BetterBite - Final Report

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Introduction & Motivation

BetterBite is a daily nutrition tracker app that exists for users to obtain a better understanding of how to maintain their health. BetterBite addresses people's struggle not only to monitor calorie intake but also to understand whether their overall nutrition supports their health goals. Prior research shows that most people lack a balanced diet and often misunderstand how nutrients contribute to long-term well-being (USDA, 2020). Our project responds to this need by giving users a structured, evidence-based way to log what they eat over a week and receive a clear, personalized breakdown of their nutritional strengths and deficiencies. Our design focuses on nutrient composition, which aligns with human-centered design principles that emphasize users' real motivations and deficiencies in their existing tools (Norman, 2013).

Our intended users include health-conscious individuals, beginners seeking to understand their diet, and college-aged students wanting to optimize their nutrition. These users often turn to existing apps, like MyFitnessPal, that rely heavily on calories and rarely provide actionable insights into nutrients. This omission is noted in both industry reviews and academic studies of nutrition-tracking technology (Mendes et al., 2022). BetterBite fills this gap by combining weekly food logging with data from our chosen open-source nutrition database, Spoonacular, which enables our app to measure intake against dietary benchmarks and recommend realistic, preference-aware alternatives. Our minimum viable product focuses on four core interactions: a profile quiz, structured weekly food entry, nutrient-balance evaluation, and tailored recommendations for nutrition improvements through homemade recipes. Each of these categories was chosen because they directly support the user's goal of understanding and improving their diet.

The project is significant because it helps users build awareness of their nutritional patterns through feedback grounded in data and visualization. The experience is designed to be simple and not overwhelming. The user logs their meals for the day, which generates a nutrition summary, and a graph that maps to the user's weekly nutrient consumption. Also, users can see their personalized recipe recommendations based on their own preferences. BetterBite also promotes nutrition education through items like short pop-ups explaining nutrition vocabulary. Through our user research on campus, we were able to reach students who validated the need for nutrient-based insights that included both macro- and micronutrients. The work was worth our time because it enabled us to create an experience that not only fills a documented gap in nutritional-tracking tools but also empowers users to make healthier choices. Ultimately, BetterBite contributes to a broader public-health objective by helping individuals overcome common barriers to understanding nutrition, while advancing design practice by reframing diet tracking as a nutrient-literacy and food-positivity challenge.

Specification: Requirements, Personas & Use Cases

Our final list of requirements for BetterBite have been continuously improved and iterated based on our user studies and feedback from the teaching team. These requirements are listed below:

1. As a visual learner, I want recipes and nutrition tips communicated with interesting visuals so I can understand and use those recipes despite my busy schedules.
2. As a student, I want recipes that are easy and quick to make, so I don't need to sacrifice my health for my studies / research.
3. As a nutrition beginner, I want my nutrition resource to have simple, clear language so that it is understandable regardless of my experience with nutrition.
4. As a busy person, I want to see infographics about my nutritional diet, so that I can attain a lot of nutrition information in a short amount of time.
5. As a student following a protein-based diet, I want to quickly see the breakdown of my meals with visual guides so I can stay conscious of nutrition without devoting too much time to the nutrient tracking process.
6. As a learner, I want my nutrition resource's data to be accurate and up-to-date so that the information I am presented with is reliable.

We have managed to fulfill many of the above requirements with functionality that meets the user experience expected from our potential audience.

We have managed to provide the user with visuals such as progress bars, images for recipes, and timeline graphs (Figure 7) to indicate the user's nutritional information and guide the user to make more informed decisions about their eating habits, which is what our app went out to do.

Additionally, we provided the user with information on the recipe page about the ingredients and time it takes to make each recipe, giving the user an option to look at short, easy recipes for when users are in a rush, as our user base consists mainly of students who have many other responsibilities to tend to.

We also implemented popups in our application to give the user more information about different nutrients and how those nutrients tend to affect the average adult's body. This is to ensure that users understand the importance of keeping a healthy diet, and to incentivize users to eat more consciously.

One of the requirements we did not get around to fulfilling was keeping a more specific view of how every meal can affect a user's diet. In the future, we may implement a way to track how each meal affects the nutritional analysis page rather than only displaying the total analysis for each day, and this may help users understand what foods benefit their nutrition and what foods they may need to cut down on to give the user more actionable goals in terms of their diet.

Finally, we ensured that our data was always up to date through the Spoonacular API, which is heavily based on the USDA food database. The USDA food database is updated at different intervals, but generally branded foods are updated monthly, which is fairly often.

Some visuals are provided below for reference.

Personas

Persona 1 - Marta (The Busy College Teacher Assistant):
Bio:

Marta is 20 years old and is working as a college TA for multiple courses. She is usually busy tutoring or grading papers, so she does not have a lot of free time throughout the week. She is not an avid cook and, as a result, she does not have much experience with making homemade meals. Instead, she usually goes out to buy food during her lunch break and/or orders food to be delivered to her home. When she does cook, she prefers simple recipes that are quick. She currently has a general knowledge of nutrition that comes from things she learned from social media or from the health class she took in high school.

Goals:

- Save money by cooking food at home instead of buying prepared meals.
- Minimize calories and sugars in her diet as part of her weight loss journey.
- Eat more protein to complement her exercise routine.
- Cook food that she likes and that will taste good.

Where we can help:

- Filter recipes based on Marta's preferences (e.g., Mediterranean, Italian, etc.)
- Filter recipes that complement Marta's diet.
- Suggest short recipes that can be completed in under 45 mins.
- Provide the option to learn about nutrition category meanings and their significance.

Persona 2 – Aliya (The Woman with PCOS)
Bio:

Aliya is a 21 year old woman with PCOS (Polycystic Ovary Syndrome). She is currently an undergraduate studying Pre-Med. With her busy schedule and health diagnosis, Aliya is constantly struggling to find the time to make meals that suit her. As a woman with PCOS, Aliya needs to constantly watch what she eats to avoid her symptoms getting worse, which results in her over analyzing every meal she consumes. Although she does know how to cook, oftentimes she relies on other individuals such as family or friends to cook for her, as she does not live alone.

Goals:

- She wants to find meals that don't result in her symptoms flaring up, such as foods that avoid excess amounts of sugar and carbs.
- She needs resources that teach her how to cook with limited time and ingredients.
- She wants a way to track her health that doesn't stress her out or overwhelm her with conflicting or confusing information.

Where we can help:

- Filter recipes based on health preferences and factor in what foods trigger Aliya's PCOS.
- Suggest short recipes
- Provide Aliya with analysis on weekly consumptions through visuals
- Provide suggested improvements on nutrient consumption to maintain good health.

Use Cases

Marta:

Marta spent most of her day grading papers and tutoring, so she has limited free time to complete her chores. She decides to get a head-start by preparing her lunch right now. She is not sure what to make, so she opens Better Bite to look for inspiration. She is hoping for a simple recipe that is also healthy. As a new user, the first thing she sees is a questionnaire. It asks her for dietary restrictions, and she says she is vegetarian and cannot eat peanuts or gluten. It asks her what her preferences are and the Mediterranean is listed and she selects it. Then, she hits next after seeing she 100% finished bar in the questionnaire. Now, she is required to add a food entry of the most recent meal for that day. She selects Monday, her serving size, and enters her snack that was just potato chips for the day. After completion, she hits next and she sees her Nutrition Analysis. She immediately sees that her protein and iron bars are marked red and display low values, meaning those levels are low. She glances at the info icon next to these values and hovers over it, realizing that this means she could be at higher risk for fatigue and stomach problems. She hits next and sees the Personalized Food Recommendations section. The first recipe suggestion she likes is "Fresh Tomato Risotto with Grilled Green Vegetables" , a Mediterranean meal which was based on her preferences. She selects this salad, and she continues to the Recipe page. She can see in the image and list of ingredients that it is a quinoa bowl with broccolini, garlic cloves, olive oil, onion, quinoa, vegetable broth, and walnuts. She proceeds with this recipe because it looks simple and it aligns with her food recommendations. She gets the ingredients from her fridge and follows the provided instructions.

Aliya:

Aliya went to school and came home exhausted, ready for a night of relaxation. Her PCOS symptoms had been flaring up recently, causing her emotions to be all over the place and resulting in her feeling very tired. Her doctor had warned her that she needs to take care of her health and make sure she does not include too much starch in her diet, or her symptoms could get worse. When she got home, she didn't know how to make a meal that would satisfy her doctor's expectations with limited ingredients in her fridge. Aliya opens Better Bite to help assist with her meal. As a new user, she is introduced with a questionnaire homepage, one of the questions asks if she has any of these food restrictions, she selects Gluten-Free and Low-Fat due to her PCOS. Then, she hits next after seeing she 100% finished bar in the questionnaire. Now, she is required to add a food entry of the most recent meal for that day. She selects Friday, her serving size, and enters her meal. After completion, she hits next and she sees her Nutrition Analysis. She immediately sees that her Sugar bars are marked green and display 87%, meaning those levels are normal, but her protein and fiber were marked red and displays 20%, meaning levels were low. She hits next and sees the Personalized Food Recommendations section. She skims and looks for meals with protein and fiber. She sees in chicken salad that protein and fiber are highlighted in this meal. It has highlighted macros of Protein, Fiber,Vitamin D, and Iron. She selects the chicken salad.Then, she continues to the Personalized Recipe Suggestions page. She can see in the image and list of ingredients that it is a salad with grilled chicken, baby tomatoes, cucumbers,olives, olive oil, salt and pepper. Aliya is excited because it is a great choice that won't cause her flare ups and is quick. She gets the ingredients from her fridge and follows the provided instructions.

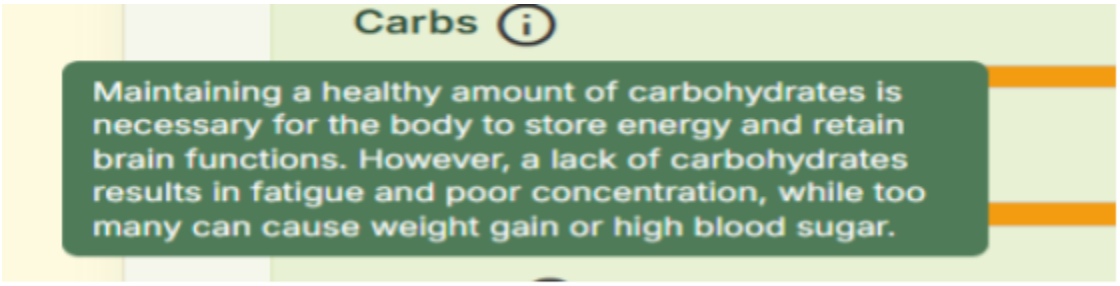

Figure 1
Pop-up for Each Nutrient, Detailing Vital Information

Illustrated Report: Minimum Viable Prototype

Our prototype link: https://betterbite.netlify.app/

BetterBite's main functionality is demonstrated across five main webpages: the Profile Quiz, the Food Tracker, the Nutrition Analysis, the Personalized Food Recommendations, and a recipe instructions page. Each page was created as part of our initial design proposal. Since then, we have updated each page and our implications of design based on documented user needs. Our prototype was built using HTML and CSS for the frontend, JavaScript and HTML local storage for the backend, and the Spoonacular API for fetching nutrition and recipe data. The frontend and backend technologies were chosen because they aligned with the scope of our MVP for this semester. We chose Spoonacular API because it offered a comprehensive database and search functionality for nutrition and recipe information. This API aligned the closest with our app goals. Our app is a supplement for users to track their food, receive feedback on their health choices, and provide guidance in food choices. Our program works as intended with small API limitations, but overall the program works. Our users can navigate and flow through our applications quickly while becoming knowledgeable about their health. Through a set of modifications over the studies where we introduced new features based on feedback like more visualizations and more signifiers for better navigation. Overall, BetterBite became knowledgeable yet simple, supporting users having a positive experience without feeling overwhelmed.

Key Functionality

- Profile Quiz that gathers user's dietary restrictions and food preferences (see Figure 3). This includes questions about the user's current diet, allergies, and favorite cuisine. We expanded this section by allowing for more options to choose from as well as letting the user choose more than one option. We added more quiz answer options as well as checkboxes as a signifier to indicate multi-selection. This fulfills our personas where like Aliya there are specific diet restrictions or like Marta specifically addresses multiple different food cuisine preferences. It makes it easier to view available recipe options for users who are on a time constraint or need guidance.

Figure 3: Profile Quiz cuisine options

- Food Tracker allows users to input their meals.We provide a drop down list of options for the user to select different food items, day of week, Food Category, servings, and Brand (see Figure 4). At the end of the week or whenever the user wants can clear all entries. Users can view a weekly summary of their food entries or each individual day. These target our intended users like

our personas Aliya and Marta where they want to make an improvement in their health and tracking their meals takes a huge part.

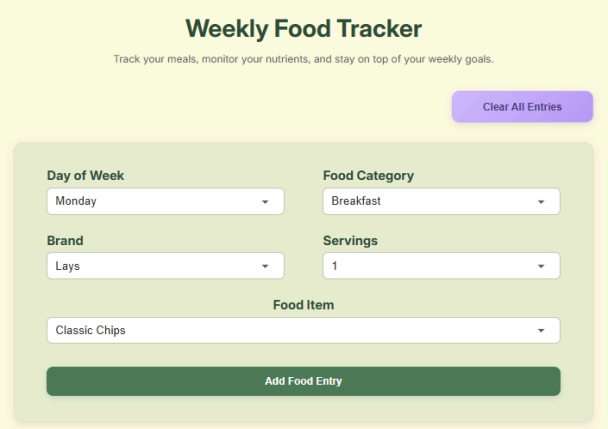

Figure 4: Food Tracker form

- Nutrition Analysis displays information about nutrition analysis by day for users. Users can visually see the percentage of daily intake of set nutrients(see Figure 6). Users can overlay on the small icon for each nutrient that maps to important information on the nutrient (see Figure 2 above). Nutrient intakes breakdown for each nutrient is mapped to a graph that visualizes it over the week(see Figure 7). Also, fulfills the requirement of engaging the user in the importance of nutritional information through different days for a wider perspective.

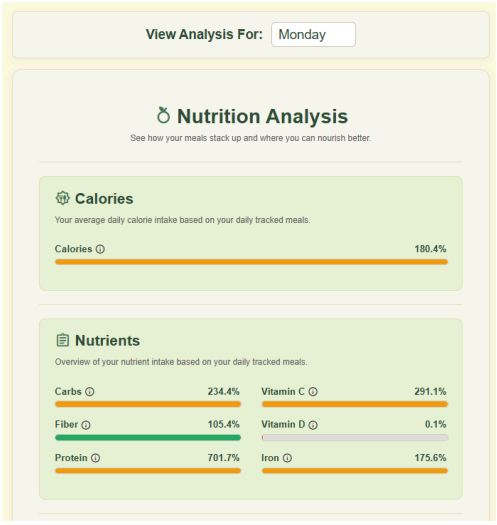

Figure 6: Nutrition Analysis breakdown

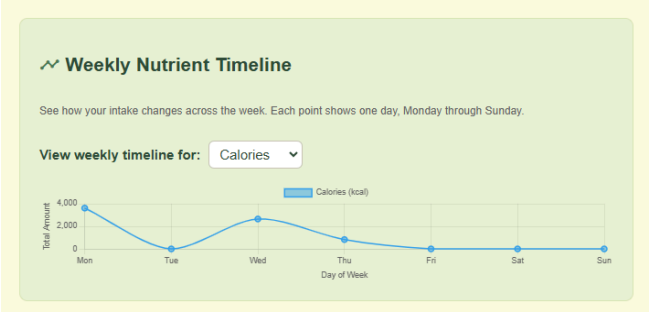

Figure 7: Weekly Nutrient Timeline

- Users preferences and diet restrictions are mapped to our Personalized Recommendation page , where there is a selection of filtered recipes to those constraints and estimation of time for it (see Figure 9). It creates personalized connection to the user and sense of control on what recipes are catered to them and can freely choose based on their time limitation. Then, based on selection it maps to step by step instructions on the recipes and ingredients needed with another visualization (see Figure 10).These functionalities fulfills our requirements for our visual learners and time constraint targeted users where our recipes and nutrition tips are communicated with interesting visuals and provide recipes that are easy and quick to make.

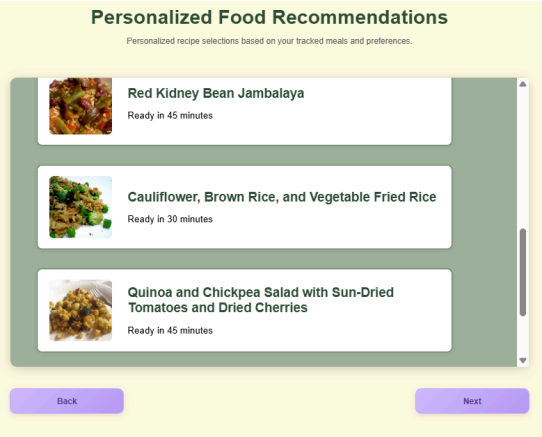

Figure 9: Personalized Food Recommendations

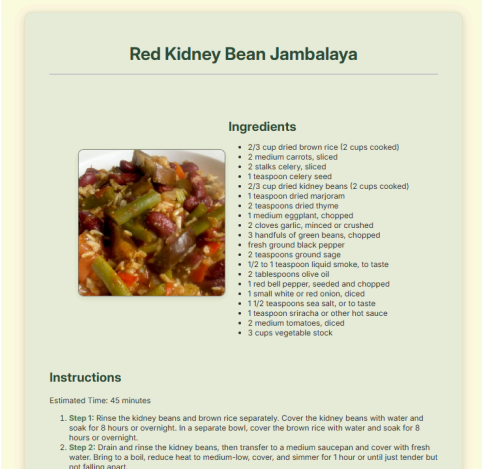

Figure 10: Example recipe instructions

Key Design Choices

- Color palette focuses on contrasting colors to allow for visual separation. It has complementary (yellow/purple) and analogous (green/purple) colors to clearly separate components. Our low-fidelity study participants suggested more contrast between inner and outer containers, so we changed to light green/white over dark green to visually separate content.
- Separate containers with light gray borders to prevent visual bulk
- Signifiers like information icons, dropdown arrows, scroll bar that serve as perceptual cues
- Back and Next buttons that map the interface to the app navigation
- Incorporate feedback from selectable items by highlighting them on hover

Studies Methodology

In the requirements study, we wanted to gather information on the participant's health journey, their knowledge of nutrition, and their unique needs and values. Participants were interviewed about their personal background, daily routines, and overall relationship with nutrition. They described how they currently track what they eat, where they look for nutrition information or healthy recipes, and what influences their eating habits positively or negatively. They also shared challenges they faced, such as difficulty finding reliable information, staying consistent, or selecting foods that match their goals, which helped identify real user needs before any design work began.

During the low-fidelity prototype study, participants interacted with early Figma sketches of the application. They simulated tasks such as searching for recipes, navigating to different pages, and entering foods into a questionnaire. While performing these actions, they used the think-aloud method to explain what they found confusing, what made sense, and how they interpreted the interface. Their reactions helped evaluate the clarity of the navigation, the layout of information, and the overall logic of the early design.

Finally, in the functional prototype study, participants tested a working version of the application. They performed more complex tasks, including selecting dietary preferences, logging foods into a weekly tracker, accessing nutrition analysis results, and exploring personalized recipes. They also tried specific example entries, such as logging “two servings of sushi on Monday,” and assessed whether the analysis and recipes matched their needs. Afterward, they provided detailed feedback about usability, clarity, and design strengths or weaknesses. This helped to guide improvements for the final product.

Study Participants

User Study	ID	Age	Gender	Race	Persona
Requirements	1	26	Woman	Latino	Marta
Requirements	2	25	Woman	Black	Marta
Requirements	3	49	Woman	Latino	Aliya
Requirements	4	20	Woman	Asian	Aliya
Requirements	5	19	Woman	Asian	Aliya
Requirements	6	20	Man	Black	Marta
Requirements	7	22	Woman	Asian	Aliya
Requirements	8	21	Woman	Middle Eastern	Aliya

Requirements	9	22	Man	Asian	Marta
Requirements	10	20	Man	Asian	Marta
Requirements	11	18	Woman	Black	Aliya
Requirements	12	23	Man	Latino	Marta
Low-Fidelity Prototype	13	20	Man	Black	Marta
Low-Fidelity Prototype	14	22	Man	Asian	Marta
Low-Fidelity Prototype	15	23	Man	Asian	Aliya
Low-Fidelity Prototype	16	20	Woman	Black	Marta
Low-Fidelity Prototype	17	23	Woman	Latino	Maria
Low-Fidelity Prototype	18	22	Woman	Latino	Aliya
Functional Prototype	19	21	Man	Asian	Marta
Functional Prototype	20	19	Woman	Asian	Aliya
Functional Prototype	21	19	Woman	Asian	Aliya
Functional Prototype	22	19	Man	Asian	Marta
Functional Prototype	23	23	Woman	Latino	Aliya
Functional Prototype	24	20	Man	Black	Marta

Studies Findings - Data Analysis (Coding)

Data Analysis / Coding: Requirements User Study:

Code One: Busy Schedule

- "Some days are just worse than others so I can't find time to cook…I end up eating bread or just some fruits or I end up ordering something." (Participant 7)

- "Sometimes I think having a busy schedule also makes it hard to eat nutritious food…and having to prepare meals and cook for hours on the weekend is sometimes not an option because of how busy I can get." (Participant 4)

Both of these quotes indicated to us that it's important to have something accessible and quick signifiers for users to navigate through the application. It enhances our targeted users experience with their time limitation, and keeping it simple and not demanding much from them. Otherwise, it's easy for individuals to turn to less healthy options such as DoorDash.

Code Two: Conscious Eating

- "I avoid packaged foods, rarely soda, no chips. I used to eat junk all the time and

was obese in high school, but now I focus on natural foods. I see food differently, more like something that fuels me. It took time to change, but now I feel healthier and more disciplined." (Participant 8)

- "I shifted to a protein-based diet ,mostly chicken thighs and pasta. I've realized that nutrient-dense food keeps me more energetic throughout the day. Before, I didn't really pay attention to what I ate, but now I try to make sure it's balanced and high in protein." (Participant 10)

Both of these quotes are insightful in telling us that many individuals do care about the nutrients they are or are not consuming, and would benefit from having an easy way to track that.

Data Analysis / Coding: Low Fidelity User Study

Code One: Confusing Buttons

- "The improvements kind of look like I can click on them. I instantly clicked on it , so I would like it if it could be bullets of low protein and suggestions for what I can eat for that thing." (Participant 13).

- "When I looked at this, I felt like these were buttons. Are they not supposed to be?" (Participant 14).

Both of these codes indicated to us that some of the tags on our application were confusing and looked like buttons rather than tags, which we changed up for our functional prototype.

Code Two: Adding more Details / Visuals

- "You might want to darken this entire bar. Like, instead of the white, maybe give it a slightly darker color. And the star, you can still have the star still…" (Participant 16).

- "It's not telling me any of the quantity, though. So, like, if I was to, I don't know, if I had to buy a lime, I could buy a whole bag of limes, and then one lime I would use, and then everything else might go bad." (Participant 18).

Both of these codes indicated a need for more details. The second quote helped us realize that the recipes did not have the necessary information to be usable, and the first quote gave us an idea to make the list of recipes pop out more.

Data Analysis / Coding: Functional User Study

Code One: Design Suggestions

- "I am a visual learner, so, in every page, I will have seen more pictures or images to show me more about the questions or the results on every aspect and uh, and these, these, uh, surveys. So, as a visual learner, as many people are, I prefer to see more pictures, more colors," (Participant 22).

- "Maybe for the food recommendations, I wish it maybe had a picture already next to it

instead of like having to click on it and then you get the picture," (Participant 21).

Both of these codes tell us that the users prefer more visuals to understand their diets and/or the recipes they are choosing to consume. Participants indicated that adding more visuals would make navigation and comprehension much better for them.

Code Two: Content Suggestions

- "Of course it did give me, like, the nutrients and stuff but then like you know maybe if you actually have like, 'Oh how many calories it is?' and like, how your diet is kind of like what part of your diet is what. Like you know that would of course be better. So I can get a little bit more insight on what I'm eating," (Participant 24).

- "I would say, just adding more options. Like, some of the, like, allergies. Like, there's, you know, more allergies than just peanuts and stuff," (Participant 23).

Both of these codes indicate that the user needs a broader range of options to correctly filter the recipes, and that we should add more nutrients such as calories to enhance the user's insight.

Overall Implications For Design

Expand Personalization Options While Keeping It Light:

- **Finding:** Participants liked the idea of customizing their dietary recommendations but spoke about feeling "pressure" or "unsure" about if they had entered the correct restrictions.

- **Implication:** The questionnaire should express flexibility, not diagnostic accuracy, and should include optional presets (e.g.,"High in protein," "Vegetarian") with straightforward explanations of what each means.

- **Design Principle**: Cater to universal usability. List the ingredients of each recipe so users can easily tell what they are consuming. Utilize multiple choice options during the initial quiz so many users can select multiple restrictions that cater to them without users fearing making the wrong choices . This supports , "The usability heuristic of reducing errors and supporting user confidence" (Nielsen & Molich, 1990).

Promoting Nutrition Education:

- **Finding:** They continued to wonder what different bars (protein, sugar, vitamin measurements) "mean" on the Nutrition Analysis screen.

- **Implication:** Add hover-over pop-ups explaining why a nutrient is essential or how it aids goals of the user. This makes it easier to interact with information through sensemaking rather than passive consumption of data.

- **Design Principle**: Give people helpful hints right when they need them so they can learn

while they're using the application, instead of forcing them to click away and read about more info on nutrients on Google because they can't recall the importance. This supports the core usability principle *recognition over recall*, “Minimize the user's memory load by making elements, actions, and options visible ”(Nielsen, 1994a).

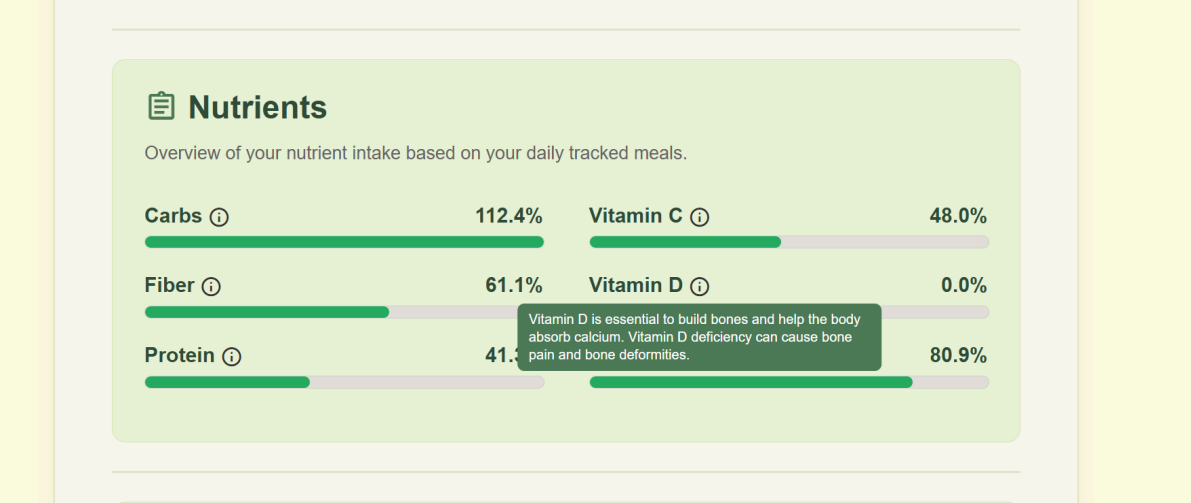

Figure 11: Pop Up Nutrient Information

UX Begins With Understanding Users, Not With Building Features:

- **Finding:** Participants shared information we had not considered for what a user already knows or wants to know when using a nutrition app.

- **Implication:** Content matters as much as interface. Choosing the right data or media fundamentally shapes interaction. People respond better when interfaces feel tailored.

- **Design Principle**: Every feature must have a purpose; if it doesn’t improve the user experience, remove it. Good software design follows the design diamond process of discovering, defining, developing, and delivering a solution for a problem. This reflects, "Design decisions must be grounded in user understanding, not assumptions" (Nielsen, 1994b).

Interaction Design Should Reduce Cognitive Load:

- **Finding:** Participants valued visual learning and saving time when interacting with the application.

- **Implication:** Clear navigation reduces mental effort and helps users feel confident rather than overwhelmed. Users should not have to memorize or overthink in order to complete tasks, therefore the interface should do the heavy lifting.

- **Design Principle**: The interface design should balance navigation clarity, affordance consistency, visibility for options, and feedback that helps users understand what is

happening.This expands on Nielsen's heuristic that interfaces should reduce cognitive load through clear, consistent design, visibility, and simplify decision making (Nielsen & Molich, 1990).

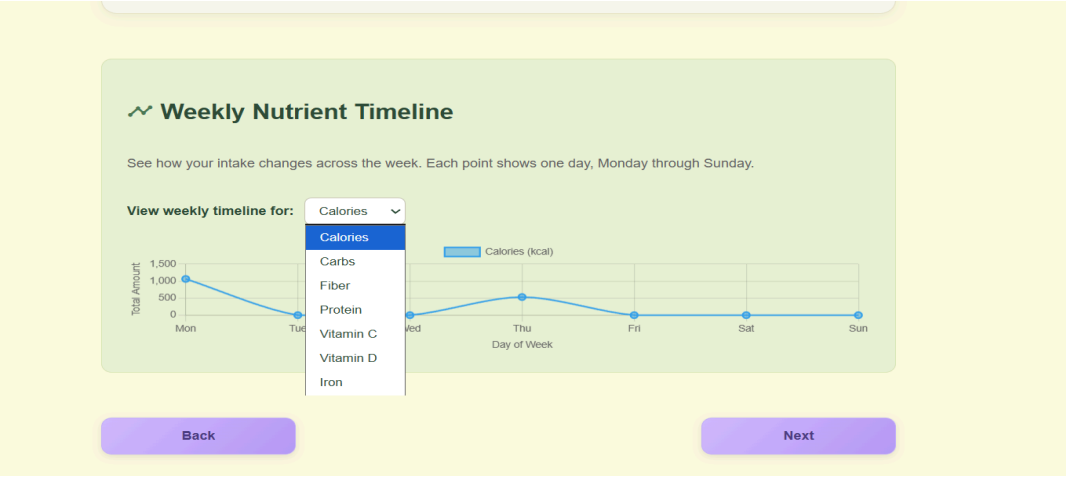

Figure 12: Timeline for each weekly nutrient consumption

Changes:

Throughout the three studies, our understanding of users changed a lot. In the beginning, we focused on features we thought would matter, but after each study showed us things we overlooked or didn't realize were important. Every study revealed something new ranging from how much clear navigation mattered, visualizing important information, or how helpful flexible personalization could be. As we kept improving the prototypes, we realized quickly users cared most about simplicity, ease of use, and being able to get what they needed quickly. Our biggest takeaway was that listening to users and adjusting based on their feedback is what truly makes the experience better and enhances the application as a whole.

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