SingaDiet – Diet Tracking for Singapore

Group Number: 15

Group Members: Dev Bahl (1003375), Roy Chua (1003497), Jia Le Lee (1003516), Clarice Chua (1003796), Iman (1003311)

• Introduction

Nutrition applications are a dime a dozen, yet we do not see as wide an adoption as their numbers suggest. A survey by mHealth in 2017 found that while 82.4% of Singaporean participants were aware of diet tracking apps, only 59.8% of participants actively used them (Hossain et al., 2018). Furthermore, a journal in MDPI found that the traditional diet recording in the Southeast Asian context is highly prone to under-reporting (Tay et al., 2020).

While there are existing applications such as MyFitnessPal, there seem to be many inadequacies that cause such applications to remain a niche adoption. Not only is there a limited selection of the local food items that make up a majority of our Singaporean diet, for the layman, a level of prior knowledge regarding general or specific diets is expected in order to fully maximize the application's features. Furthermore, when it comes to daily usage, simple choices such as finding appropriate food options when outside and adding meals to the meal plan or daily consumption remain a challenge.

As a result, our nutrition application solution aims to provide not only a larger selection of local food items, but also make smart recommendations relevant to a user's specific location or diet. In doing so, we hope that it can guide users in their journey of gaining insight into their nutrition as well as giving them the necessary support to achieve their goals.

Based on the surveys conducted and data gathered, we utilized the Agile methodology (Paulk, 2018), beginning with listing out the user's needs, developing prototypes to churn out as many iterations as possible and zooming in on the relevant features with regards to the use of the standard calorie counting application with every iteration to improve on them. The use of prototypes ranged from low-fidelity paper prototypes to high-fidelity prototypes using tools such as "Figma" amongst many others.

- # Your Solution

Initially, our vision for SingaDiet was as follows:

With SingaDiet we hope to help Singaporeans stick to their

dietary requirements, or goals, through data and recommendations.

We had three main problems we were keen to solve, and alongside each of them, we had suggested a proposed set of features:

Problems & Feature-set (from mid-term)

1. Problem 1: Users having difficulty finding food-items on diet tracking applications when outside.
    a. Mimicry of real-world interfaces on the application to leverage on past experience.
    b. Creation of an interface similar to layouts seen at Hawker shops such as Yong Tau Foo making it more relatable for our target audience.
    c. Increase database to host more Singaporean options.
2. Problem 2: Difficulties for Users with special dietary needs and preferences to be catered to when eating outside.
    a. Recommending eateries based on location data of users.
    b. Help them find options based on their goals and restrictions.
    c. Find food items currently being consumed easily.
    d. Using maps will allow for the abstraction of physical geographies further immersing the user.
3. Problem 3: Lack of engagement of current Users who cook at home.
    a. Compatibility with an IOT weighing scale solution that allows users to gather the weight of their consumed ingredients in sublime fashion.
    b. Providing them with real-time statistics of the meal being prepared - such as calories and nutrition.
    c. Other solutions could be in the form of an Augmented Reality measuring tool that works on the user's mobile.
    d. Inclusion of guided recipe tours that will enable users to cook alongside the application.

Throughout this project, we have conducted various forms of interviews and tests on our target users. We conducted interviews with existing target users, as seen under *Observations*, to understand more about their motivations and experience using existing diet tracking applications and through these interviews we were able to gather that there were some issues that were more prominent than others. This led us to narrow our scope to the two main issues highlighted below:

1. Problem 1: Users having difficulty finding food-items on diet tracking applications when outside.
    a. Making it easier to input multi-dish local meals.
    b. Allowing users to input meals according to their current location.
    c. Increase database to host more Singaporean options.
2. Problem 2: Difficulties for Users with special dietary needs and preferences to be catered.
    a. Recommending pre-filtered eateries based on location data of users.
    b. Making it easier for people with special dietary needs to set their required nutritional intake.

Our overall vision for SingaDiet remains unchanged.

- Target Users

Table 1 User Descriptions

Users	Description
Primary Users	• People who are interested in their nutritional data & statistics. • People who are counting calories with a weight goal in mind
Secondary Users	• People with special diets, i.e. ketogenic
Supplemental Users	• People who have health conditions and therefore need to keep track of their diet.
Served Users	• Restaurant owners who partner with SingaDiet.
Negative Users	• People who are averse to monitoring their nutrients • People who are interested in non-food related nutritional data.

Table 2: Target User Descriptions

Table 3 User Personas

User Personas	Description
Primary Users	 **Primary Users** About • Jane is recently interested in calorie counting • She does not have any experience in it before • She is mainly interested in the data and figures with calorie counting and how it can benefit her Behaviour • She uses her phone a lot throughout the day • She likes to optimize her life in various ways Needs • Calorie & Nutritional details • Intake suggestions given she is inexperienced Pain-Points: • Lost about different kinds of macronutrients • Struggle in finding specific food items • Struggle in inputting customised local food items. (Mix Veg Rice) Name: Jane; Age: 19; Occupation: Student; Education: Bachelor's (Math); Location: Singapore  **Primary Users** About • New mother of twins • Bothered about pregnancy weight • Has a weight goal in mind • Feels motivated by her weight goal Behaviour • Has time to cook at home & enjoys doing it for family • Orders in once every 2 days • Will feel frustrated about weight goals if no progress Needs • Guidance in weight goals Pain-Points: • Ease of tracking goals • Access to weight trends • Inaccuracy when inputting meals when eating outside Name: Jenny; Age: 30; Occupation: Former UI Engineer; Education: Psychology; Location: Singapore

<table>
<tr>
<td>Secondary Users</td>
<td>

<table>
<tr><td>Name</td><td>John</td></tr>
<tr><td>Age</td><td>27</td></tr>
<tr><td>Occupation</td><td>Associate at MOE</td></tr>
<tr><td>Education</td><td>Bachelor's</td></tr>
<tr><td>Location</td><td>Singapore</td></tr>
</table>
Secondary Users
About
• John is a newly graduated government employee
• He loves hanging out with friends, exercising
• He keeps a strict keto diet to keep fit.
• Looking for places to eat is a challenge, given he eats out a lot.

Behaviour
• Exercises Daily
• Eats out a lot
• Avid smart phone user

Needs
• Record his daily food intake
• Monitor daily calorie intake and macronutrients
• Record exercise and weight

Pain-Points:
• Hard to add many food items
• Hard to add local meals
• Customising goals are troublesome
</td>
</tr>
<tr>
<td>Supplemental Users</td>
<td>

<table>
<tr><td>Name</td><td>James</td></tr>
<tr><td>Age</td><td>48</td></tr>
<tr><td>Occupation</td><td>Banking</td></tr>
<tr><td>Education</td><td>CA</td></tr>
<tr><td>Location</td><td>Singapore</td></tr>
</table>
Supplemental Users
About
• Recently diagnosed with a heart condition
• Needs to adopt a cleaner diet

Behaviour
• Likes to eat out & have a drink once every few days
• Does those for networking
• Open to trying new places

Needs
• Diet limited by doctor's orders
• To find new places

Pain-Points:
• Wants to still be able to eat out
• Cannot compromise on diet
</td>
</tr>
<tr>
<td>Served Users</td>
<td>

<table>
<tr><td>Name</td><td>Jackson</td></tr>
<tr><td>Age</td><td>30</td></tr>
<tr><td>Occupation</td><td>Restaurant Owner</td></tr>
<tr><td>Education</td><td>Nutritionist</td></tr>
<tr><td>Location</td><td>Singapore</td></tr>
</table>
Served Users
About
• Jackson has just set up a new Restaurant in a University in Singapore.
• He has taken on a big loan however that has not curbed his ability to take risks and innovate.
• He is well-educated and pro-technology adoption.

Behaviour
• Likes to find new and innovative ways of doing things.
• Has already invested in technology by creating his website and social media profiles. Uses them to convey his unique restaurant idea.

Needs
• Needs more customers in his location.
• Has a unique healthy menu that he needs convey to potential customers.

Pain-Points:
• New menus that is unrecognized by potential customers.
• No current regulars.
</td>
</tr>
</table>

Table 4: User Personas

- Observation/Data Gathering

Observation/Data Gathering Plan (from mid-term)

As mentioned above in the introduction, there are several similar applications for calorie counters and nutrition trackers. We plan to review some such applications - particularly the top most downloaded applications. This is to understand user needs and identify gaps in existing features which will in-turn validate our solution and inspire us to employ a better approach.

To effectively target our local target audience, we will conduct more interviews & surveys in Singapore as well. We will first conduct interviews & surveys on people who already use nutrition tracker applications, as this will help us understand any glaring gaps in existing applications.

We will also interview our target audience on our proposed features. Firstly, we will include questions with regards to the difficulties faced (if any) when logging meals into their nutrition tracking applications. Secondly, for our special dietary preferences feature, we will interview people with special diets, i.e. vegetarians, keto etc, to find out their current usage of nutritional tracker applications. Finally, we will be interviewing people who cook at home to see if they use any nutritional tracker apps and how it affects their cooking process (if applicable).

For targeting secondary audiences, we will also conduct interviews to find out if they currently use similar apps to monitor their weight goals and dietary goals respectively to understand their different motivations and needs. This will help us to adjust our features slightly to include them as our secondary audiences.

Observations and Data Gathering

The first round of interviews was conducted in-person to understand more about users' experiences with the existing apps that they are using, which all happened to be MyFitnessPal. This eliminates the need of reviewing other such applications. After the initial interviews, we decided to narrow our scope into two features, to focus on making inputting of meals simpler in Singapore's context, and to help people with special diets set their required nutritional intake more easily.

Hence, in our second and third round of interviews which were conducted as part of the user study, we focused on the narrowed scope and only interviewed our primary users. The results of the second and third round of interviews will be discussed more in the User Testing section.

Initial Interviews to Understand Users' Experience with Existing Calorie Counter Applications

We interviewed 5 users who have used MyFitnessPal to understand more about their motivations for using the app and their experience with the app, and used an affinity diagram (Figure 1) to help us summarise their inputs better. These inputs from them helped us to craft our user personas and focus on essential features for our prototypes. All 5 interviewees used the app to count calories, either to track their dietary goals, or to achieve a daily desired number of calories in order to gain/lose weight.

Users were asked to take us through the process of them using the app, while verbalising their actions and thoughts. As MyFitnessPal's home page is a social media timeline, all users first clicked on the Diary page before inputting their meals. When asked further, all users stated that they do not use the social media function on MyFitnessPal at all. On the Diary page, users would click on the add button to input their food and serving size. 4 out of 5 users estimate the food portions roughly, while 1 user weighs the food (if at home) before inputting the exact weight of the food.

We then made users imagine that they were in a coffee shop and ordered mixed vegetable rice with the usual dishes that they would order and asked them to show us how they would normally go about inputting their food. 1 out of 5 users said that she does not track calories when outside as it is too inconvenient. The remaining 4 demonstrated to us by searching each dish and adding them one by one. However, 3 out of 4 of them did not know the name of at least 1 dish that they

usually ordered and said they would normally omit the food item if they were unsure. For meat and fish dishes, all 4 of them used the generic options like "1 portion of chicken", and verbalised that they were doing a very bad estimate. One user said, "for stuff like *caifan* (mixed vegetable rice) and homecooked food then abit troublesome ah… I just anyhow but I know not accurate". Another user said, "have to *agar agar* (make rough estimates), just that I'm like a perfectionist and I feel very uncomfortable when I say I eat 2000 calories but know that there is something I never count. For those stuff that I roughly estimate not so bad."

As 1 out of 5 of the users interviewed was on a ketogenic diet, we asked him if the app helped him keep to his special diet in any way. He said it was just like normal calorie counting, just that he had manually changed the goal to suit his diet. When asked further about how he determined the values to set, he said he did his own research and it was troublesome. However, he was also unsure whether he was setting the right values for his keto diet as different sources online had conflicting information.

We summarised our observations and insights from the interview in the table below.

Table 5 Interview Observation and Insights

Observation	**Insights**
Users do not use social media function on MyFitnessPal	Users mainly use calorie counting app to count calories, so the focus of the app should be on that function.
Most users estimate their food portions roughly, but there are some who tries to be as accurate as possible	Giving predefined portions/weight to each food item (like MyFitnessPal) will be convenient for users, but it is also important to give users the option to edit if they wish
Keying in multiple-dishes meals (common in Singapore) is troublesome and results in poor user experience when people are unsure of the name of the dish they have eaten.	• Allowing users to search for the generic name of the food, for example *caifan* (mixed vegetable rice), and seeing all the common *caifan* dishes at once will make adding of individual food items for *caifan* easier. • Having pictures along with the name of the food might help users with the identification of the food
Some users do not track calories when eating out as it is too inconvenient.	Allowing users to add food based on the eatery they have visited might make it more convenient and accurate for users.
Users following special diets manually change their Macronutrients goal based on their own research.	Allowing users to select diet presets (and change it easily) might improve their experience since • they do not have to manually change each Macronutrients goal • Can use the app as a source of information rather than having to do research on their own.

Table 6: Observation and Insights

Table 7 User Needs and Application Features

Needs/Wants	Relevant Features
Goal Setting	Diary Page for tracking and showing trends, with settings to adjust goals
Quantifying food intake	
Calorie Counting	Adding food using different methods
Adding Meals	
Special Diet Options	Pre-sets for special diets (during app set-up and able to update in settings)
Wanting to lose/gain weight using the app	Weight and Height tracking (during app set-up and able to update in settings)

Table 8: Features derived from Needs and Wants

- Scenarios

Name	Jane
Age	19
Occupation	Student
Education	Bachelor's (Math)
Location	Singapore

Primary Users

User Scenarios

Jane has been an undergraduate student studying Mathematics for the past three years. She has been staying in hostel as her university campus is located far away from her home and she is not keen on travelling back and forth due to the lack of time she faces brought about by a packed schedule. Her usual day looks as such: She wakes up at 8:00 am and gets ready for her morning lecture at 9:00 am. Due to the Covid-19 pandemic she has lessons split between being in-person and online. When she has lectures online, she doesn't feel like going out of her room to get breakfast and eats whatever she has stocked in her pantry. Throughout her day, she tends to eat what is conveniently available to her on campus and she tends to eat meals with her friends although she is not entirely particular about it. She has recently been feeling unhappy with her dietary habits and is not happy that she is unable to control the food she consumes and currently chooses food out of convenience. She was recently recommended SingaDiet by her friends and she keen to use it to give her diet more control and direction. Nowadays, before she goes to sleep, she purchases her morning breakfast. She scans/keys in the food item in the morning as she consumes it. Before leaving her hostel in the afternoon for lunch, she uses SingaDiet to find food places near her and chooses her meals based on its nutritional breakdown. She likes to plan this before hand as it ensures her food decisions will be well-informed. She enjoys the certainty, insight and control provided by SingaDiet through the information provided to her.

Name	Jenny
Age	30
Occupation	Former UI Engineer
Education	Psychology
Location	Singapore

Primary Users

User Scenarios

Jenny is a new mother to twins. This was her first time being pregnant and giving birth and she is struggling with post-pregnancy weight. She is still on maternity leave and is keen on adjusting her life-style before she begins working again. She has time to cook at home and her day usually looks as such: She wakes up in the morning and cooks some lunch to pack for her husband who has to leave for work early. After which, she takes care of her children while also having some breakfast herself. She takes some rest before she has her lunch and does some household chores. She is still recovering from the pregnancy and does not enjoy cooking every meal. Her husband helps pack food for the family every alternative day saving her the effort of preparing for dinner. She has also been feeling insecure of her post-pregnancy weight gain and is very keen on adjusting her lifestyle to allow her to lose weight. She has been feeling frustrated lately as her making the same few meals at home has not been helping her lose weight and she feels like she has exhausted all her options. Her husband has recently introduced her to SingaDiet and she has started using it. She has begun exploring new recipes and spends some time every night to key in her food intake for the day. She keeps track of her weight and knows that it will take a while for her to see progress but is hopeful that with the new approach and insights it will be possible.

Name	John
Age	27
Occupation	Associate at MOE
Education	Bachelor's
Location	Singapore

Secondary Users

User Scenarios

John is a freshly minted university graduate and is currently working as an Associate in MOE. From a young age he was very passionate about sports and fitness and since he enrolled in University, he has been following a Keto diet as he believes it helps him maintain his fitness better. Due to his special diet, he usually packs his lunch from home before going to office. He is bothered by the fact that he is missing out on an opportunity to socialise with his co-workers during lunch breaks. His gym-friend recently introduced him to SingaDiet. His day now usually looks as such: He wakes up early for his morning work-out before having his supplements and cooking himself a breakfast. Occasionally, he likes to look up new recipes to cook but he is bothered by the fact that he can't accurately key in nutritional data of food cooked in conventional applications. With SingaDiet, he keys in his morning supplements and breakfast into the application. He is able to explore new recipes and key them in easily. At office, he decides to join his co-workers for lunch and explores eateries that support his special diet. Conflicting sources of information on the nutritional breakdown of an ideal keto diet has been a source of frustration for him in the past but now he has standardised nutritional goals according to his selected diet prepared and presented to him through SingaDiet. Every night, he will measure his body weight before going to sleep and likes to keep track of his weight trends over many days, weeks and months.

- Prototyping

We began ideation with low fidelity prototypes, making use of paper prototypes to get a better understanding of how our user interface would look like. The paper prototypes allowed us to explore different ways of handling features derived from the user scenarios in the previous section.

Table 9 Paper Prototypes

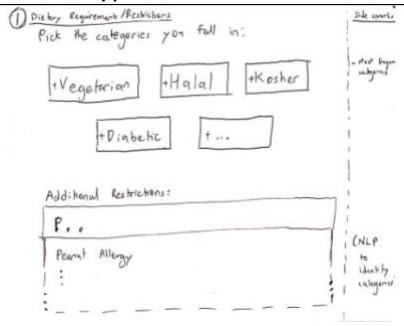
<table>
<tr><td>Feature</td><td colspan="2">Paper Prototypes</td></tr>
<tr><td>Special Diet Options</td><td> 

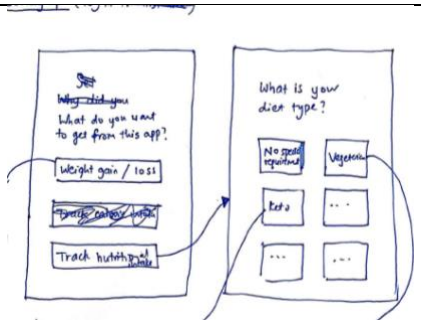
Figure 1: Special Diet Option Design 1</td><td> 

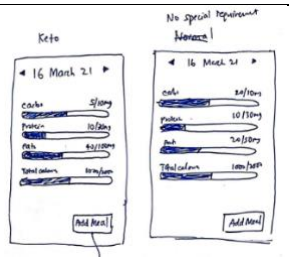
Figure 2: Special Diet Option Design 2</td></tr>
<tr><td>Goal Setting</td><td> 

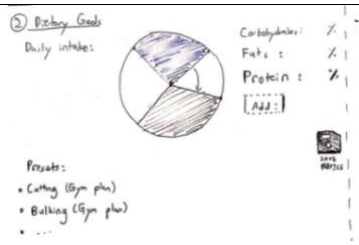
Figure 3: Goal Setting Design 1</td><td> 

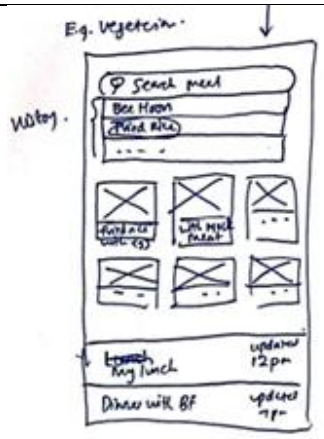
Figure 4: Goal Setting Design 2</td></tr>
<tr><td>Meal Selection and Recording</td><td> 

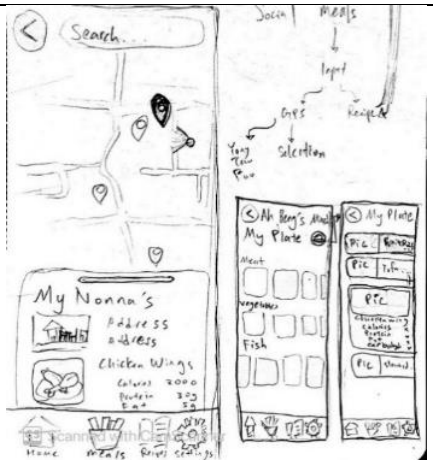
Figure 5: Meal Selection and Recording Design 1</td><td> 

Figure 6: Meal Selection and Recording Design 2</td></tr>
</table>

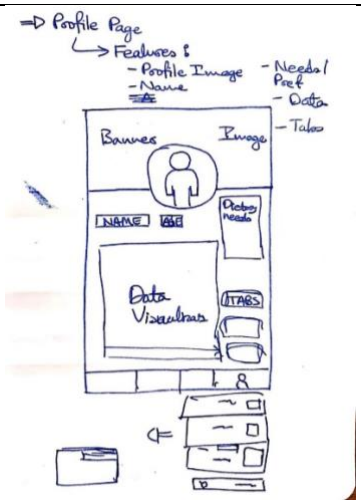
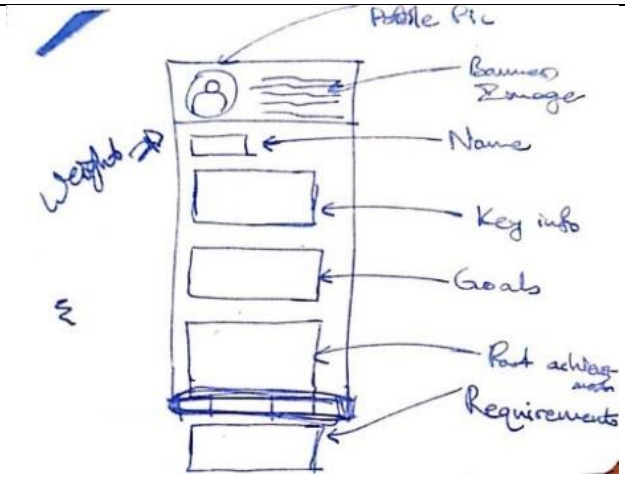
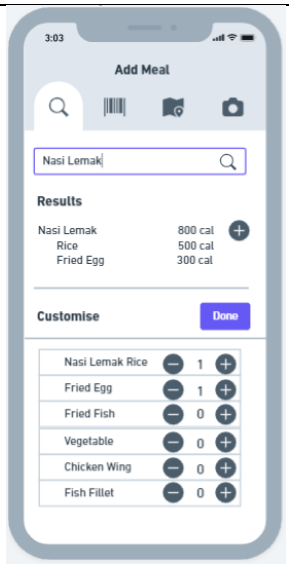
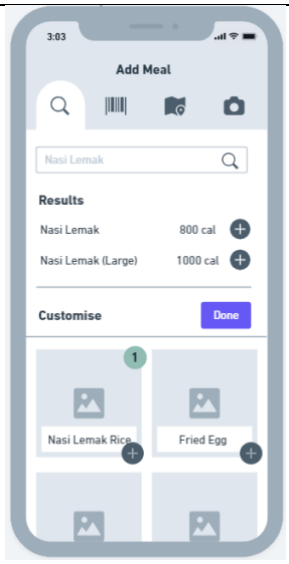
User Profiles	 *Figure 7: User Profiles Design 1*	 *Figure 8: User Profiles Design 2*

Table 10: Paper Prototype by Feature

The prototypes were evaluated using Jakob Nielson's 10 Usability Heuristics. Useful features from these prototypes were then brought forward into the next iteration of prototypes. For example, the User Profiles feature was dropped from the next iteration of prototypes due to the lack of use based on our data gathering.

We then began experimenting with barebones user interfaces using tools such as "Whimsical" to get a more accurate view of the application, developing multiple views for a single interface screen to carry out AB testing with our user research groups.

Table 11 A/B Testing with Whimsical

Feature	A	B
Add Meal	 *Figure 9 Add Meal Design A*	 *Figure 10 Add Meal Design B*

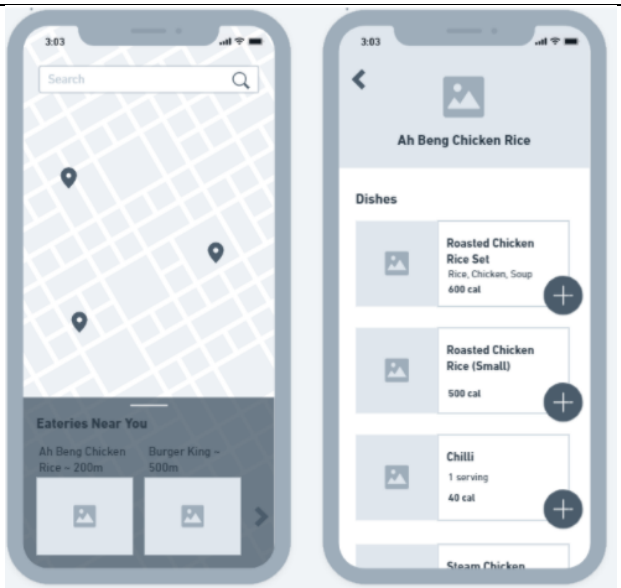
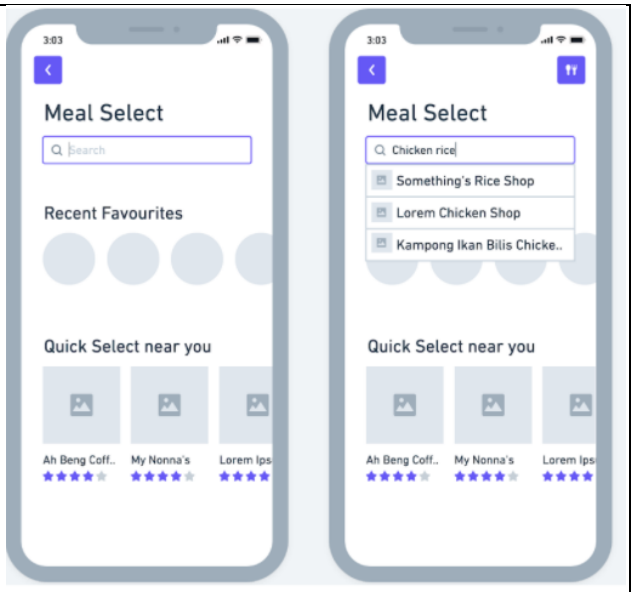
Add Meal by Location		
	Figure 11 Add Meal by Location Design A	*Figure 12 Add Meal by Location Design B*

Table 12: Whimsical Prototypes by Feature

With a better view of the necessary features for implementation, we then developed the possible use case diagram of the application which allowed us to link up the different features and components of the application.

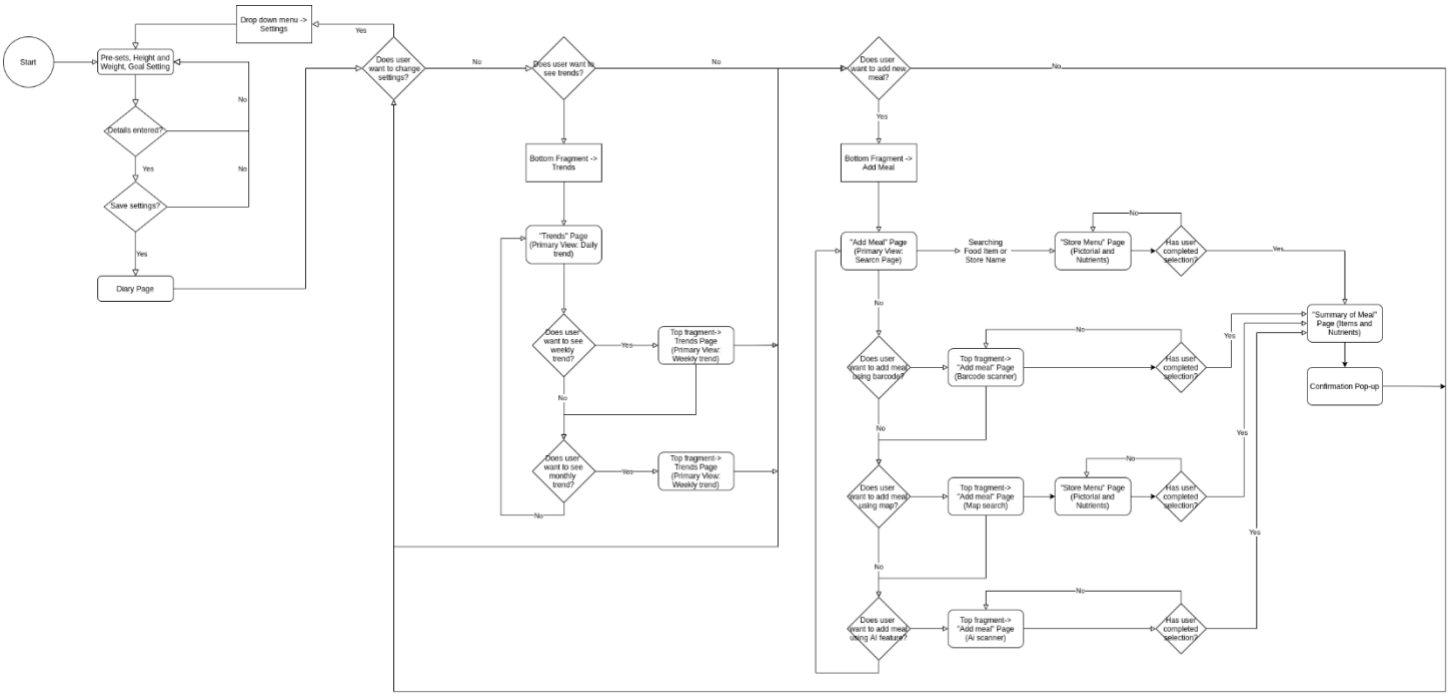
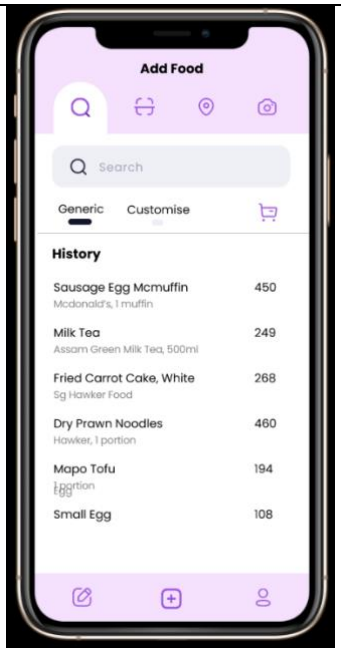
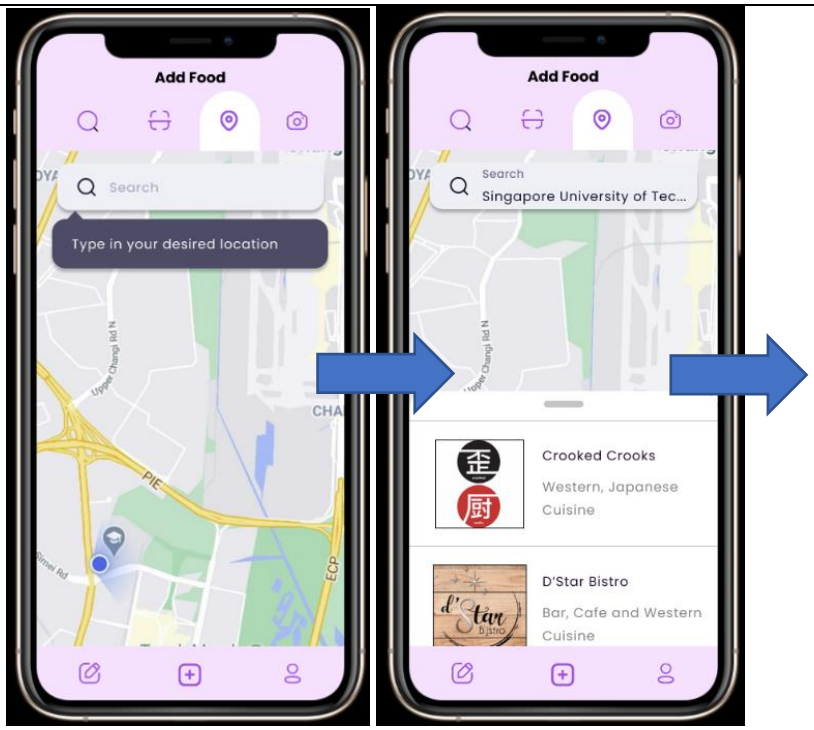
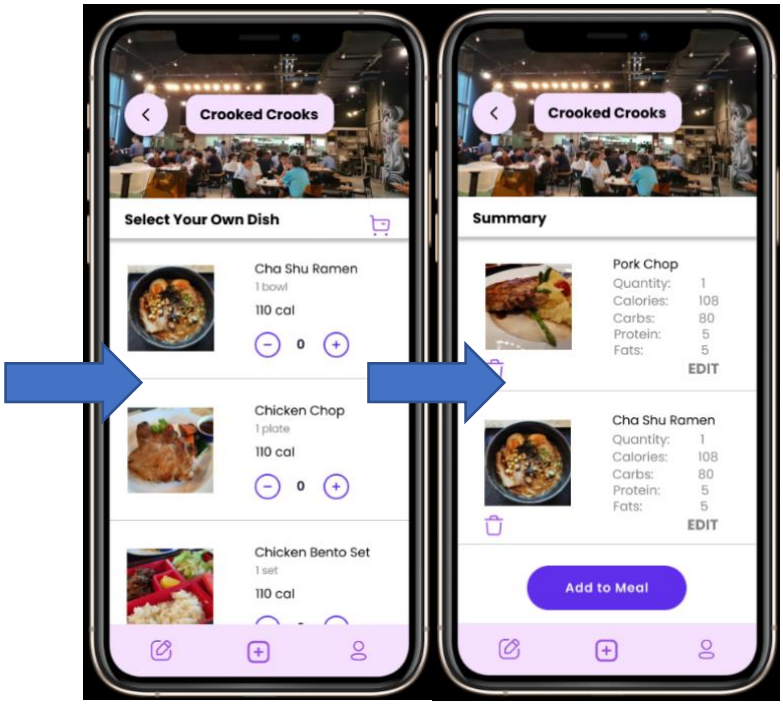


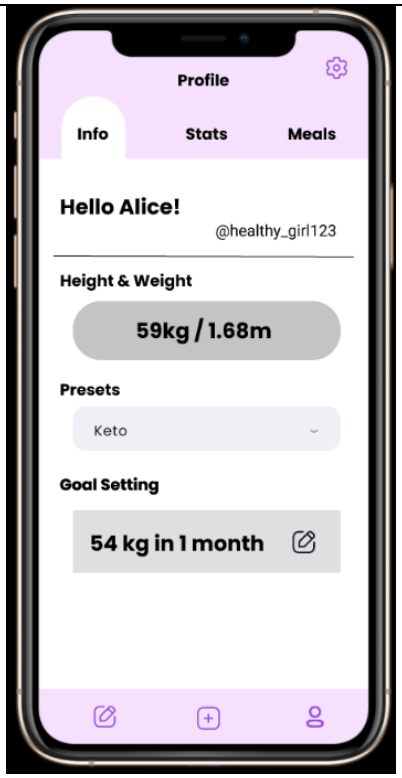
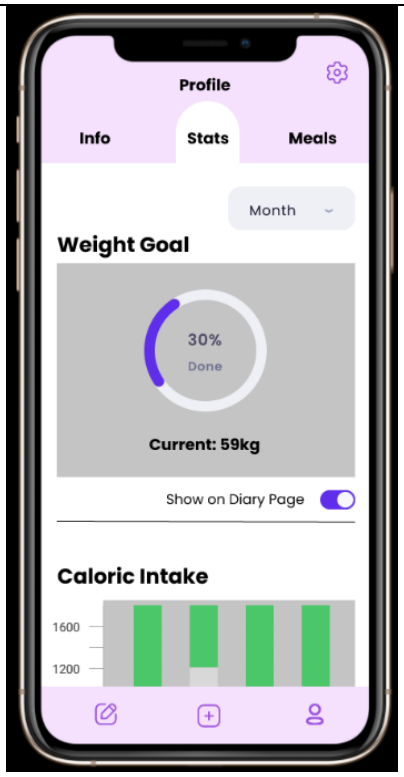
Figure 13 Use Case Diagram using diagrams.net

This would be beneficial in the final part of our prototyping process where we utilized tools such as “Figma” to develop our interactive high-fidelity prototype. The app flow would aid our development process in forming the connections between separate user interface screens.

Table 13 Final Prototype Features

Feature	User Interface
Diary Page of Calorie intake and history of past meals	 *Figure 14 Diary Page*
Add meal Feature based on Search Menu	 *Figure 15 Add Meal by Search*

Add meal Feature based on location	 *Figure 16 Add Meal by Location "Map" Page*  *Figure 17 Add Meal by Location "Food Selection" Page*

Profile Info	 *Figure 18 Profile Info Page*
Profile stats with option of Day/Month/Year trends	 *Figure 19 Profile Stats Page*

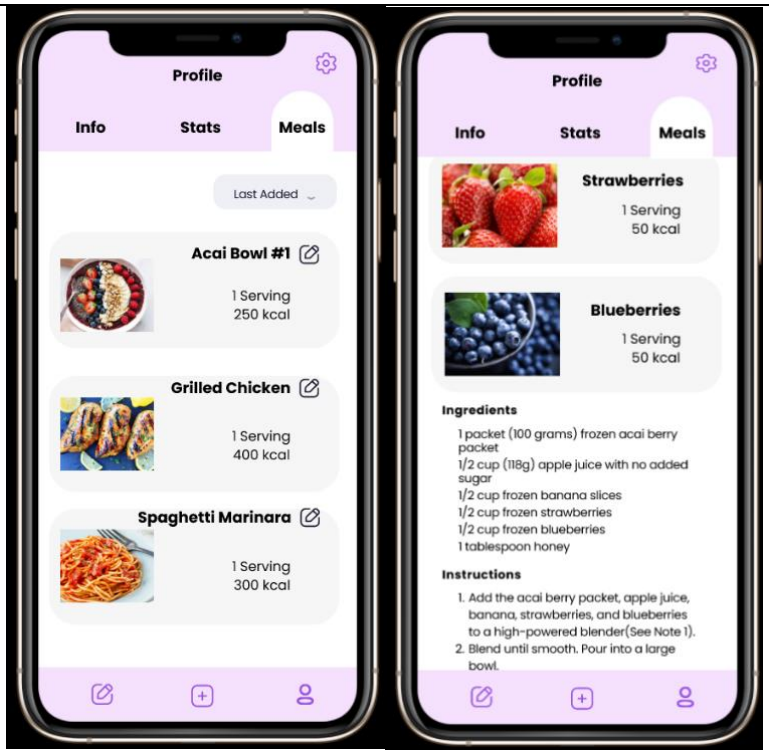
Profile Meals/Recipes	 *Figure 20 Profile Meals / Recipes Page*

Table 14: Figma Prototypes by Feature

- User Testing

User Testing (from mid-term)

We plan to do user testing at three stages. After doing our wireframes, we will use Treejack, an online platform to test out our information hierarchy. Users will do a survey-like questionnaire as seen in figure 2 below. Based on the results of this test, we will be able to find out if users are able to navigate through our app and find what they are looking for easily.

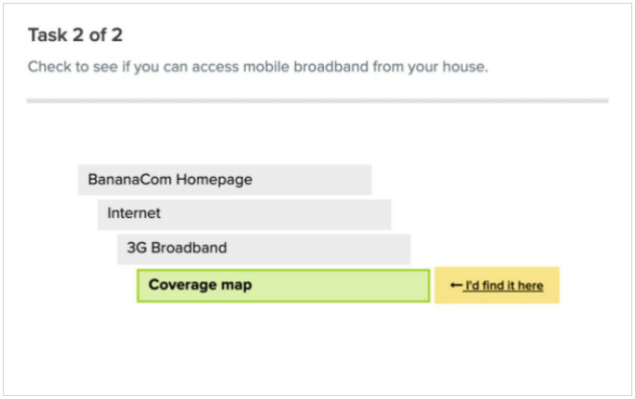


Figure 21 Example of Question on Treejack

After doing our interactive low-fidelity prototypes using Figma, we will get users to test the prototypes on their phone. One of us will facilitate the session with the participant, while the rest of us can observe the session remotely using Figma's observation mode. To test our prototype, we will turn user goals into task scenarios. For example, we would say "You have just finished your lunch and you want to update your calories. Use the mockup to do that." We will tabulate the task success rate of each task, and error rate. We will also take down notes of the errors that users made, get users to do the System Usability Scale (SUS) Survey, and interview the participant to gather qualitative feedback. If we get good quantitative results and positive qualitative feedback, it will mean that our solution is successful.

Taking into consideration the feedback and results from our lo-fi prototype testing, we will do our hi-fi prototype accordingly and do testing. We will take the same approach and measure the same things.

Evaluation Using Paper Prototypes

We initially started user testing with low-fidelity prototypes such as paper prototypes. This is done via a simplified version of an expert review (**Heuristic Evaluation**) within our own group, with 1 person testing the other 4 prototypes made by other members. It was done in an informal manner, which we evaluate based on Jakob Nielsen's 10 usability heuristics (Nielsen 2005). Some issues we identified were #2 Match between system and the real world and #3 User Control and Freedom. For #2, some of our paper prototypes did not have the right icons to signify meaning to some of us instinctively. For #3, some of our paper prototypes were lacking an "exit" button to return to previous screen, for users to undo any mistakes they made in the application. Thereafter, the 10 usability heuristics were taken into consideration in designing further prototypes.

Evaluation Using Low Fidelity Wireframes

Instead of testing the information hierarchy using Treejack as we have planned, we did some simplified A/B testing with wireframe screens we made using Whimsical as we felt that interfaces would be easier for users to understand what we are referring to as compared to words. We focused on two main features, the diary and add meal page. The diary page is essential for users to view their current calorie counting progress. The add meal page, focused on our main feature, improving user experience in the local context. During our class presentation, via a survey we created to record their responses and take in live feedback from the audiences.

These quantitative responses are then analyzed afterwards, used in our approach in future wireframing. Some of these feedbacks are 60% prefer the statistics features to be in the diary page, 65% prefer the add meals feature to include pictures of the food item when choosing (Figure 11), Finally, 70% of respondents prefer a "Google Maps" view (Figure 12) as compared to a "Grabfood" view (Figure 13) for the map page. Table w below highlights some key findings.

Feedback	Next Iteration's Improvement
When searching for food item to input calories, users think that it is confusing to have "Results" and "Customise" on the same page. They thought that they are customising the selected result.	Rename the titles and create separate tabs for the general results and the customisable results.
When selecting food items for customisation, users prefer pictures to choose from rather than just words	Work on the prototype with pictures for food items
When user has selected a food item during customisation, he/she is unable to delete the food item on the customisation page.	Change the UI of the counter/increment stepper to ensure that users can change the quantity easily.

Table 15: Improvement for next iteration

All these feedbacks were incorporated into the next stage of mid-fidelity prototyping.

User Test 1: Methodology

Moving on to mid-fidelity prototyping, we used Figma for wireframing. From all the info we gathered, we crafted a working prototype on Figma. We conducted cognitive walkthrough sessions with 3 of our primary users over Zoom. We screenshared the Figma prototype with the users and gave them remote control access to complete the tasks given below.

The tasks we gave users were as follows:

1. Imagine you are trying to lose weight and so you are counting your calories to ensure that you do not exceed the daily intake amount. You went to a hawker centre, and decided to eat Nasi Lemak. As you are a picky eater, you usually only order a fried chicken to go with the nasi lemak rice. Please use the search function to customise your food and add the calories of the food that you have eaten.
2. Now, imagine that you are in SUTD and decided to eat Crooked Cooks for lunch. As you are very hungry, you ordered 2 main courses - pork chop and cha shu ramen. Use the location function of the app to input the calories of the food items you have ordered into an existing meal category you have created.
3. Imagine that you have recently adopted a keto diet. This means that your diet is going to consist of less carbs and more fats. The daily macronutrients intake shown on the diary page is no longer accurate since it caters to people on a normal diet. Change your diet settings from "normal" to "keto" to get a more accurate macronutrients daily goal.

Through these series of tasks, we measured the completion rate, time taken to complete each task, and number of mis-clicks (if any). As we screen recorded the users' interactions with the prototype, we could establish the time taken for each task by subtracting the end time from start time from the video timestamp. The number of mis-clicks were also manually counted from watching the recorded video.

Throughout the sessions, one member will oversee each step in the task sequence, if he/she can tell a credible story based on the following questions (Wharton et al., 1994):

1. Will the user try to achieve the right effect?
2. Will the user notice that the correct action is available?
3. Will the user associate the correct action with the effect that the user is trying to achieve?
4. If the correct action is performed, will the user see that progress is being made toward the solution of the task?

These allow us to understand if our prototype led to success stories, working as it was intended to be.

At the end of the session, a survey with the System Usability Scale (SUS) (Brooke, 1995) questions was sent to each participant to evaluate the usability from the user's perspective. Our target was to achieve a SUS score of 68 and above, which is a 50th percentile and above score for SUS. (Klug, 2017)

User Test 1: Results

The results of the first user testing can be seen in table 7 below. The average SUS score was slightly above our target of 68. All 3 users feedbacked that it was not intuitive that the app started off from the Add Meal page, and suggested that the Diary page should be the landing page upon entering the app. 2 out of 3 users also feedbacked that the shopping cart icon for the customisation page was not intuitive. For task 3, the user who could not complete it could not find where to change the diet settings. He feedbacked that this was because he was looking for a heading called "Diet Settings", but the section was named "Presets". These qualitative feedbacks were taken into consideration and changes were made accordingly (table 8).

Table 16 User Testing 1 Results

	Average Task Completion Rate	Average Number of Misclicks	Average Task Time	Average SUS Score
Task 1	0.66	3	39.68	72.5
Task 2	1	2	25.23	
Task 3	0.66	1	22	

Table 17: Results from first user testing with target users

Table 18 Improvement for next iteration

Feedback	Next Iteration's Improvement
Not intuitive that the Add Meals page was the landing page	Changed Diary Page to be the landing page (See Appendix)
Shopping cart icon at the customisation tab of the search food page is not intuitive	Changed icon to a "Done" button (See Appendix)
User does not expect to change diet settings under "Presets" heading	Changed "Presets" to "Diet Setting" (See Appendix)

Table 19: Feedback for next iteration

User Test 2: Methodology

After improving on the previous iteration, the same steps were taken to conduct user testing on 5 other primary users.

User Test 2: Results

The results of User Test 2 can be seen in Table Z below.

Table 20 User Testing 2 Results

	Average Task Completion Rate	Average Number of Misclicks	Average Task Time	Average SUS Score
Task 1	0.8	2	30.1	75
Task 2	1	2	16.2	
Task 3	0.8	1	14.7	

Table 21: Results from first user testing with target users

From iteration 2 to iteration 3, there was a notable improvement across all metrics used for all 3 tasks.

- References

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- Appendix

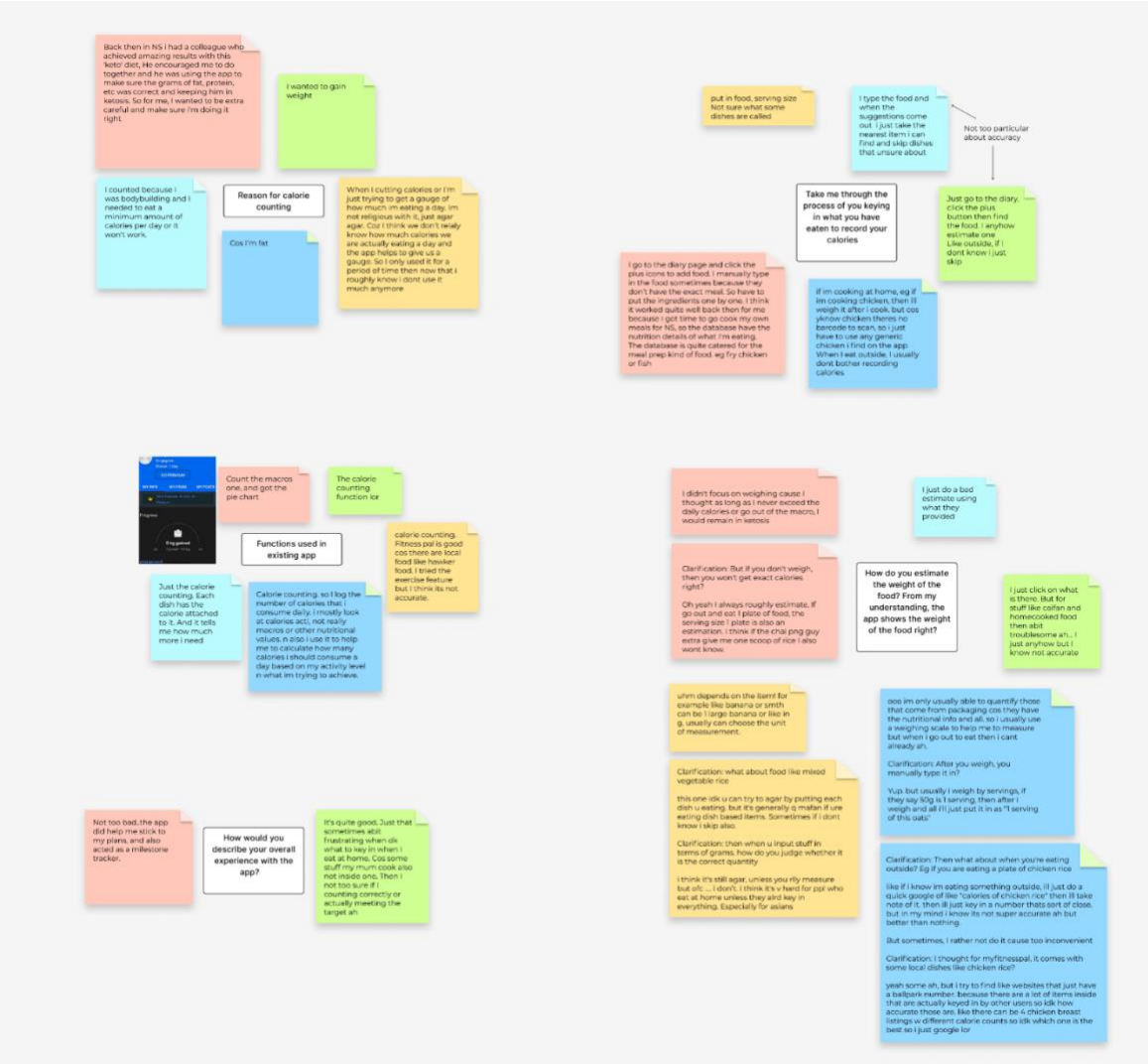

Figure 22 Overview of Affinity Diagram from Interviews

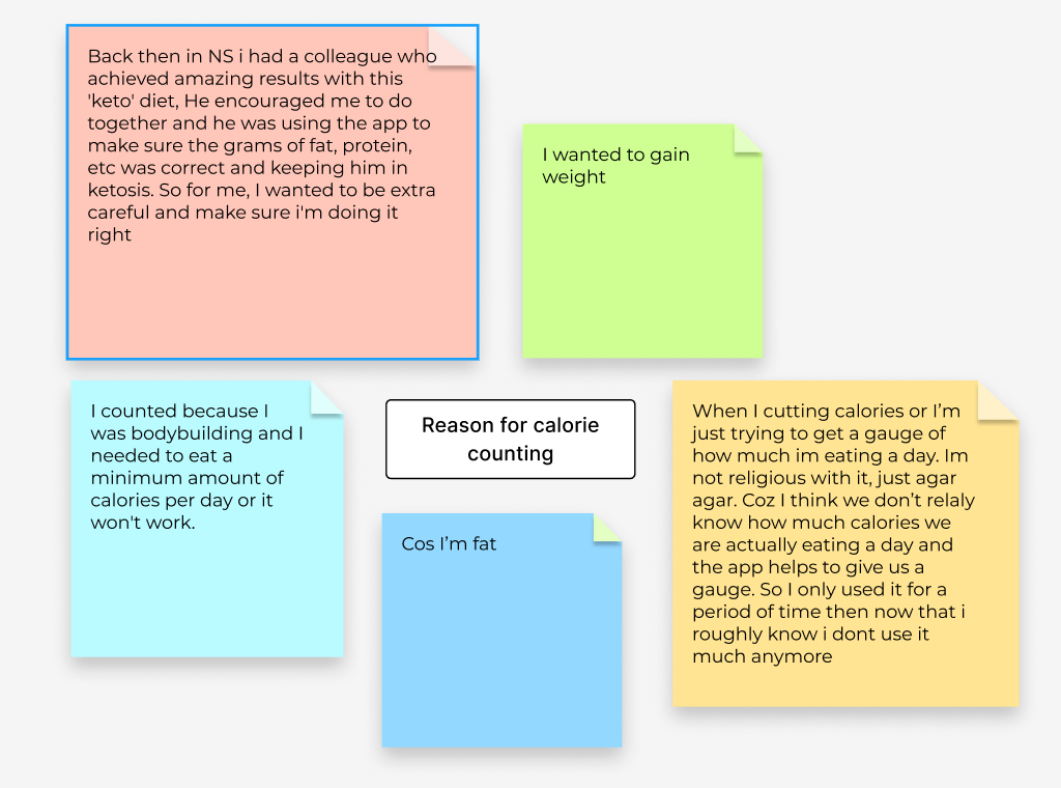

Figure 23 Affinity Diagram (Reason for calorie counting)

Figure 24 Affinity Diagram (Process of recording calories)

Figure 25 Affinity Diagram (How do you estimate the weight of your food)

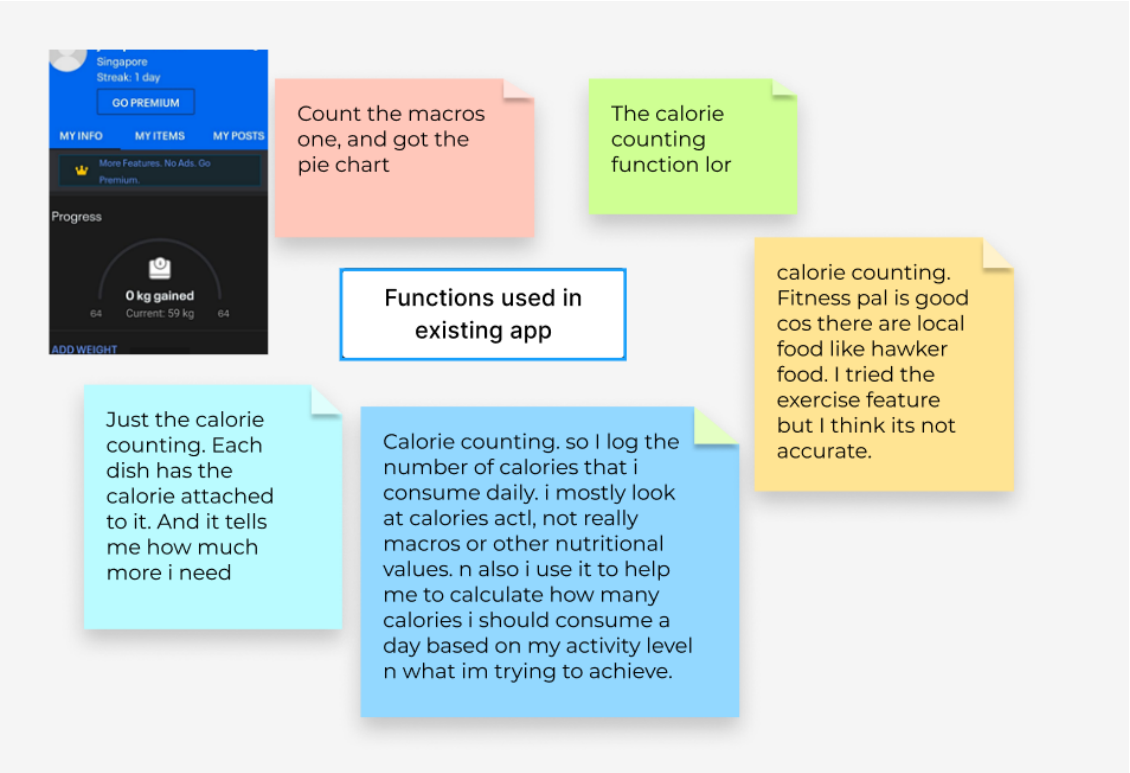

Figure 26 Affinity Diagram (Function used in existing apps)

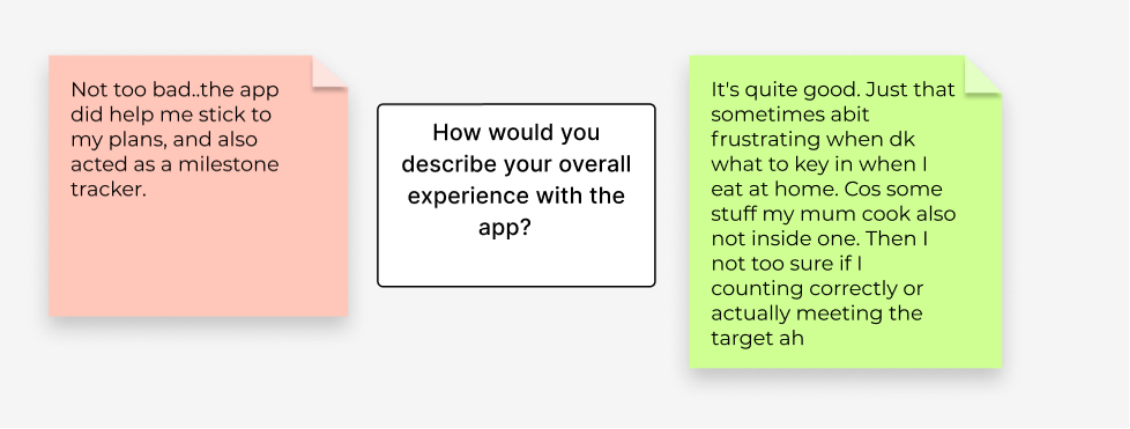

Figure 27 Affinity Diagram (Overall experience with the app)

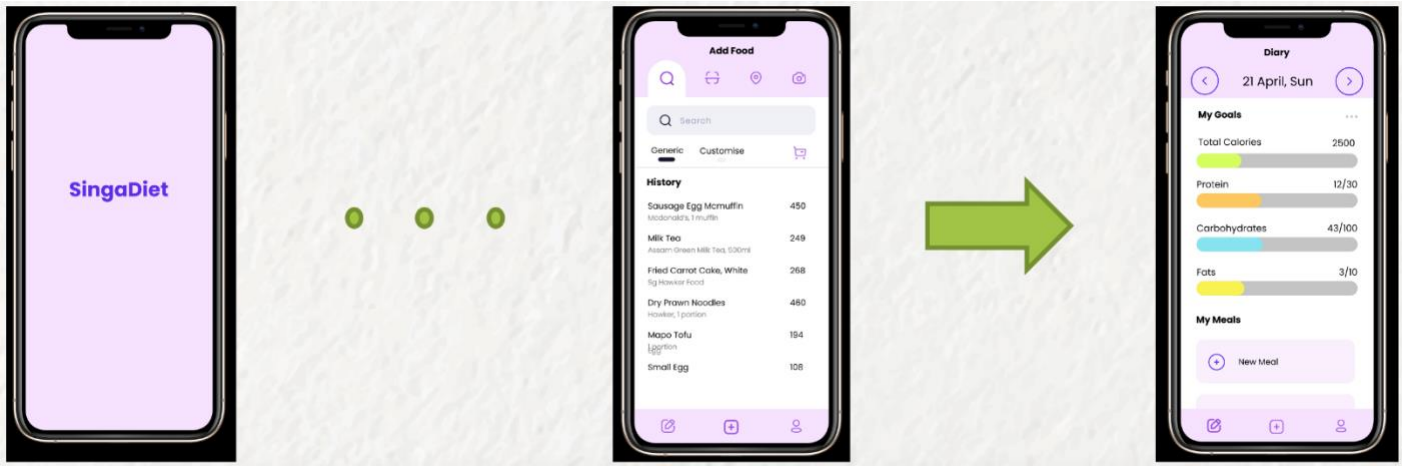

Figure 28 Changing of Diary Page to be the landing page

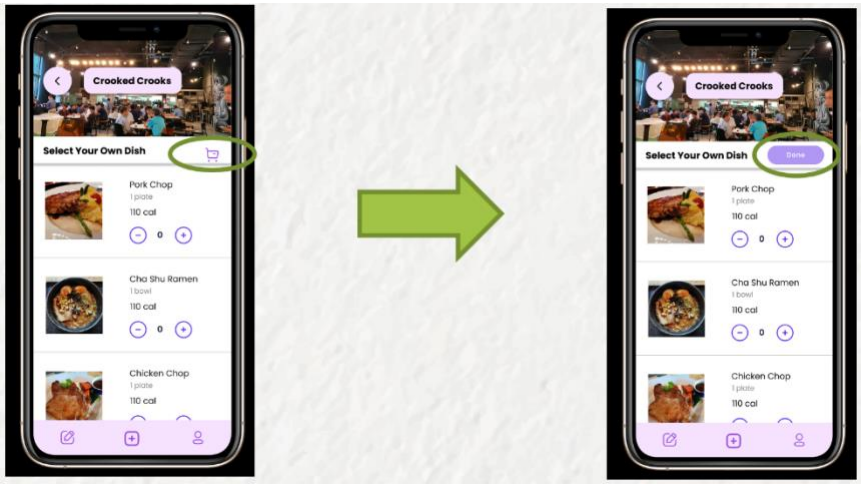

Figure 29 Changed Shopping Cart icon button to a "Done" button

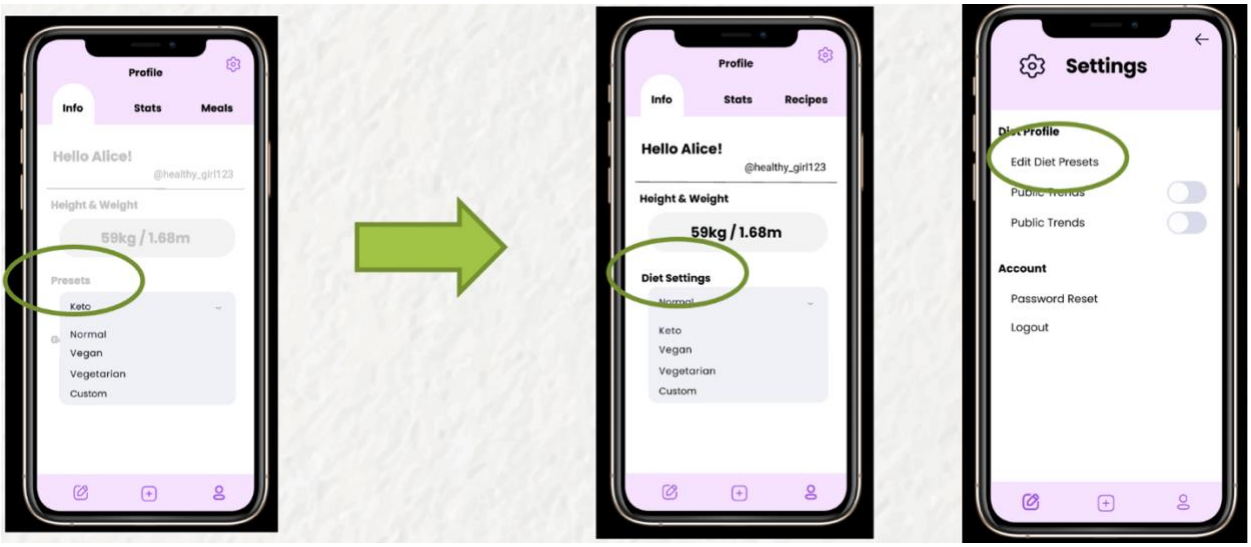

Figure 30 Changed "Presets" to "Diet Setting"