Project Report

1. **INTRODUCTION**

1.1 Project Overview

"Comprehensive Analysis and Dietary Strategies with Tableau: A College Food Choices Case Study" is a data-driven initiative designed to analyze and enhance the dietary habits of college students. By utilizing Tableau, the project transforms student dietary data into interactive visualizations and real-time analytics. The objective is to provide educational institutions with actionable insights to monitor nutritional intake, identify dietary deficiencies, and implement personalized nutrition plans. This approach supports proactive health management, encourages informed decision-making, and promotes overall student well-being through evidence-based dietary strategies.

1.2 Purpose

The purpose of this project is to utilize data visualization and real-time analytics to understand and improve the dietary habits of college students. By analyzing data related to food choices, nutrition, and health behaviors through Tableau, the project aims to:

- Support educational institutions in making informed, data-driven decisions.
- Identify trends, deficiencies, and risk factors in student diets.
- Enable timely interventions to promote healthier eating habits.
- Foster long-term student wellness and academic performance through personalized dietary strategies.

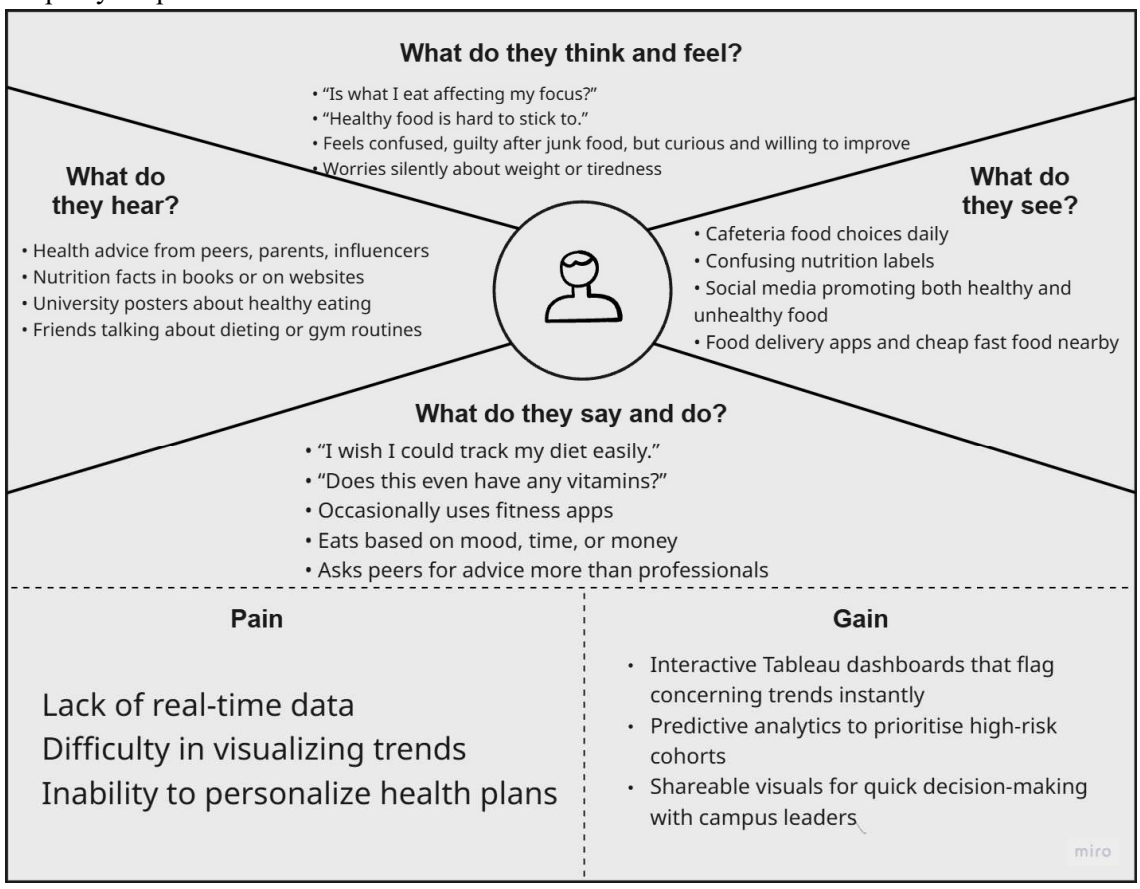
2. **IDEATION PHASE**

2.1 Problem Statement

Customer Problem Statement Template	Response
I am	College student
I'm trying to	Make informed dietary decisions and promote healthy eating habits among students
But	I lack access to clear, actionable, and visual insights about nutritional intake, food preferences, and health trends
Because	The available dietary data is unorganized, underutilized, or difficult to interpret for making real-time or long-term decisions
Which makes me feel	Frustrated, uncertain, and less capable of improving student health and well-being effectively

A college student trying to eat healthily on campus but I don't have access to personalized dietary feedback or easy-to-understand nutritional insights, which makes me feel confused and often demotivated to improve my eating habits.

2.2 Empathy Map Canvas



2.3 Brainstorming

Brainstormed Ideas:

Idea	Description	Group
Real-time monitoring dashboard	Tracks intake of fruits, vegetables, and other nutrients in real time	Nutritional Monitoring
Dietary deficiency alerts	Flags trends like low vitamin intake or high junk food consumption	Health Alerts
Personalized nutrition plans	Uses predictive analytics to suggest meal plans based on habits	Predictive Analytics
Exercise and health perception integration	Links dietary data with exercise routines and self-reported wellness	Holistic Health View
Campaign impact tracking	Measures success of interventions like awareness drives	Intervention Feedback
Mobile-friendly access	Allows students to view dashboards and get recommendations	Accessibility Tools

Idea Prioritization:

Idea	Impact (High/Med/Low)	Feasibility (High/Med/Low)	Priority (High/Med/Low)	Justification
Real-time monitoring dashboard	High	High	High	Directly supports health monitoring and early intervention

Idea	Impact (High/Med/Low)	Feasibility (High/Med/Low)	Priority (High/Med/Low)	Justification
Dietary deficiency alerts	High	Medium	High	Critical for addressing nutrition gaps swiftly
Personalized nutrition plans	High	Medium	Medium	Needs historical data but has high potential impact
Exercise and health perception integration	Medium	Medium	Medium	Useful, but may depend on external input sources
Campaign impact tracking	Medium	High	Medium	Easy to implement and helps measure strategy effectiveness
Mobile-friendly access	Medium	High	Medium	Increases engagement, especially from student end

3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

Category	ENTICE	ENTER	ENGAGE	EXIT	EXTEND
Steps (What do they experience?)	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.
Interactions (Digital or physical)	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.
Goals & Motivations	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.
Positive Moments	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.	Become aware of the dashboard via wellness events, posters, or peers.Interest builds in understanding diet-health links.

3.2 Solution Requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

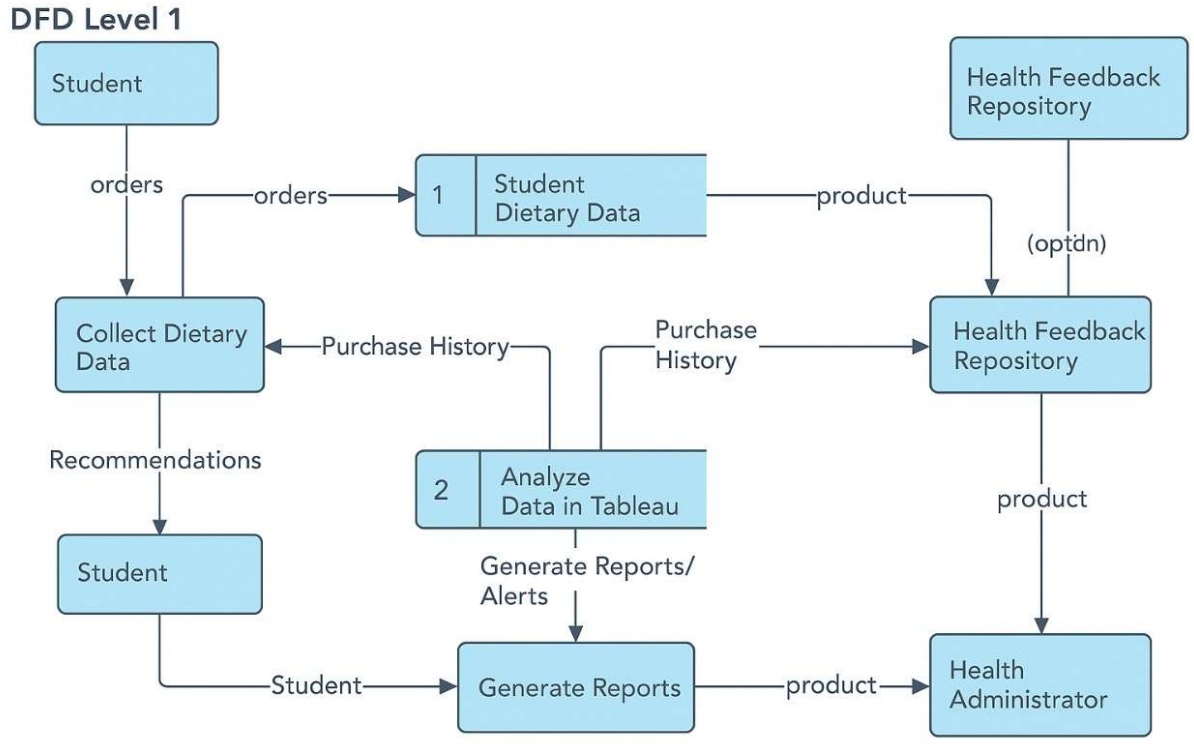
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through College Email ID
		Registration via Student Portal Login
FR-2	User Confirmation	Confirmation via Student Email
		Confirmation using OTP-based verification
FR-3	Dashboard Access and Navigation	User-friendly dashboard interface
		Role-based access (Student, Health Staff, Admin)
FR-4	Data Visualization	Interactive charts on diet intake, deficiencies, comparisons
		Filtering by gender, department, meal type, hostel/day scholar
FR-5	Alerts & Notifications	Trigger alerts for critical trends (e.g., low fruit intake)
		Weekly email summaries / reminders
FR-6	Personalized Insights & Recommendations	Generate customized dietary advice
		Predictive suggestions based on trends (All/pattern-based)
FR-7	Feedback Collection	Allow users to submit feedback on dashboard usability
		Review feature for health advice usefulness

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Simple, intuitive UI for students and staff; low learning curve
NFR-2	Security	Secure student data access with authentication and role-based permissions
NFR-3	Reliability	Consistent data availability with real-time updates from trusted sources
NFR-4	Performance	Dashboard loads under 3 seconds, even with large data filters
NFR-5	Availability	99.9% uptime on web and mobile platforms
NFR-6	Scalability	Supports scaling to thousands of student users and real-time data growth

3.3 Data Flow Diagram



DFF Level 1 Data Flow Dragram

3.4 Technology Stack

The Deliverable includes the architectural diagram and the information as per Table 1 & Table 2.

Architectural Diagram: A 3-tier architecture comprising a presentation layer (Tableau for visualizations), an application layer (Python for data processing and analytics), and a data layer (MySQL for structured data storage and cloud storage for scalability). The diagram would illustrate data flow from user inputs to Tableau dashboards, processed via Python scripts, and stored/retrieved from a MySQL database hosted on a cloud platform.

Table-1 : Components & Technologies:

The technology stack for the "Comprehensive Analysis and Dietary Strategies with Tableau: A College Food Choices Case Study" is designed to deliver a scalable, secure, and high-performance platform for analyzing and visualizing student dietary data. The stack leverages Tableau for intuitive, interactive dashboards, Python (with Pandas, NumPy, Scikit-learn, and TensorFlow) for data processing and predictive analytics, and Streamlit for real-time data monitoring. Data is stored in MySQL on Amazon RDS for structured storage and Amazon S3 for file storage, ensuring scalability and accessibility. External APIs like USDA FoodData Central and Fitbit enrich nutritional and health insights. The system is deployed on AWS with Kubernetes for container orchestration, ensuring scalability, while AES-256 encryption, AWS IAM, and OWASP compliance provide robust security. AWS Elastic Load Balancer, multi-AZ deployment, Amazon CloudFront, and Redis caching optimize availability and performance, enabling real-time analytics and data-driven decision-making for student well-being.

S.No	Component	Technology
1	Front-End	Tableau Public / Tableau Server
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1	Front-End	Tableau Public / Tableau Server

Table-2: Application Characteristics:

The application characteristics for the "Comprehensive Analysis and Dietary Strategies with Tableau: A College Food Choices Case Study" ensure a robust, scalable, and efficient system tailored for dietary data analysis. Open-Source Frameworks like Python (Pandas, NumPy, Scikit-learn, TensorFlow) and Apache Kafka enable flexible data processing, machine learning, and real-time streaming. Security Implementations utilize AES-256 encryption, AWS IAM roles, and OWASP top 10 compliance to safeguard sensitive student data. The

Scalable Architecture leverages AWS Lambda and Kubernetes for microservices-based deployment, handling large datasets and concurrent users effectively. Availability is ensured through AWS Elastic Load Balancer and multi-AZ deployment, providing high uptime and fault tolerance. Performance is optimized with Amazon CloudFront (CDN) for fast content delivery and Redis for caching, supporting high request throughput and seamless real-time analytics for informed decision-making.

S.No	Characteristics	Technology
S.No	Open-Source Frameworks	Python (Pandas, NumPy, Scikit-learn, TensorFlow), Apache Kafka
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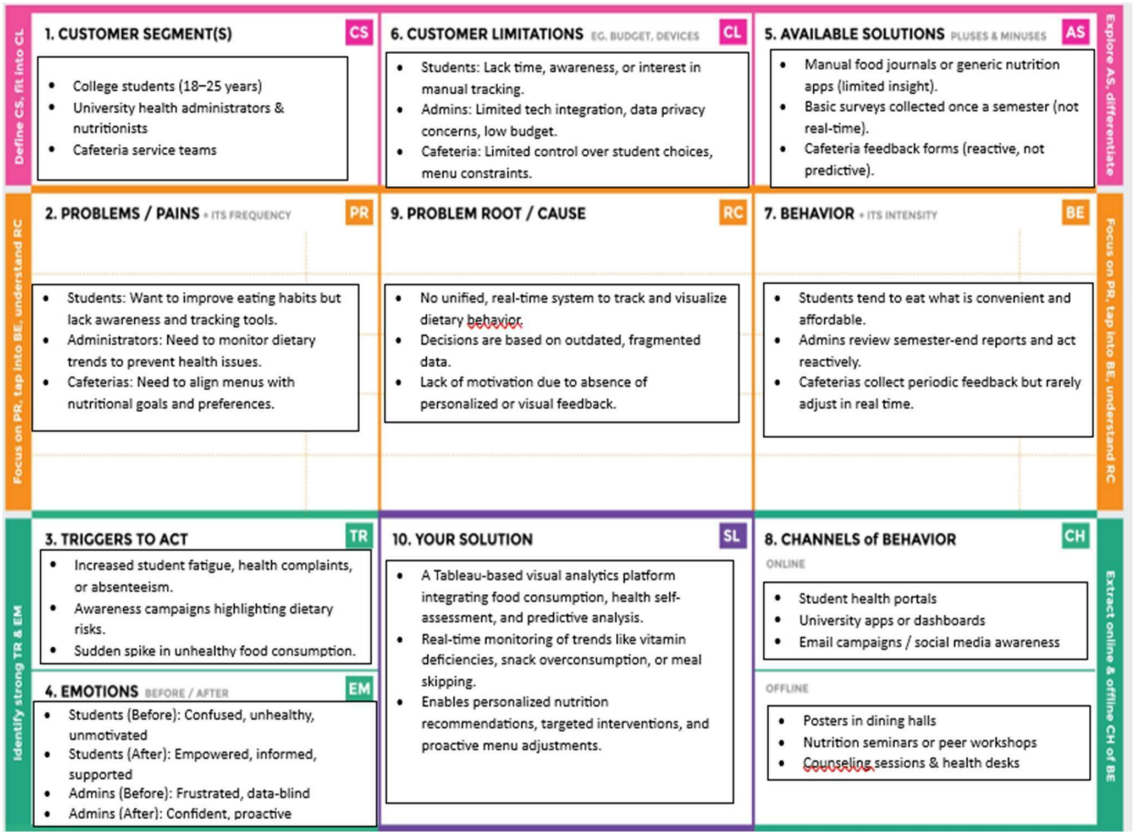
4. PROJECT DESIGN

4.1 Problem Solution Fit



4.2 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Lack of real-time, comprehensive insights into college student's dietary habits, nutritional gaps, and related health impacts hampers timely interventions, personalized nutritional guidance, and data-driven decision-making by students and university stakeholders.
2.	Idea / Solution description	Build a Tableau-powered analytics platform that integrates cafeteria purchase data, self-reported diets, exercise logs, and health perception surveys. The system delivers interactive dashboards for real-time monitoring, predictive alerts on nutritional deficiencies, and personalized nutrition plans for students.
3.	Novelty / Uniqueness	Combines multiple data sources (purchases, surveys, wearables) into a unified visualization layer; leverages predictive analytics for proactive interventions; and provides role-based views for students, health administrators, and cafeteria managers—all within an intuitive Tableau environment.
4.	Social Impact / Customer Satisfaction	Promotes healthier lifestyles, reduces risk of diet-related illnesses, and boosts academic performance. Increases student engagement through personalized feedback while enabling administrators to deploy evidence-based health programs—resulting in higher overall satisfaction and well-being.
5.	Business Model (Revenue Model)	Subscription-based SaaS for universities (tiered by student population); implementation and customization fees; optional analytics consulting services; and anonymized, aggregated insights licensable to nutrition researchers.
6.	Scalability of the Solution	Cloud-hosted architecture allows easy onboarding of additional campuses; modular data connectors support new data sources (e.g., fitness trackers, meal delivery apps); scalable Tableau Server/Cloud deployment ensures performance as user base grows.

4.3 Solution Architecture

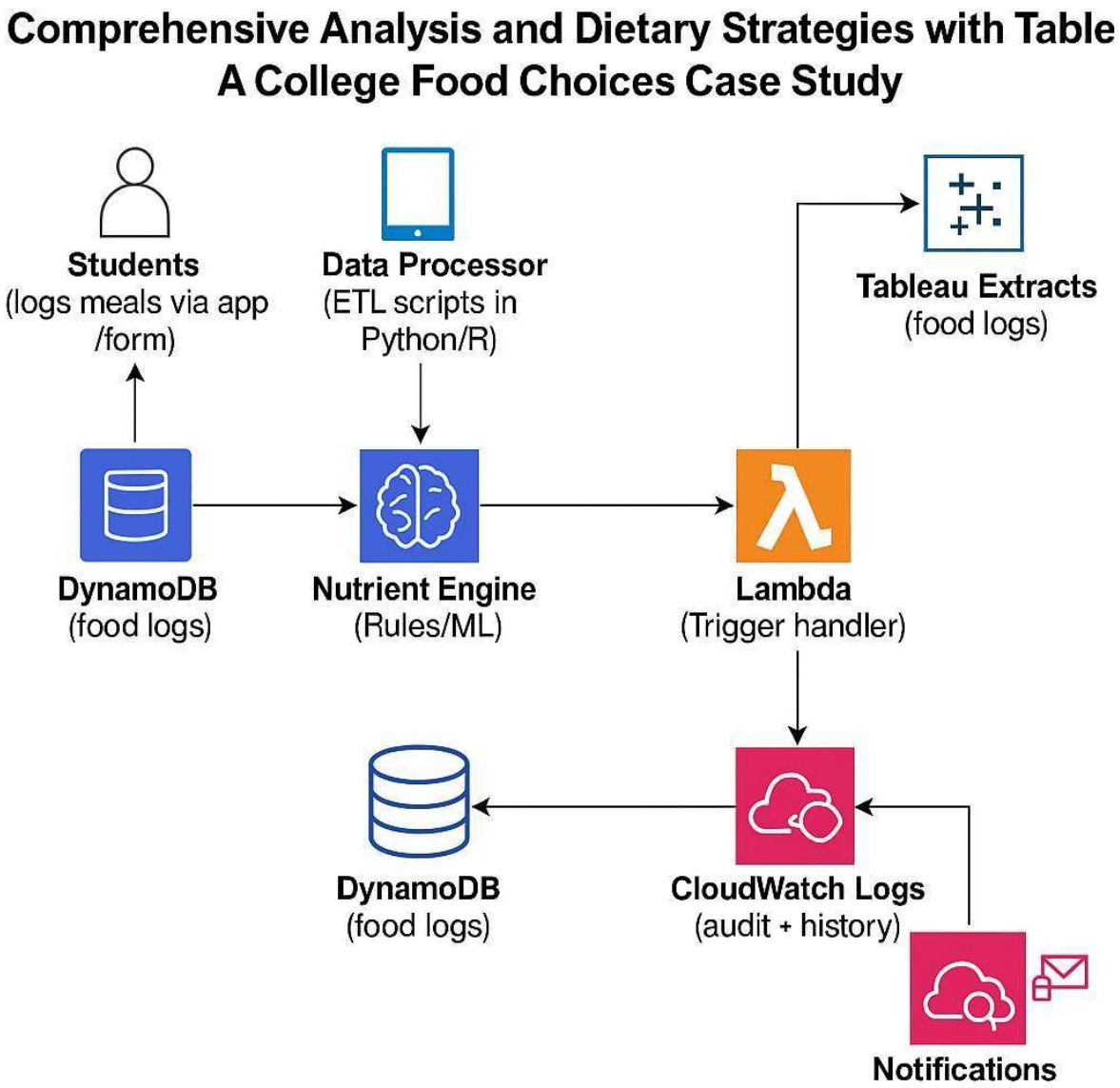


Figure 1: Architecture and data flow of the Comprehensive Analysis and Dietary Strategies with Tableau: A College Food Choices Case Study.

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection & Cleaning	USN-1	As a user, I want to load college food choice data into Tableau for analysis.	2	High	Duvvarapu Vanitha
Sprint-1	Data Cleaning & Transformation	USN-2	As a data analyst, I want to clean and preprocess the dietary data to remove errors and nulls	3	High	Sai Vinuthna Budagatla
Sprint-1	Visualization - Nutritional Intake	USN-3	As a user, I want to view daily/weekly trends in fruit and vegetable consumption.	3	High	Duvvarapu Vanitha
Sprint-2	Visualization - Dietary Deficiencies	USN-4	As a health admin, I want to visualize vitamin deficiency patterns across student demographics.	4	Medium	Sai Vinuthna Budagatla

Sprint-2	Predictive Analytics	USN-5	As a nutritionist, I want to predict at-risk students using historical diet and activity patterns.	4	Medium	Duvvarapu Vanitha
Sprint-3	Personalized Nutrition Dashboard	USN-6	As a student, I want a personalized dashboard suggesting diet strategies based on my data.	5	Low	Sai Vinuthna Budagatla
Sprint-3	Alerts & Recommendations System	USN-7	As a health officer, I want to receive alerts when unhealthy eating patterns are detected.	3	Medium	Duvvarapu Vanitha
Sprint-3	Final Dashboard Compilation	USN-8	As a viewer, I want to see all visualizations and KPIs in a single Tableau dashboard.	3	High	Sai Vinuthna Budagatla

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	8	6 Days	16 JUNE 2025	24 JUNE2025	8	24 JUNE 2025
Sprint-2	20	6 Days	26 JUNE 2025	30 JUNE2025	20	29 JUNE 2025
Sprint-3	20	6 Days	5 JUNE 2025	10 JUNE 2025	20	10 JUNE 2025
Sprint-4	20	6 Days	12 JUNE 2025	17 JUNE 2025	20	17 JUNE 2025

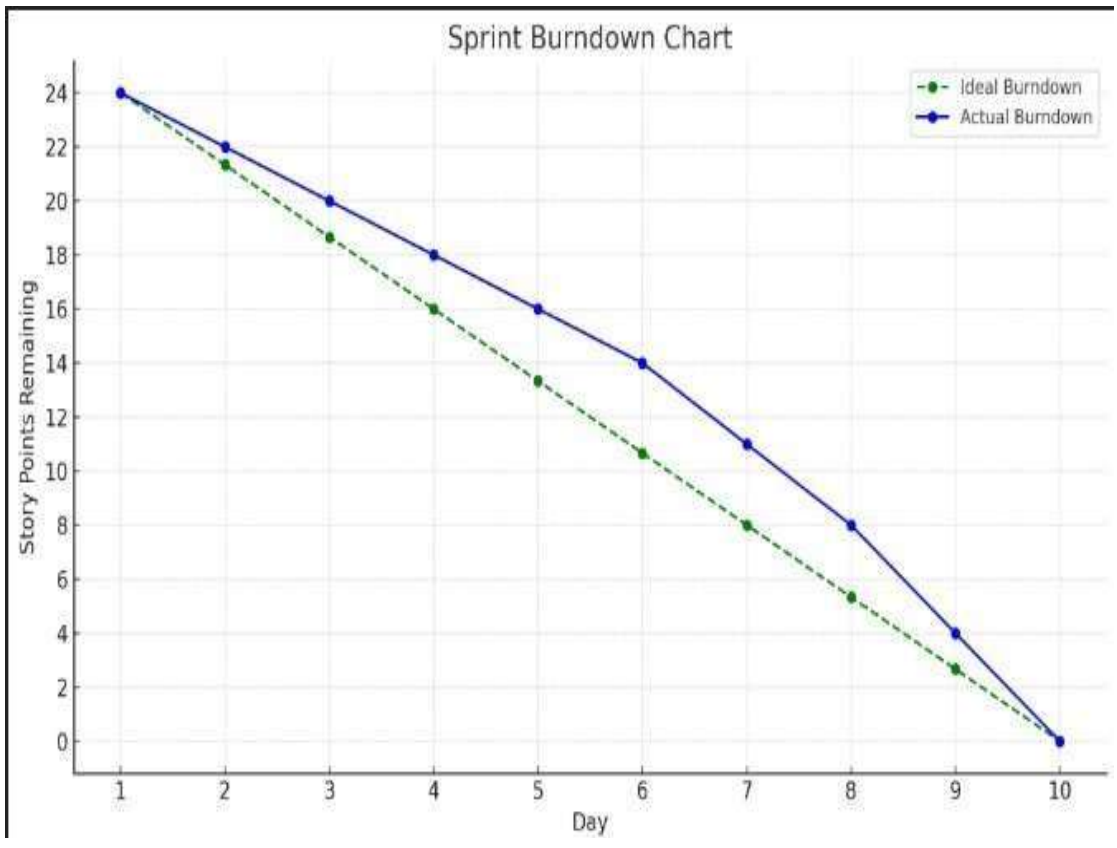
Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

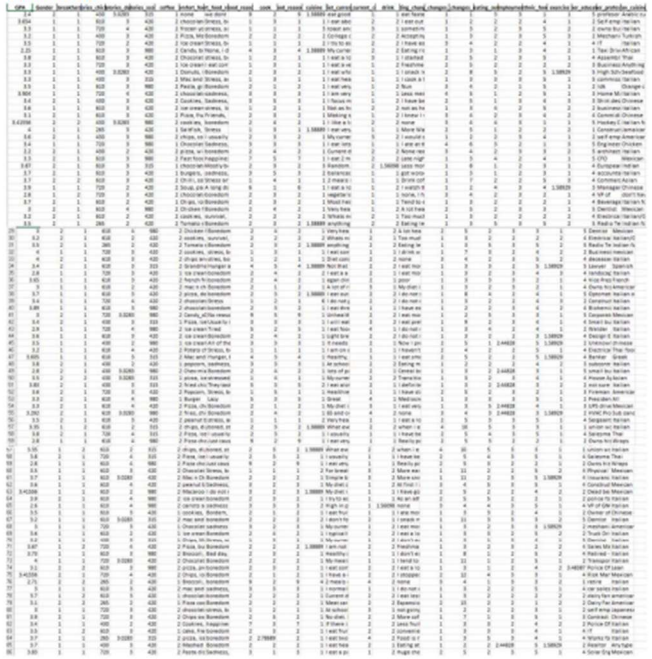
- Total Story Points = 8 + 16 = 24
- Number of Sprints = 2
- Velocity = 24 / 2 = 12 Story Points per Sprint

Burndown Chart:



6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

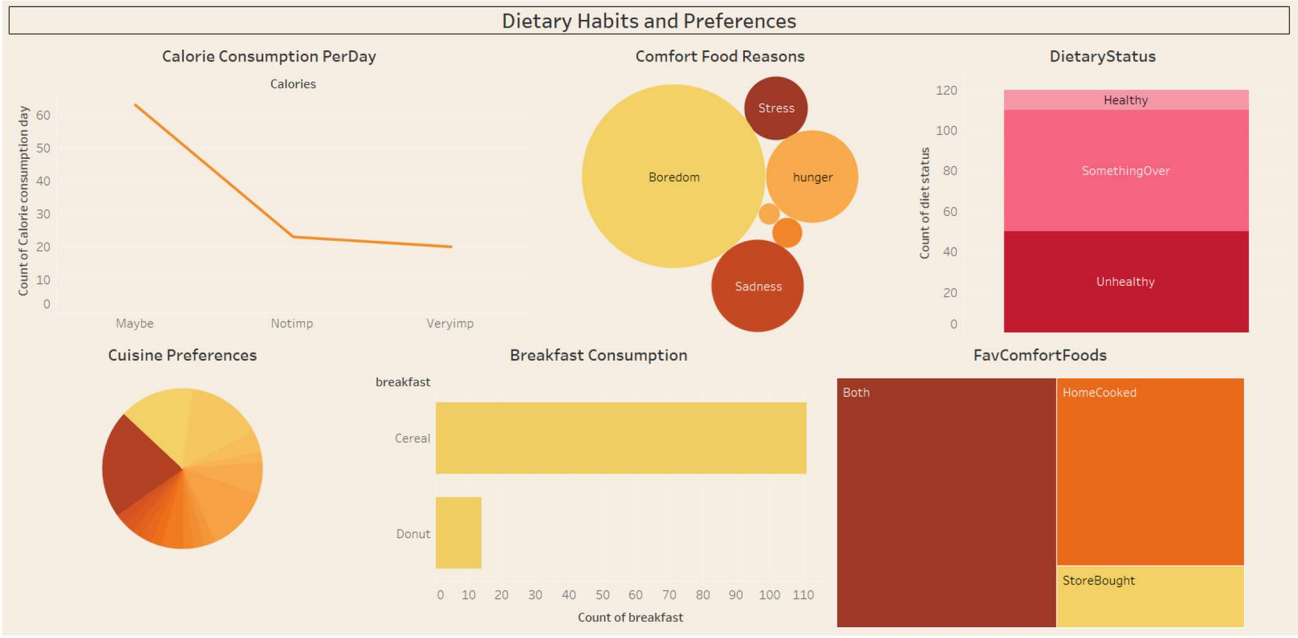
S.No.	Parameter	Screenshot / Values
1.	Data Rendered	Data collected from college food choices survey (including dietary preferences, frequency of meals, nutritional content, etc.) Dataset : 
2.	Data Preprocessing	- Removed null values - Cleaned and standardized cuisine names
3.	Utilization of Filters	Filters used: - Meal Time (Breakfast/Lunch/Dinner/Snacks) - Nutrient Levels (Low/Medium/High) - Cuisine Type - Gender/Age Group
4.	Calculation fields Used	- Calories Category: IF [Calories] > 600 THEN "High" ELSEIF [Calories] ”low" ELSE "Medium" - BMI Impact - vitamins:IF [Vitamins] = 1 THEN "Yes" ELSE "No" END - gender:IF [Gender]=1 THEN "Male" ELSE "Female" END
5.	Dashboard design	No of Visualizations / Graphs - 23
6	Story Design	No of Visualizations / Graphs -10

7. RESULTS

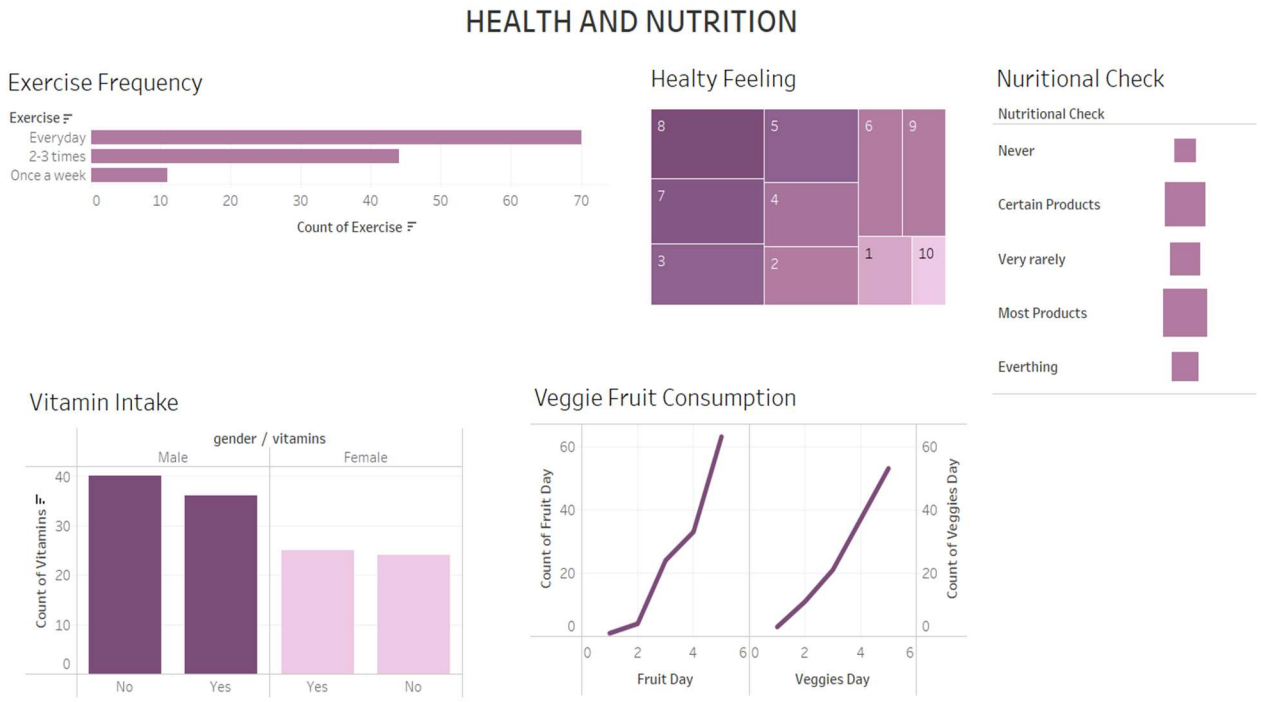
7.1 Output Screenshots

Dashboard 1:

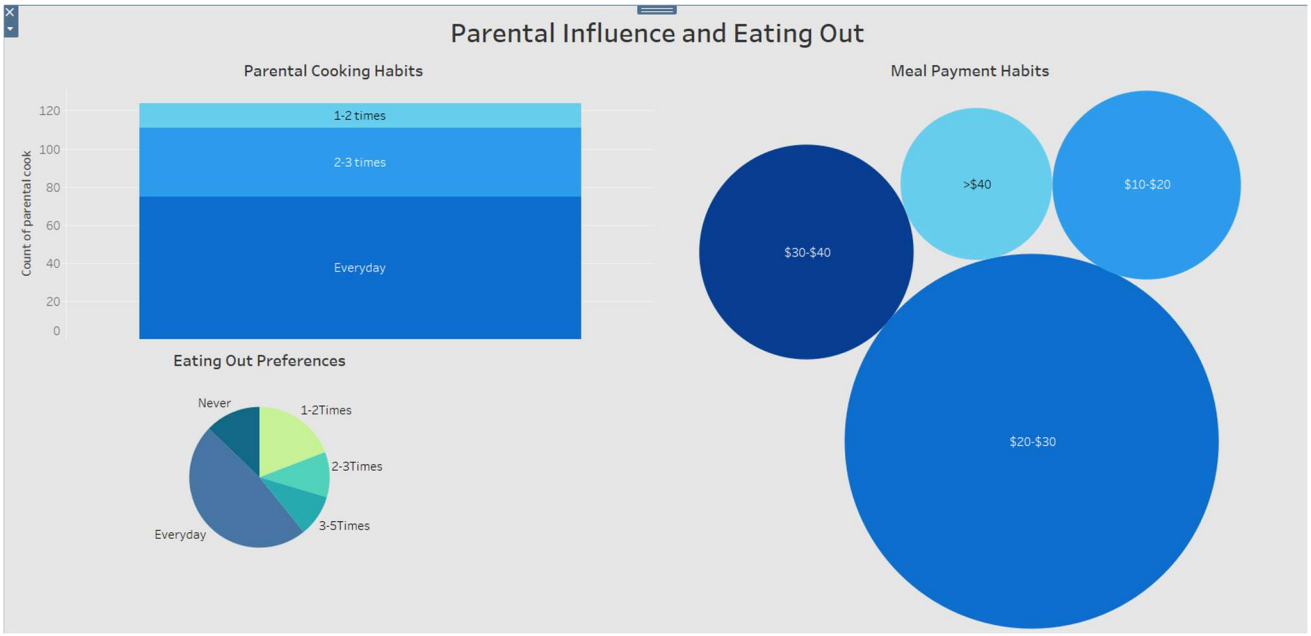
Dashboard 2:



Dashboard 3:



Dashboard 4:



8. ADVANTAGES & DISADVANTAGES

Advantages

1. Data-Driven Decisions
   Enables institutions to make informed choices regarding student health and nutrition programs.
2. Real-Time Monitoring

Tracks dietary trends and health risks as they happen, allowing for quick interventions.

3. Interactive Visualizations
   Tableau dashboards make complex dietary data easy to understand for various stakeholders.
4. Personalized Nutrition Plans
   Supports creation of customized dietary strategies based on student-specific data.
5. Early Detection of Health Issues
   Predictive analytics help identify and prevent potential nutrition-related problems.

Disadvantages

1. Data Privacy Concerns
   Collecting and analyzing student health data may raise privacy and ethical issues.
2. Dependence on Data Accuracy
   Insights and predictions rely heavily on the accuracy and completeness of collected data.
3. Initial Setup Cost and Complexity
   Implementing a data analytics system like Tableau may require technical expertise and financial investment.
4. Limited Action Without Institutional Support
   Insights are only useful if institutions are willing and able to act on them.
5. Student Participation Required
   The success of the system depends on consistent and honest input from students.

9. CONCLUSION

The "Comprehensive Analysis and Dietary Strategies with Tableau" project offers a powerful, data-driven approach to understanding and improving the dietary habits of college students. By leveraging Tableau's visualization and analytical capabilities, the project transforms raw dietary data into actionable insights that support proactive health management. It enables educational institutions to monitor nutritional trends, address deficiencies, and implement personalized dietary strategies. Ultimately, this initiative contributes to enhancing student well-being, promoting healthier lifestyles, and fostering a supportive academic environment through informed decision-making.

10. FUTURE SCOPE

1. Integration with Wearable Devices:
   Incorporate data from fitness trackers and smartwatches to gain deeper insights into students' physical activity and calorie expenditure.
2. Cloud-Based Data Platform:
   Shift to a scalable, cloud-based system for centralized data storage, real-time access, and collaboration across departments.
3. AI-Powered Recommendations:
   Use machine learning to provide smart, automated dietary suggestions tailored to individual student needs and preferences.
4. Mobile App Development:
   Develop a companion mobile app for students to log meals, receive personalized nutrition tips, and track their dietary goals.
5. Cross-Campus Comparison and Benchmarking:
   Expand the system to compare dietary data across different institutions to identify broader trends and share successful strategies.
6. Research and Policy Support:
   Support academic research and contribute to public health policies by providing reliable dietary and nutrition data.

7. Student Engagement and Education Modules:
   Incorporate interactive learning tools and gamified features to engage students in understanding and improving their nutrition.

11. APPENDIX

Dataset Link:

https://www.kaggle.com/datasets/borapajo/food-choices?select=food_coded.csv
GitHub & Project Demo Link:
file:///C:/Users/duvva/OneDrive/Documents/Project%20Executable%20files/Demo.mp4