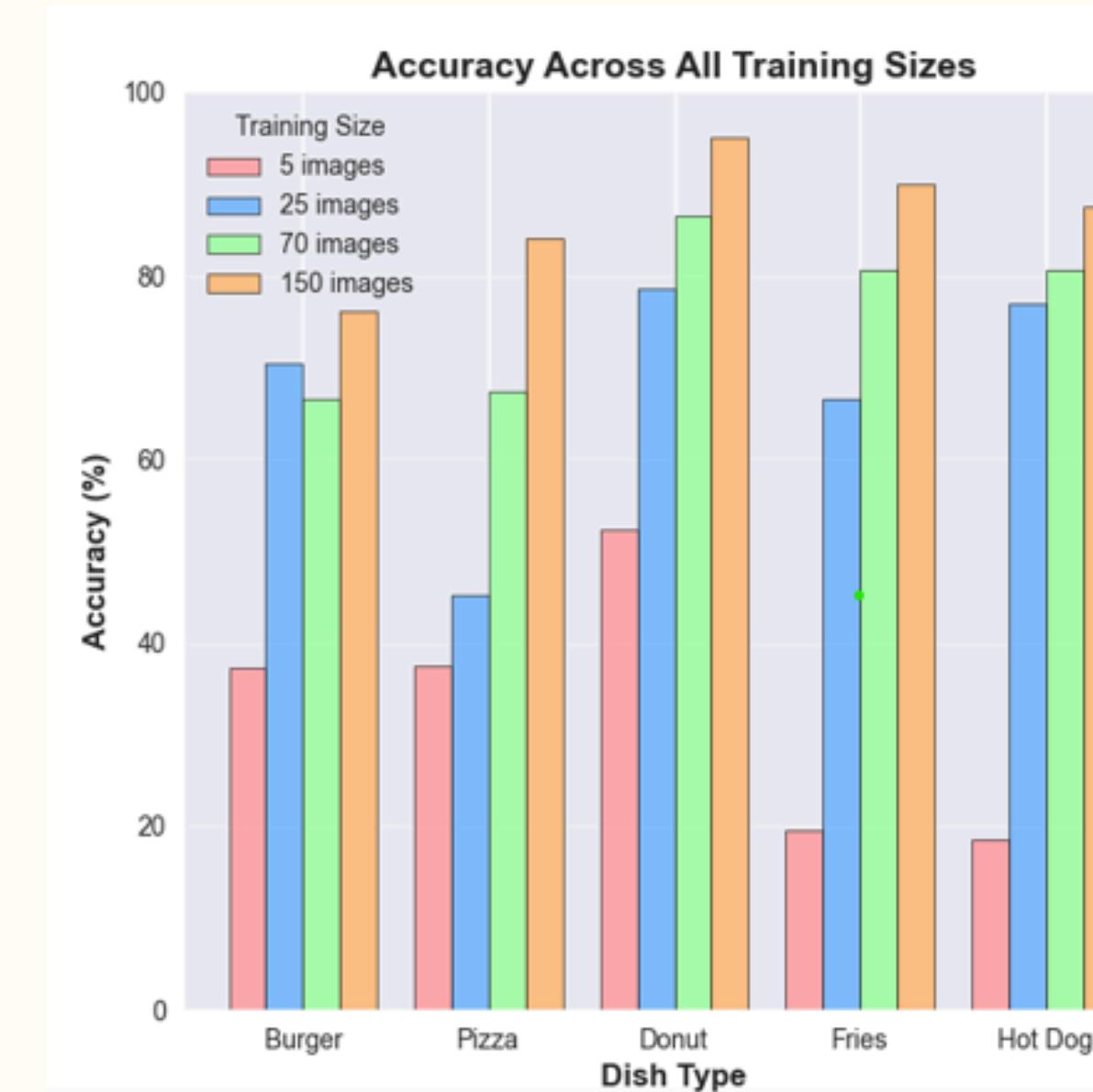
**Incremental training strategy applied**

**Separate model trained for each dataset size**

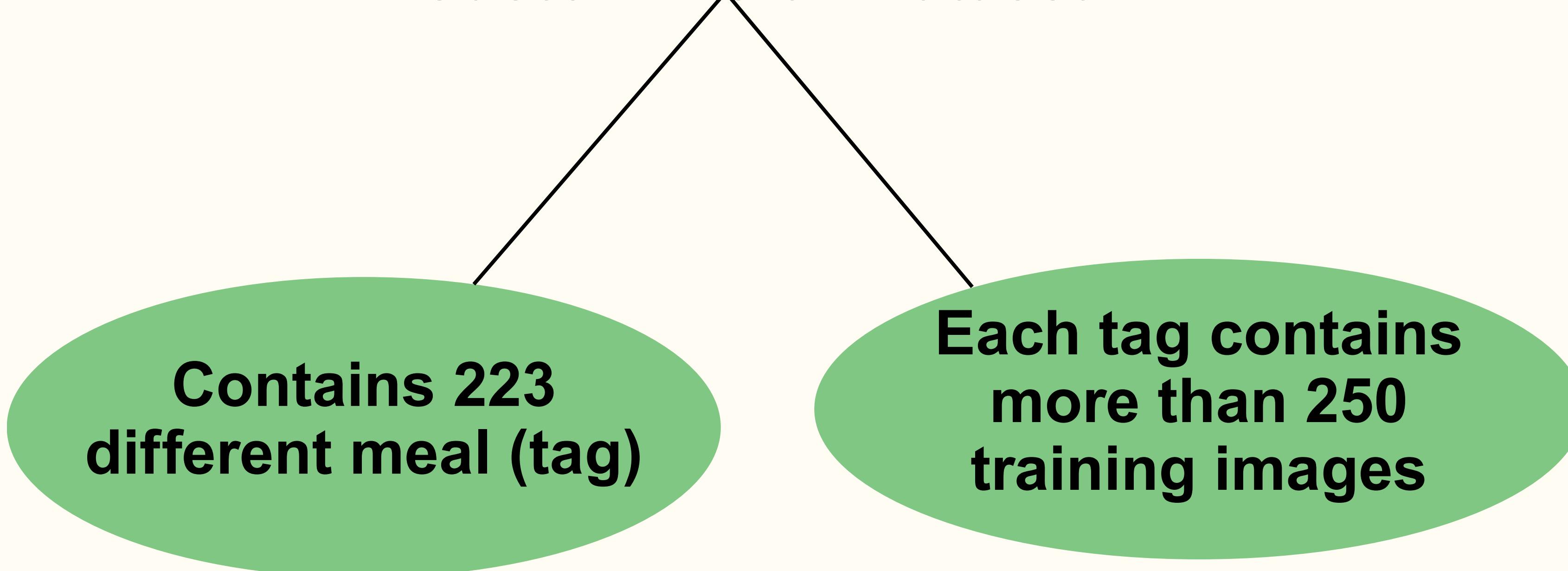
**Evaluation performed on the same fixed test set**

# Model Accuracy vs. Number of Training Images per Dish

Dish Name	5 images	25 images	70 images	150 images
Burger	37.2%	70.45%	66.67%	76.1%
Pizza	37.5%	45.24%	67.5%	84.1%
Donut	52.3%	78.7%	86.5%	95.1%
Fries	19.5%	66.67%	80.56%	90%
Hot Dog	18.6%	76.9%	80.56%	87.5%



# Custom Vision Dataset

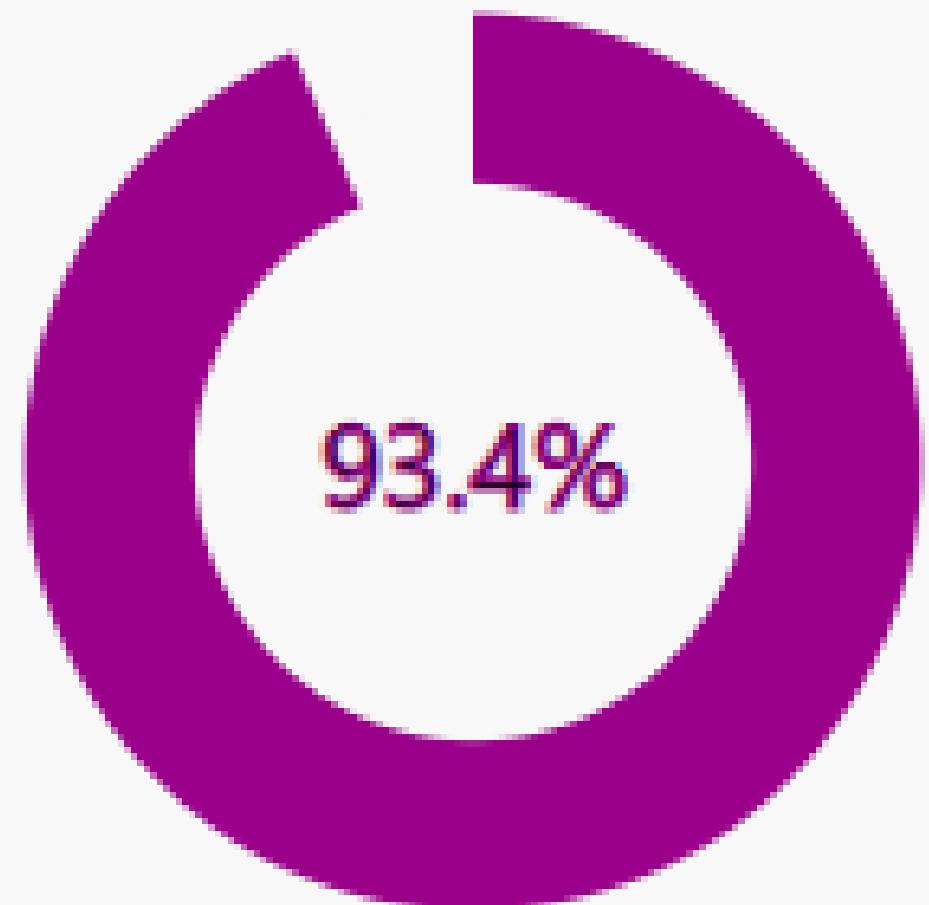


Contains 223  
different meal (tag)

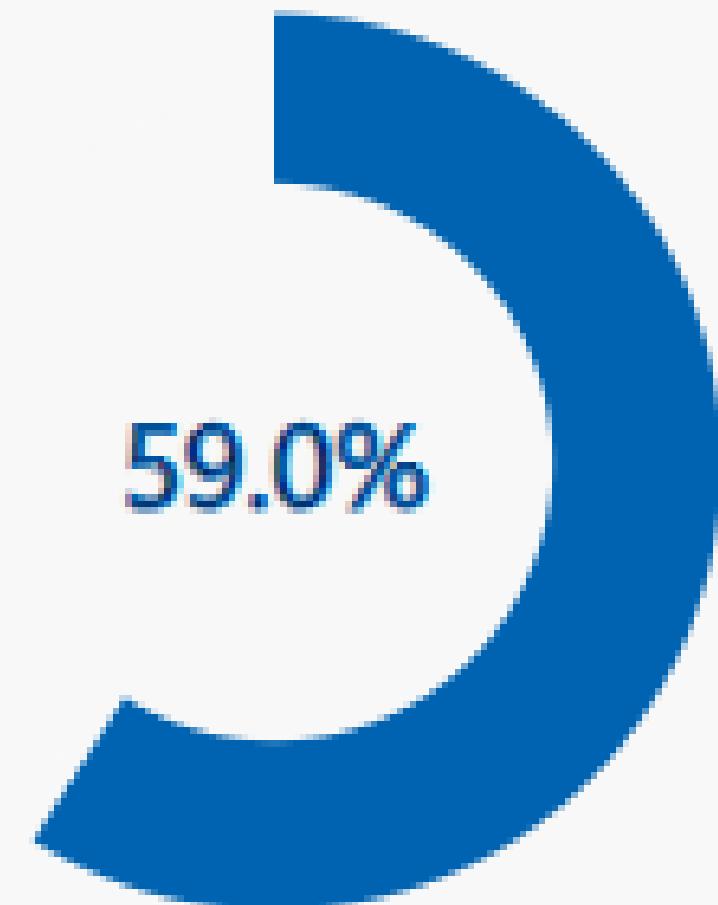
Each tag contains  
more than 250  
training images

# **Evaluation Metrics for the Model**

Precision ⓘ



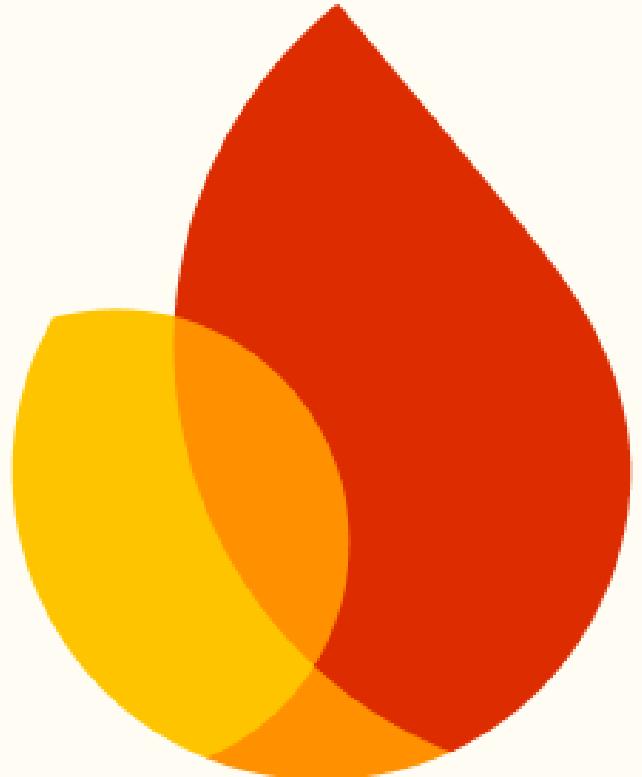
Recall ⓘ



AP ⓘ



# Backend Architecture



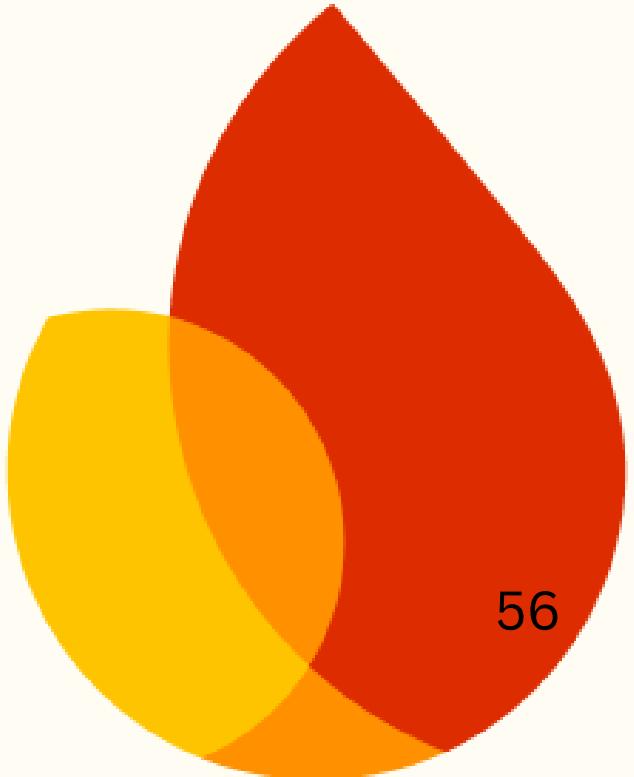
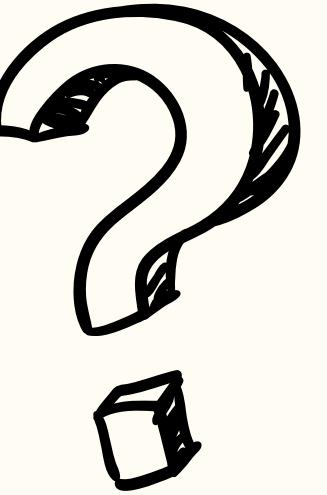
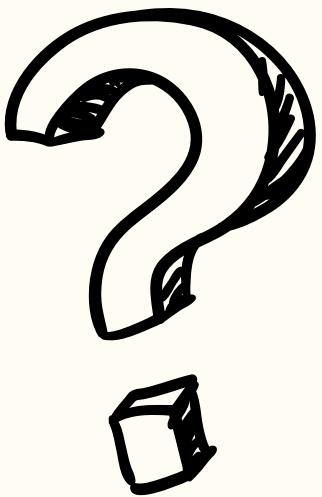
1

# Firebase Services

2

# Application Programming Interfaces (API)

# Why Firebase for Meal Lens?



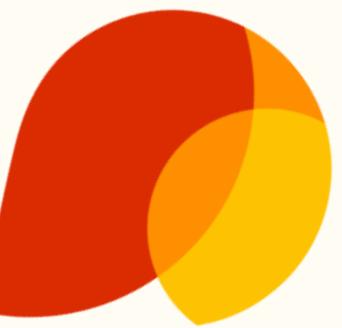


# **Fast Development**

## **Cross-Platform Consistency**

## **Scalable & Reliable**

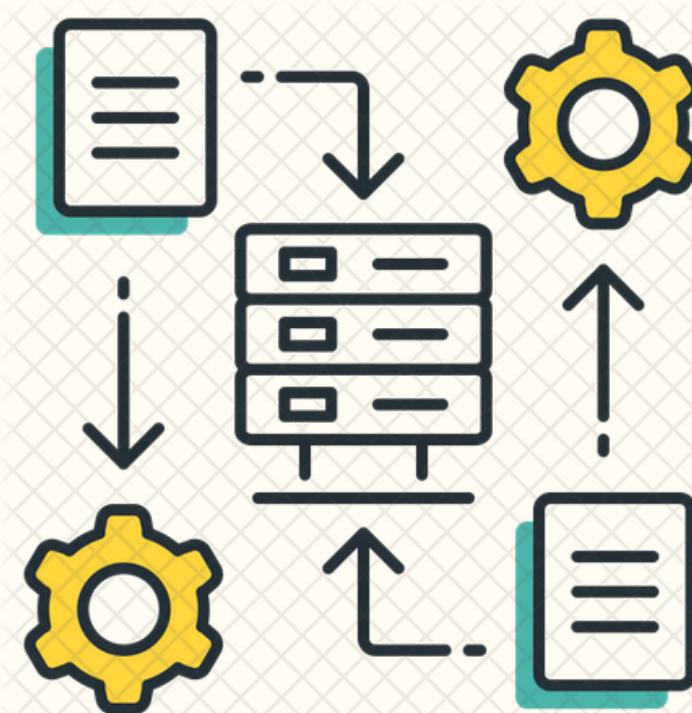
## **Cost-Effective**



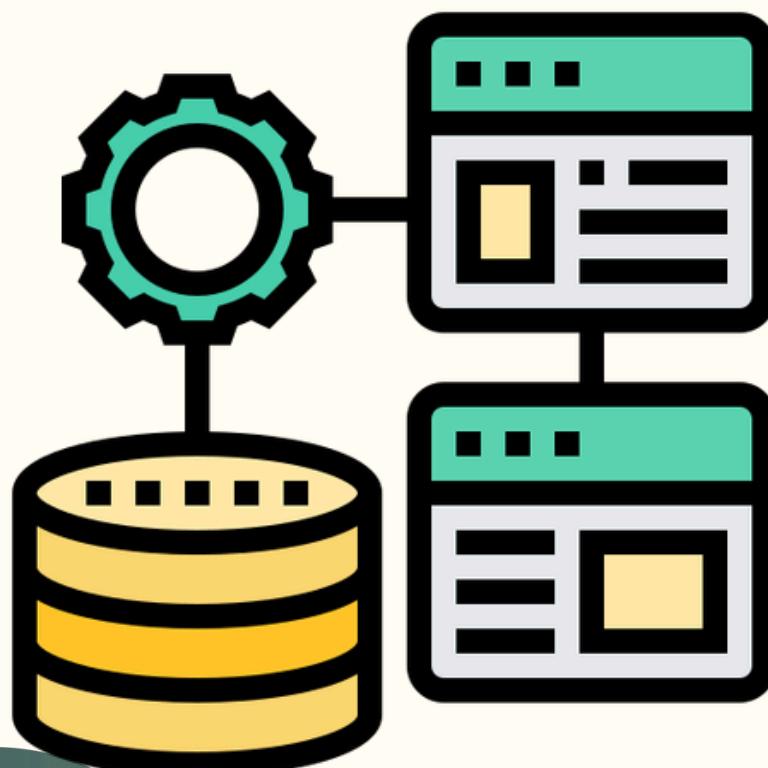
# **Key Firebase Services Used in Meal Lens**



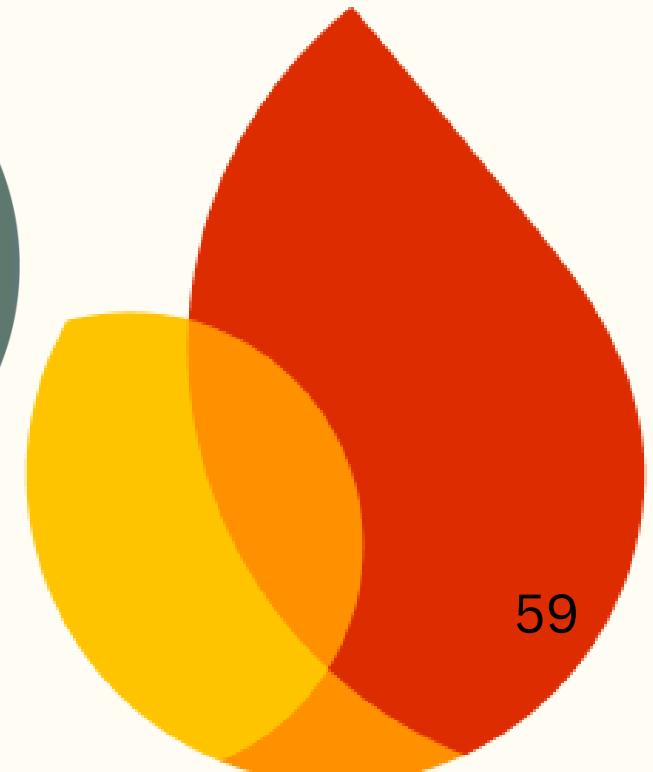
# Firebase Authentication



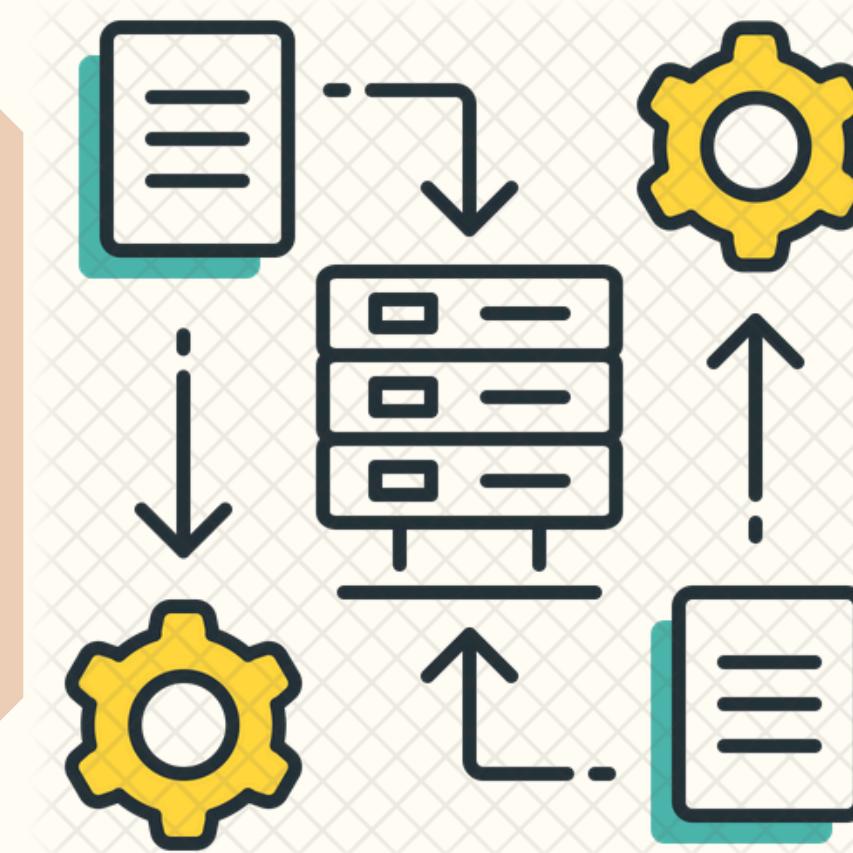
# Firebase Hosting



# Cloud Firestore (NoSQL Database)



## Primary Database Firebase Firestore



supporting 223+  
meal categories

## Real time synchronization

# Firestore

# Database

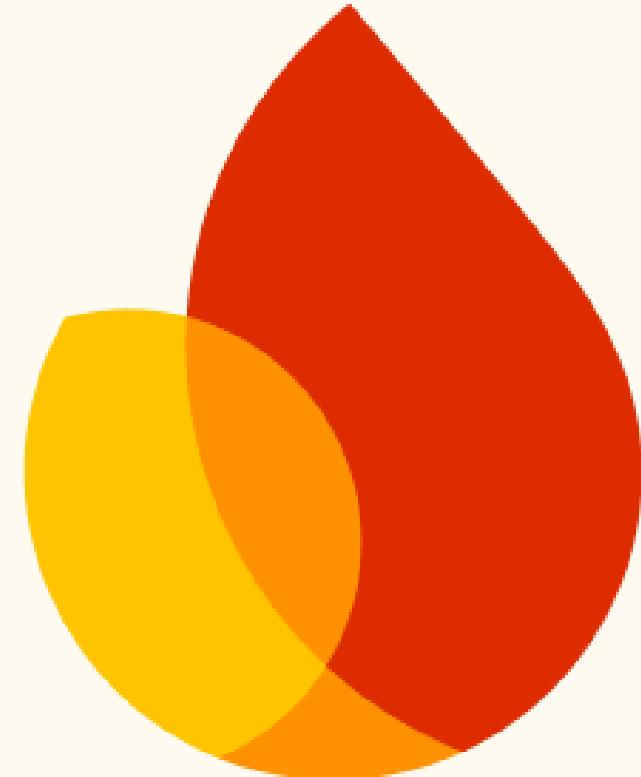
# Structure

# Main collection

Users

Recipes

Favorites  
& history

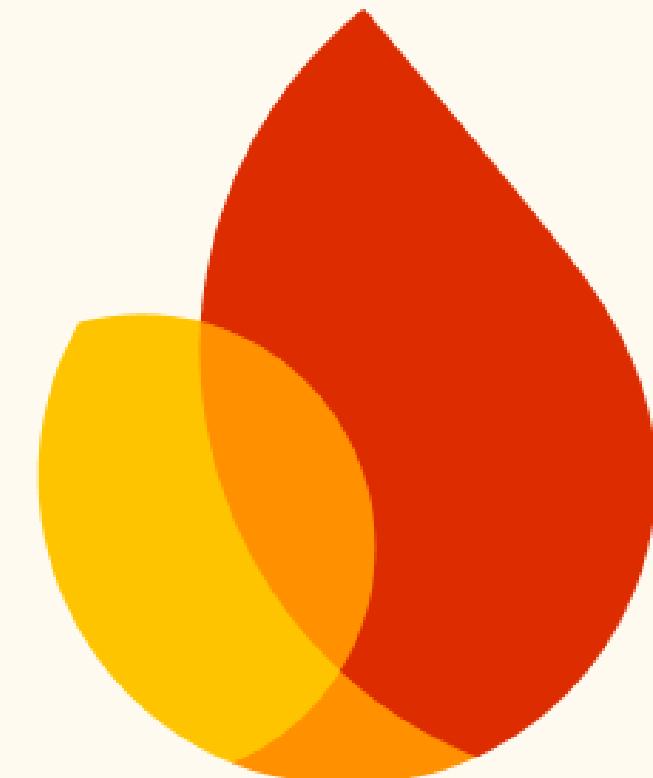


# Main collection

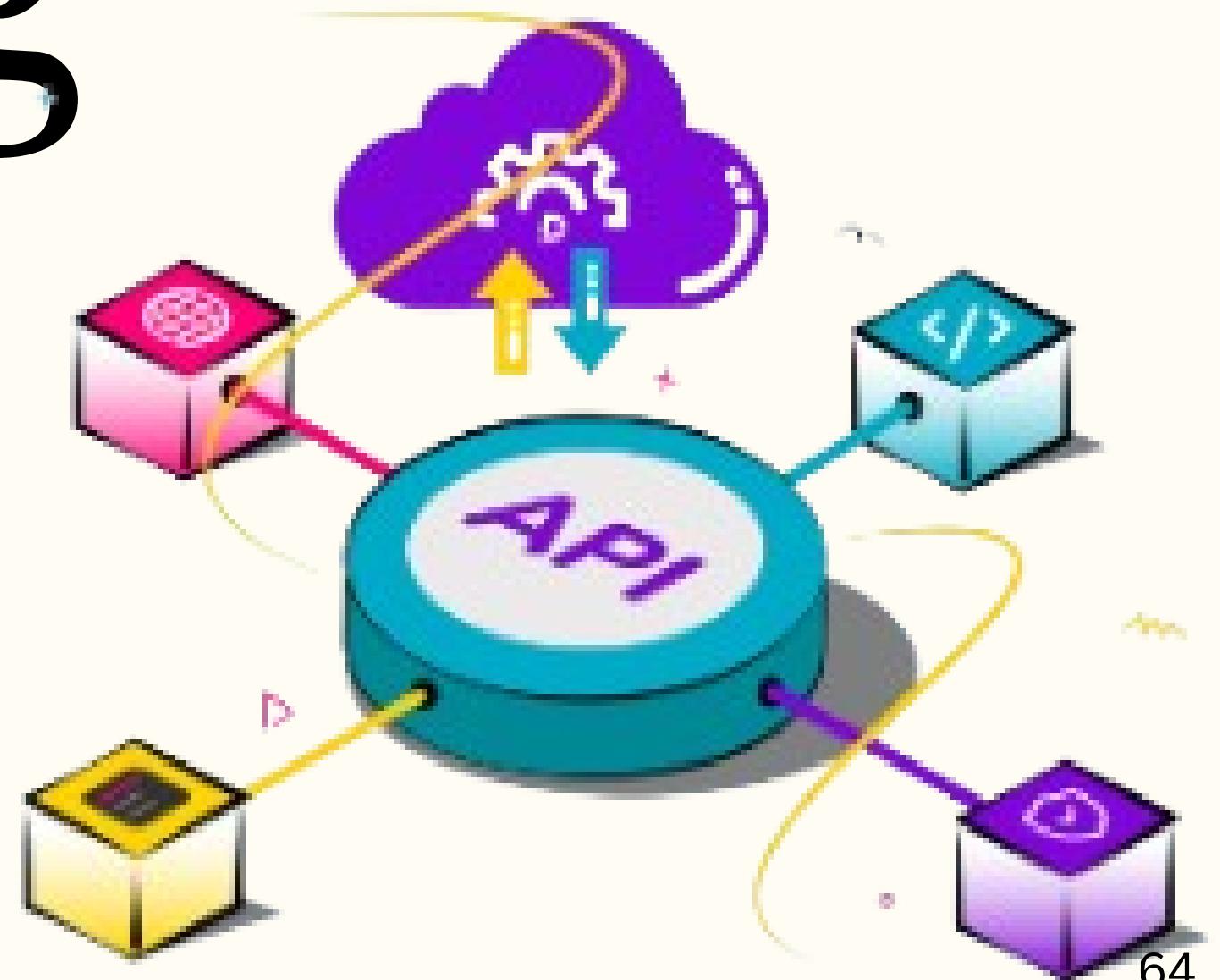
**Feedback**

**Admin**

**Website  
platform**



# Application Programming Interfaces (APIs)



API is a tool that helps  
applications share  
information with other  
applications



# Spoonacular API



**Helps apps find recipes  
and ingredients**

**Supports diet filters like  
vegan or gluten-free**

**Gives cooking steps and  
nutrition info**

**Uses data from food  
websites  
and official nutrition  
sources**

# Edamam API



**Provides detailed food and nutrition analysis**

**Calculates calories and nutrient values**

**Analyzes recipes and ingredient lists**

**Offers reliable, structured food databases**

# TheMealIDB API

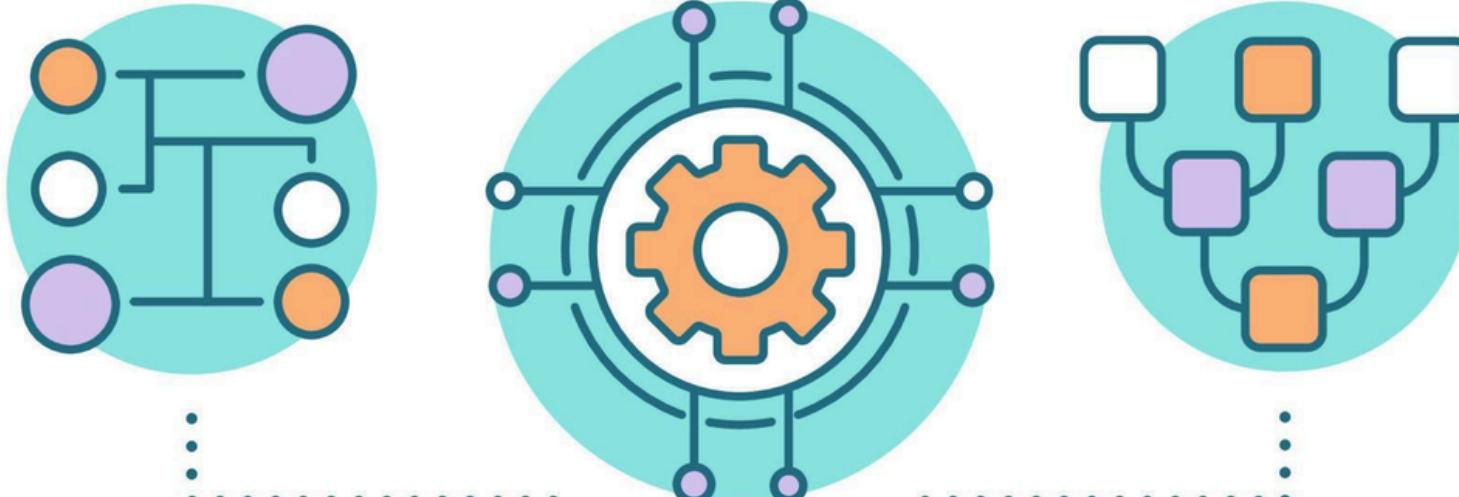


**Free online recipe database**

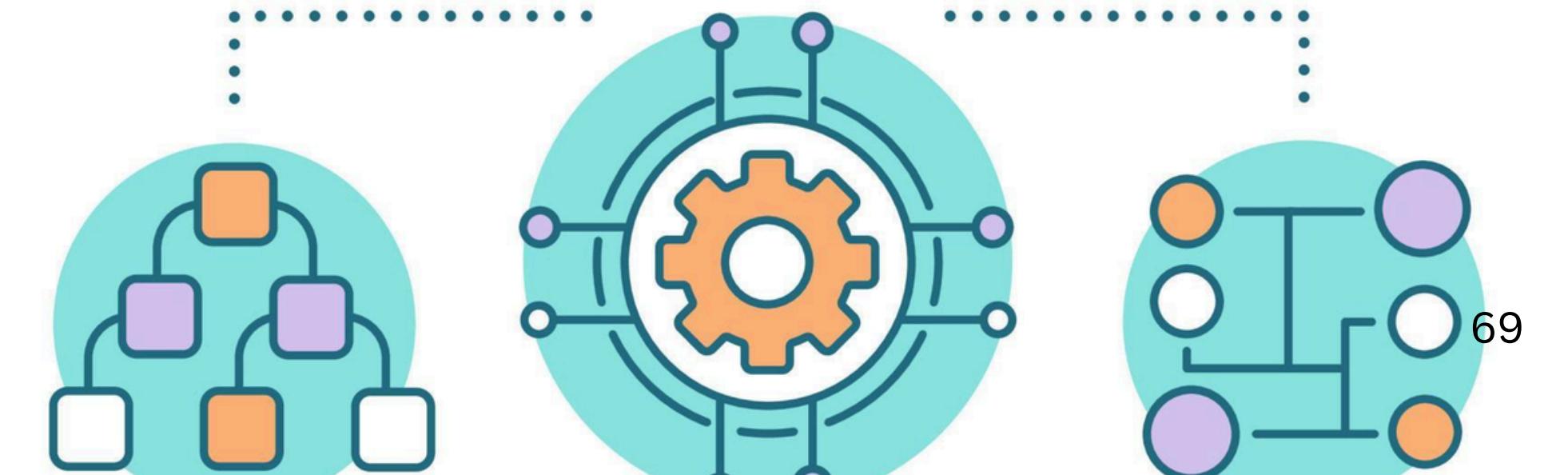
**Provides meals from different world cuisines**

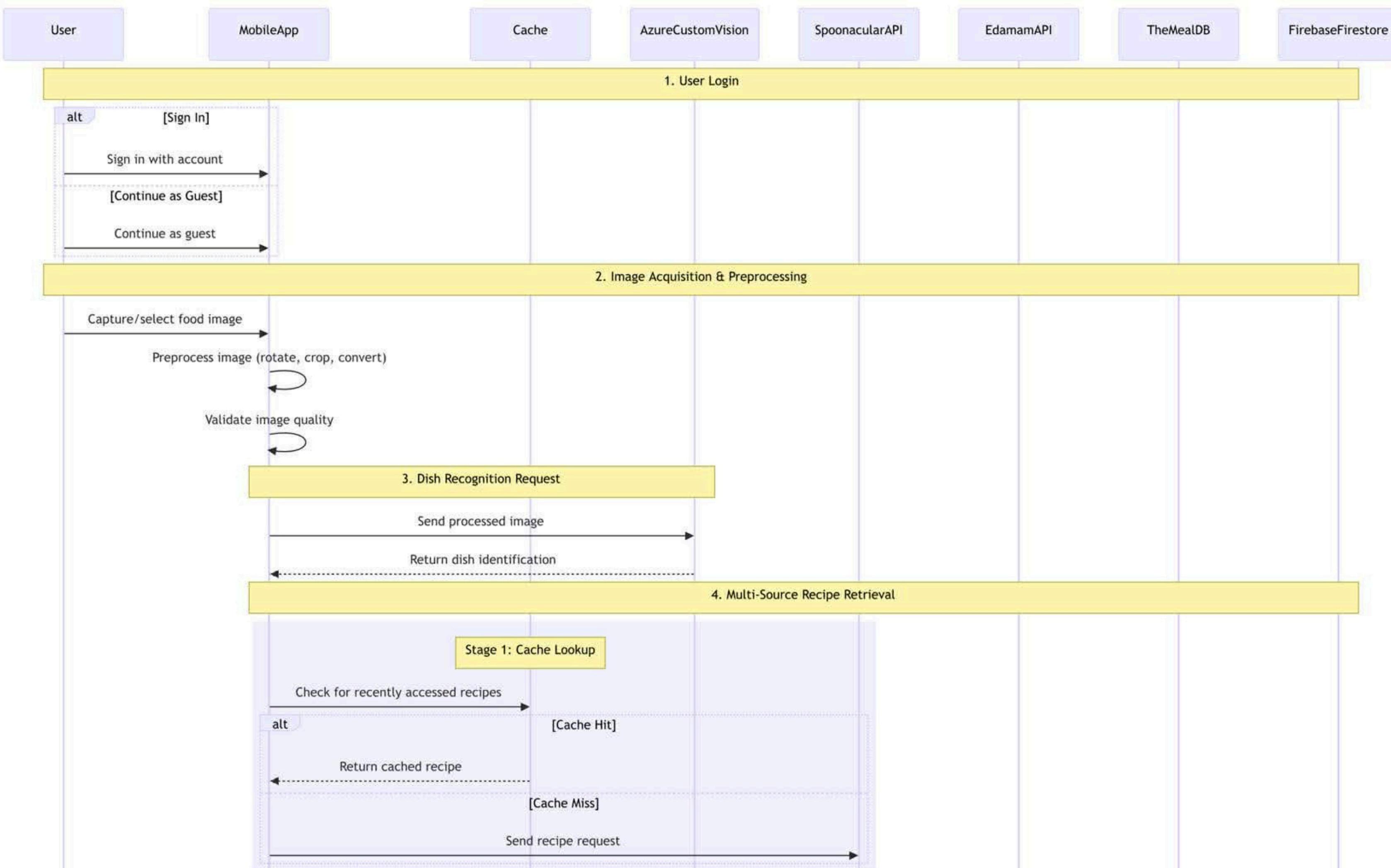
**Gives full recipe details and ingredients**

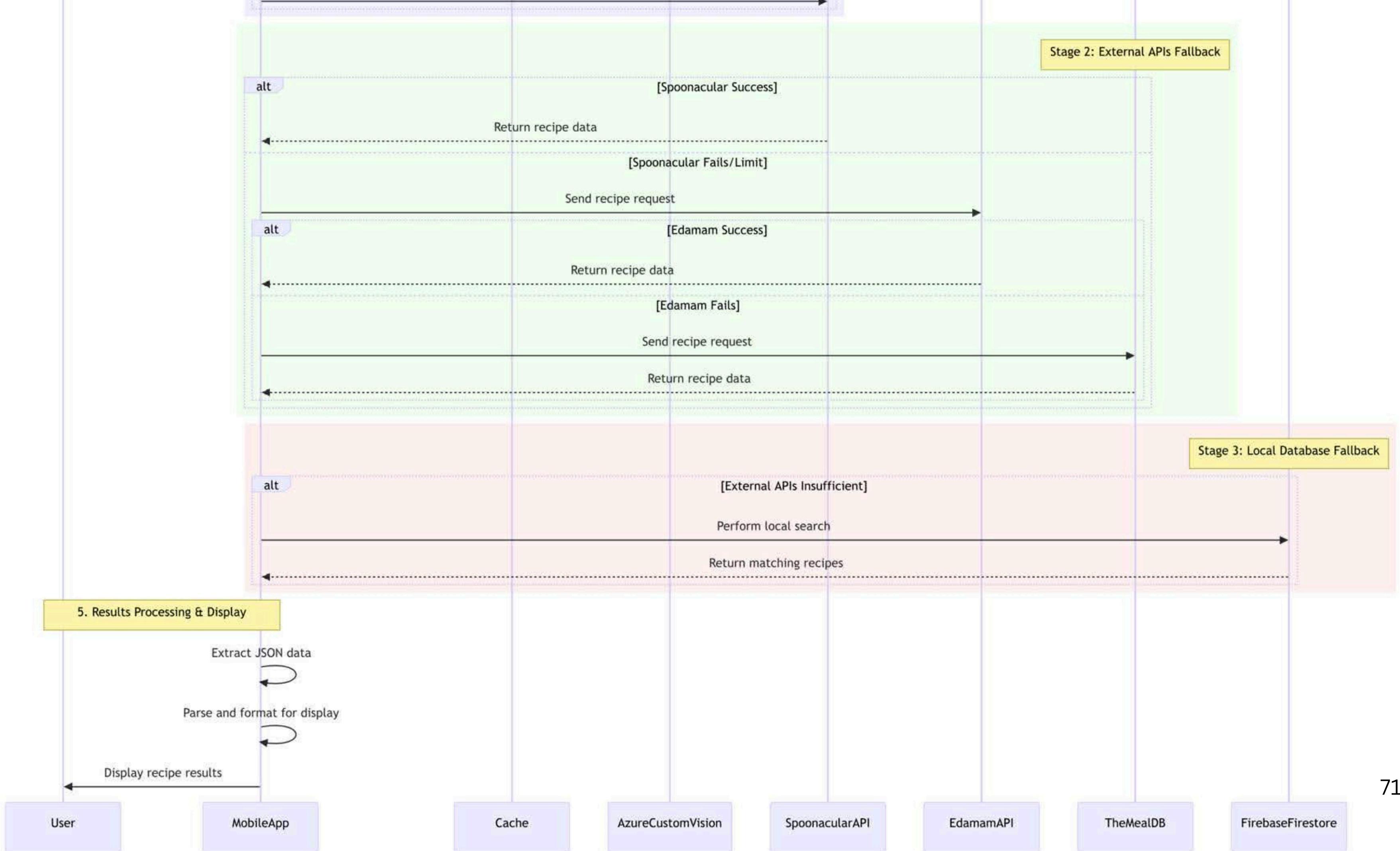
**Simple and developer-friendly API**



# System Structure







# Application



# Security





# Cost Management



**Used microsoft Custom Vision (Student/Azure Credits)**

**Integrated Free-tier APIs: Spoonacular, Edamam, TheMealDB**

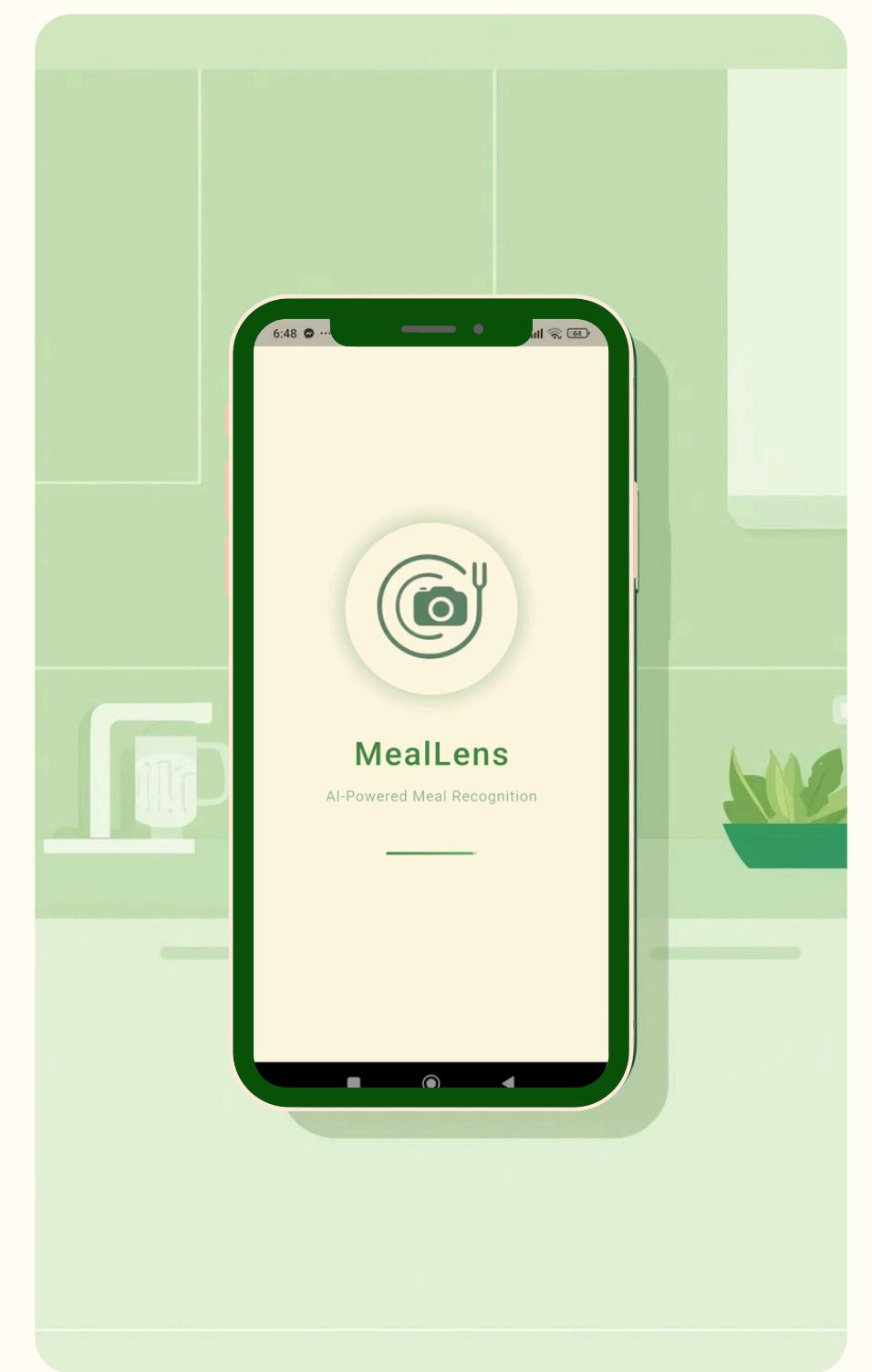
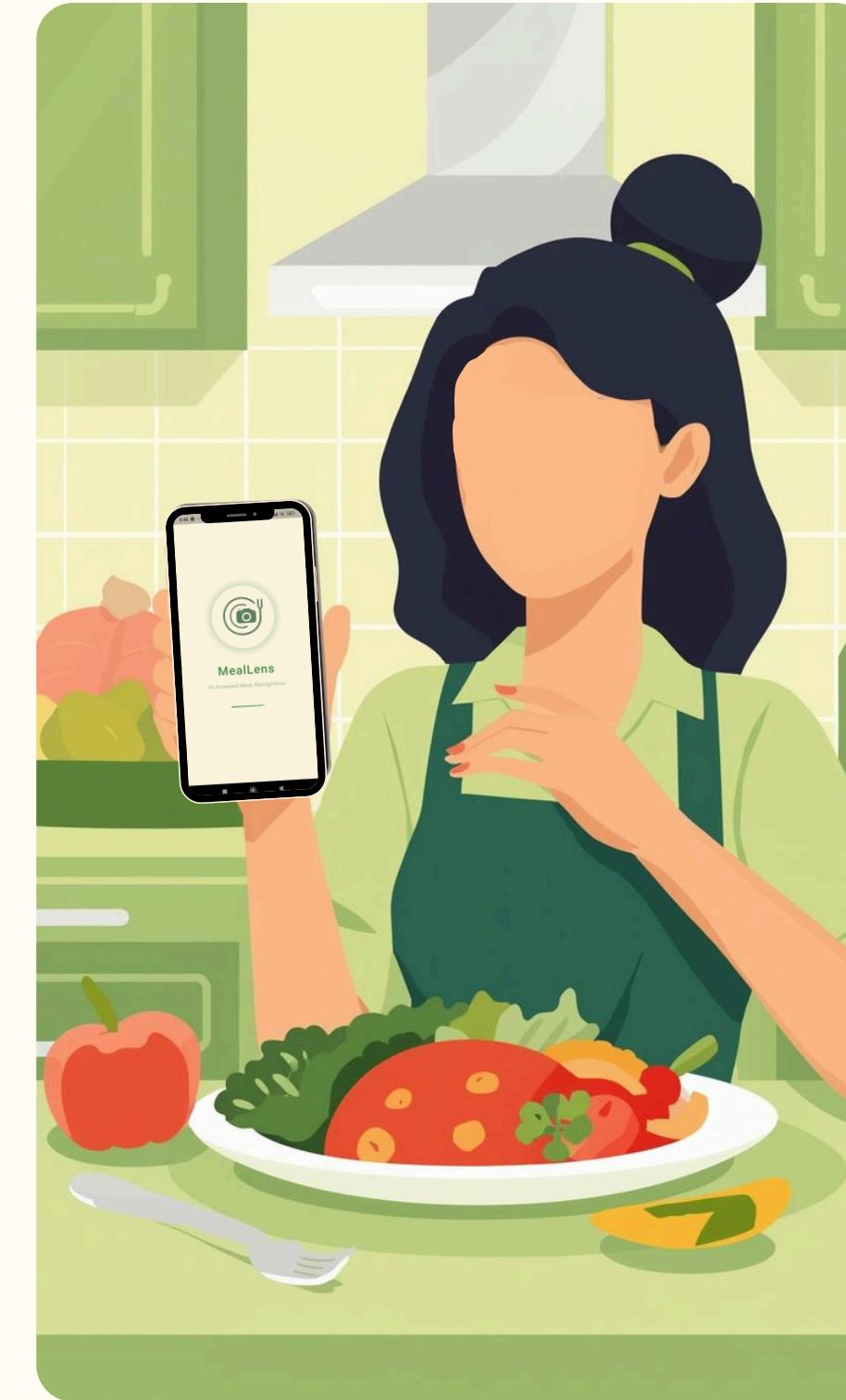
**Automatically switches when one API reaches its free limit**

**Avoid Paid Requests**

**Firebase free plan: Authentication, Database Cloud storage**

# UI / UX Design

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# Figma

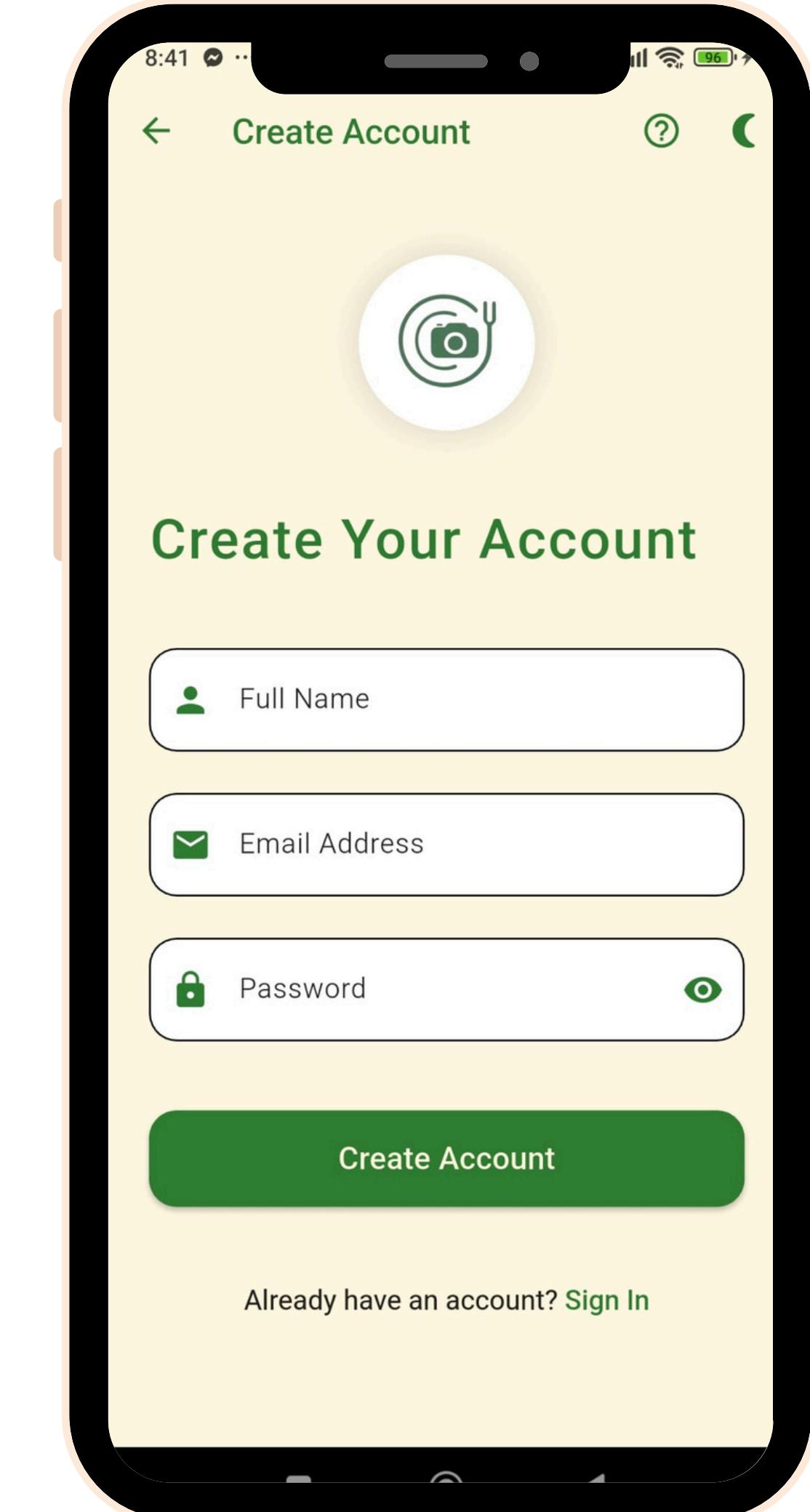
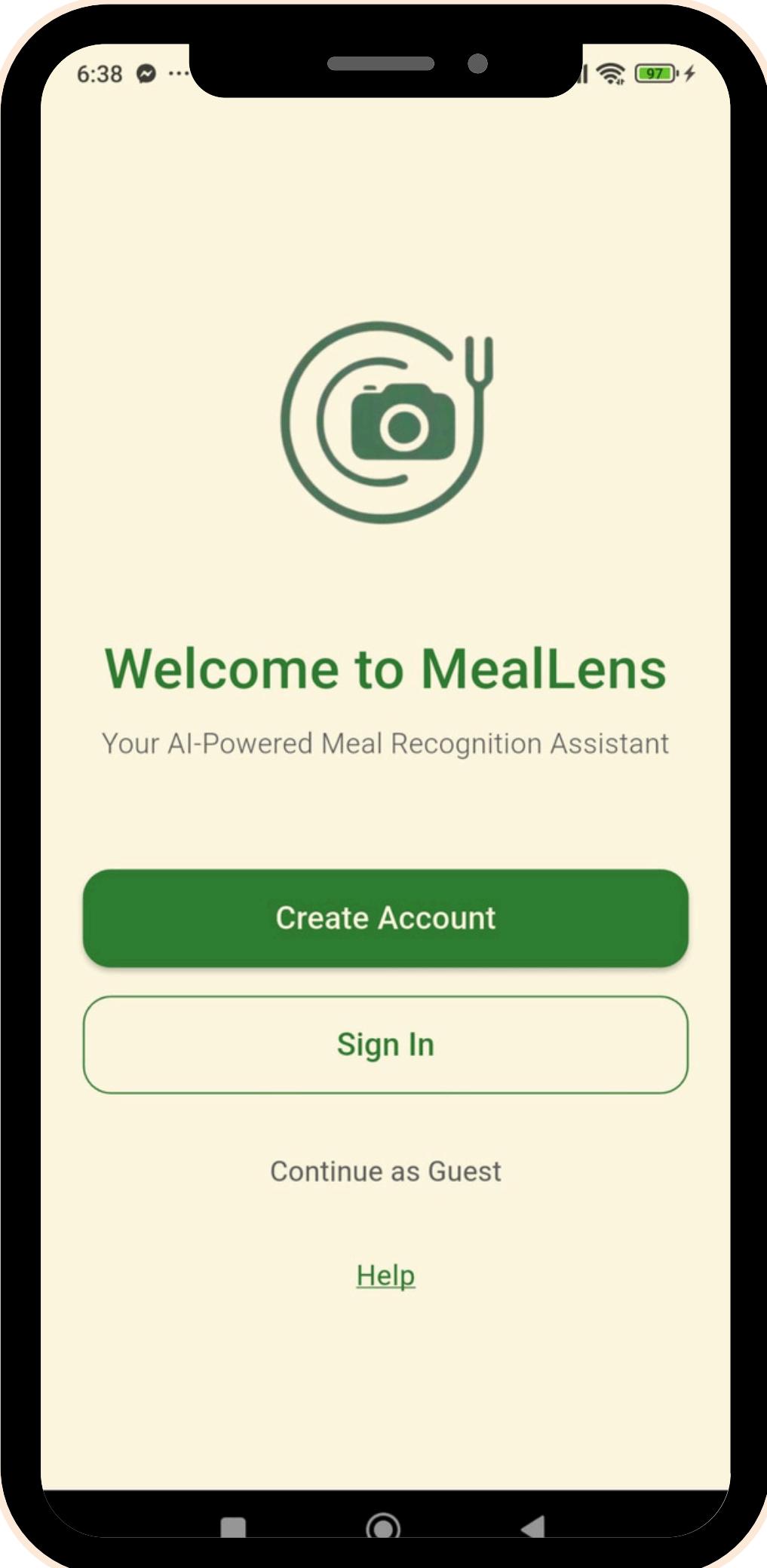
Created clean, modern, and user-friendly layouts

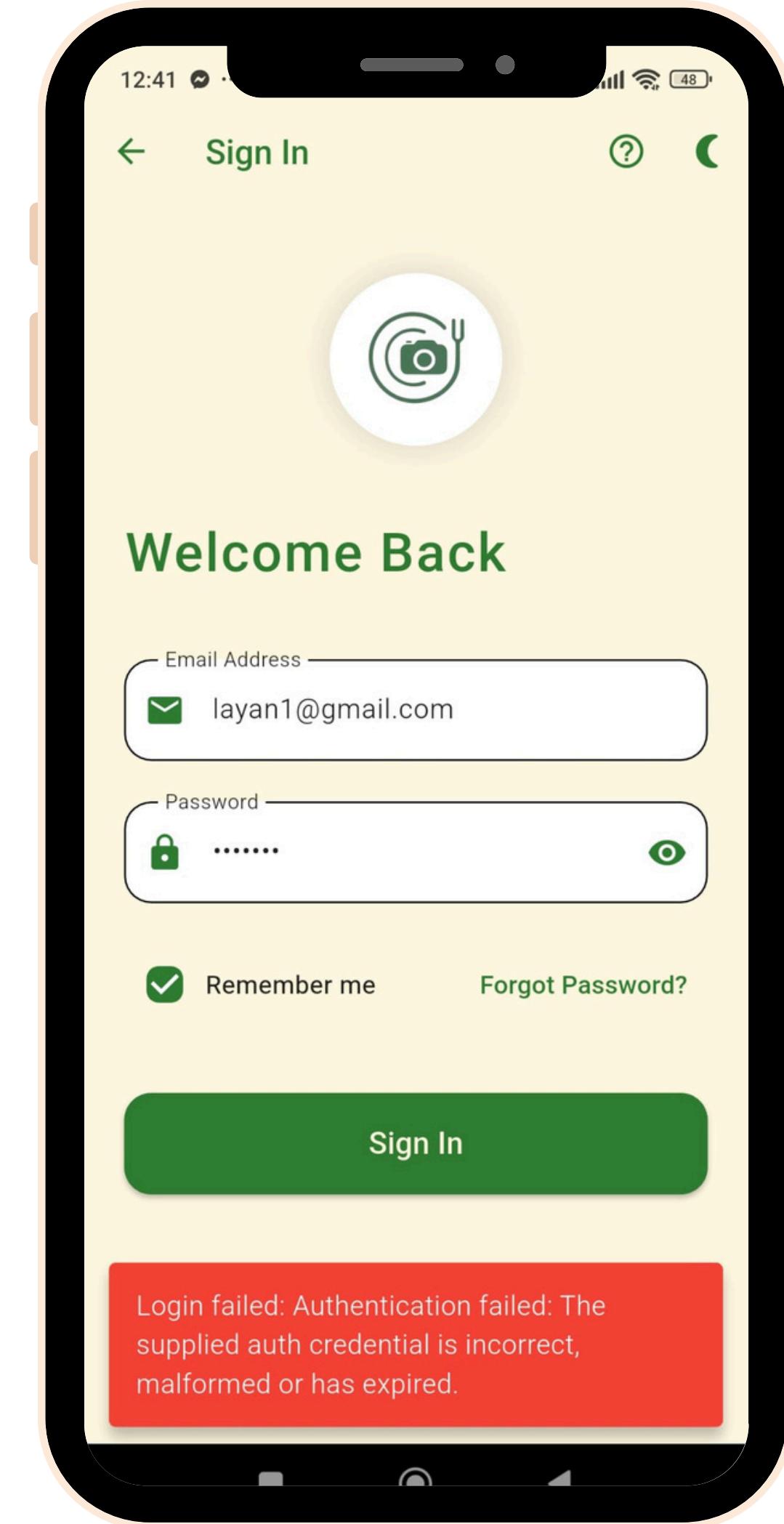
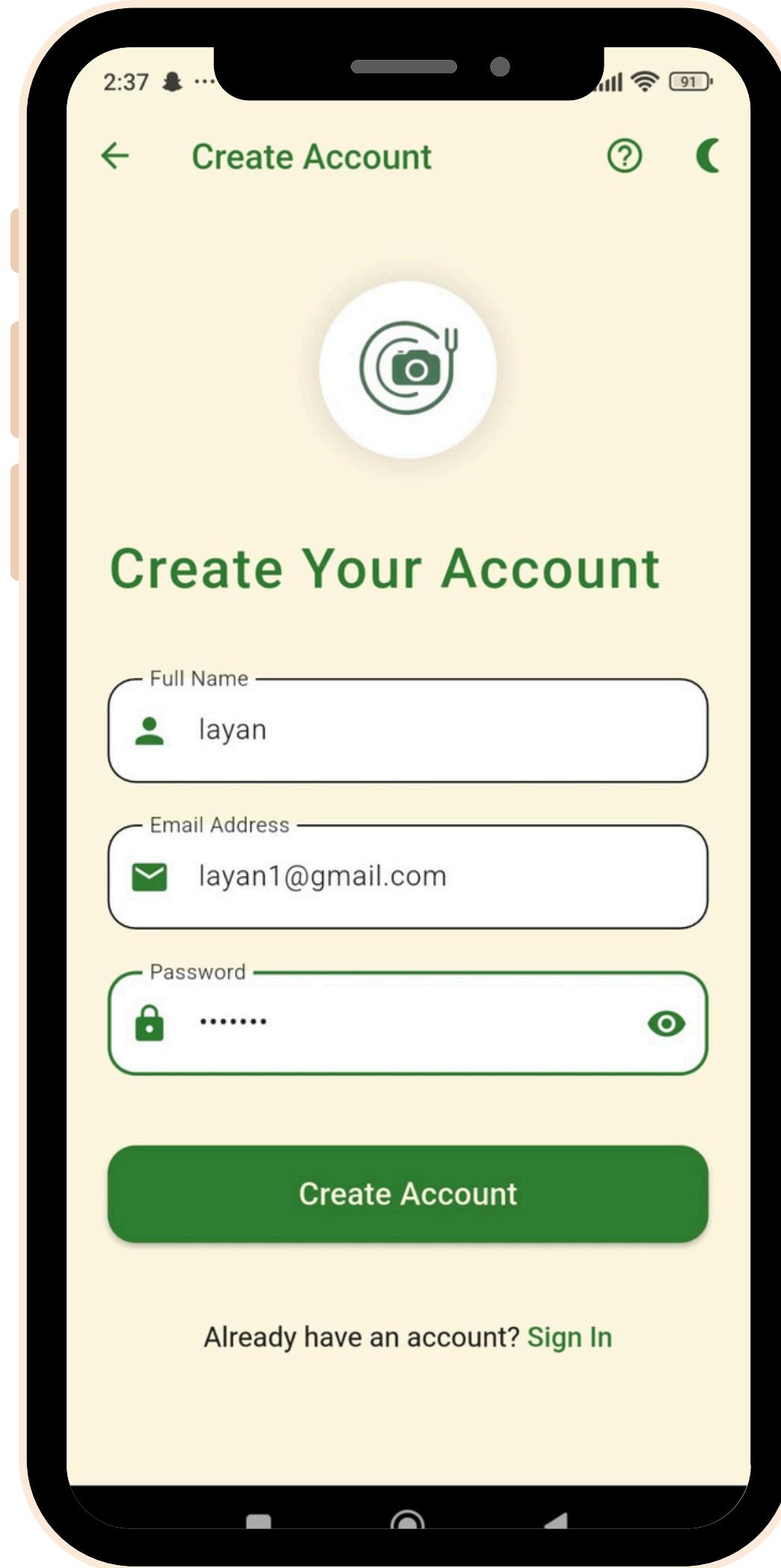
Ensured consistency in colors, fonts, and components

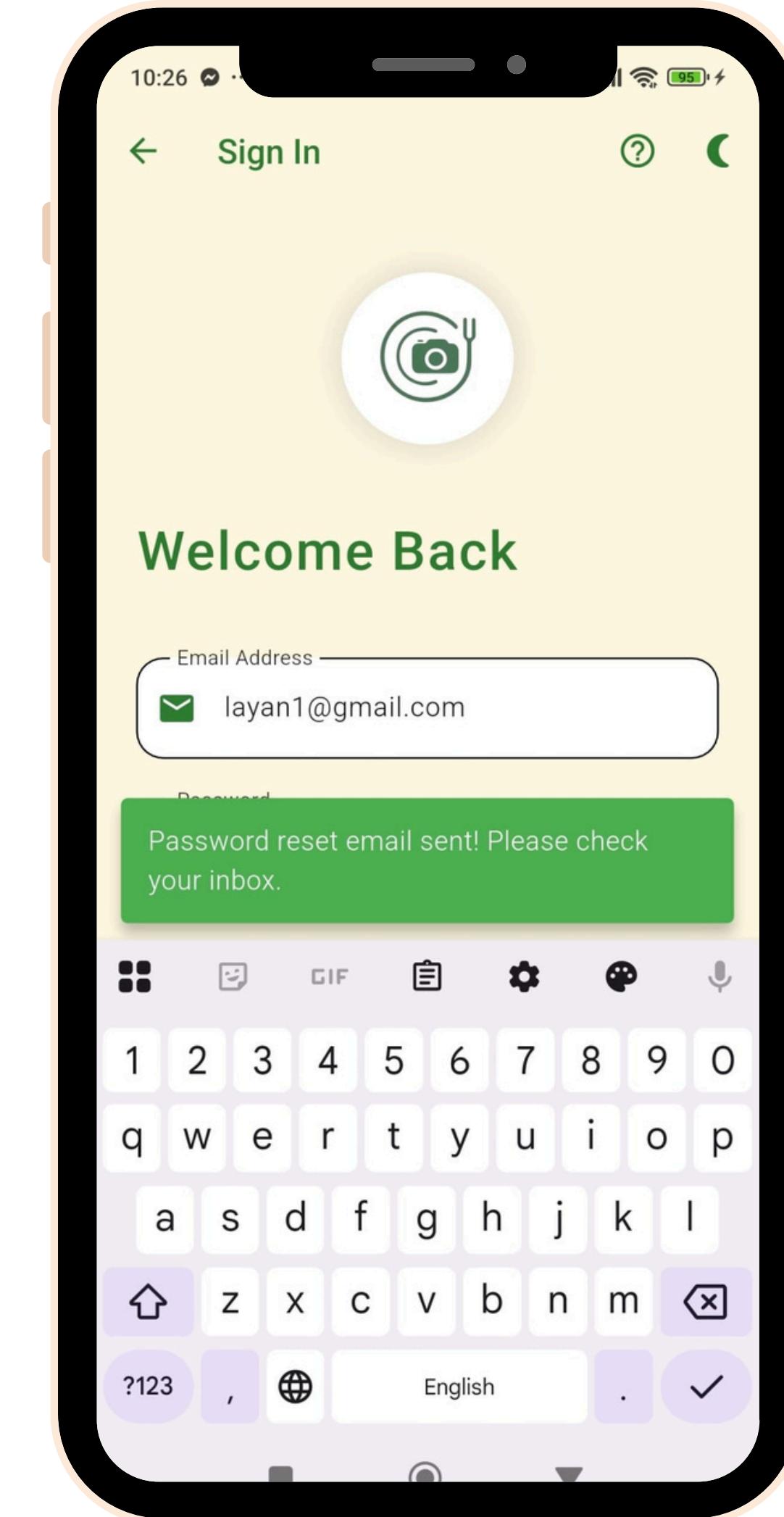
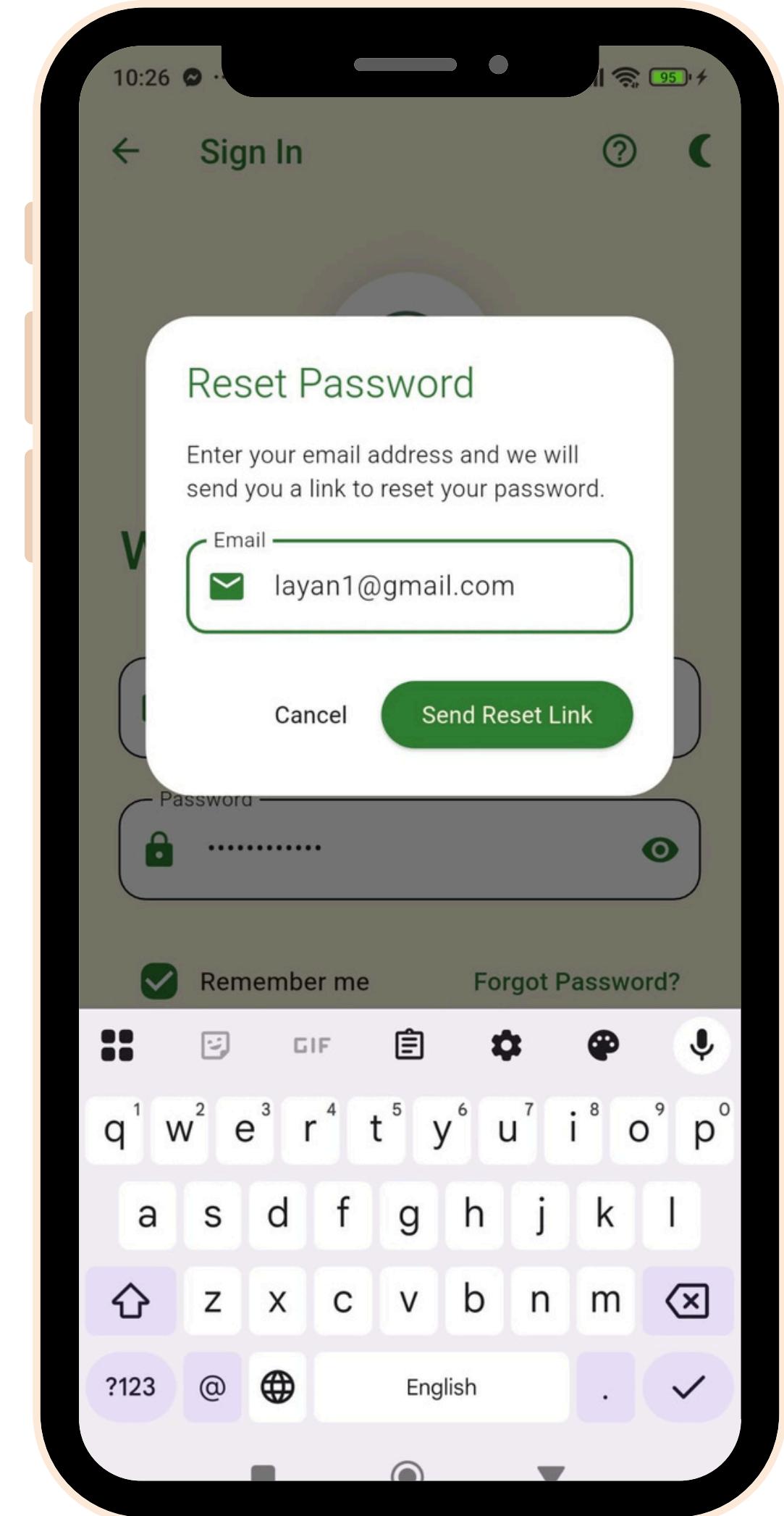


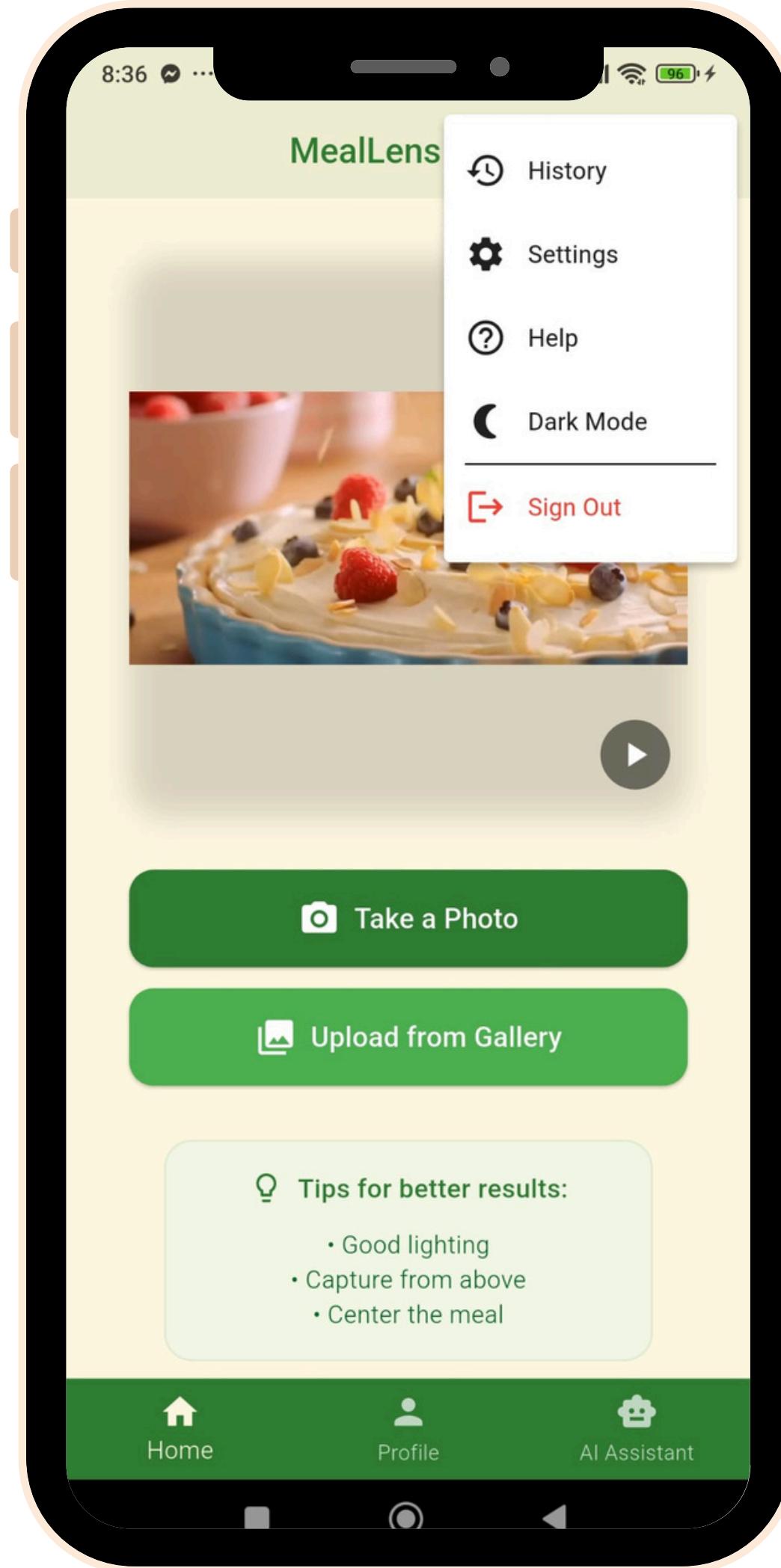
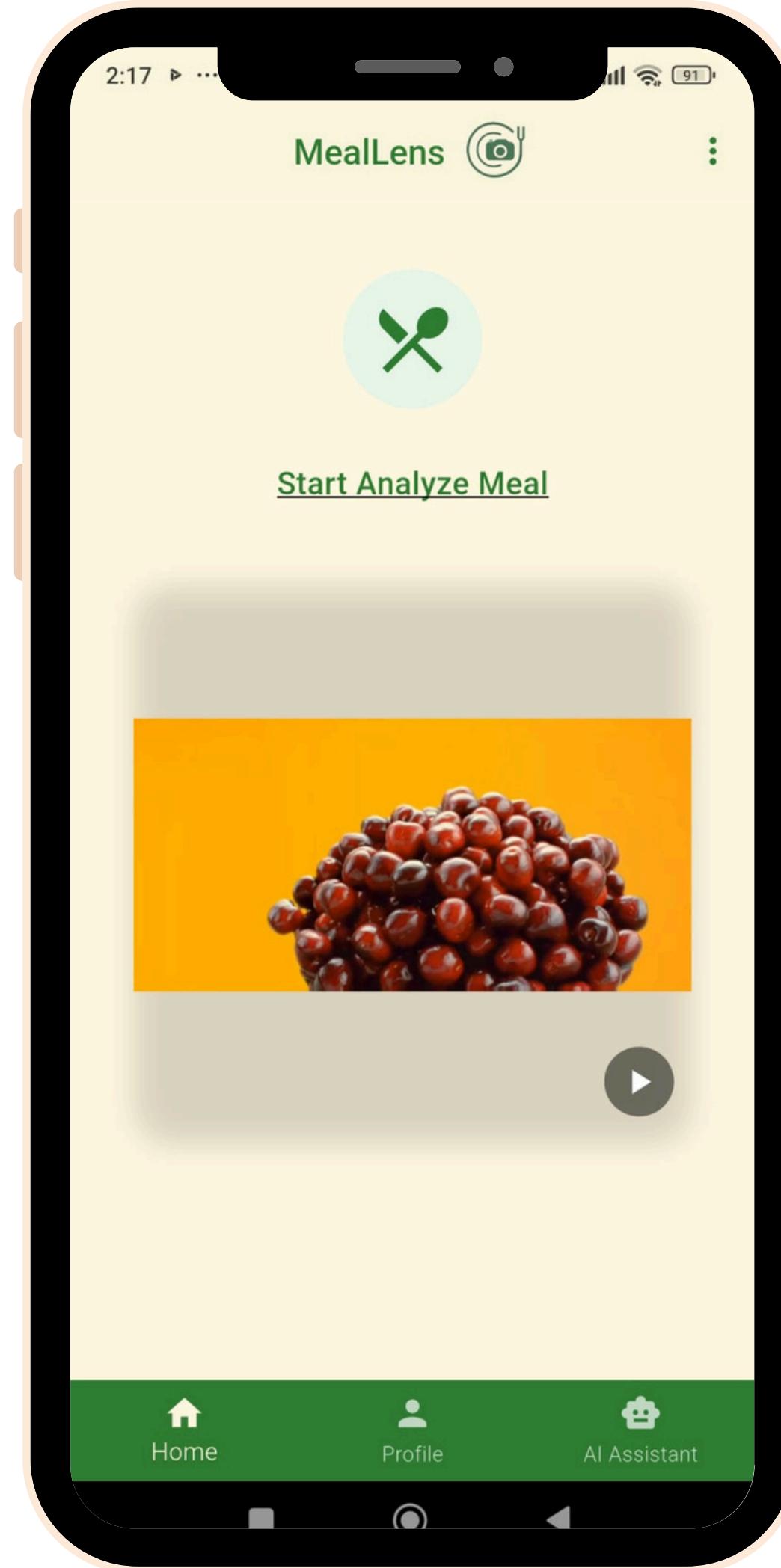
Built responsive screens for different devices

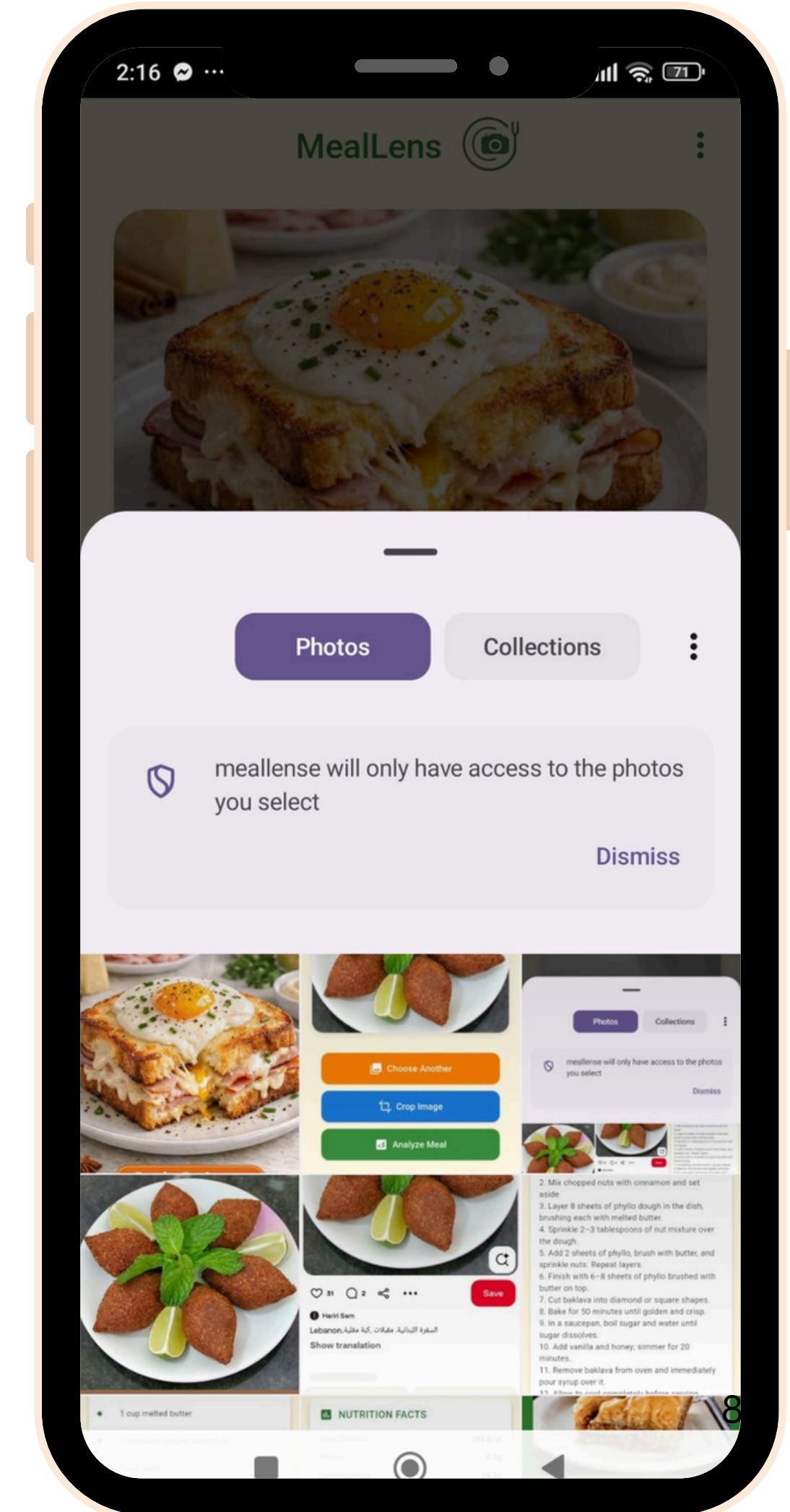
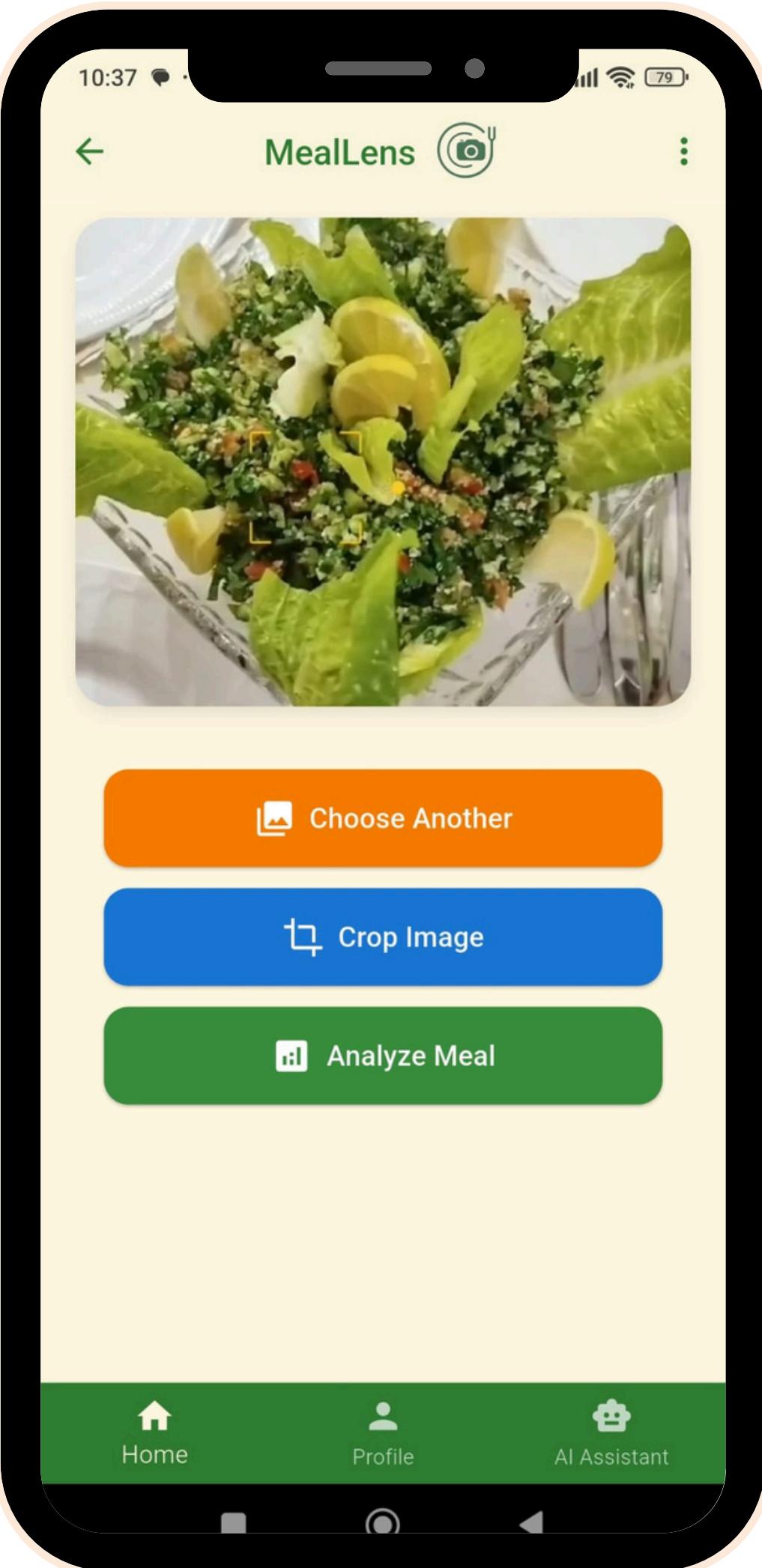
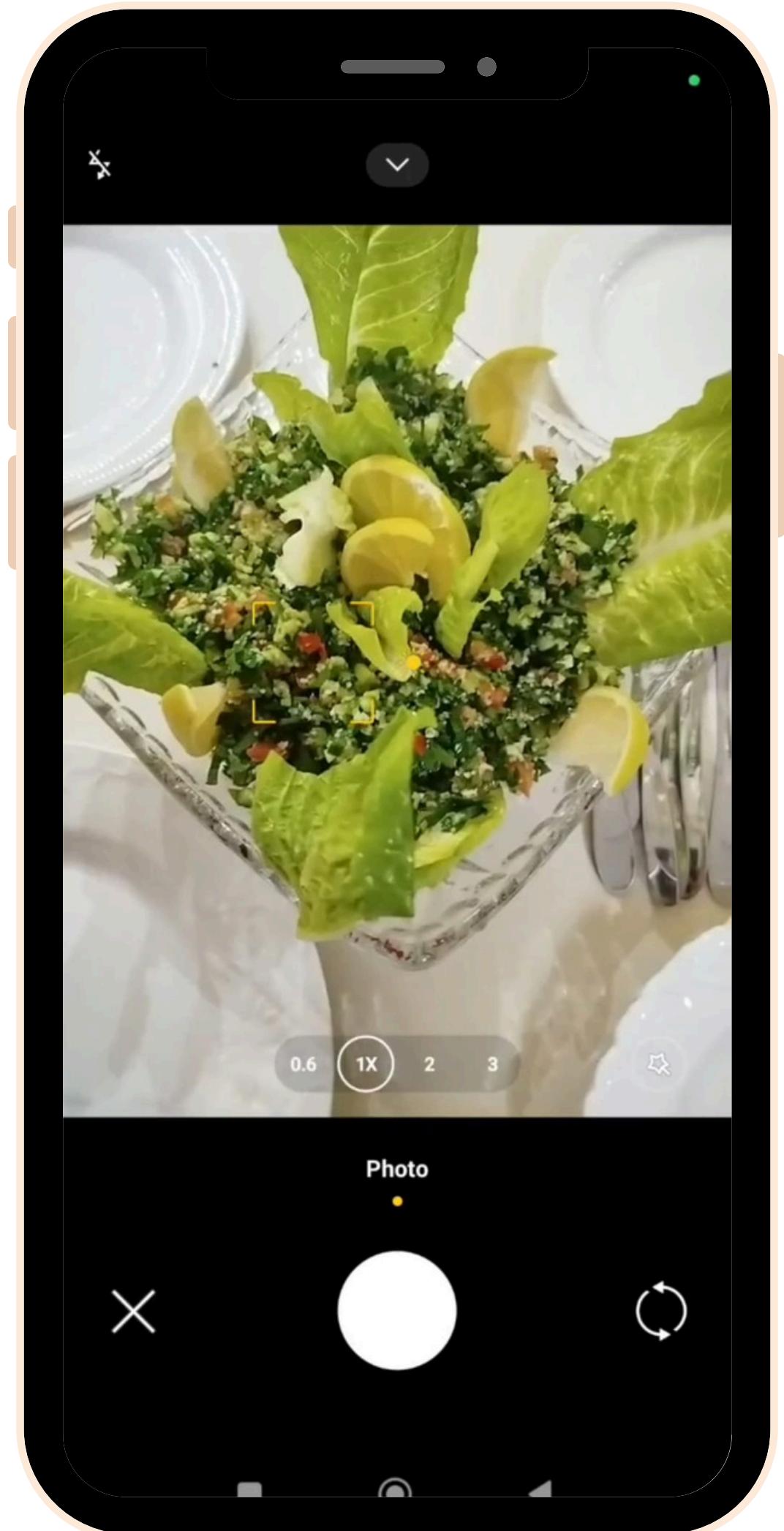
Ensured smooth and consistent user experience

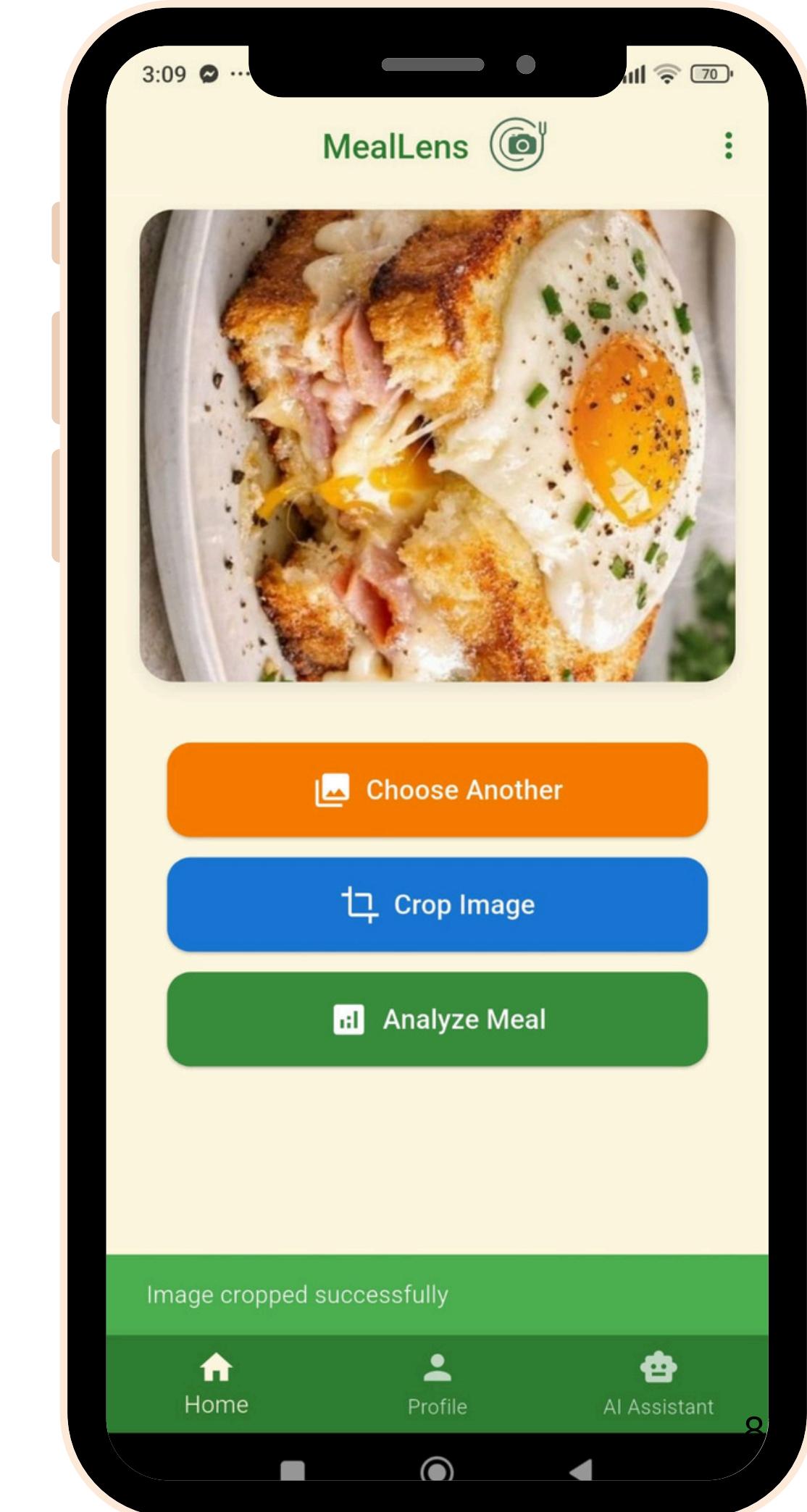
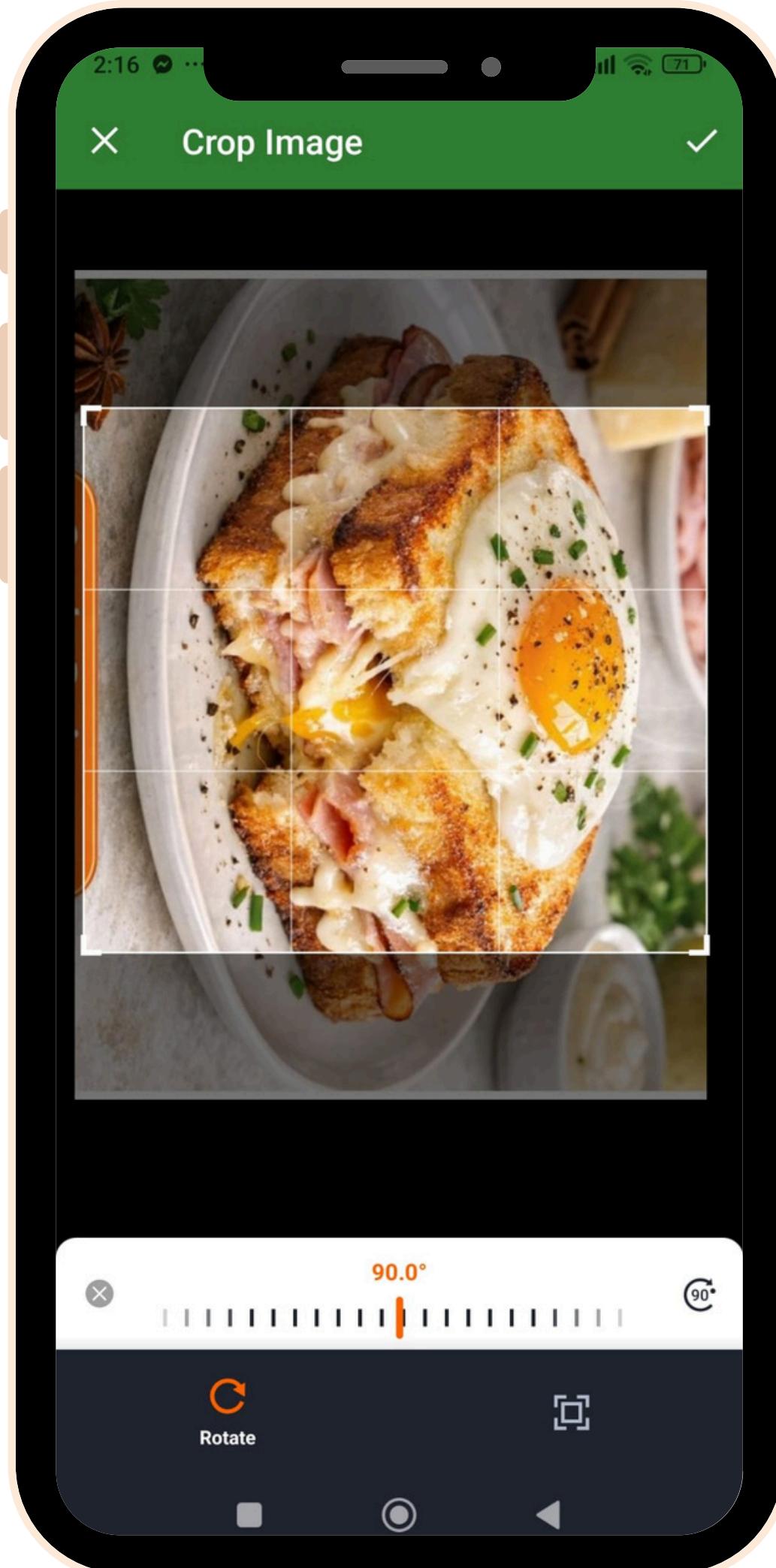
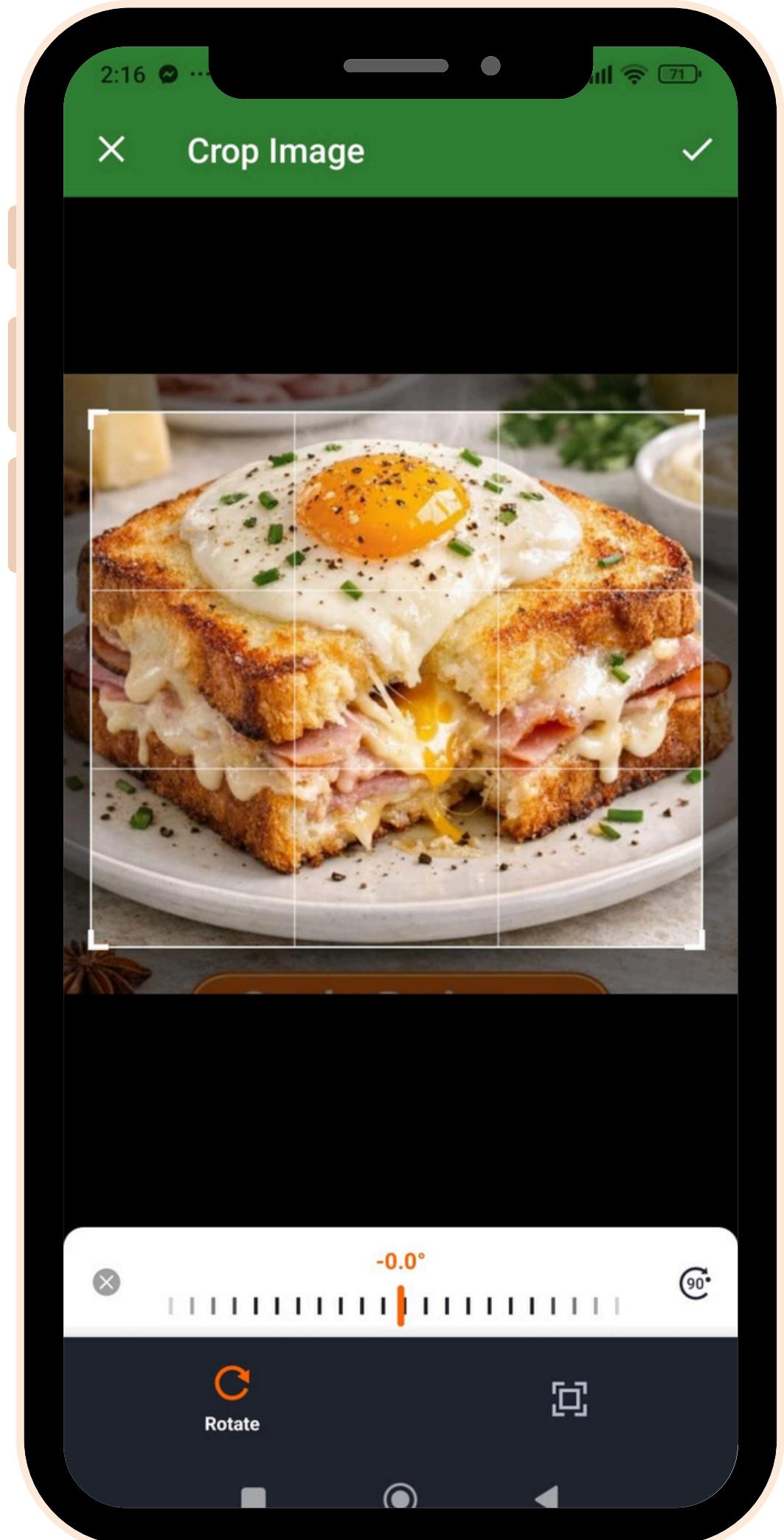


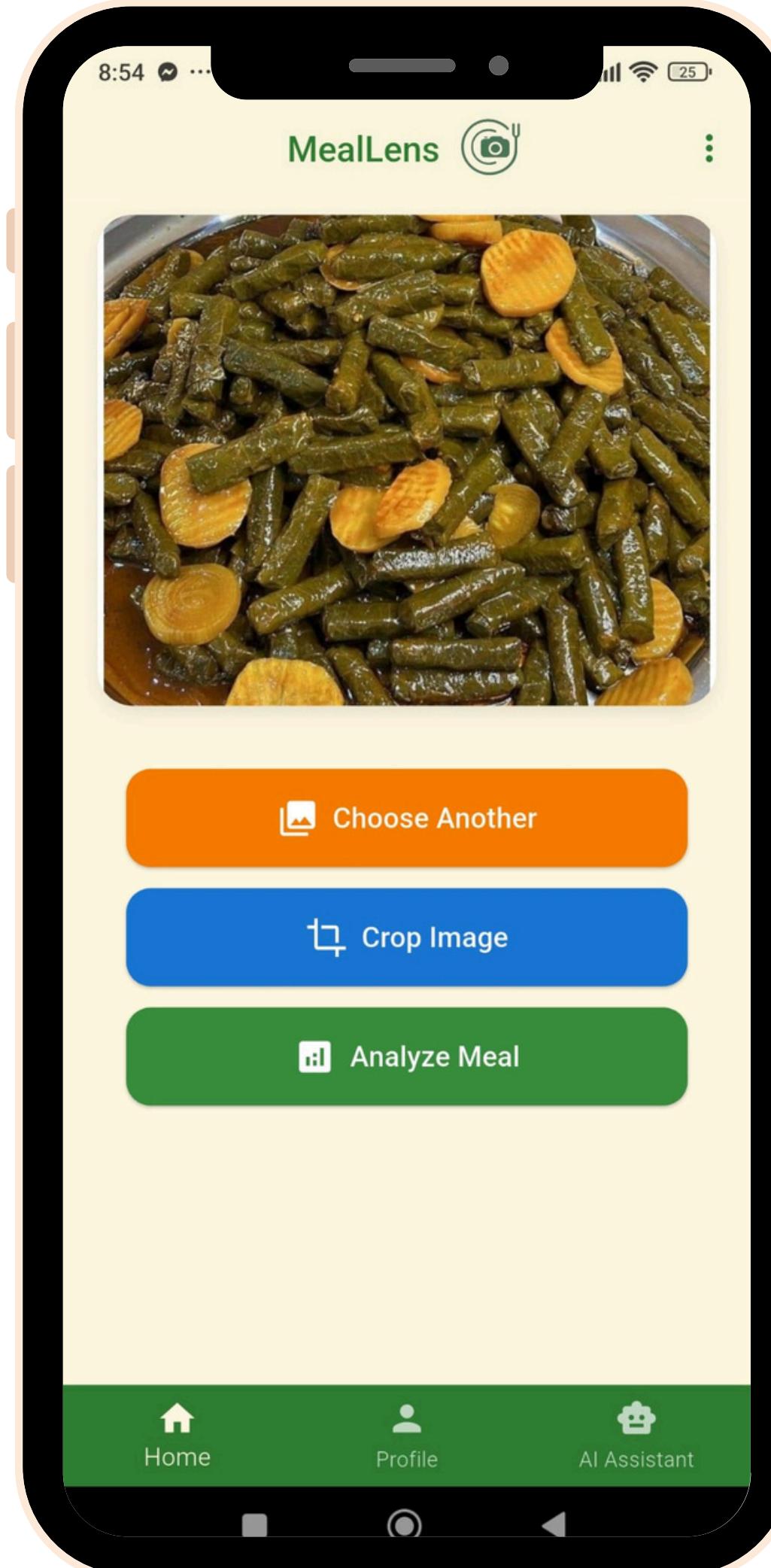












8:55

Warak Enab  
★ N/A  
Stuffed Grape Leaves

120m 8 271 kcal 76/100

Prep Time Servings Calories Health Score

NUTRITION FACTS

Total Calories 271 kcal

Dietary Information:

Arabic Traditional Mediterranean

Gluten Free

DETAILED NUTRITION

Protein 41g

Carbohydrates 149g

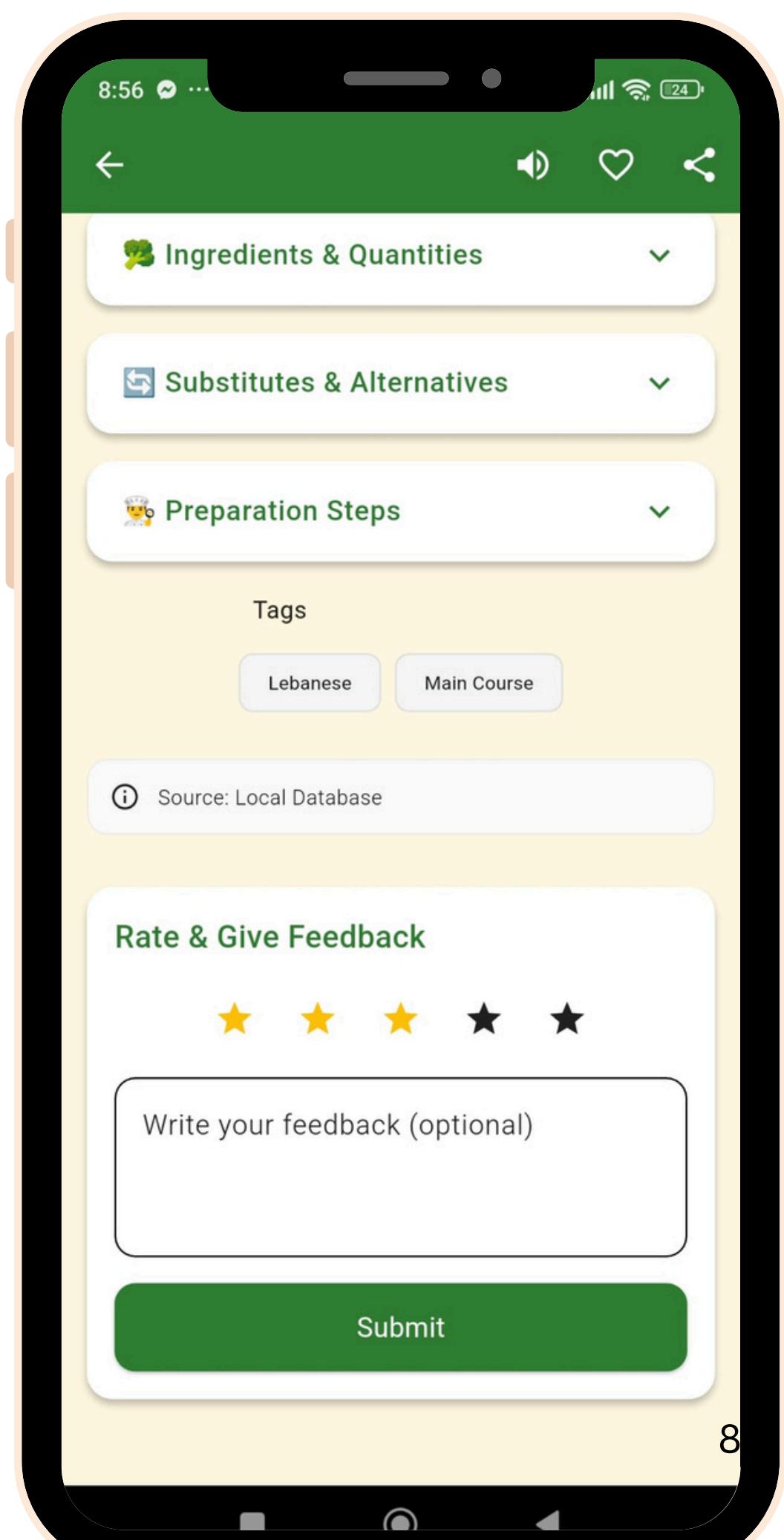
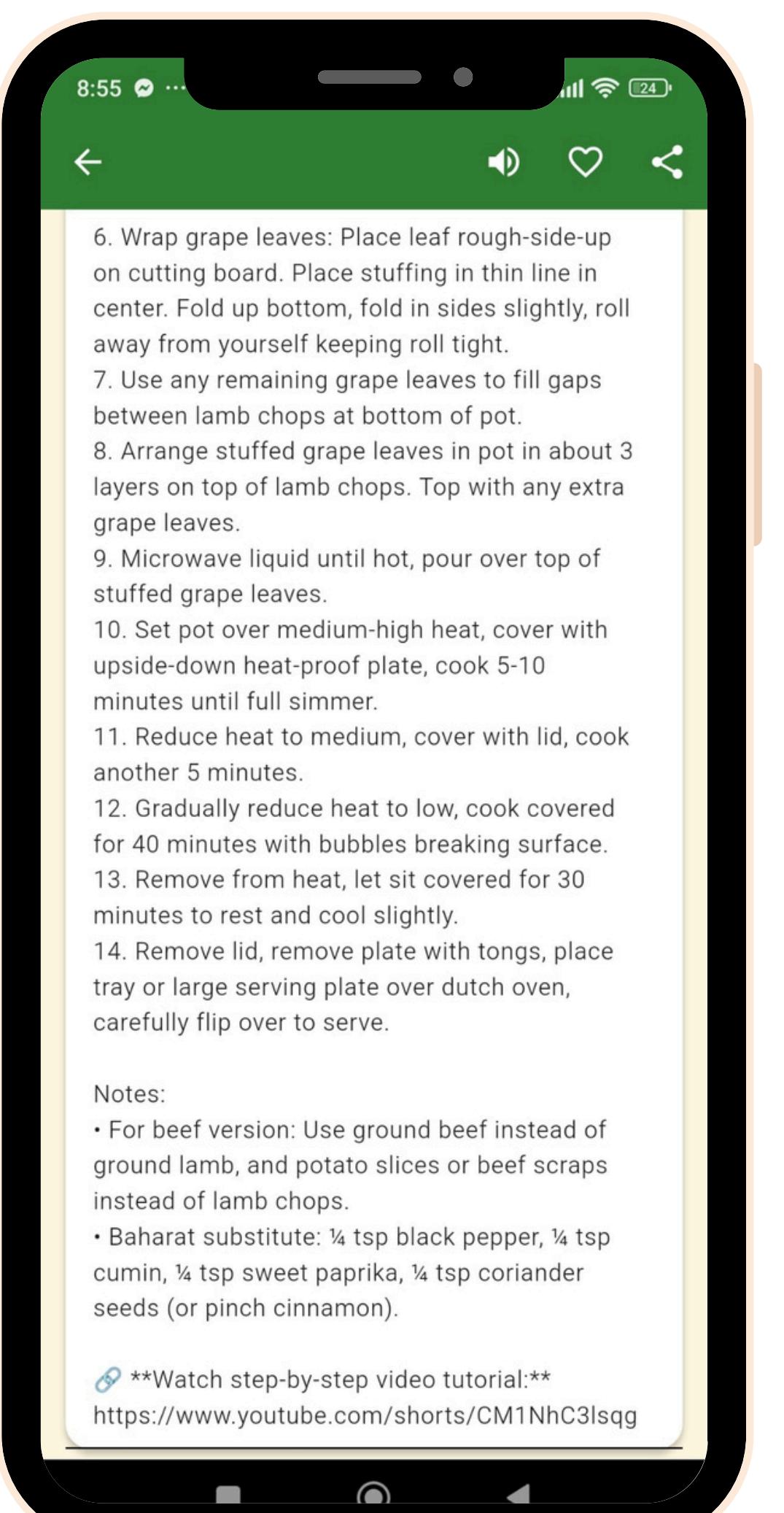
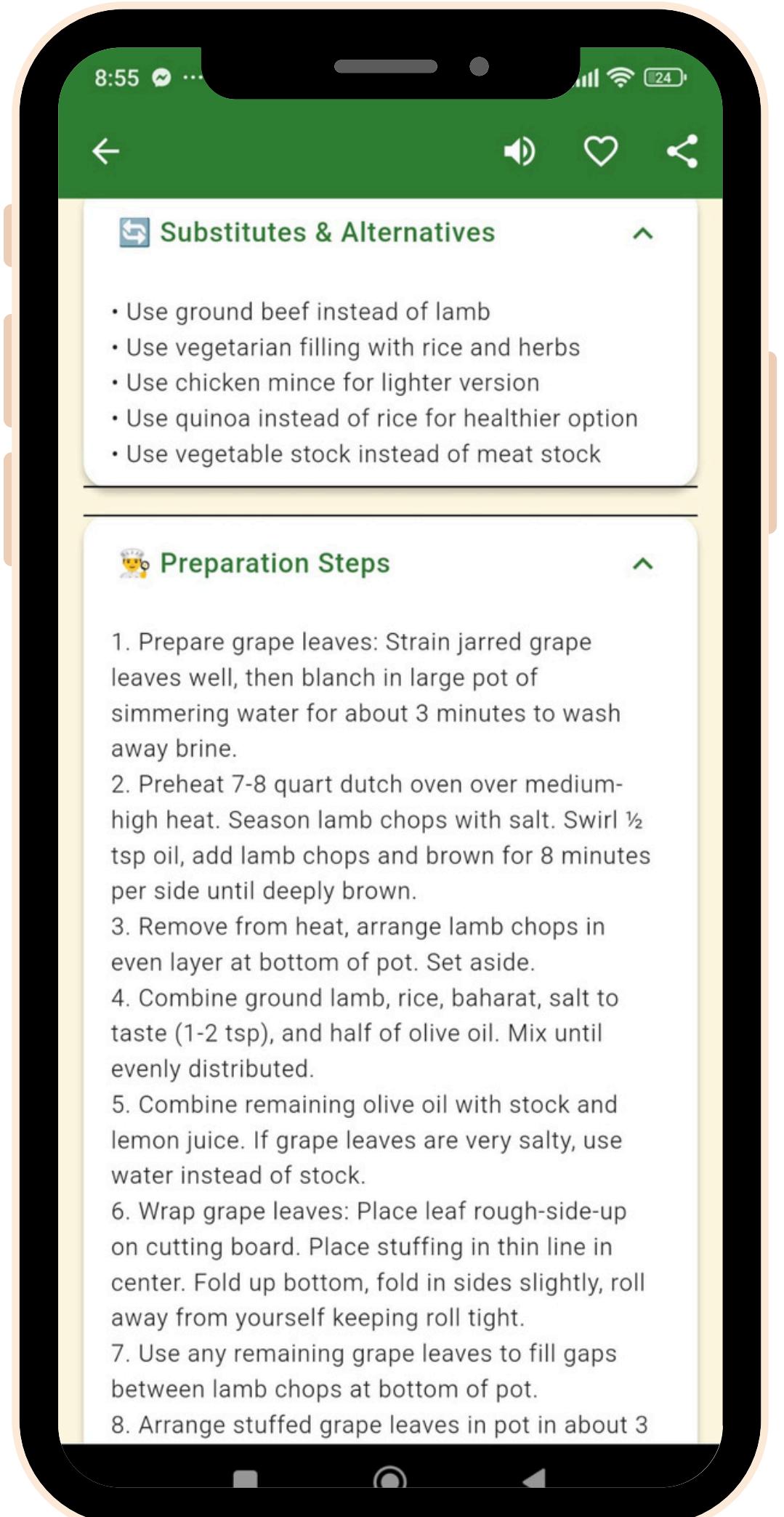
Fat 81g

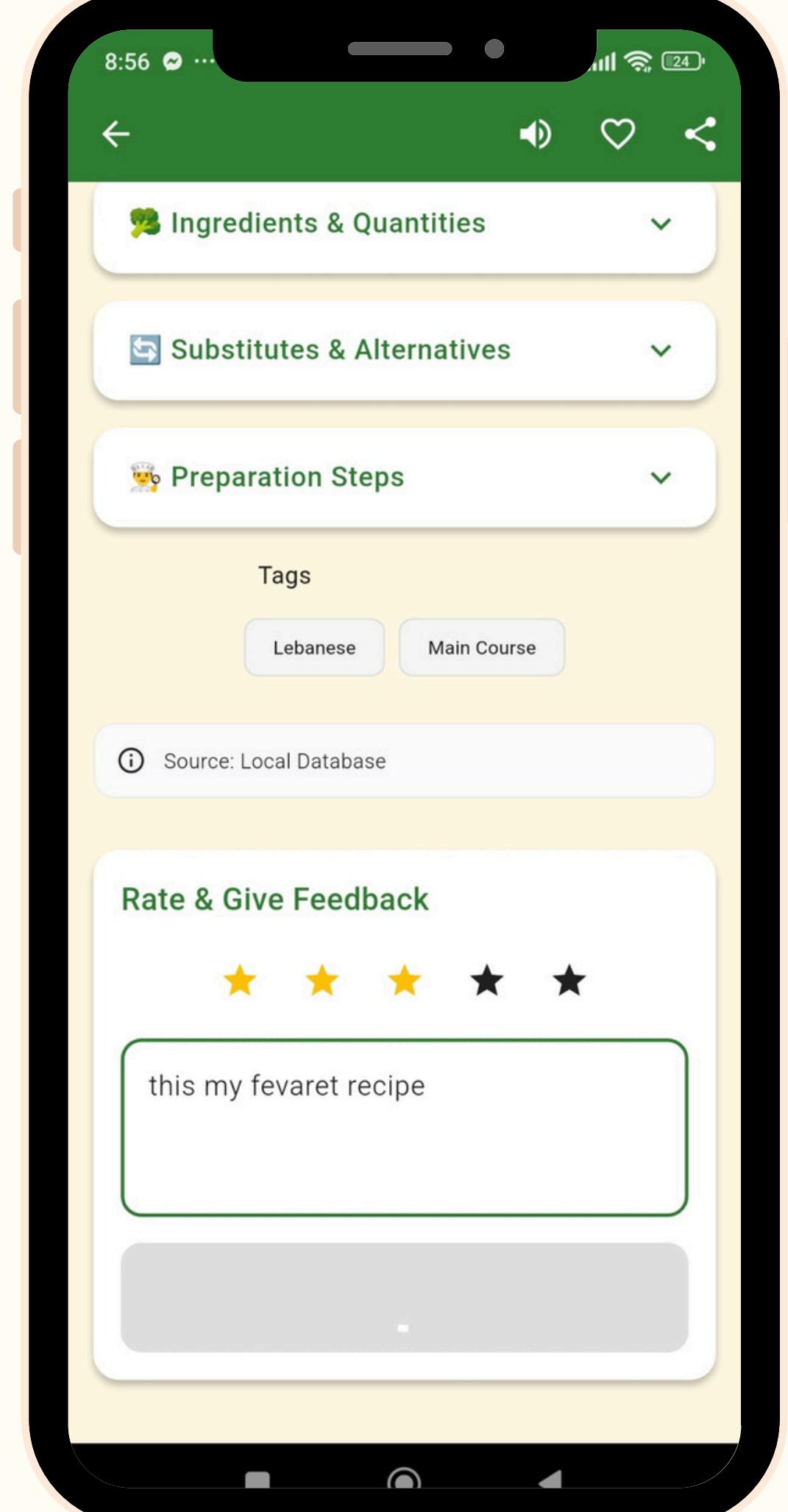
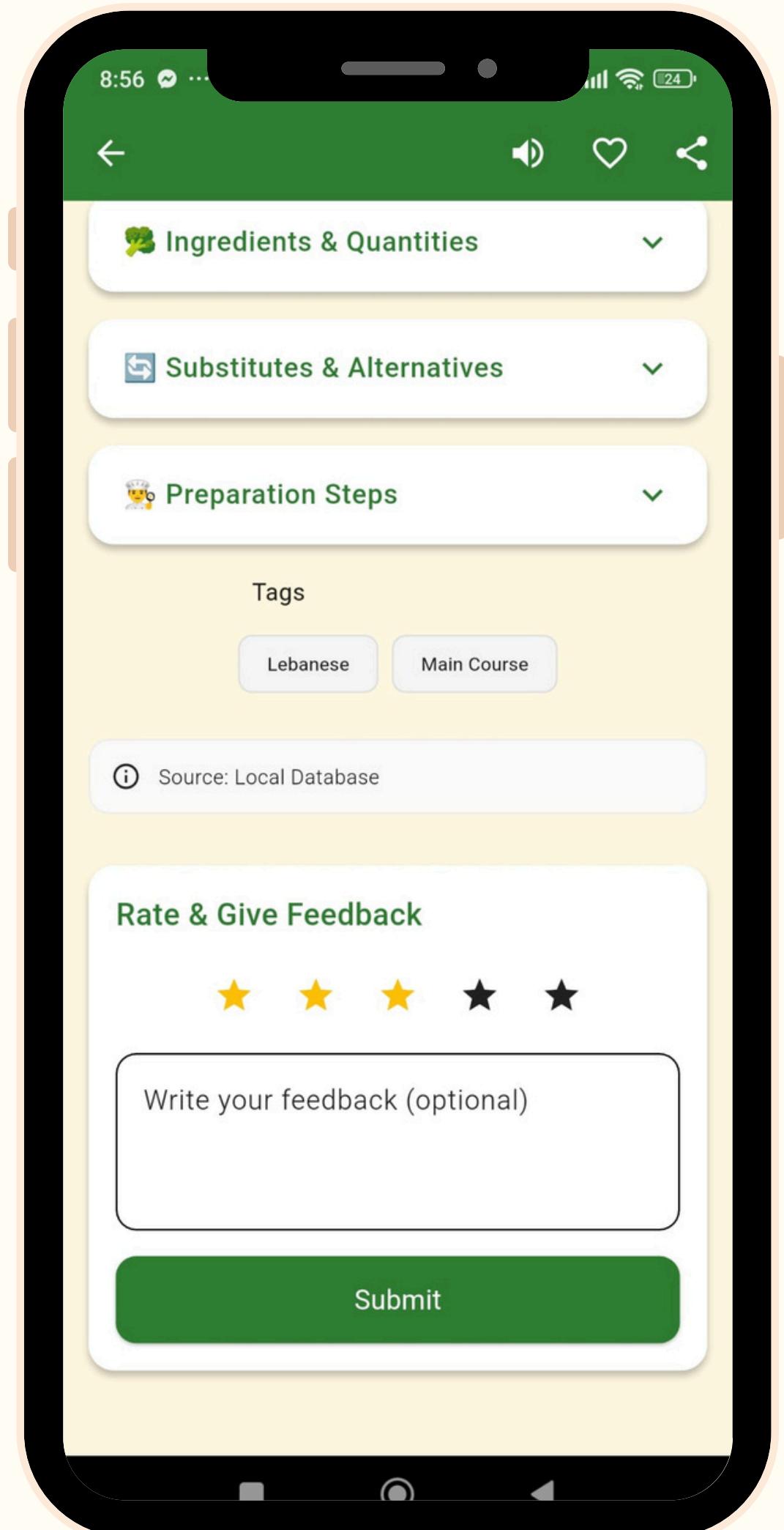
8:55

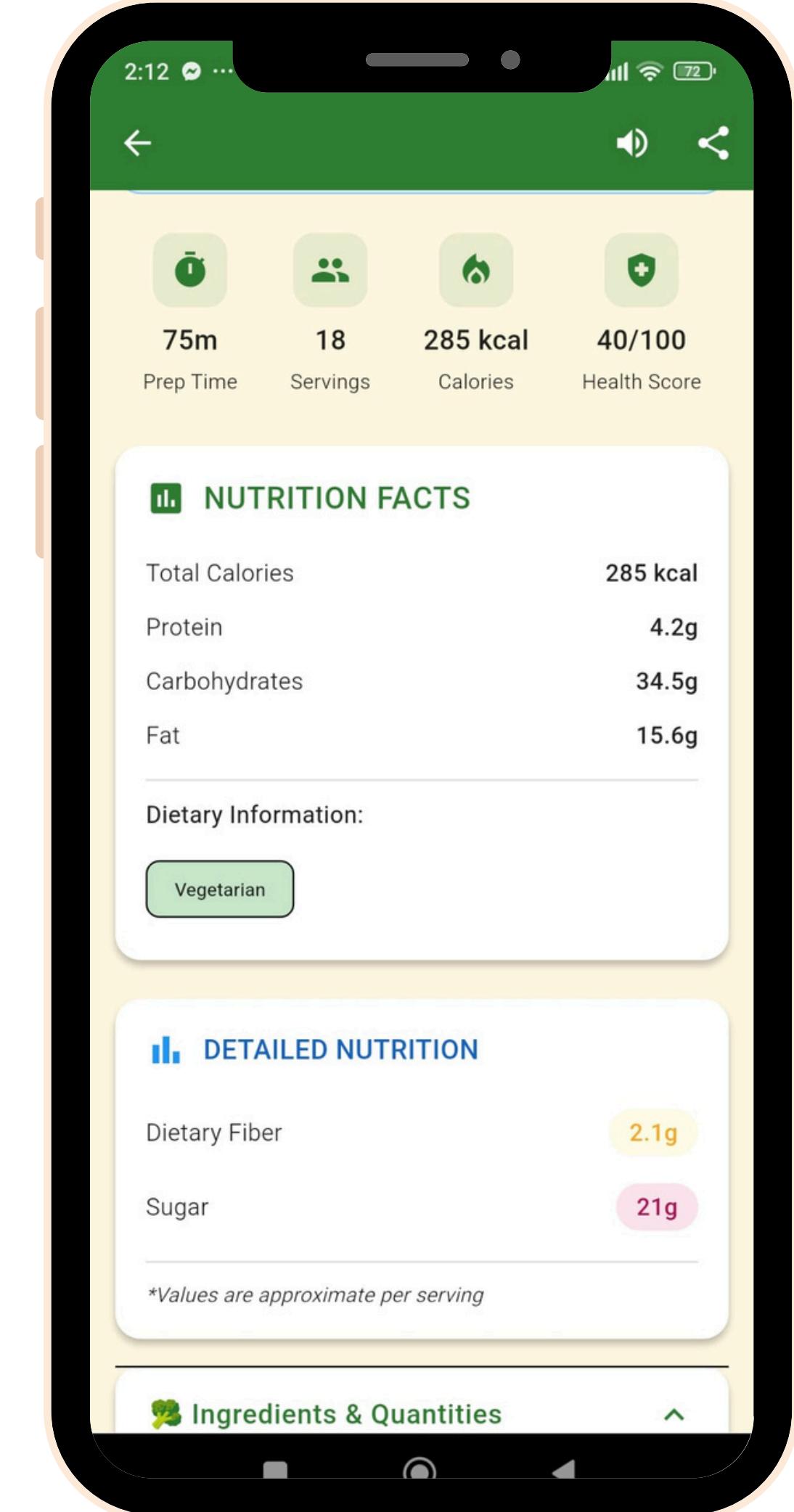
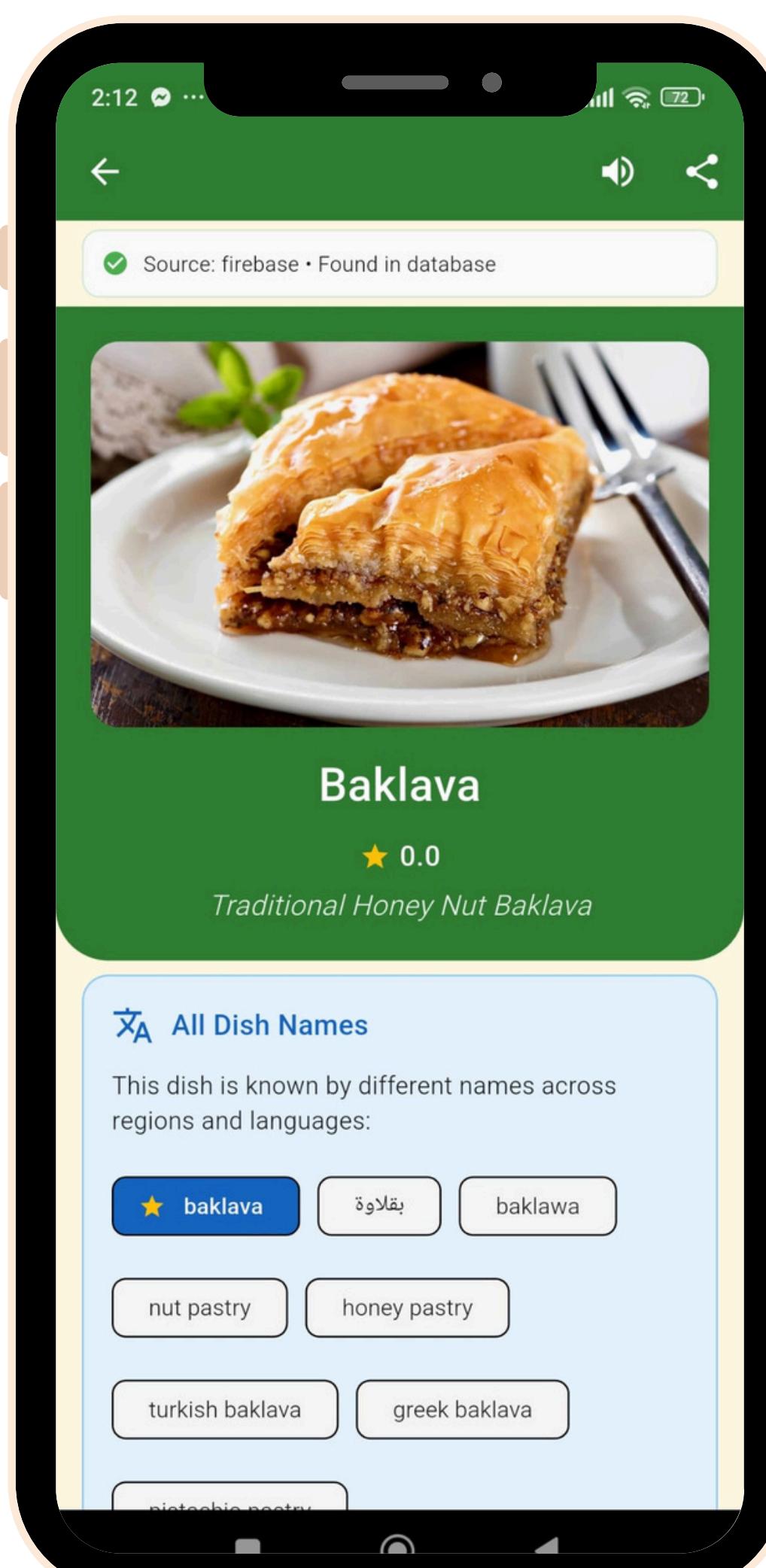
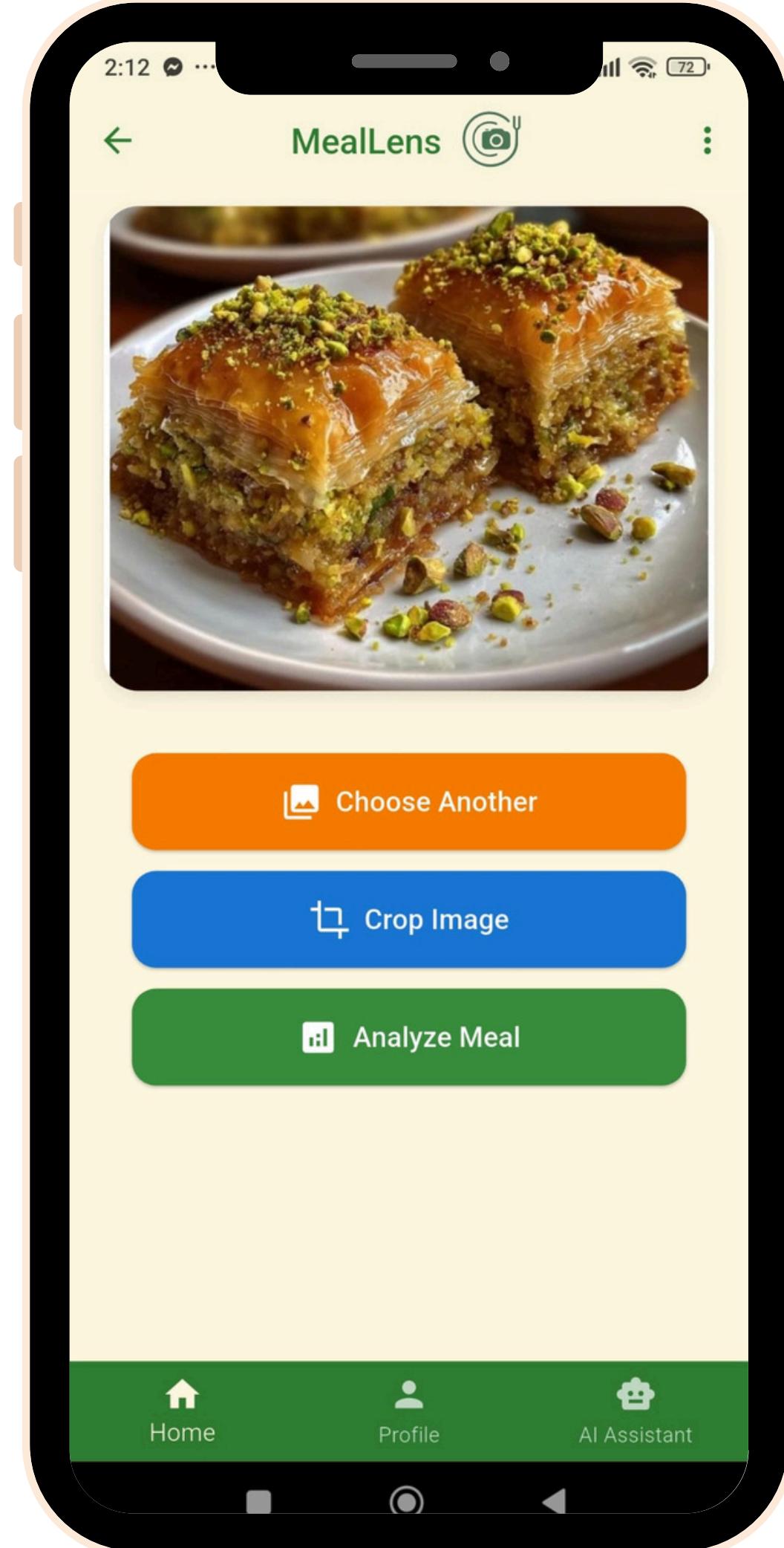
Ingredients & Quantities

- About 125–150 grape leaves, jarred or vacuum sealed (about 600g after draining)
- ½ tsp neutral oil
- 7 to 10 small lamb chops (450-650g)
- Salt to taste
- 2 pounds ground lamb (905g)
- 1 ½ cups uncooked medium grain rice, rinsed (300g)
- 2 teaspoons Lebanese baharat (3g)
- 6 tablespoons extra virgin olive oil (80g), divided in half
- 2 cups stock or water (480g)
- ⅔ cup lemon juice (160g)
- Optional: ground beef instead of lamb
- Optional: potato slices or beef scraps instead of lamb chops

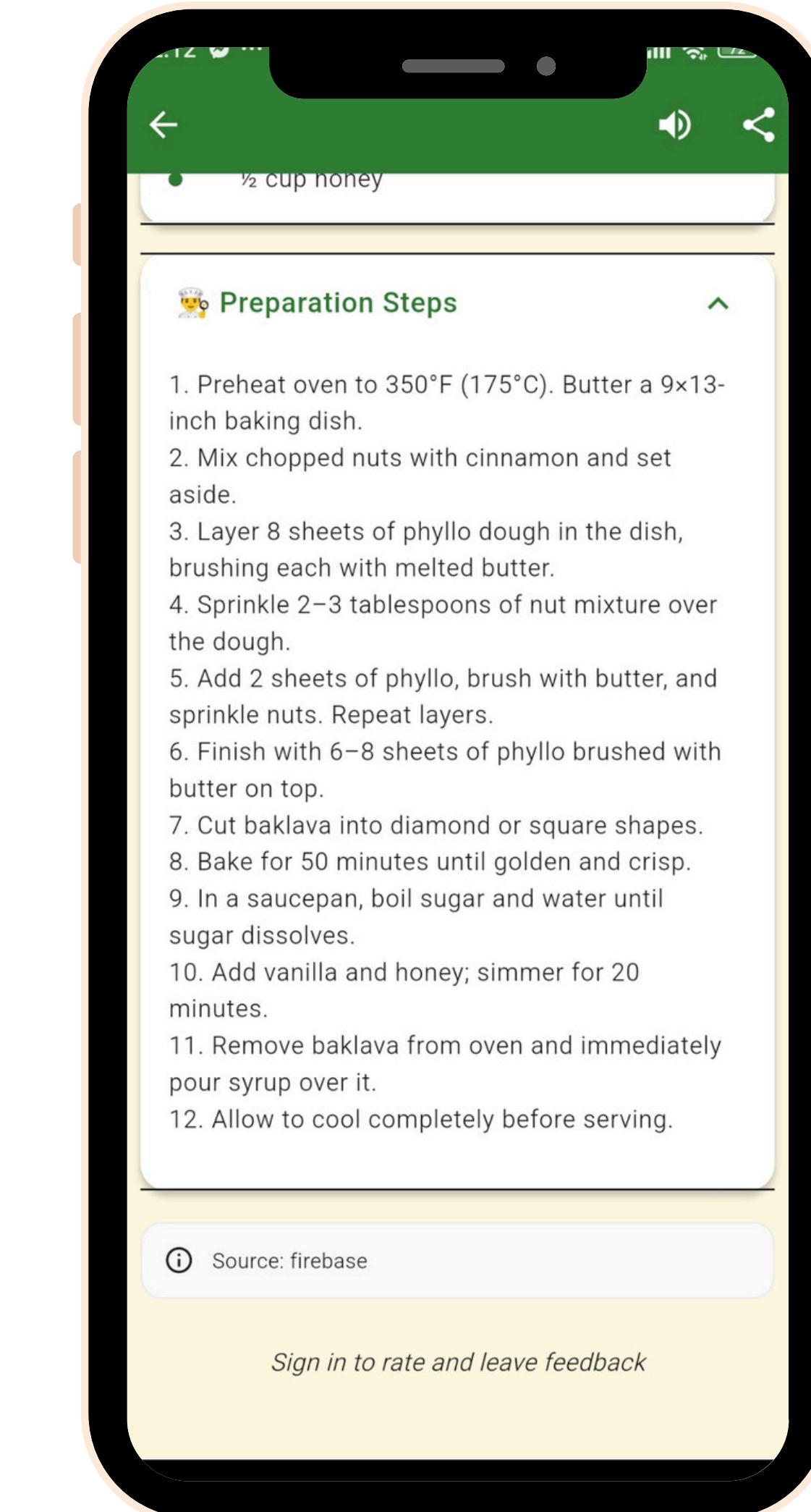
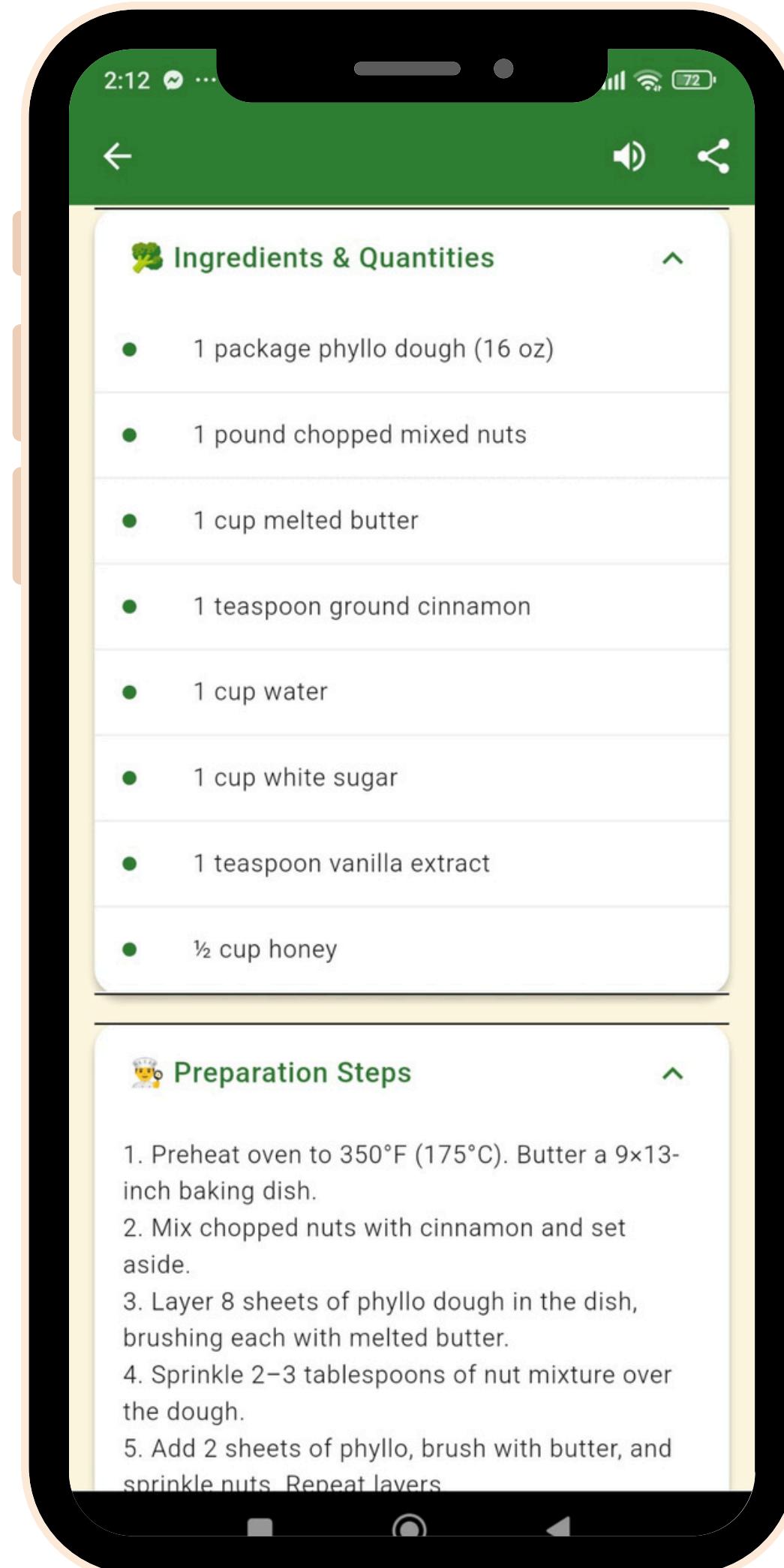
Substitutes & Alternatives

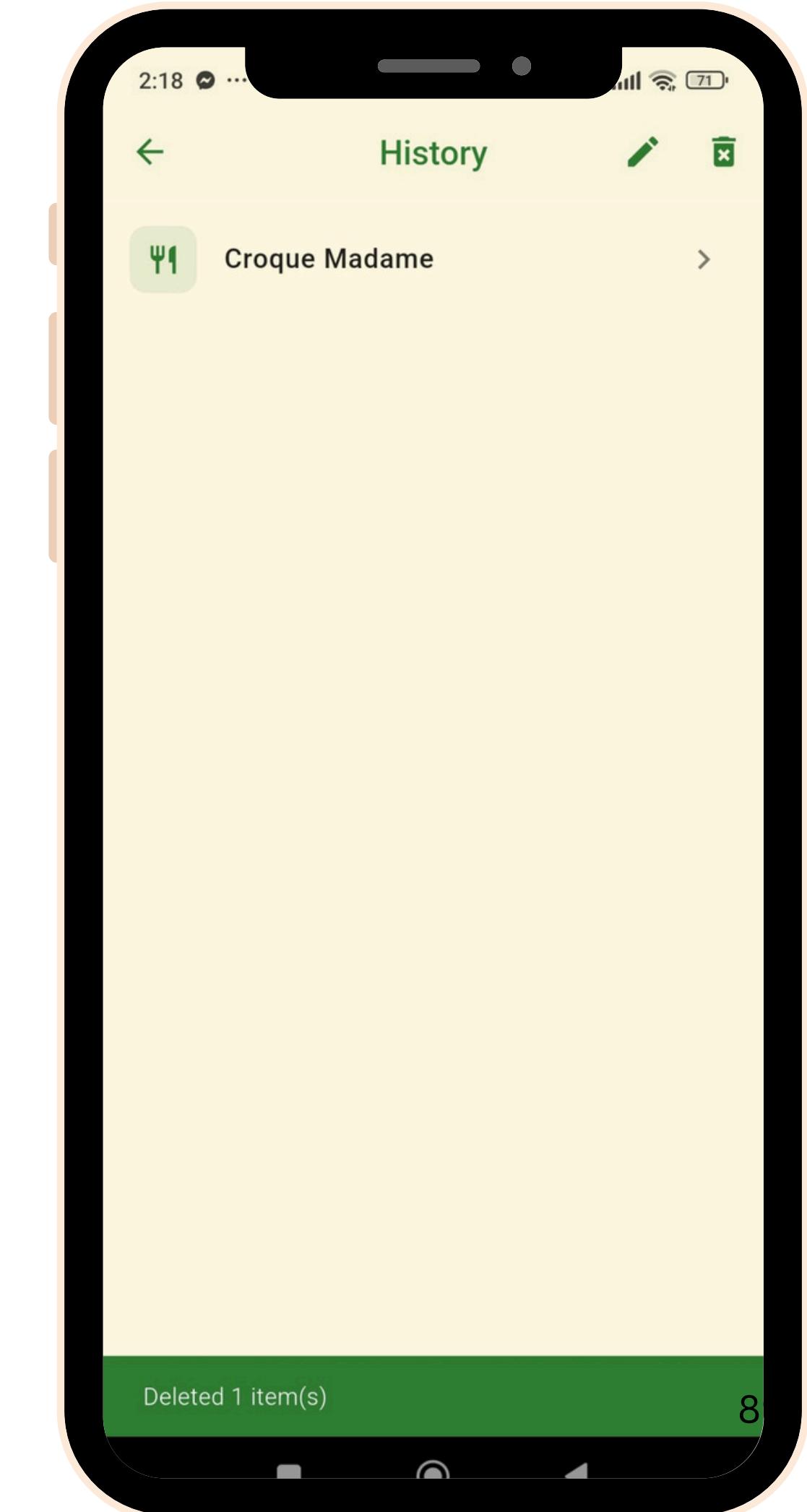
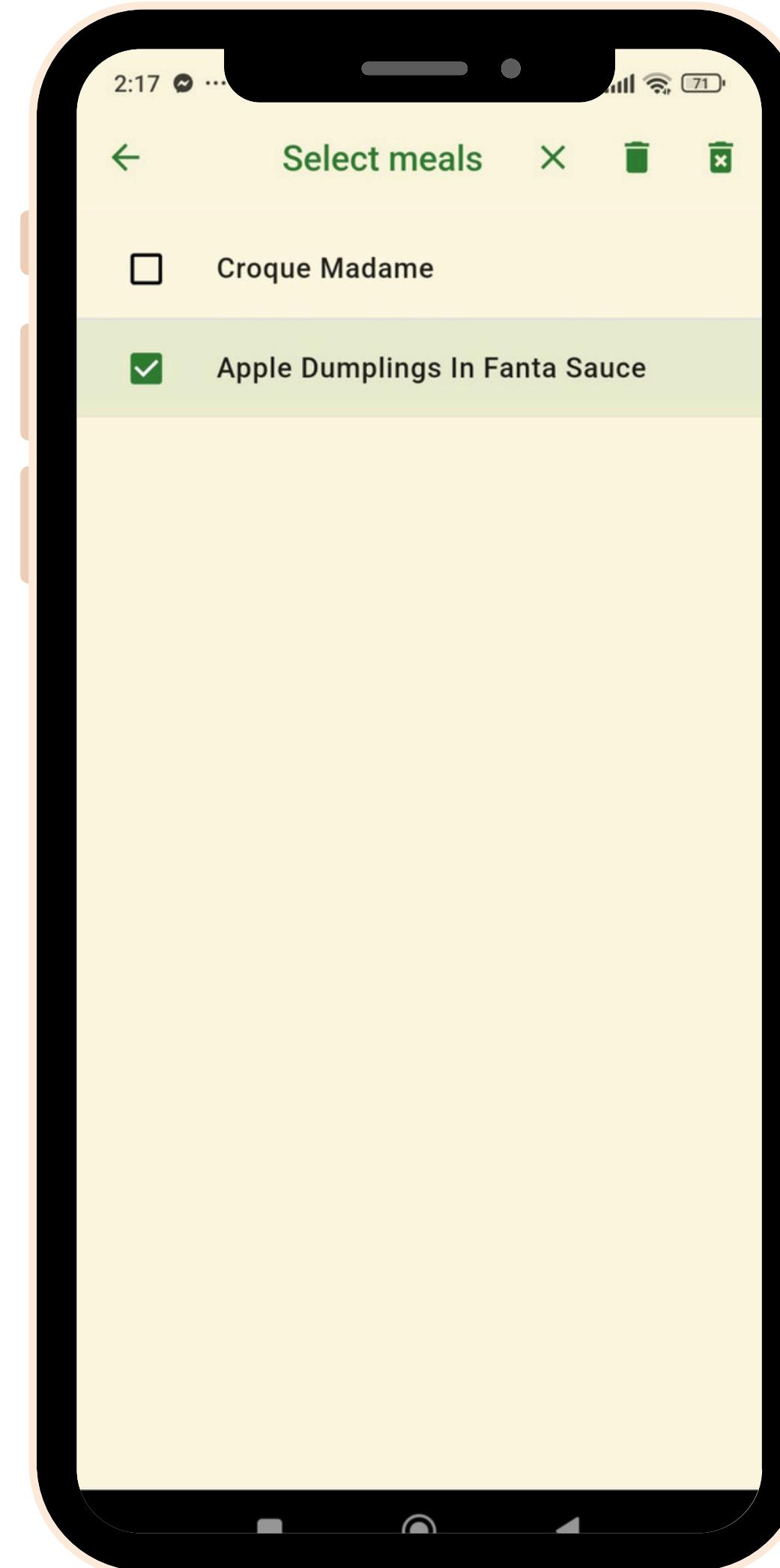
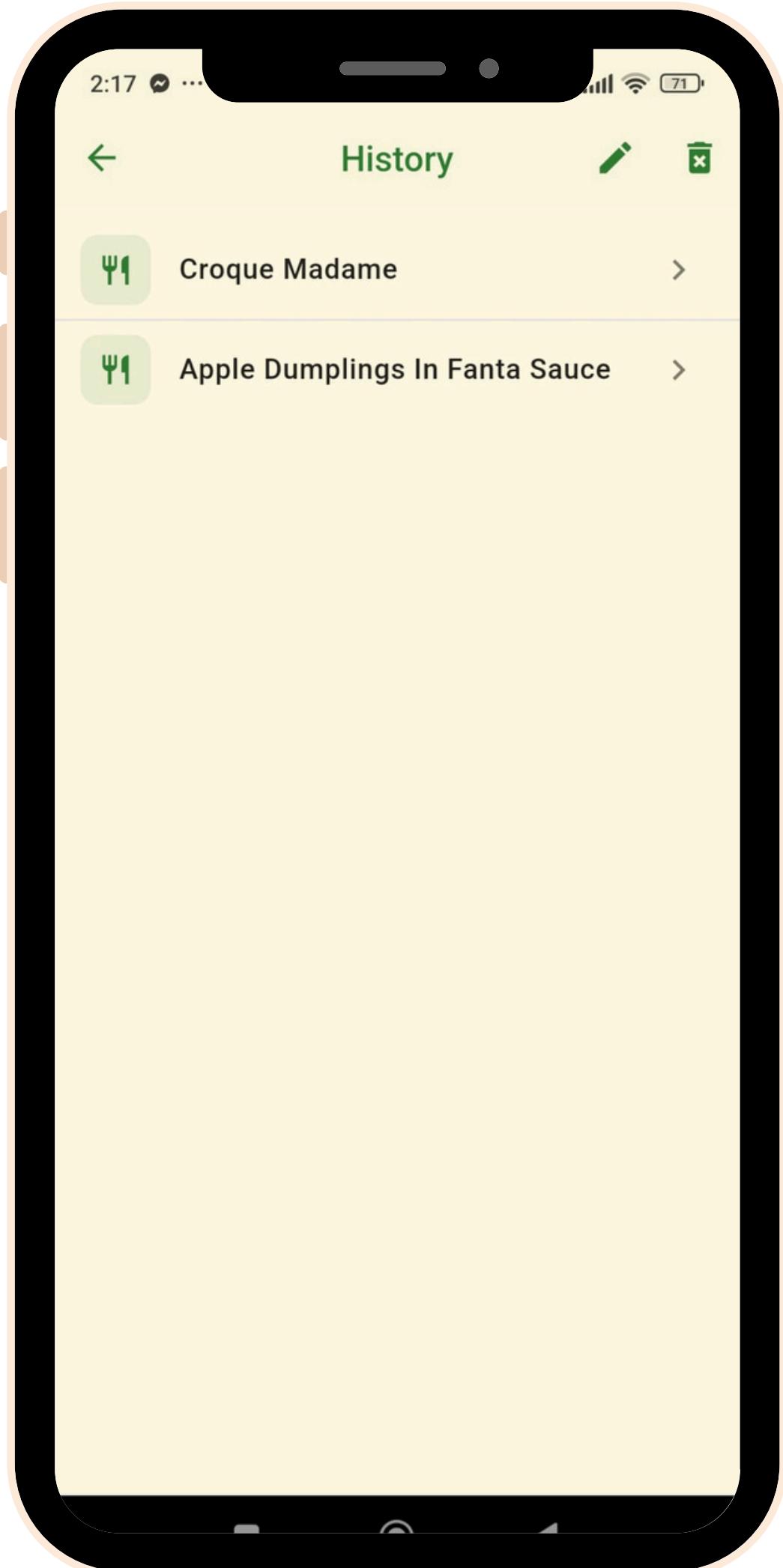


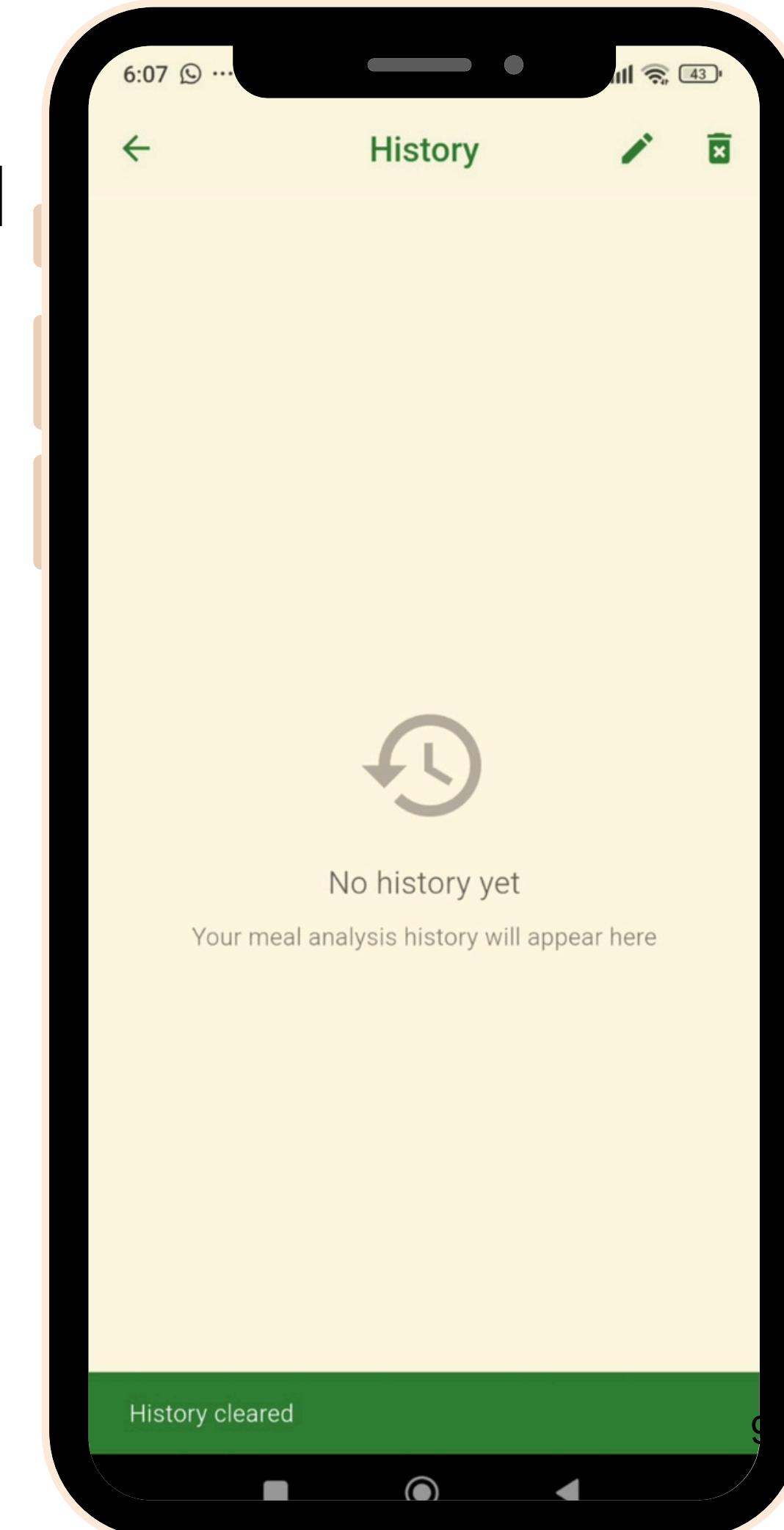
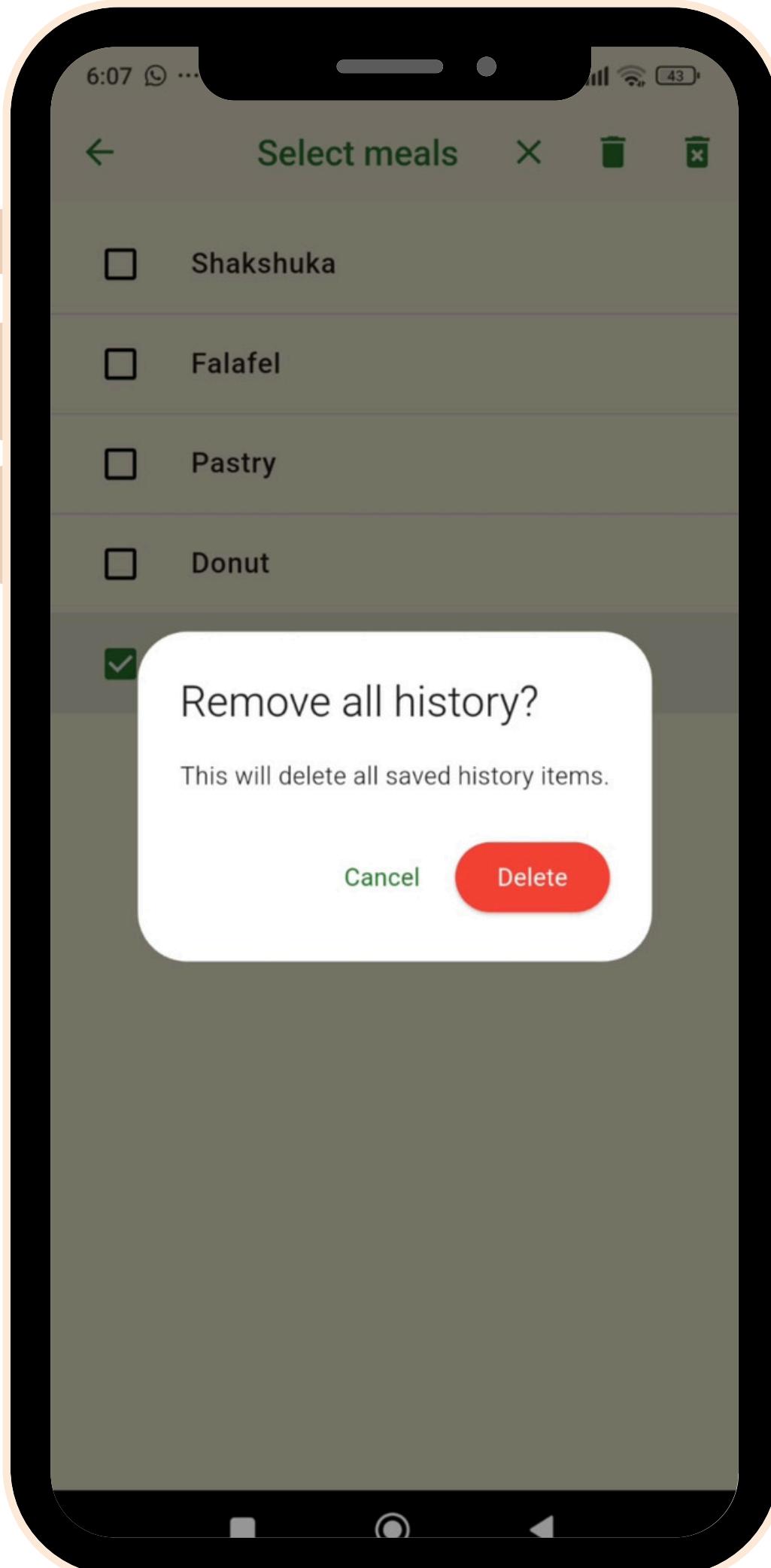
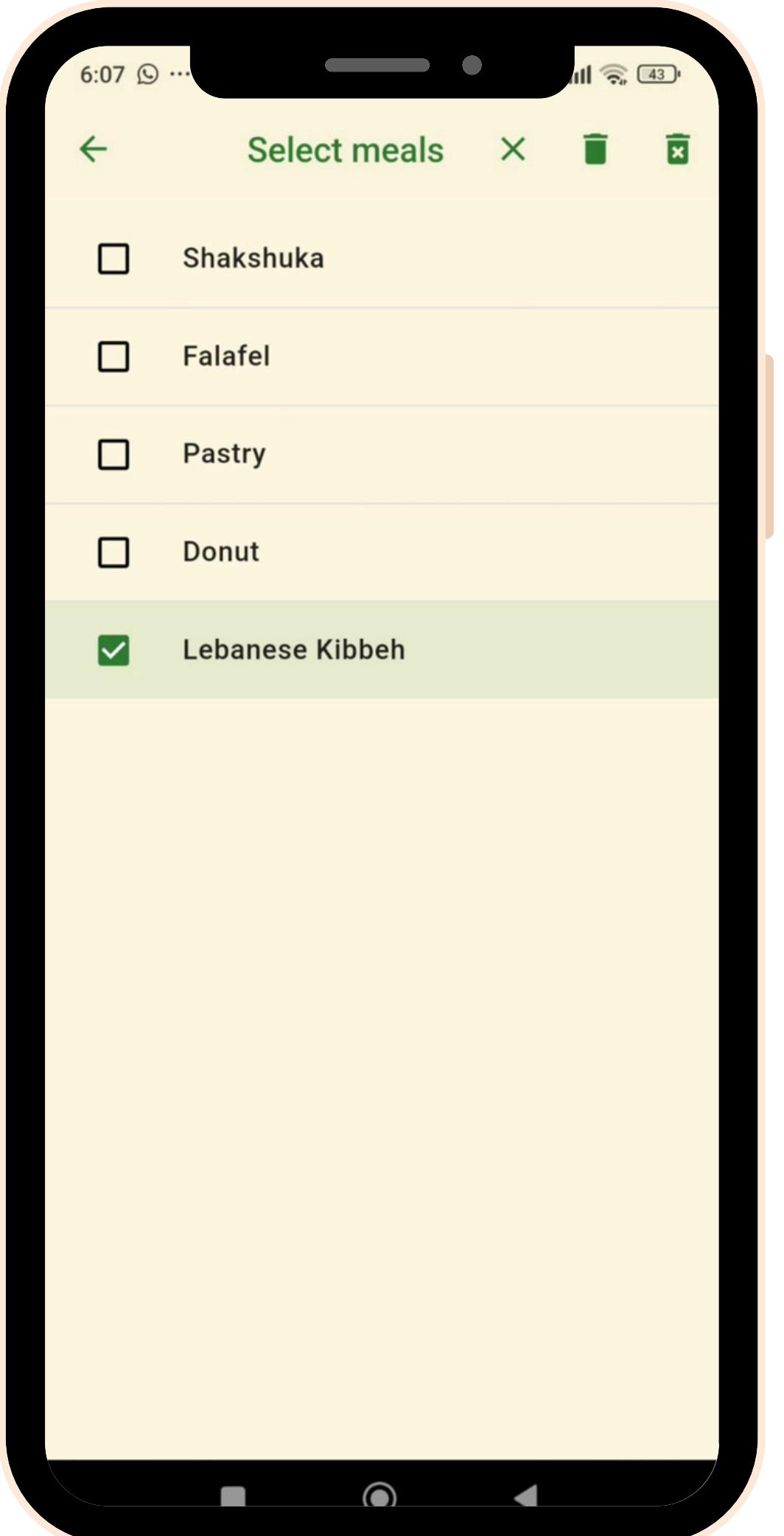


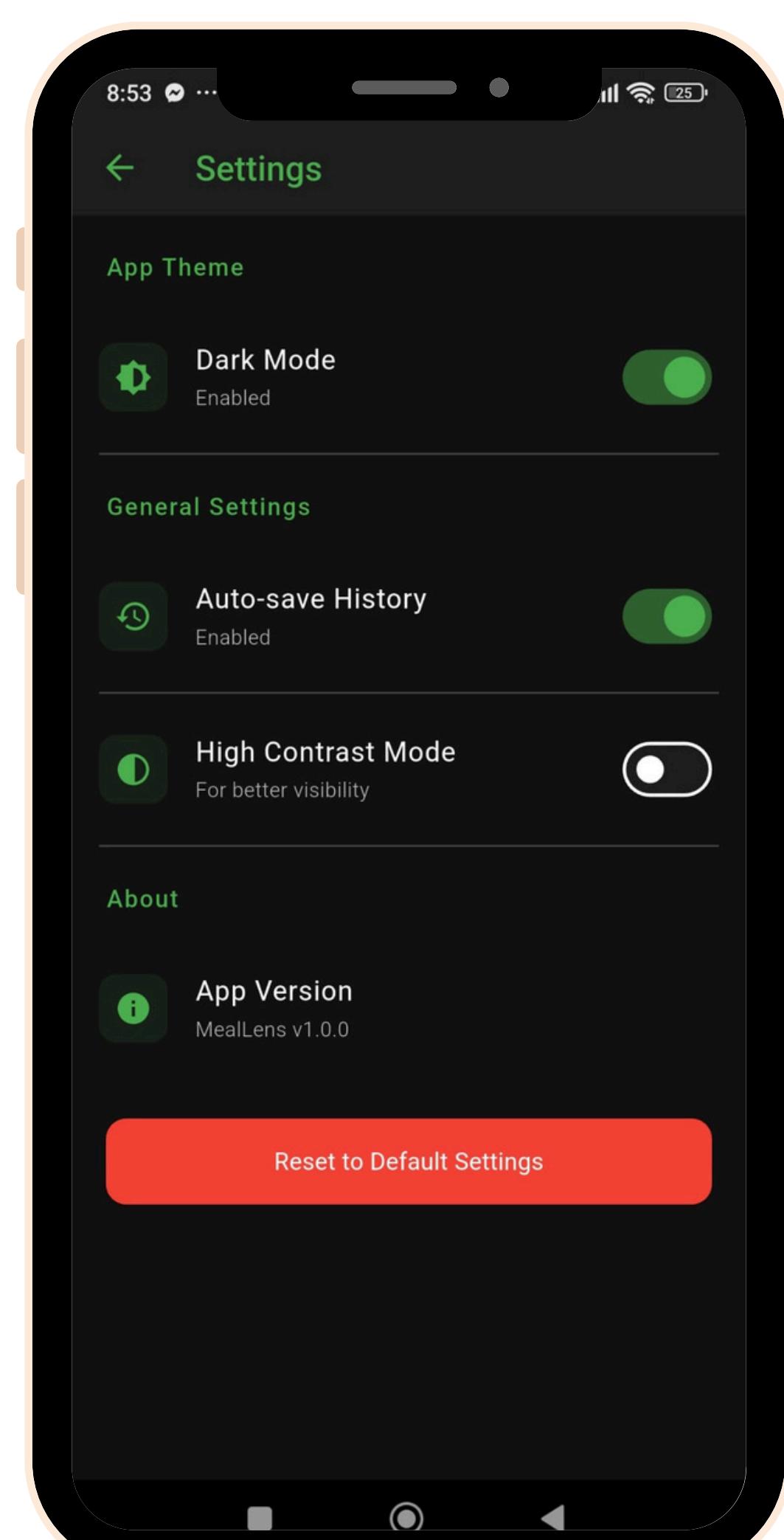
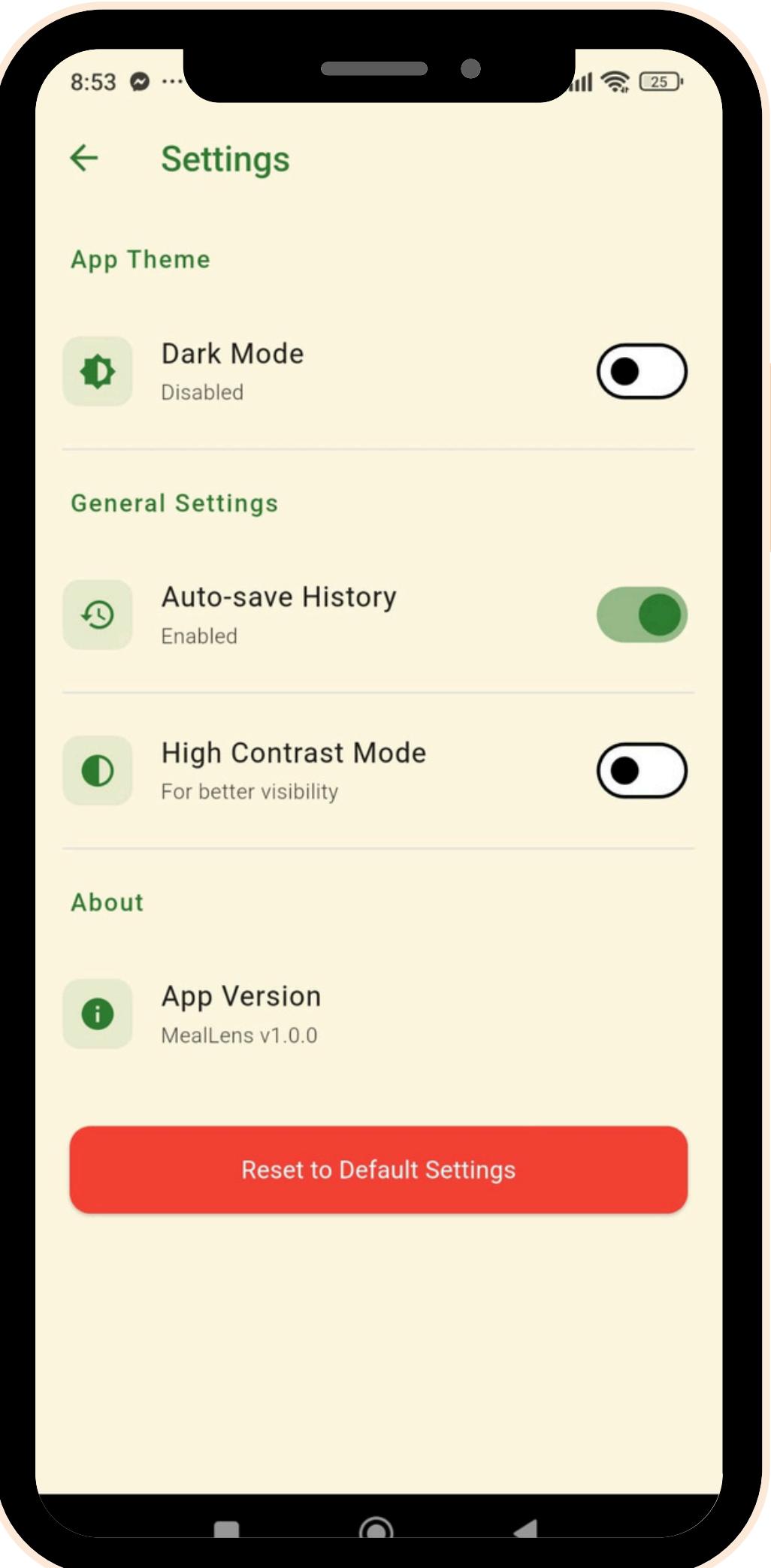
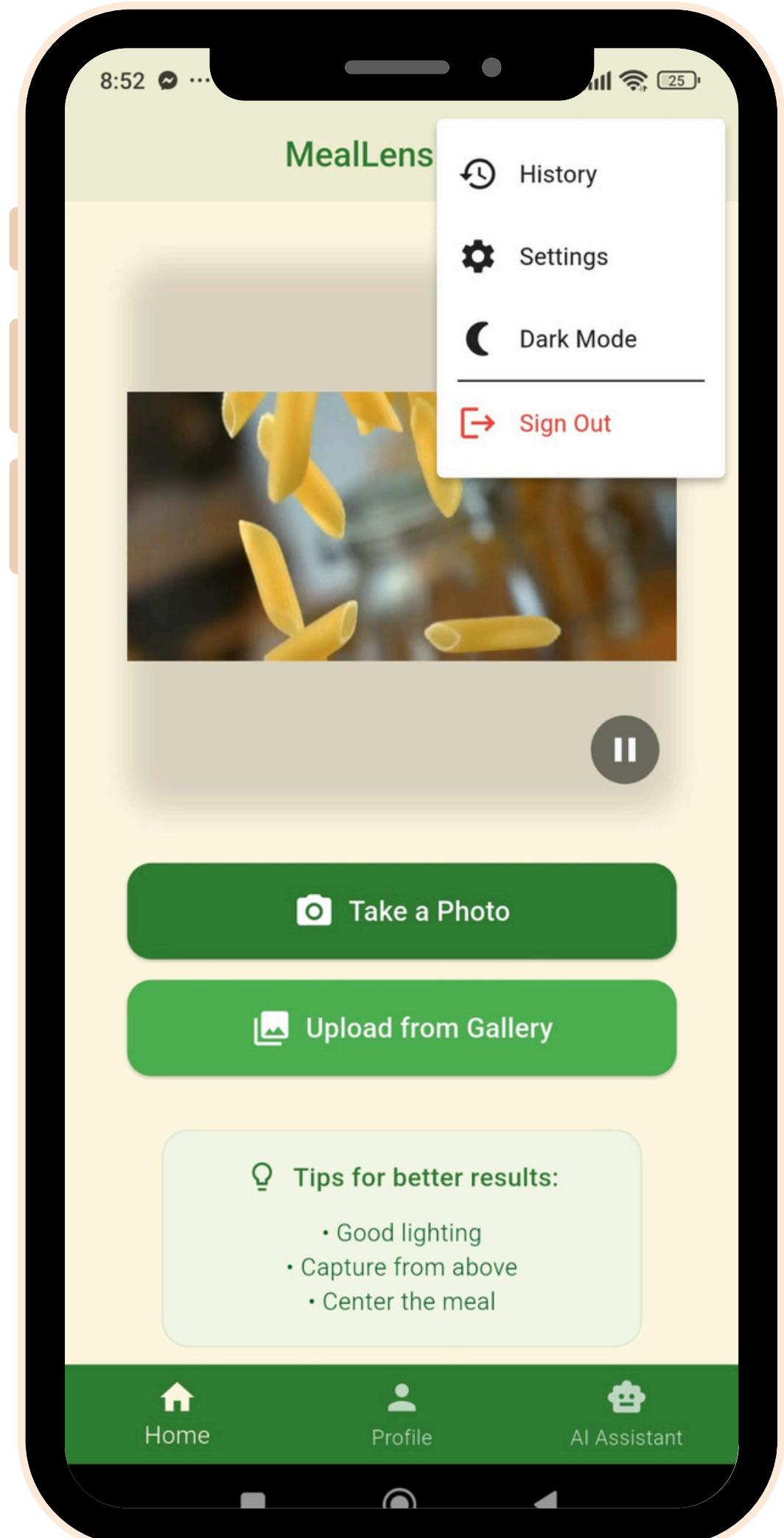


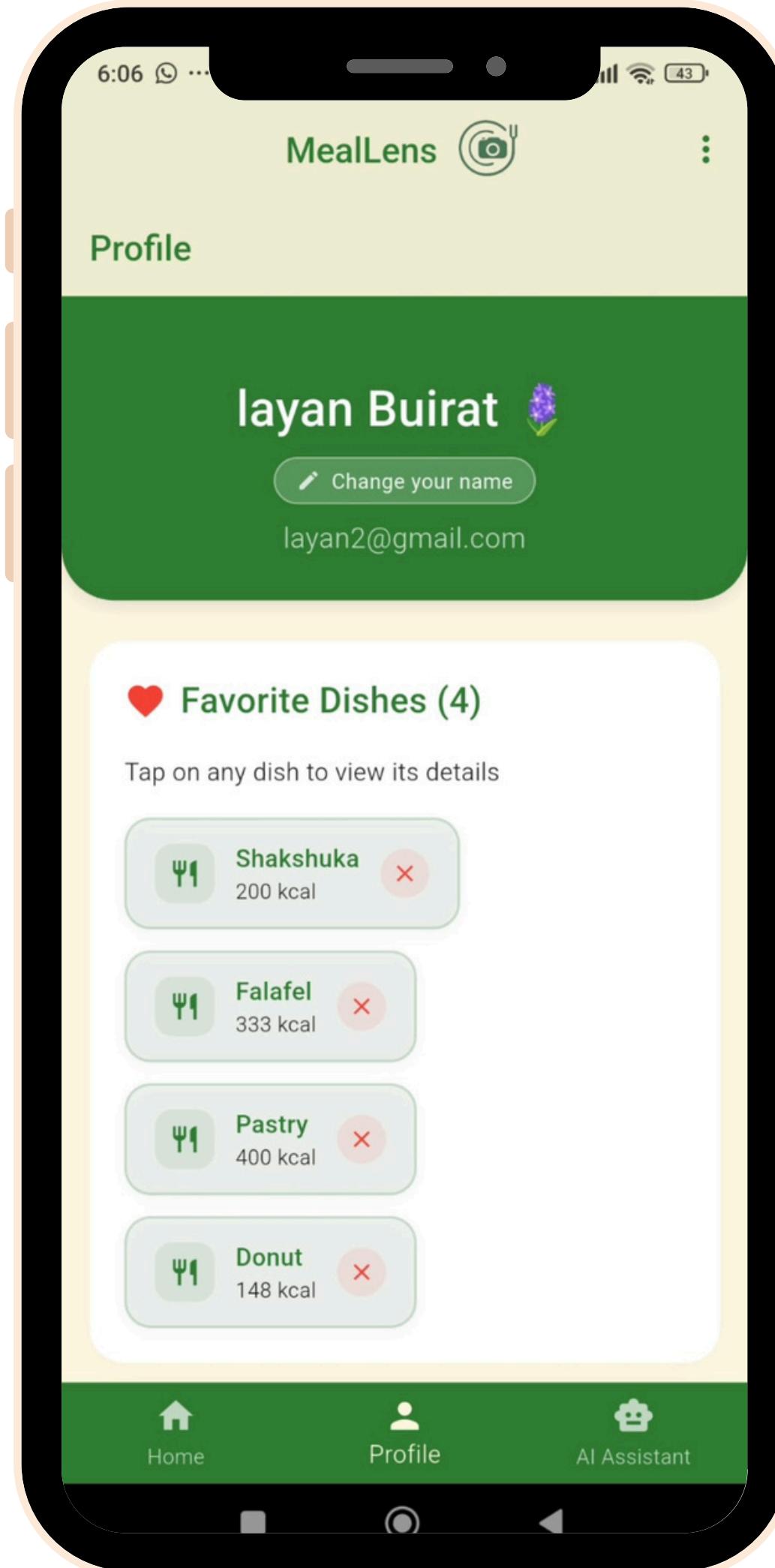
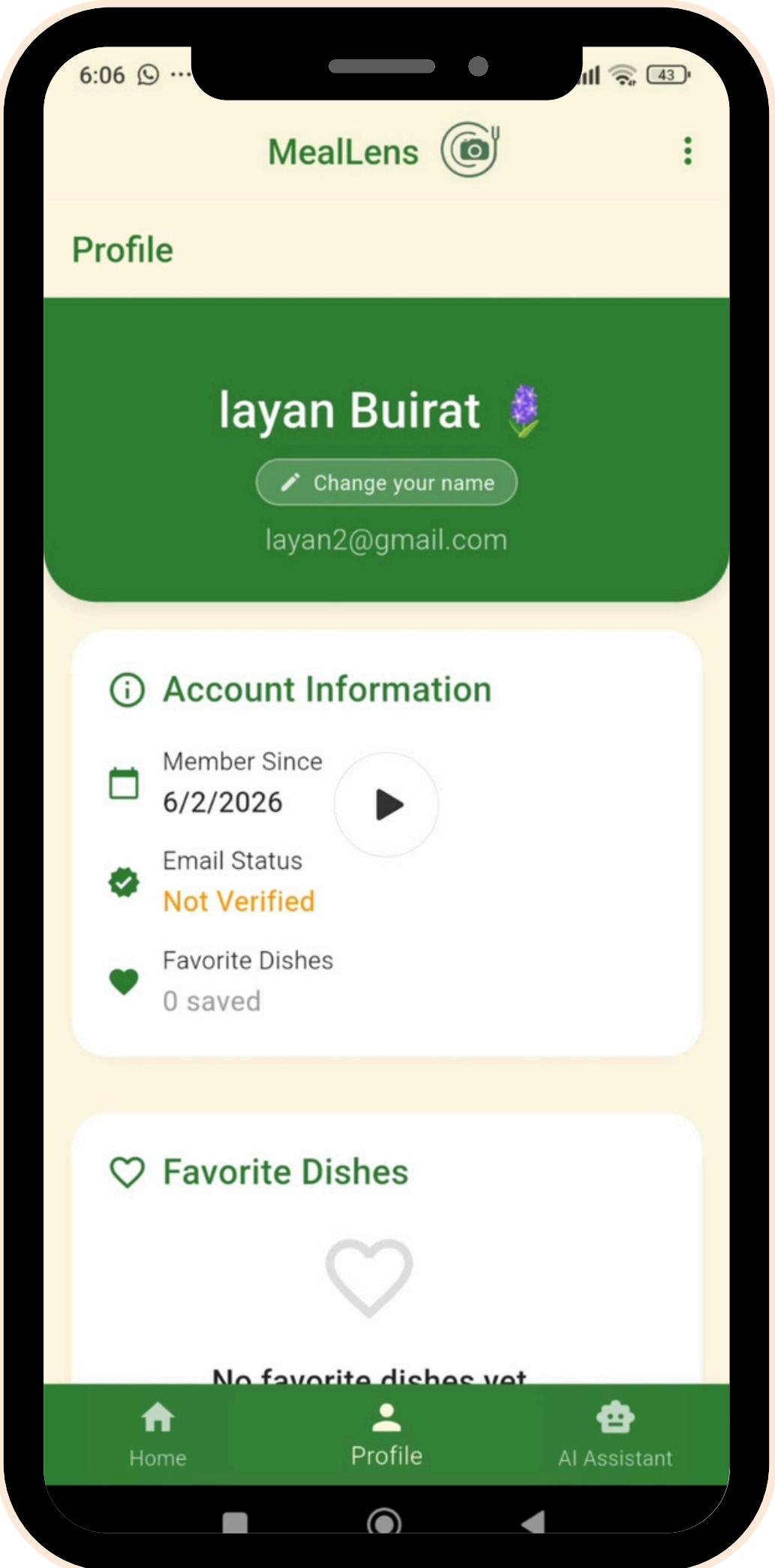
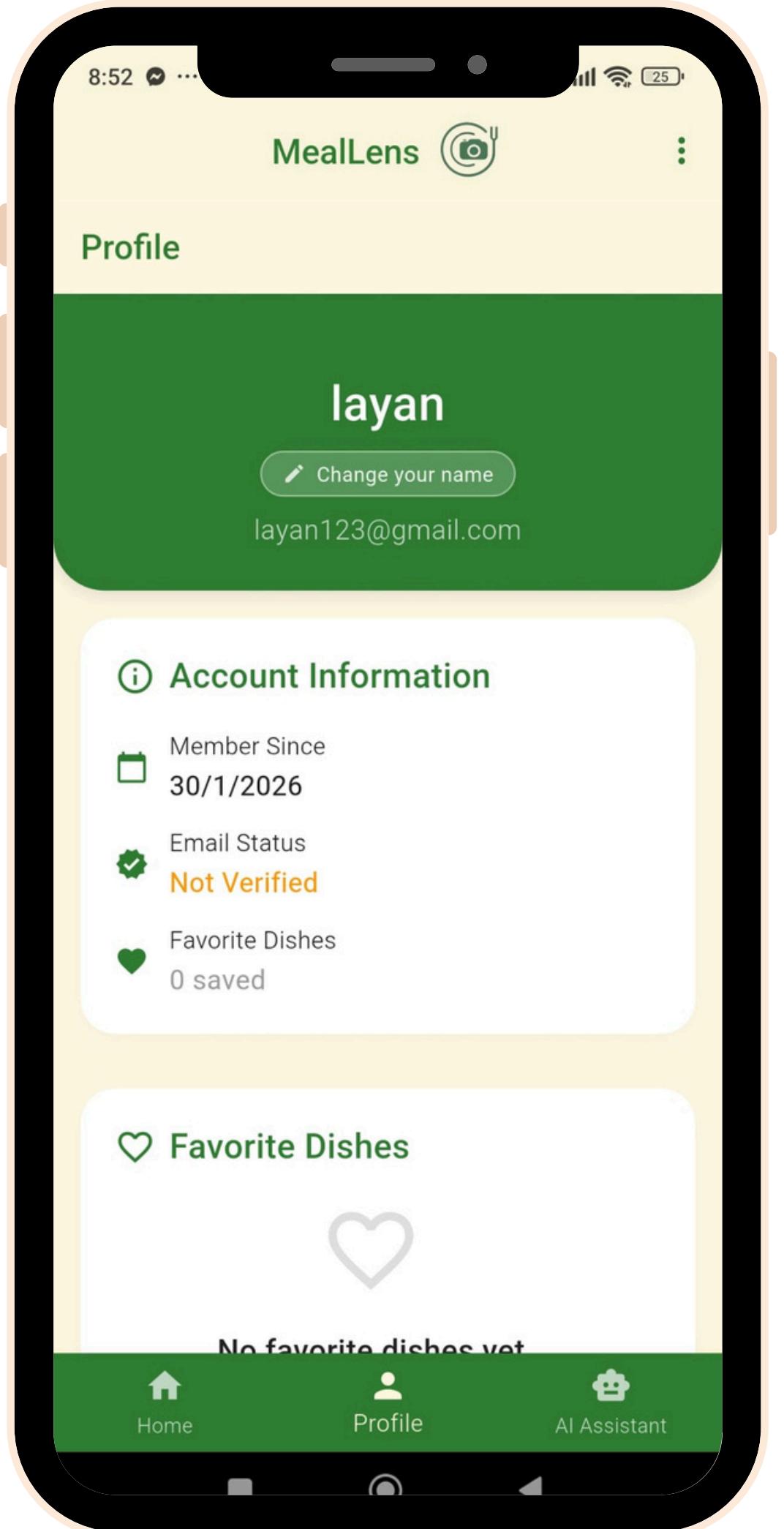
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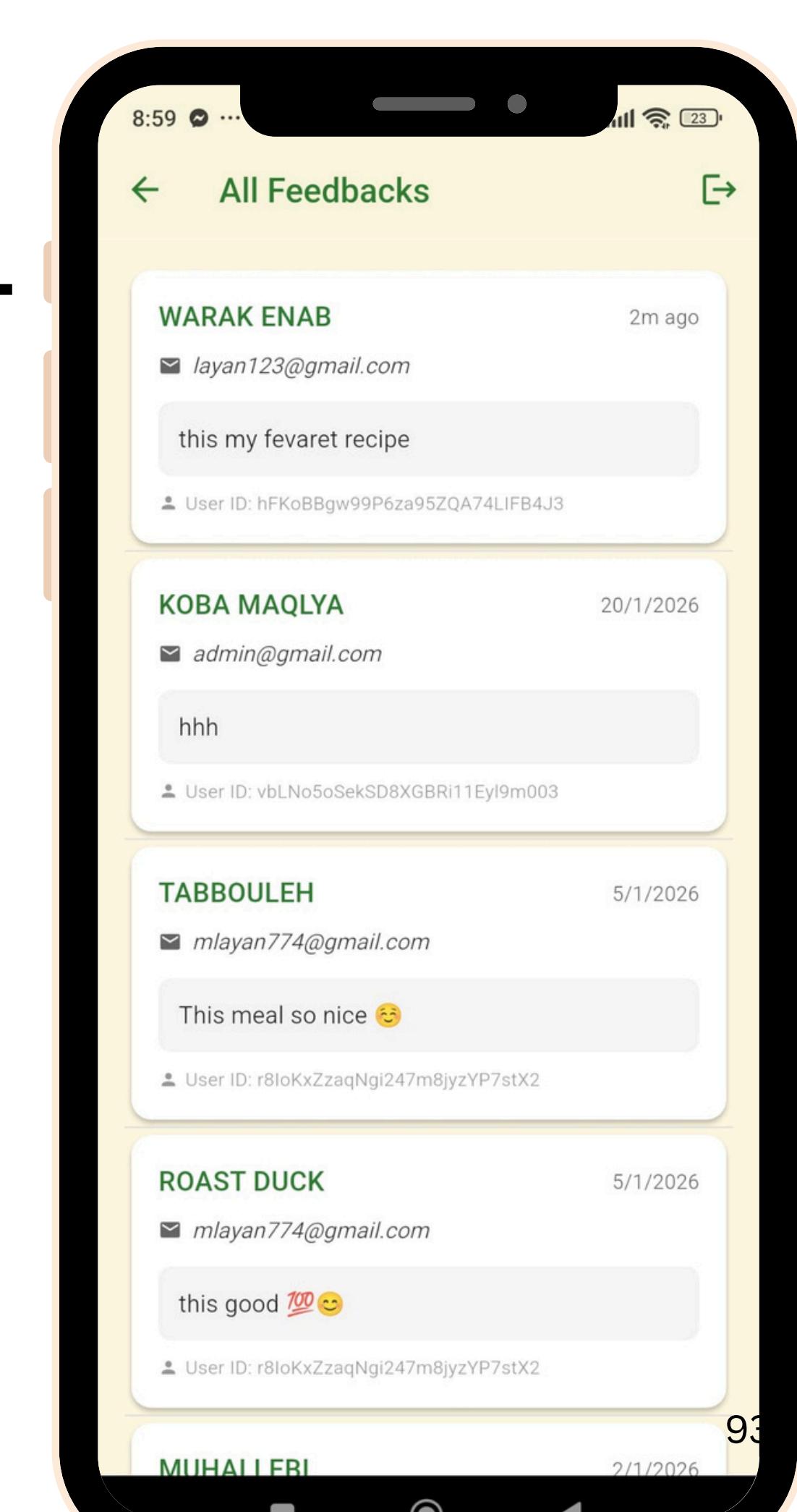
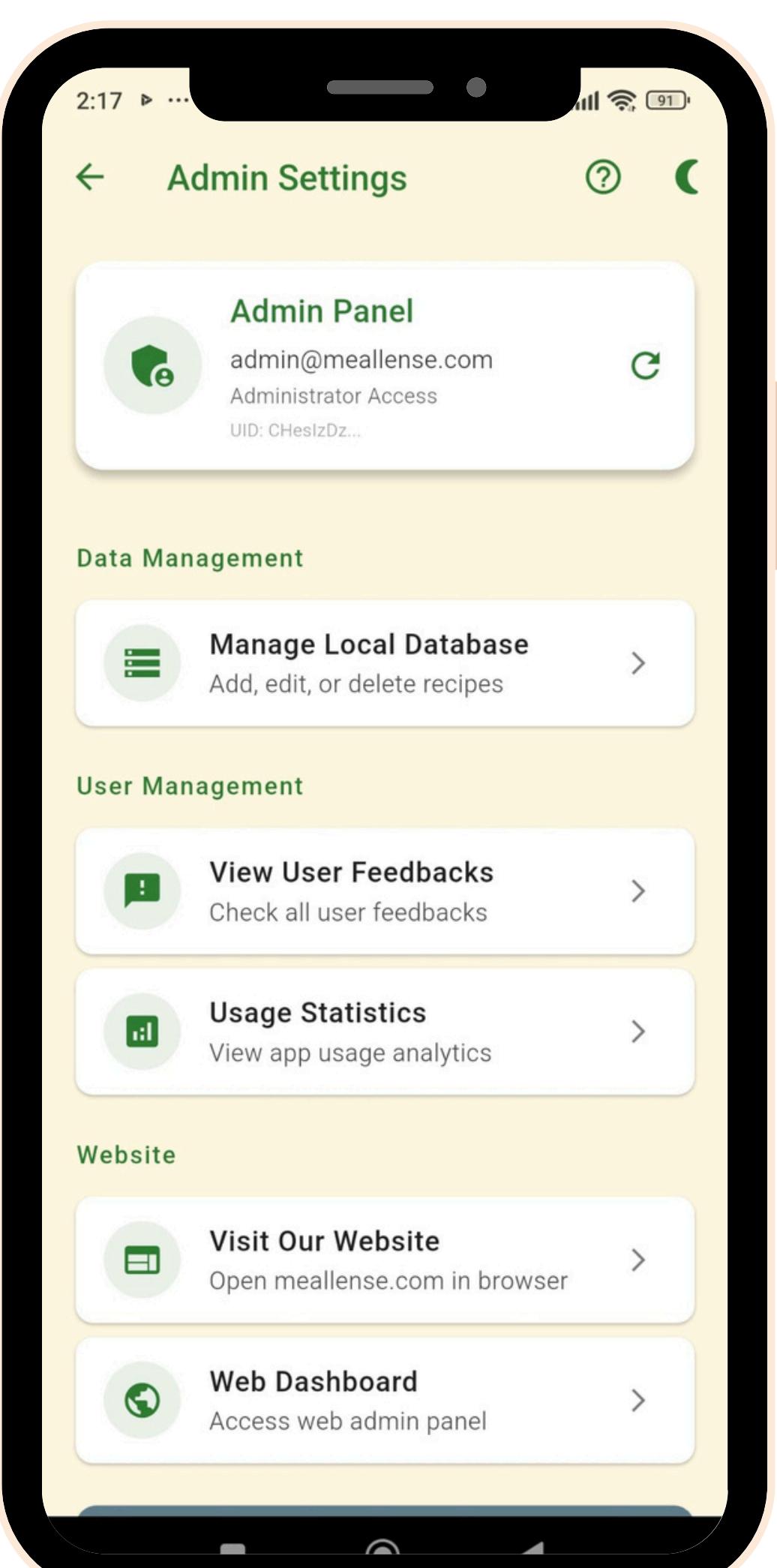
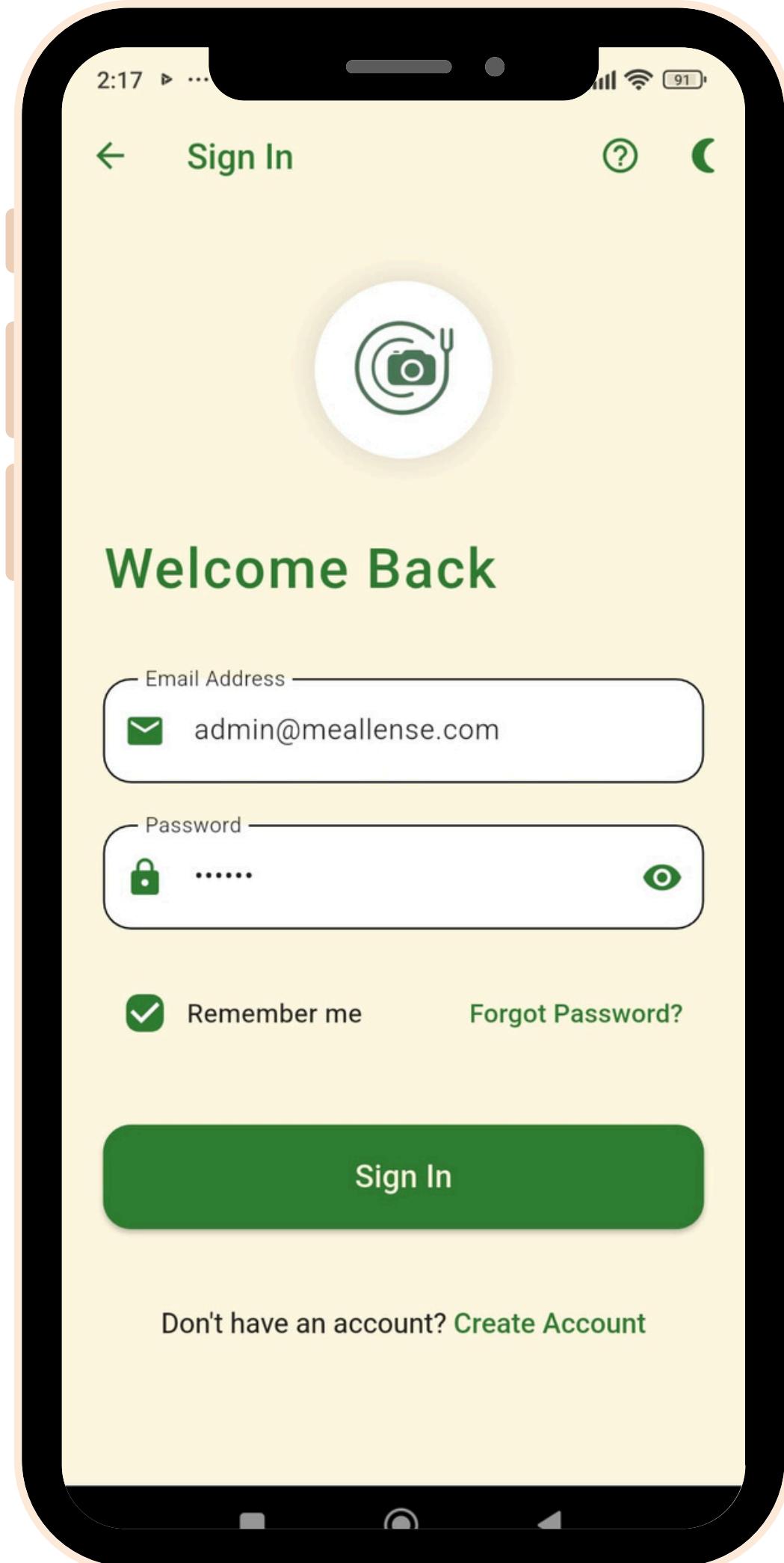


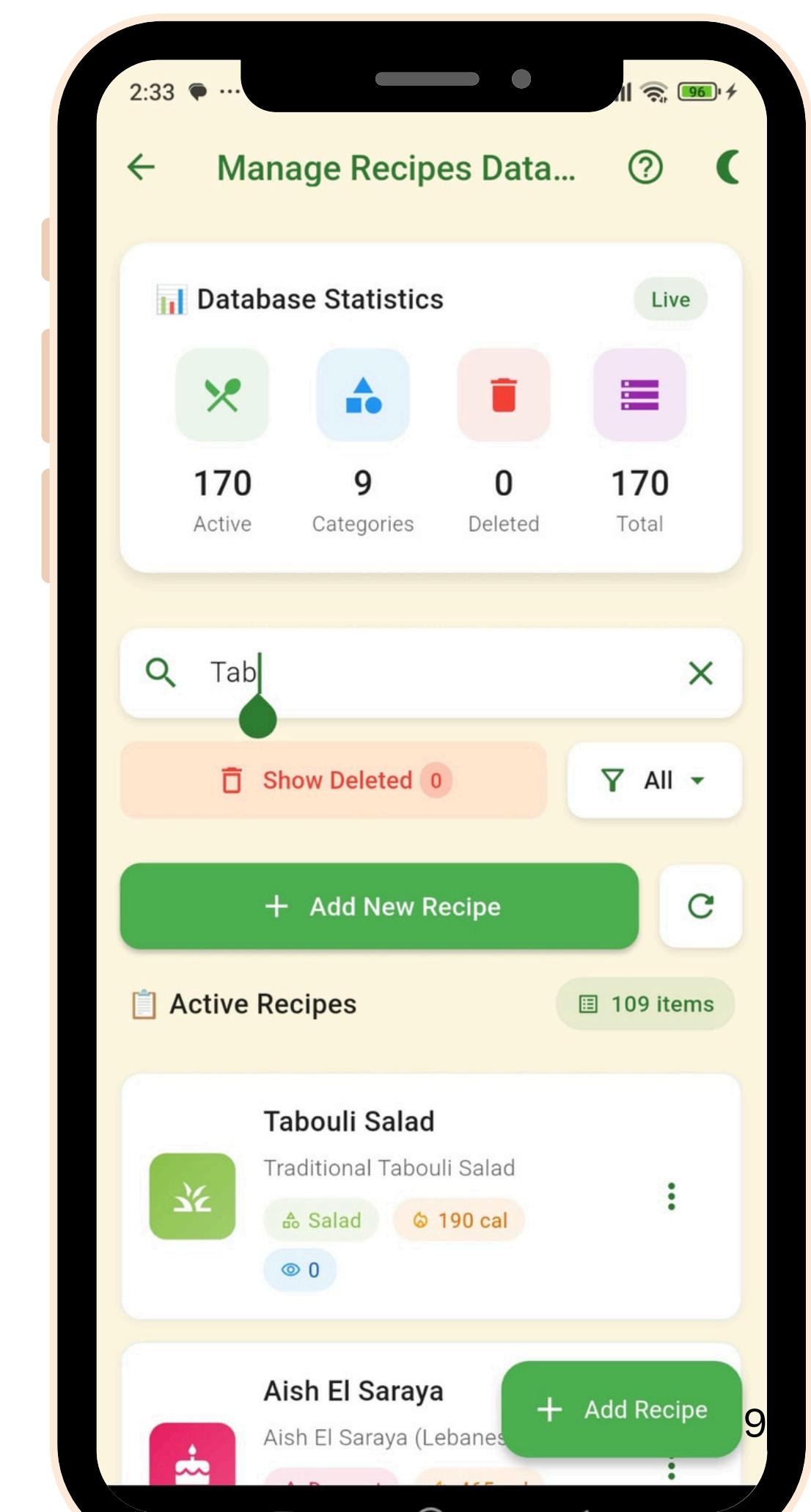
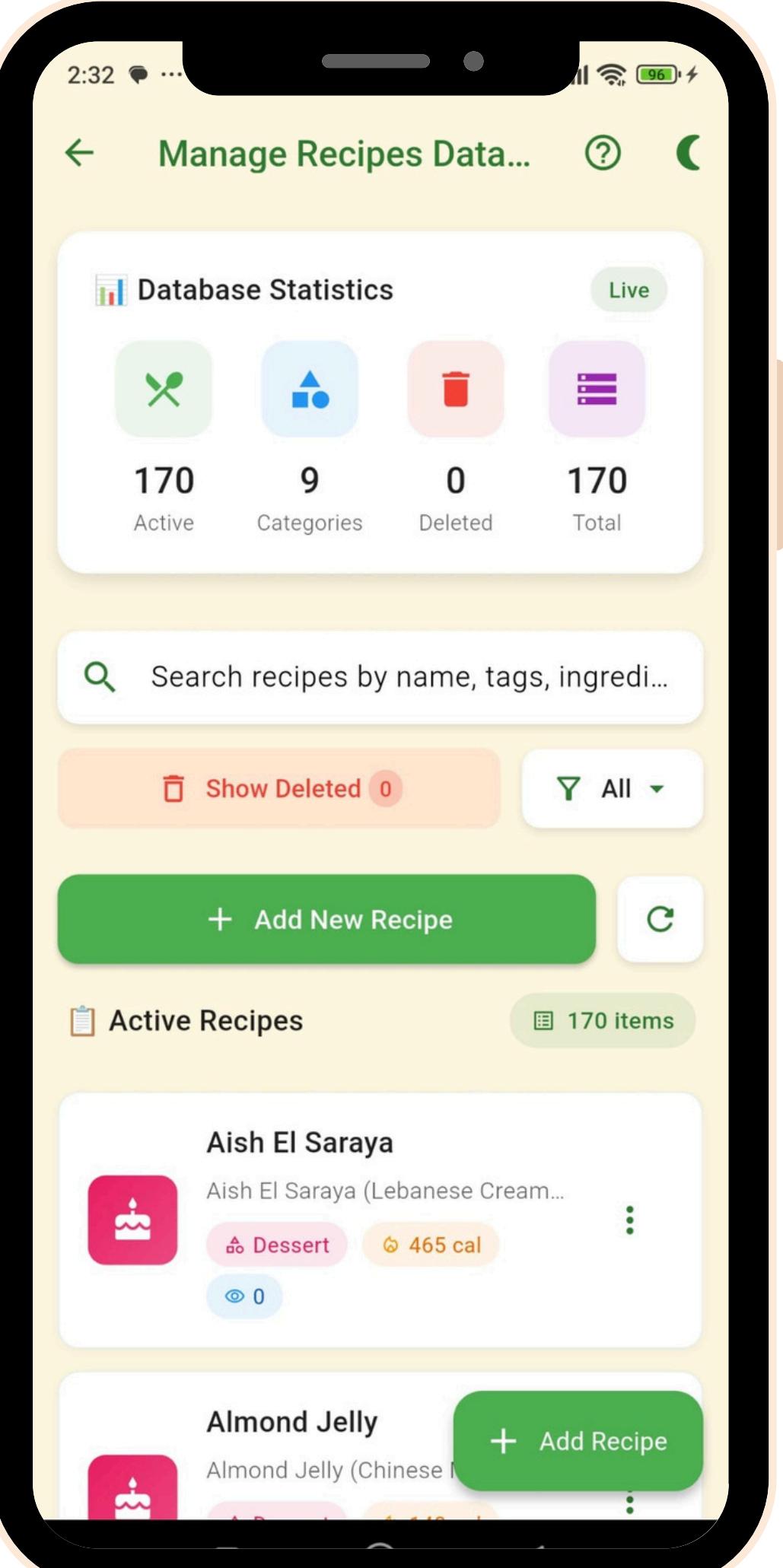
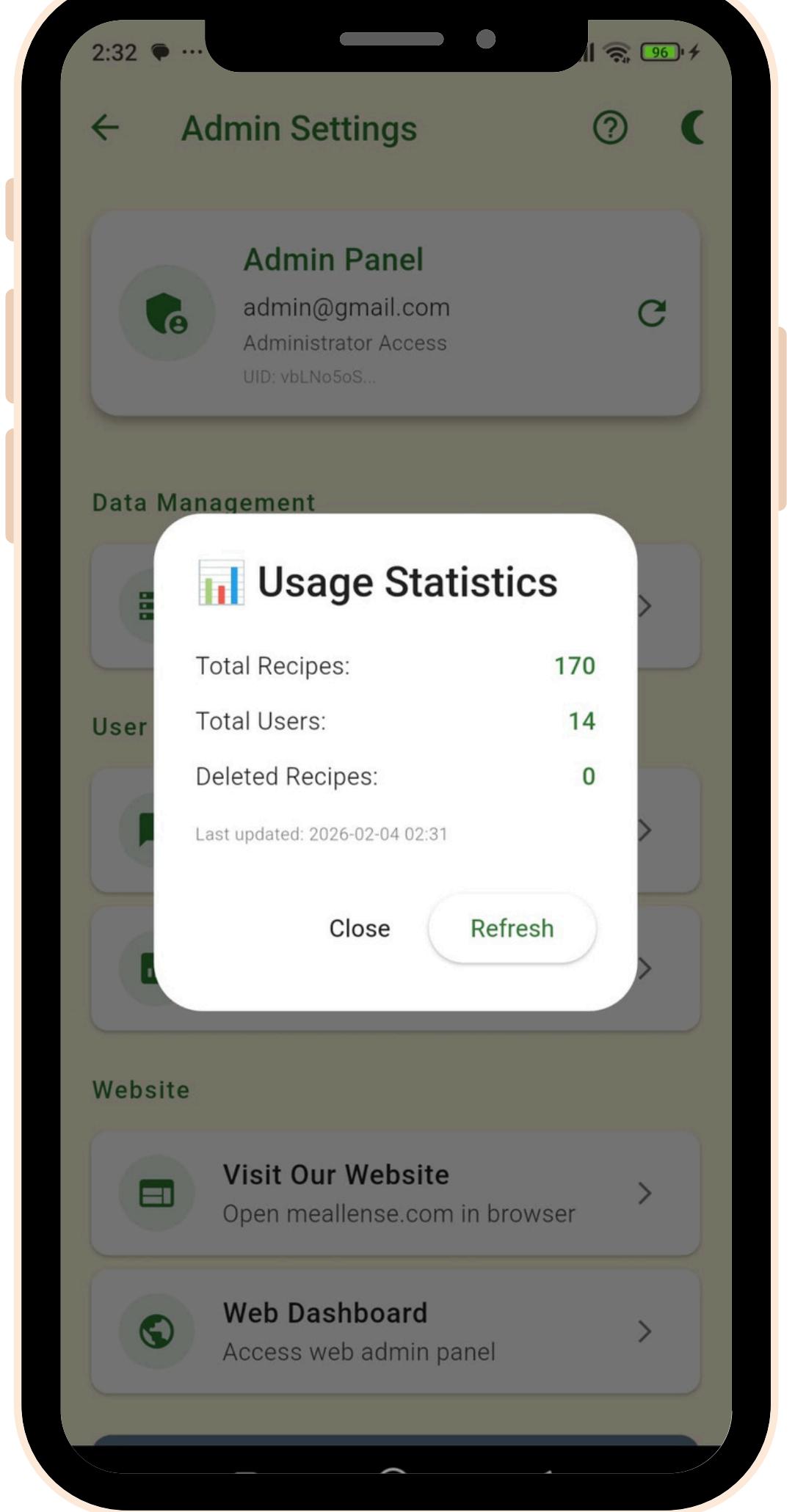


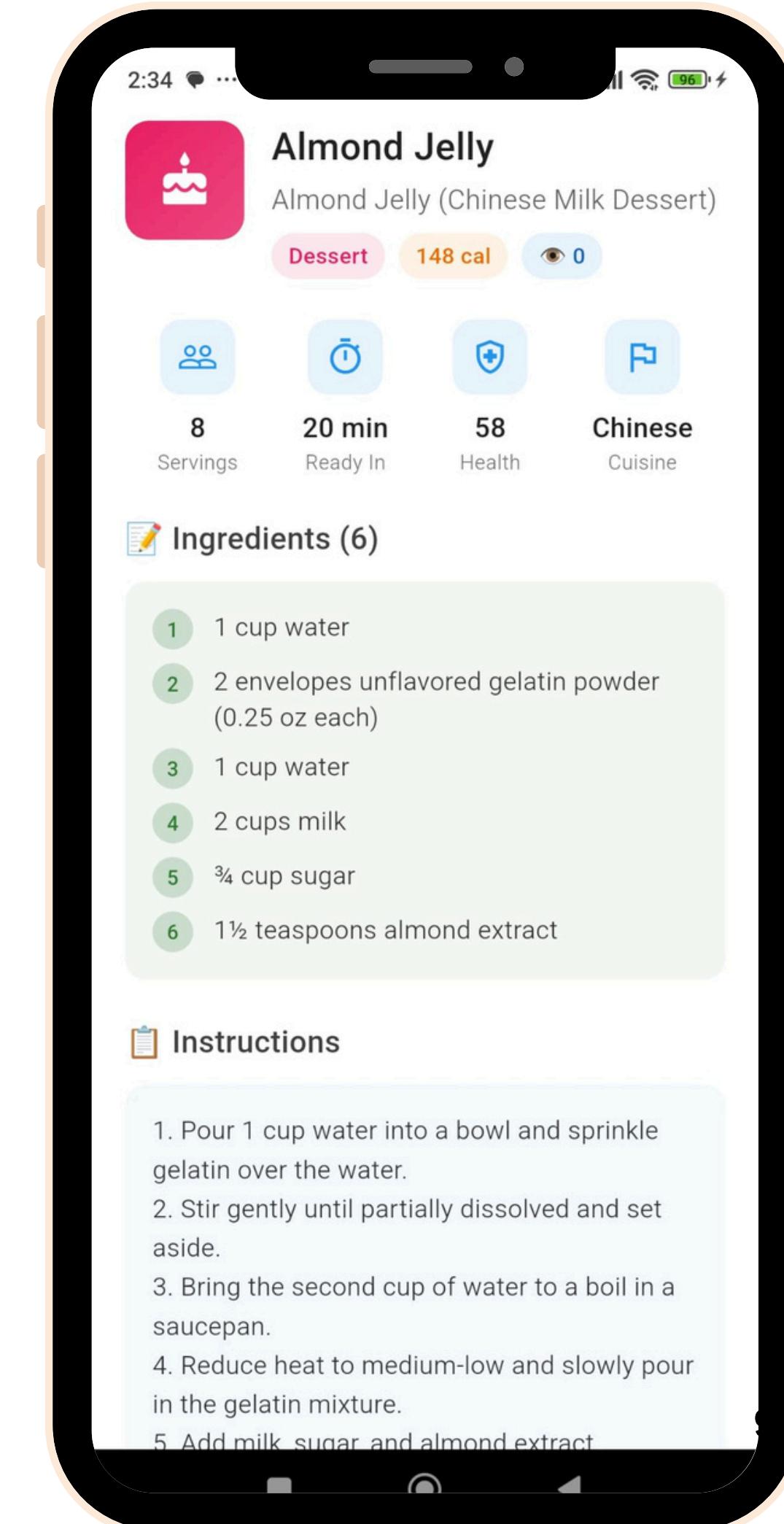
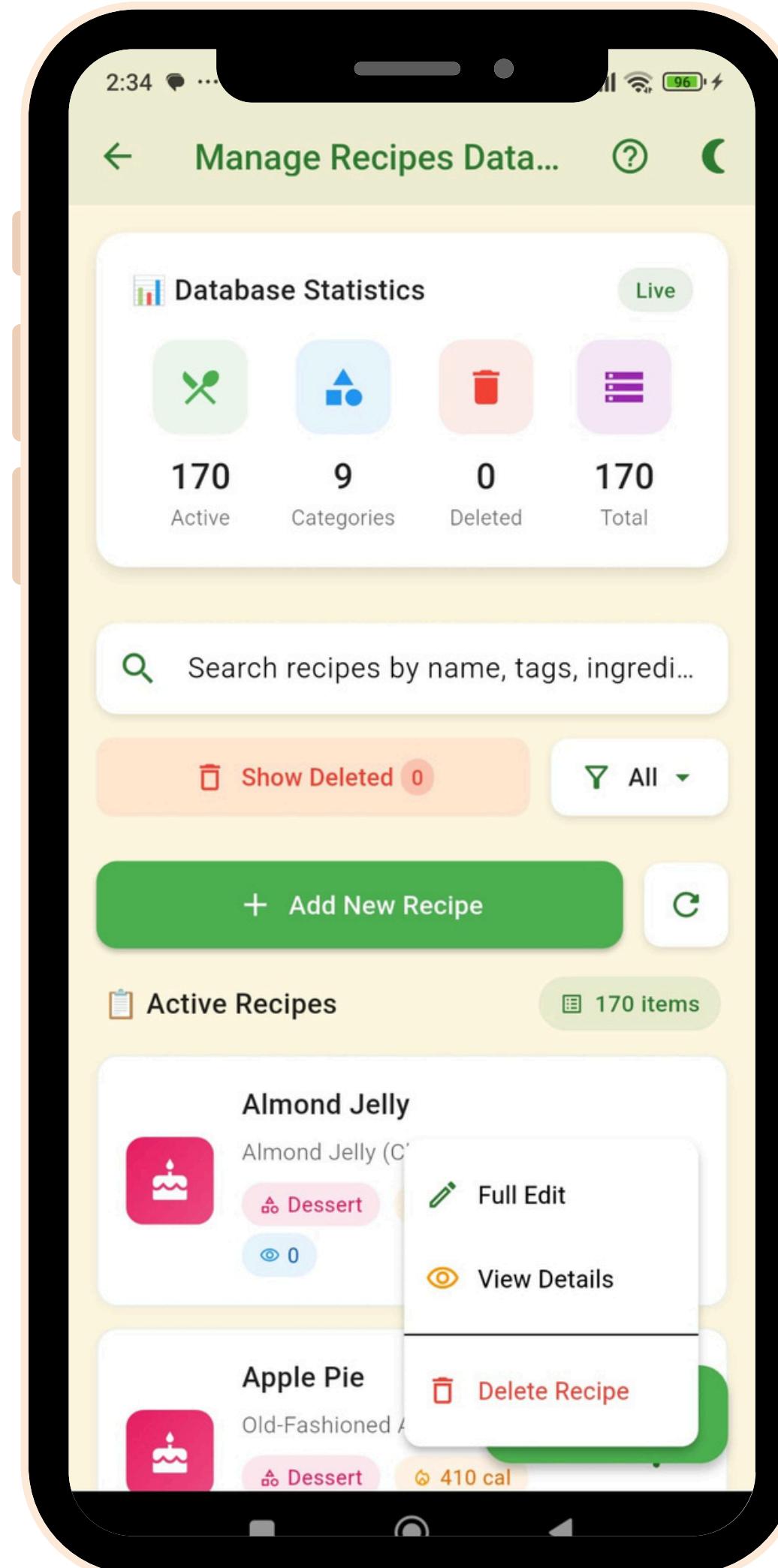
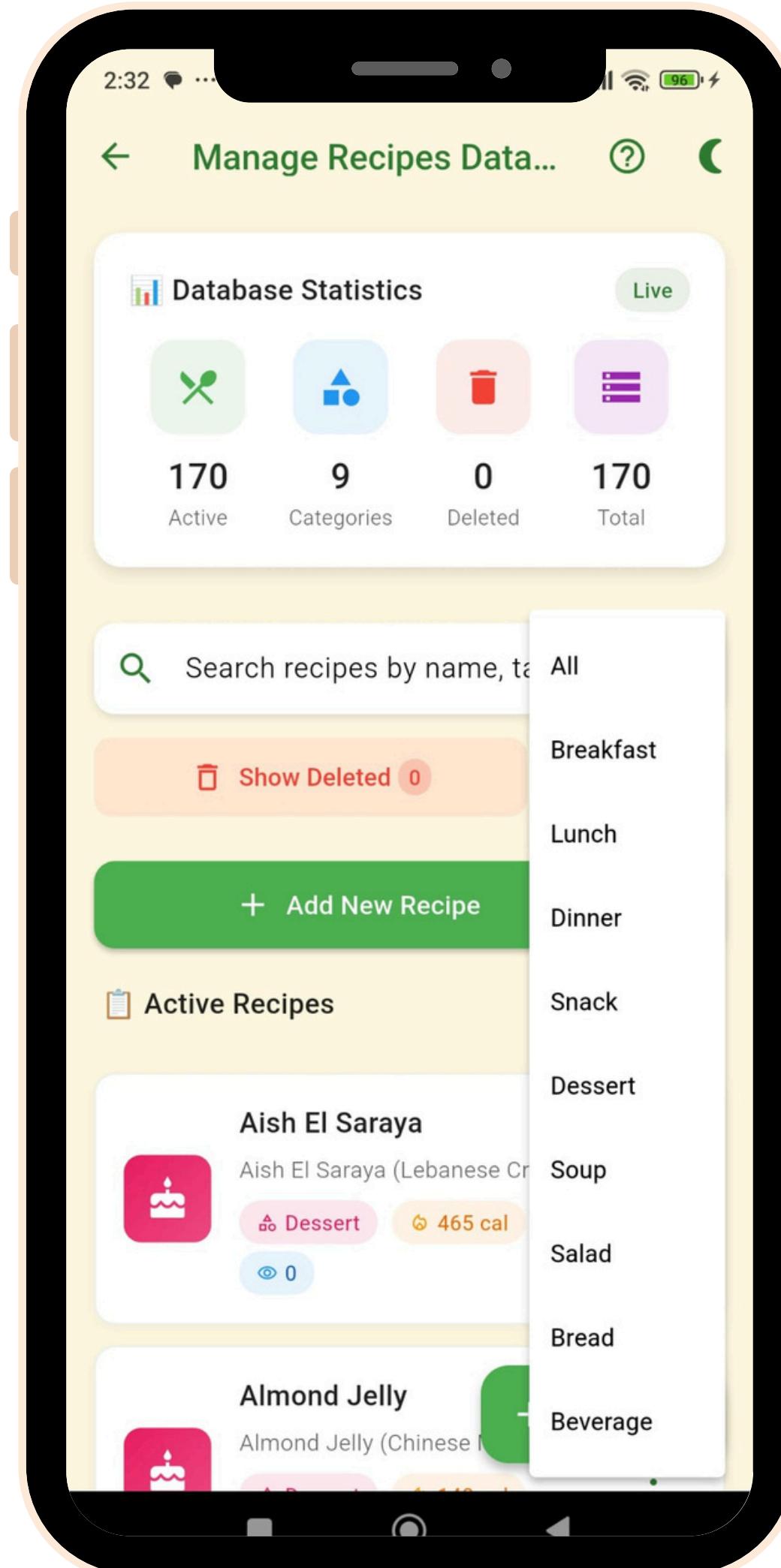












gelatin.  
2. Stir gently until partially dissolved and set aside.  
3. Bring the second cup of water to a boil in a saucepan.  
4. Reduce heat to medium-low and slowly pour in the gelatin mixture.  
5. Add milk, sugar, and almond extract.  
6. Stir continuously until sugar and gelatin are fully dissolved.  
7. Pour mixture into a shallow container.  
8. Refrigerate for 3–4 hours until fully set.  
9. Cut into small cubes and serve chilled.

#### ⚠ Restrictions

dairy nuts Vegetarian  
Gluten-Free Asian Dessert

#### Nutrition Information

148	5g	29g	2g
Calories	Protein	Carbs	Fat
0g	23g	85mg	
Fiber	Sugar	Sodium	

Edit Recipe

Close

2:35

### Manage Recipes Data...

Database Statistics

Live

170 Active    9 Categories    0 Deleted    170 Total

Search recipes by name, tags, ingredients...

Show Deleted 0    All

+ Add New Recipe

Active Recipes 170 items

Aish El Saraya  
Aish El Saraya (Lebanese Cream...)    Dessert 465 cal 0

Almond Jelly  
Almond Jelly (Chinese...)    Add Recipe

2:36

### Warak Enab

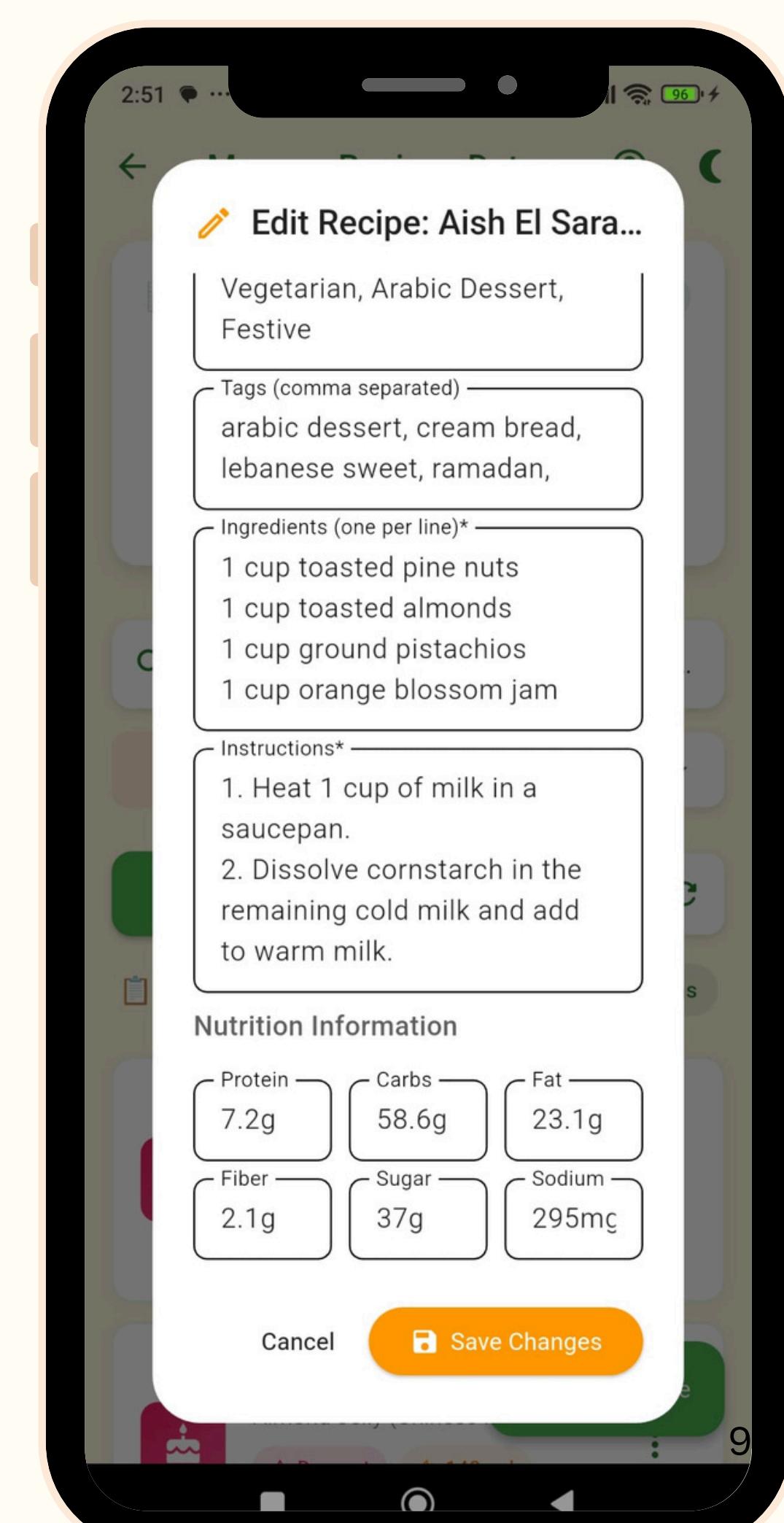
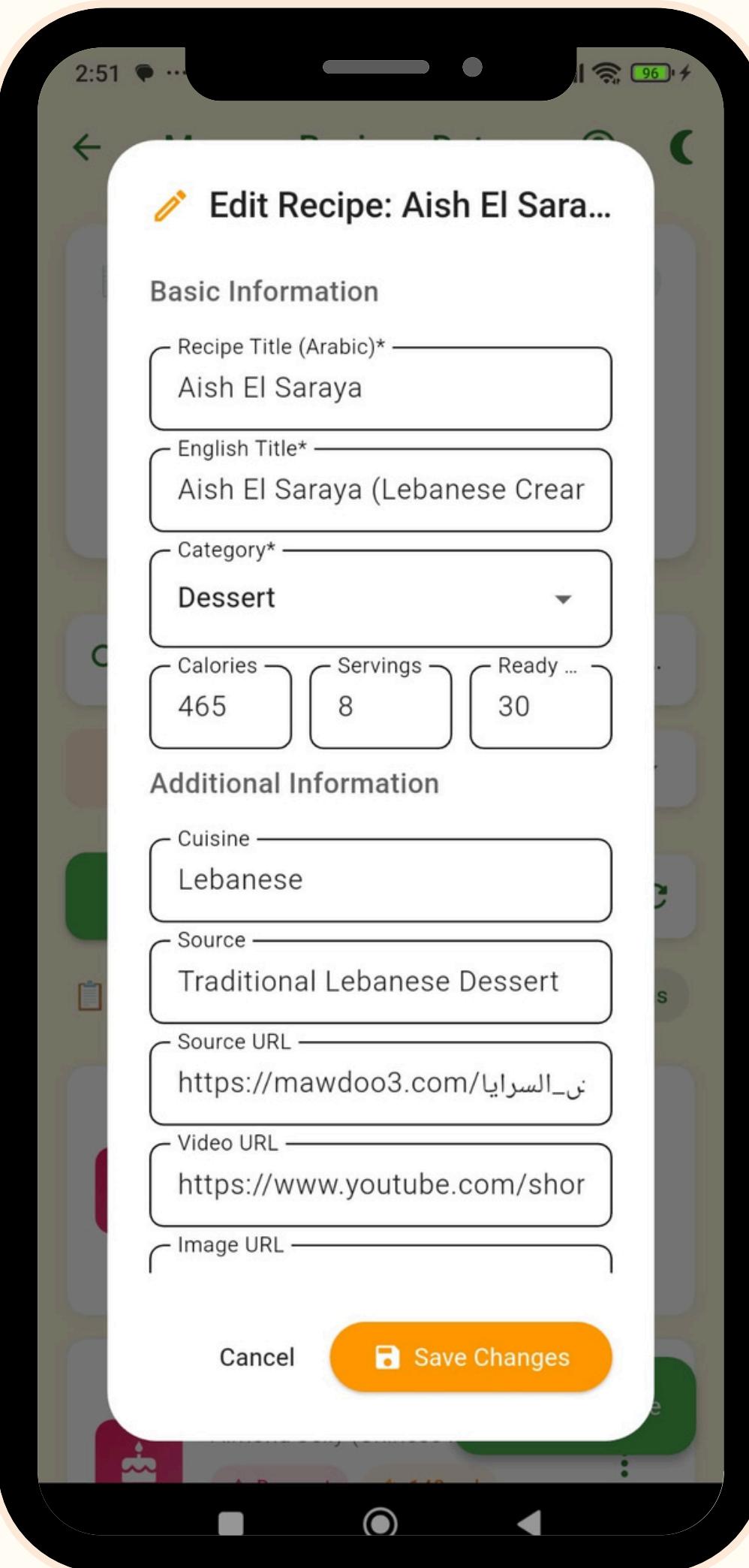
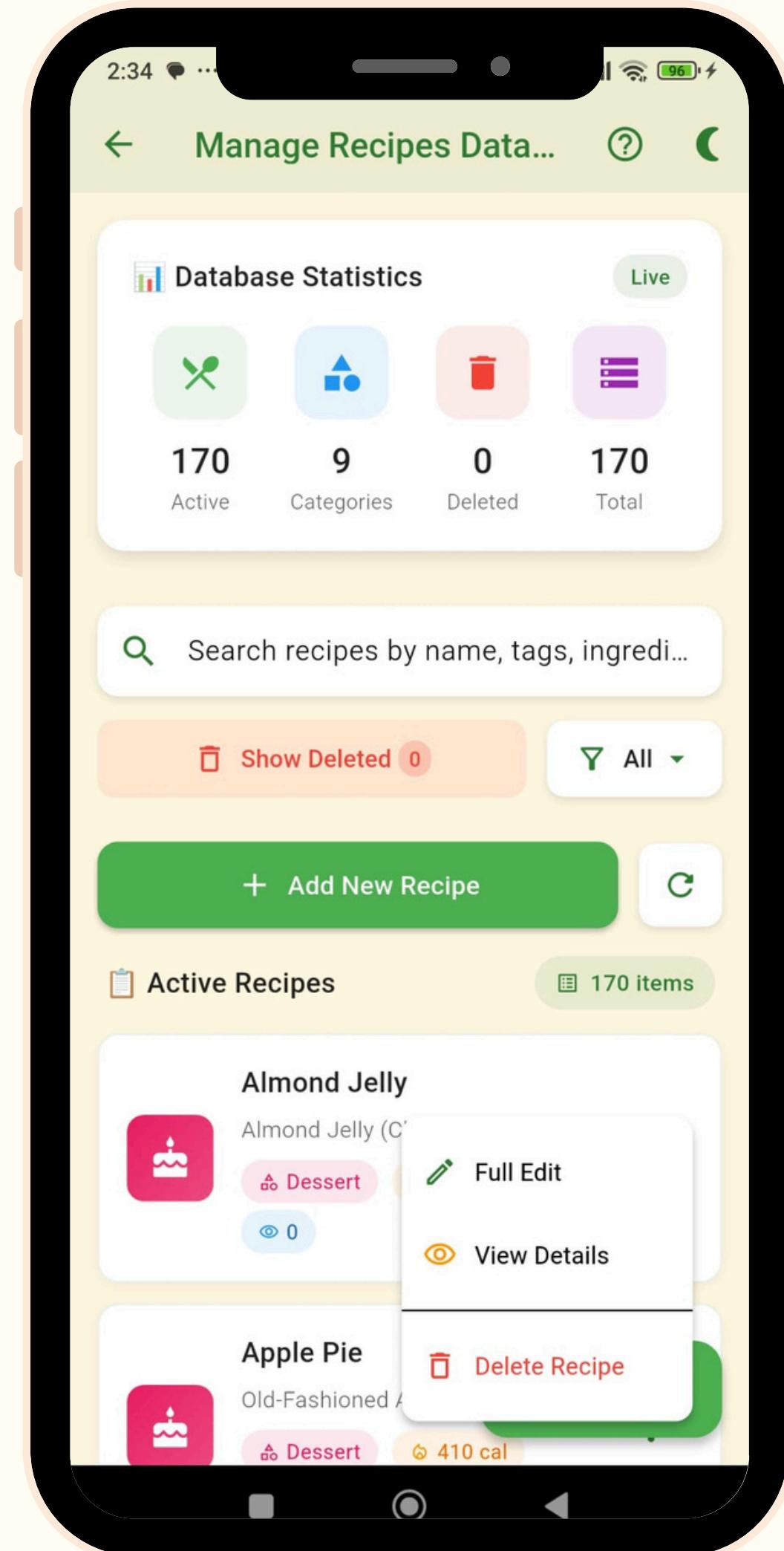
Stuffed Grape Leaves

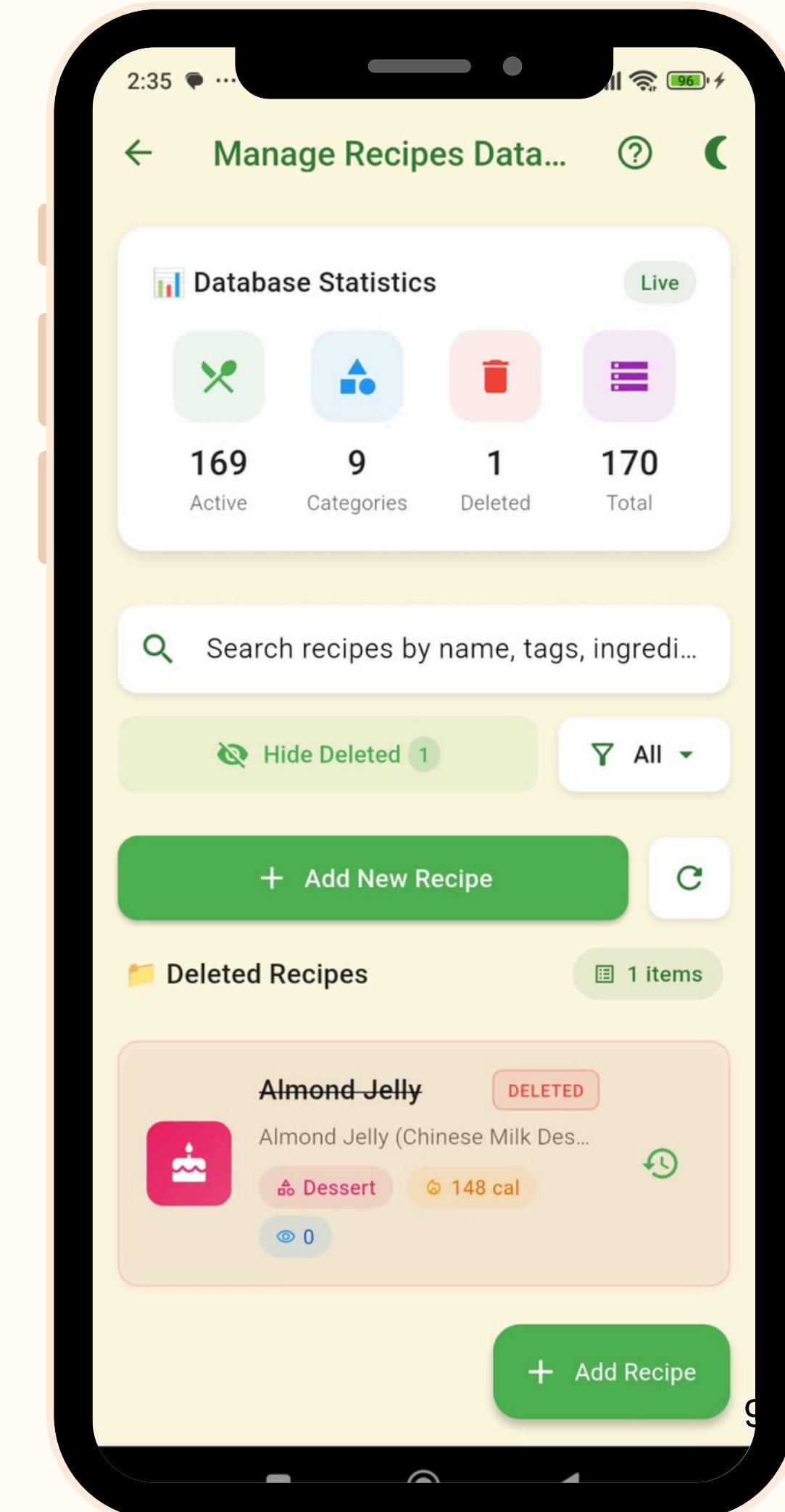
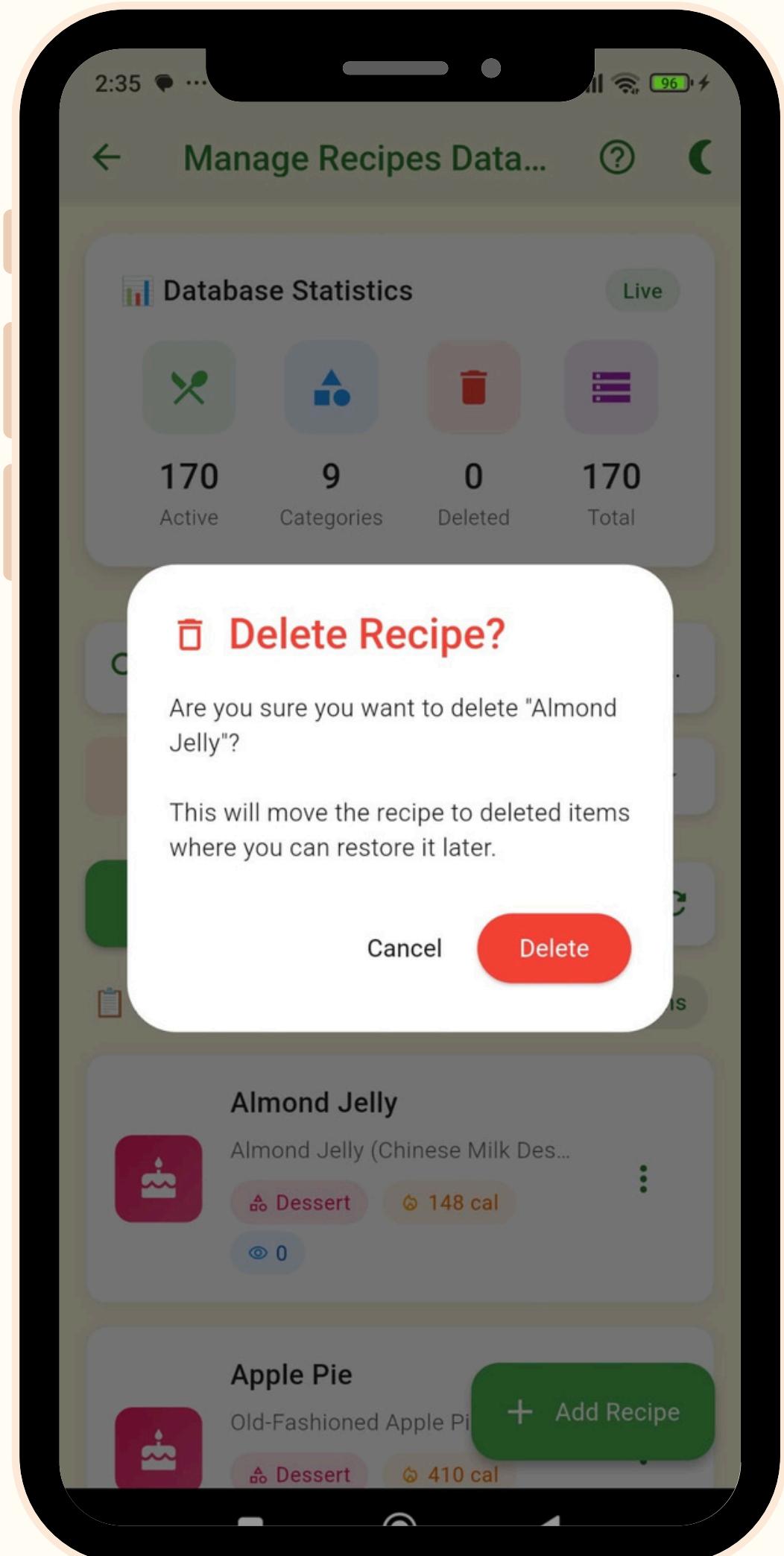
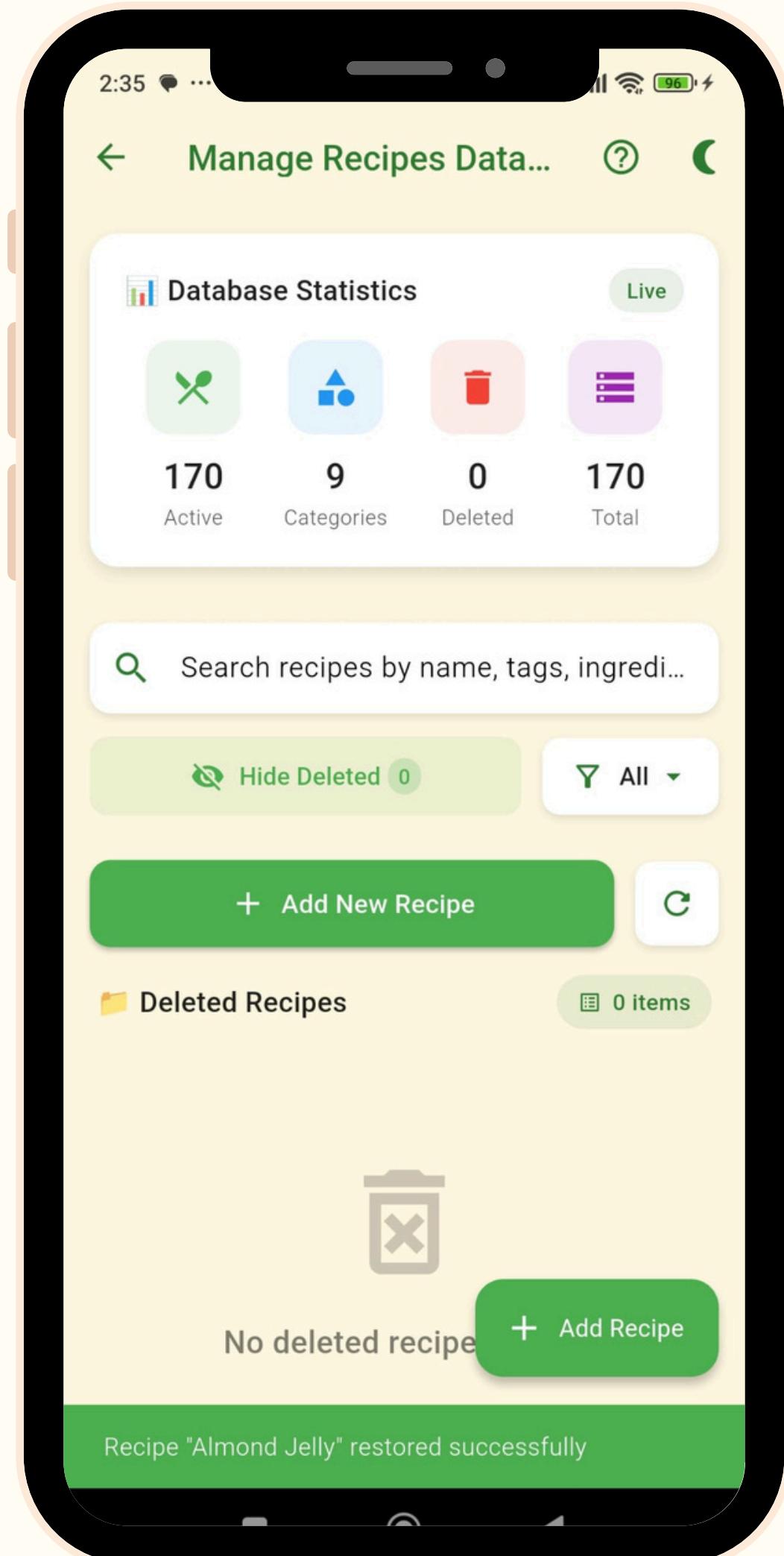
Lunch 271 cal 0

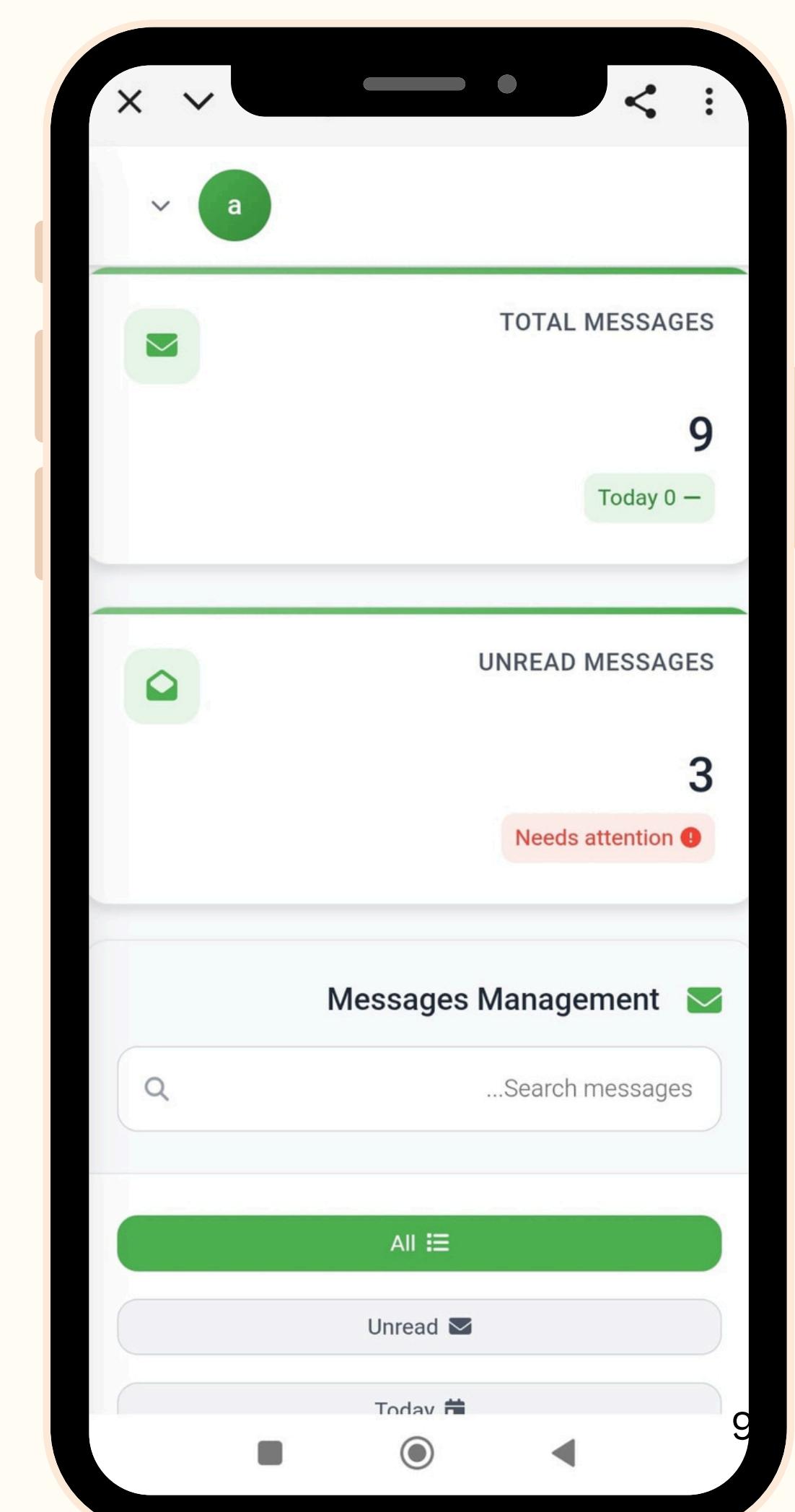
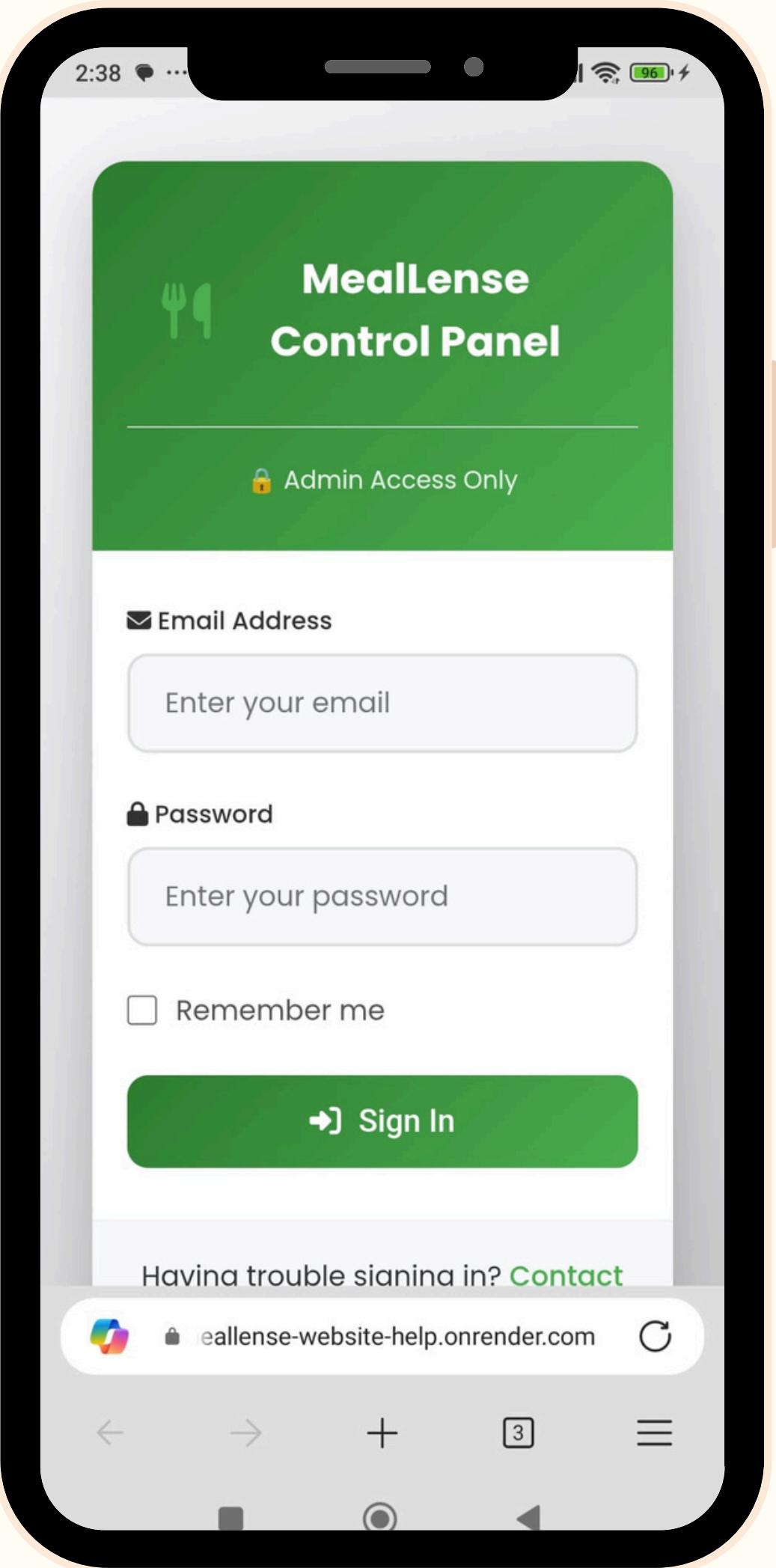
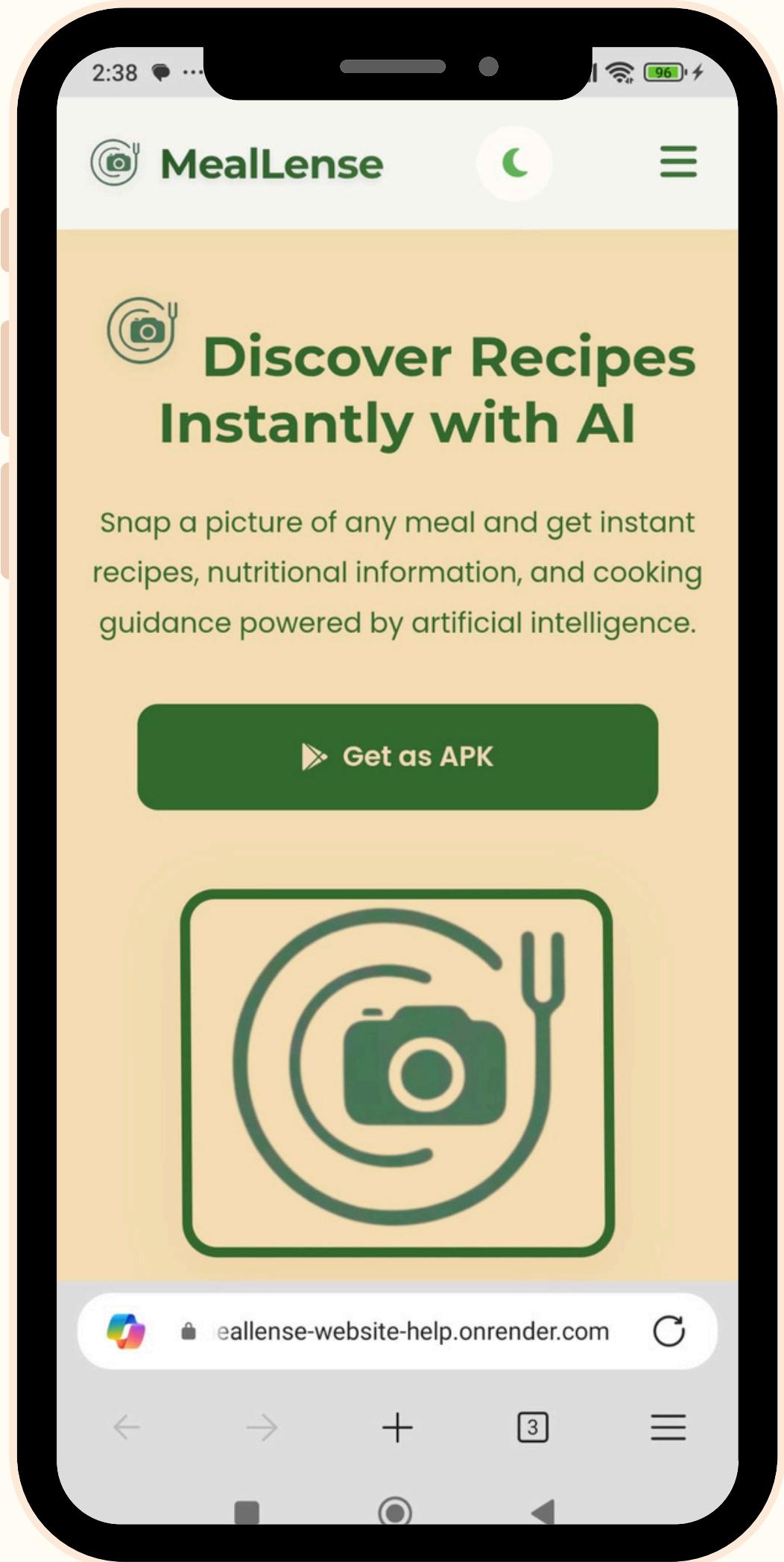
8 Servings    120 min Ready In    76 Health    Lebanese Cuisine

#### Ingredients (12)

- About 125–150 grape leaves, jarred or vacuum sealed (about 600g after draining)
- ½ tsp neutral oil
- 7 to 10 small lamb chops (450-650g)
- Salt to taste
- 2 pounds ground lamb (905g)
- 1 1/2 cups uncooked medium grain rice, rinsed (300g)
- 2 teaspoons Lebanese baharat (3g)
- 6 tablespoons extra virgin olive oil (80g), divided in half
- 2 cups stock or water (480g)
- 2/3 cup lemon juice (160g)
- Optional: ground beef instead of lamb
- Optional: potato slices or beef scraps instead of lamb chops







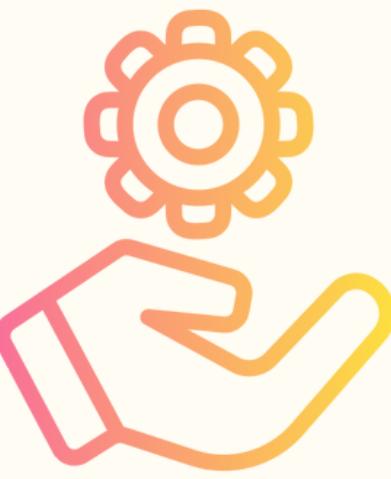
# Web Platform Development

for **MealLens** 100

R



# Key Features



User  
support

Contact form  
for inquiries

Administrative  
dashboard

FAQ system

[Home](#)[About Us](#)[FAQ](#)[Contact](#)[Admin Panel](#)

# Discover Recipes Instantly with AI

Snap a picture of any meal and get instant recipes, nutritional information, and cooking guidance powered by artificial intelligence.

[Get as APK](#)

 Why Choose MealLense?**AI Meal  
Recognition**

Advanced computer vision identifies thousands of dishes instantly

**Smart Recipes**

Get personalized recipes based on your preferences and dietary needs

**Nutrition Analysis**

Detailed calorie count and allergen detection for every meal

**AI Cooking  
Assistant**

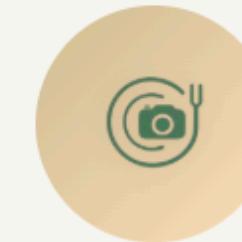
Step-by-step voice-guided cooking instructions

 MealLense Team

**Eng.Rana Musa**



**Eng.Layan Buirat**



**Eng.Haneen Odeh**



[Learn More About Our Team](#)

 Get In Touch

Your Name

Your Email

Subject

Your Message...

 Send Message



## Contact Information

 Birzeit University, Computer Engineering Department

 admin@meallense.com

 +972 598214350

 Project Year: 2025\_2026





Computer Engineering Graduation Project - Birzeit University 2025

🎓 Developed as Final Year Project

[Privacy Policy](#)

[Contact Us](#)

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# About MealLense

Bridging the gap between food discovery and meal preparation  
through Artificial Intelligence

 Meet Our Team Project Details

 Our Story

MealLense was born from a simple idea: making healthy eating easier and more accessible for everyone. Our journey began in 2025 as a graduation project at Birzeit University's Computer Engineering Department.

What started as a small academic project has grown into a comprehensive AI-powered meal recognition platform. Our team of passionate developers worked tirelessly to create an application that can instantly identify food, provide nutritional information, and suggest healthy recipes.

Today, MealLense helps thousands of users make better food choices, track their nutrition, and discover new healthy recipes every day.



## Meet The Team

Our dedicated team of Computer Engineering students worked tirelessly to bring MealLense to life. Each member contributed unique skills and expertise to create this innovative AI-powered meal recognition platform.



**Eng. Rana Musa**  
Frontend & AI Developer &  
Data Analysis

ID: 1210007

KEY SKILLS



**Eng. Layan Buirat**  
Full Stack & AI Developer &  
Data Analysis

ID: 1211439

KEY SKILLS



**Eng. Haneen Odeh**  
Frontend & AI Developer &  
Data Analysis

ID: 1210716

KEY SKILLS



# University Information

## Birzeit University

**Faculty:** Engineering & Technology

**Department:** Computer Engineering

**Location:** Birzeit, Palestine

**Academic Year:** 2025/2026

**160+**

Local Recipes Collected

**300+**

Images per Recipe Tag

**4+**

Months Development

**3+**

APIs Integrated



## MealLens

AI-Powered Meal Recognition

This project is developed as part of the graduation requirements for the  
**Bachelor's degree in Computer Engineering** at Birzeit University.

# FAQ Page

L

Search bar for instant question lookup

Bilingual toggle (Arabic/English)

Expandable answers with clear formatting

Ask New Question button for unanswered queries

 Found 12 answer(s)

## Ask MealLense

Type your question and get instant answers


 Examples: "How accurate is the recognition for Arabic food?"

## Search Results

How does MealLense work? 

How does the food recognition  
works? 

How accurate is the  
recognition for Arabic foods? 



💡 Examples: "How accurate is the recognition for Arabic food?"

## ✓ Search Results

### How does MealLense work? ^

Take a photo of any meal, and our AI will identify it and provide recipes.

Category: app

25 views

### How does the food recognition work? ✓

47 views

### How accurate is the recognition for Arabic food? ✓

52 views

## Still have questions?

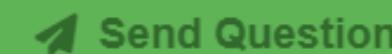
Ask us anything and we'll respond within 24 hours

Your Name \* \*

Email Address \* \*

Question Category \* \*

Your Question \* \*

 Send Question

3 Messages 

53 FAQ Management 

a


UNREAD MESSAGES


3

Needs attention 

a

TOTAL MESSAGES

10

Today 0 —

 ...Search messages

Messages Management 

Important 
Today 
Unread 
All 

ACTIONS	STATUS	DATE	MESSAGE	EMAIL	NAME	#
   	Read 	,2/6/2026 PM 5:38:54	How can download app	layan2@gmail.com	Layan	1
   	Read 	,1/31/2026 PM 1:36:09	??can read all FAQ	LAYAN@gmail.com	أو	2
   		,1/31/2026	which the model of vision use of this			



3 Messages



53 FAQ Management



FAQ Management							
ACTIONS	CREATED	STATUS	VIEWS	CATEGORY	QUESTION	ORDER	#
	1/28/2026	Active	16	General	<b>ما مدى دقة التعرف على الأطعمة العربية؟</b> دقة عالية جداً، لأننا دربنا النموذج على مجموعة خاصة من الأطعمة العربية من قاعدة ...	0	1
	1/28/2026	Active	54	General	<b>?How accurate is the recognition for Arabic food</b> ...Very high accuracy, as we trained our model on a specialized Arabic food dataset	0	2
	1/28/2026	Active	5	General	<b>?Can I share recipes with friends</b> ....Yes, you can share recipes via social media, email, or messaging apps	0	3
	1/28/2026	Active	0	General	<b>على أي أنظمة تشغيل يعمل؟</b> يُعمل على نظمي Android و iOS. كما يتوفر نسخة ويب ولكن حالياً فقط يمكن التحميل للأ...	0	4
	1/28/2026	Active	1	General	<b>من أين تأتي الوصفات؟</b> ج: من مصادر متعددة مثل Spoonacular, MealDB.	0	5
	1/28/2026	Active	7	General	<b>?Does the app identify allergens</b> ....Yes, the app highlights potential allergens like nuts, dairy, eggs, gluten, etc	0	6

admin  
System Administrator

Add New FAQ +

### FAQ Management

ACTIONS	CREATED	ORDER	#		
		1/28/2026	ما مدى دقة التعرف على الأطعمة العربية؟ دقة عالية جداً لأننا درينا النموذج على مجموعة خاصة من الأطعمة العربية	0	1
		1/28/2026	?How accurate is the recognition for Arabic food accuracy, as we trained our model on a specialized Arabic food dataset	0	2
		1/28/2026	?Can I share recipes with friends you can share recipes via social media, email, or messaging apps	0	3
		1/28/2026	على أي أنظمة تشغيل يعمل؟ يُعمل على أنظمة Android و iOS، كما يتوفّر نسخة ويب ولكن حالياً فقط	0	4
		1/28/2026	من أين تأتي الوصفات؟ ج: من مصادر متعددة مثل Spoonacular، MealDB، بالإضافة إلى قاعدة بيانات محلية للأط...	0	5
		1/28/2026	?Does the app identify allergens ....Yes, the app highlights potential allergens like nuts, dairy, eggs, gluten, etc	0	6
		Active	General	7	

**Add New FAQ**

\* Question

\* Answer

▼ General Category

Cancel Add FAQ



# Complete Demo

مَدْحُود



# Thank You!