# Final Report: Comprehensive Analysis and Dietary Strategies with Tableau: A College Food Choices Case Study

## 1. INTRODUCTION

### 1.1 Project Overview

This project, "Comprehensive Analysis and Dietary Strategies with Tableau: A College Food Choices Case Study," aims to analyze student food choice patterns using data visualization techniques in Tableau. By uncovering key behavioral trends and nutritional challenges, it seeks to deliver interactive dashboards that support personalized dietary planning. The outcome will serve as a valuable resource for students, campus dining services, and health-focused initiatives striving to make informed, balanced food decisions easier and more accessible.

College students often make dietary choices that may not align with healthy eating practices due to lack of awareness, convenience, and lifestyle constraints. This project addresses the need for evidence-based strategies to support healthier food decisions among college students.

### 1.2 Purpose

The purpose of this project is to develop a comprehensive data analytics platform using Tableau to understand the dietary habits of college students. This understanding is crucial for creating effective strategies that promote healthier eating behaviors while respecting students' time and financial limitations. The project aims to provide data-driven insights to educational institutions, nutritionists, students, and campus food services to help in making informed, balanced food decisions.

## 2. IDEATION PHASE

### 2.1 Problem Statement

College students face significant challenges in maintaining healthy eating habits due to factors such as limited nutritional knowledge, budget constraints, time pressures, and lifestyle changes. This leads to poor dietary choices, affecting their academic performance, physical health, and long-term wellness. There is a lack of data-driven insights into college students' food preferences, eating patterns, and the correlation between various demographic and lifestyle factors with their dietary behaviors.

Educational institutions need evidence-based strategies to promote healthier eating habits among their student population.

Here are some specific problem statements identified:

- PS-1: A busy student juggling classes is trying to eat on time and stay energized throughout the day, but ends up skipping meals or eating packaged snacks because they don't have the time or tools to plan meals in advance, which makes them feel exhausted and guilty.
- PS-2: A student trying to improve my fitness and lifestyle is trying to choose meals that align with my dietary goals, but campus food options don’t provide nutritional information, making them feel unsure and frustrated.
- PS-3: A student living on a limited budget is trying to eat affordable and healthy meals every day, but nutritious food is often more expensive or less accessible, and the cheapest options are usually processed foods, making them feel stuck and worried about my health.
- PS-4: A vegetarian student on campus is trying to find satisfying meals that meet my preferences, but the dining options are repetitive and lack diversity, as the menu doesn’t cater to varied dietary lifestyles, making them feel neglected and unmotivated to eat on campus.
- PS-5: A student who cares about my long-term well-being is trying to develop healthier eating habits, but doesn't understand my current food patterns or where to start, and doesn’t have access to clear, personalized insights, making them feel overwhelmed and stuck in a loop.

**2.2 Empathy Map Canvas**

HEARS:

- "I don't have time to eat healthy with all the classes."
- "Canteen food isn't always nutritious."
- "I eat based on my mood - especially during exams."
- "My parents keep asking me to eat more vegetables."

SEES:

- Peers eating junk food more often than healthy meals.
- Meal prep content on social media but doesn't follow it regularly.
- Posters or messages about dietary awareness around campus.
- YouTube reels or shorts about quick snacks and 'hostel hacks'.

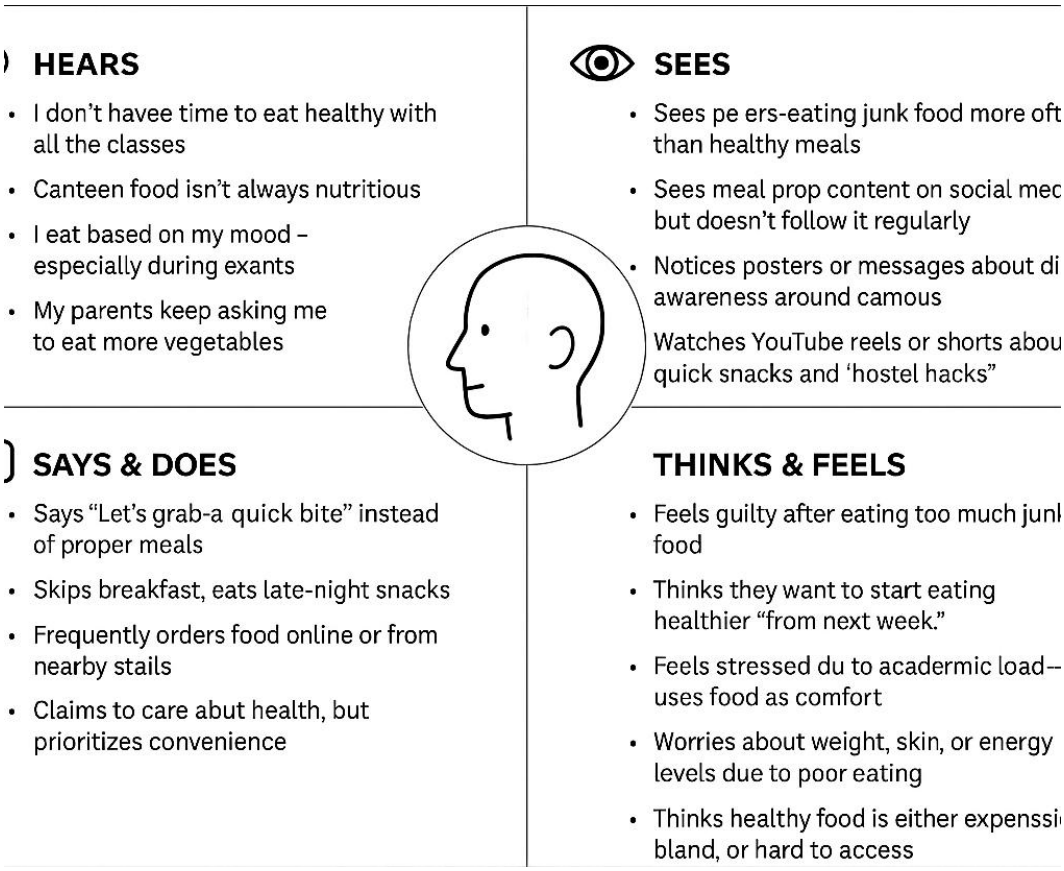
SAYS & DOES:

- Says "Let's grab a quick bite" instead of proper meals.
- Skips breakfast, eats late-night snacks.
- Frequently orders food online or from nearby stalls.

- Claims to care about health, but prioritizes convenience.

THINKS & FEELS:

- Feels guilty after eating too much junk food.
- Thinks they want to start eating healthier "from next week."
- Feels stressed due to academic load and uses food as comfort.
- Worries about weight, skin, or energy levels due to poor eating.
- Thinks healthy food is either expensive, bland, or hard to access.




**2.3 Brainstorming**

The brainstorming process involved gathering raw ideas from team members, grouping them into categories, and prioritizing them.

Raw Ideas from Team Members:

- Member 1: Food preference clusters, Healthy vs unhealthy eater profiles
- Member 2: Visual dashboard of dietary frequency by major/gender
- Member 3: Recommendation system for balanced meals
- Member 4: Correlation between stress and unhealthy food choices

Grouped Ideas by Category:

- Dietary Patterns: Clustering food habits, Frequency charts
- Demographic Insights: Dietary behavior by gender, major
- Visualizations: Dashboard of meal categories & budgets
- Behavioral Analysis: Stress-eating correlation, Motivation mapping
- Strategy & Solutions: Meal recommendations, Healthy eating index

Idea Prioritization:

| Idea | Impact | Feasibility | Priority |
|---|---|---|---|
| Visualize dietary choices by gender/major | High | High | High |
| Food clusters for healthy/unhealthy patterns | High | Medium | High |
| Correlation between stress and junk food | Medium | Medium | Medium |
| Budget-based food category analysis | Medium | High | Medium |
| Personalized meal suggestions | High | Low | Low |

Final Shortlisted Idea(s): The team chose to proceed with a comprehensive Tableau dashboard that includes:

- Visual comparisons of food habits across majors and genders
- Pattern recognition: healthy vs unhealthy eaters
- Budget tracking vs food category selection
- Exploratory insights into mood/stress & food choices

## 3. REQUIREMENT ANALYSIS

### 3.1 Customer Journey Map

Journey Phase: DISCOVER

- What does the person typically experience? Learn about the food analysis platform through college administration or campus health initiative.
- Interactions: Email invitation, project documentation, laptop.
- Places: Office, campus health center.
- People: IT administrator, project team leader.

- Goals & Motivations: Help me understand what data is available and how it can support student health initiatives.
- Positive Moments: Excitement about potential to improve student health through data-driven insights.
- Negative Moments: Uncertainty about data quality, privacy compliance, and ethical use of student information.
- Areas of Opportunity: Provide clear onboarding materials explaining data sources and use cases. Create video tutorials showing successful health interventions from similar data. Develop clear data governance and privacy protocols.

Journey Phase: ACCESS

- What does the person typically experience? Log into Tableau dashboard using provided credentials and navigate to food analysis workspace.
- Interactions: Tableau dashboard, login portal, university network.
- Places: Office, remote workspace.
- People: Technical support, data administrator.
- Goals & Motivations: Help me quickly access the system without technical barriers or delays.
- Positive Moments: Relief when login works smoothly and dashboard loads quickly with intuitive interface.
- Negative Moments: Frustration with complex login process, VPN requirements, or system downtime.
- Areas of Opportunity: Implement single sign-on integration with university systems. Create mobile-responsive dashboard for fast access. Provide 24/7 technical support during critical analysis periods.

Journey Phase: EXPLORE

- What does the person typically experience? Browse available datasets, filters, and visualization options to understand data scope.
- Interactions: Interactive dashboards, data filters, help documentation.
- Places: Workstation, meeting rooms.
- People: Data analyst, other researchers.
- Goals & Motivations: Help me understand the data structure and available analysis capabilities.
- Positive Moments: Fascination with comprehensive dataset covering diverse aspects of student life and diet.

- Negative Moments: Overwhelm from too many variables and options without clear guidance on where to start.
- Areas of Opportunity: Design guided tour highlighting key insights and starting points. Create pre-built templates for common health research questions. Develop smart suggestions based on user role and interests.

Journey Phase: ANALYZE

- What does the person typically experience? Create custom visualizations, apply filters, and perform statistical analysis on dietary patterns.
- Interactions: Statistical tools, visualization builder, calculated fields.
- Places: Quiet workspace, lab.
- People: Statistics consultant.
- Goals & Motivations: Help me uncover meaningful patterns in student dietary behaviors efficiently.
- Positive Moments: Satisfaction when discovering significant correlations between lifestyle factors and dietary choices.
- Negative Moments: Confusion when statistical significance tests are unclear or visualizations are misleading.
- Areas of Opportunity: Provide automated statistical significance testing with clear explanations. Create collaboration features for multi-user analysis sessions. Implement real-time data validation and quality checks.

Journey Phase: INTERPRET

- What does the person typically experience? Review findings, identify key insights, and correlate patterns with health outcomes.
- Interactions: Analysis results, research literature, comparison data.
- Places: Private office, library.
- People: Research colleagues, peer reviewers.
- Goals & Motivations: Help me translate data insights into actionable health recommendations.
- Positive Moments: Confidence when nutritional aligns with existing patterns knowledge and research.
- Negative Moments: Doubt when findings contradict established nutritional guidelines or seem counterintuitive.
- Areas of Opportunity: Integrate with academic research databases for context. Provide peer review features for validation of findings. Create automated report generation with evidence-based recommendations.

Journey Phase: ACT

- What does the person typically experience? Generate reports, make recommendations, and implement dietary intervention strategies.
- Interactions: Report templates, presentation tools, policy documents.
- Places: Meeting rooms, campus offices.
- People: Campus administrators, student health staff.
- Goals & Motivations: Help me implement evidence-based interventions that improve student health outcomes.
- Positive Moments: Pride when interventions based on analysis show measurable improvements in student health.
- Negative Moments: Disappointment when stakeholders don't act on recommendations or budget constraints limit implementation.
- Areas of Opportunity: Develop implementation toolkit specific to measure intervention success. Create stakeholder-specific report formats (admin vs. clinical). Provide cost-benefit analysis tools for intervention planning.

| Journey Phase | DISCOVER | ACCESS | EXPLORE | ANALYZE | INTERPRET | ACT |
|---|---|---|---|---|---|---|
| **Steps**<br>**What does the person typically experience?** | Learn about the food analysis platform through colleague recommendation or campus health initiative | Log into Tableau dashboard using provided credentials and navigate to food analysis workspace | Browse available datasets, filters, and visualization options to understand data scope | Create custom visualizations, apply filters, and perform statistical analysis on dietary patterns | Review findings, identify key insights, and correlate patterns with health outcomes | Generate reports, make recommendations, and implement dietary intervention strategies |
| **Interactions**<br>**Things, Places, People** | **Things:** Email invitation, project documentation, laptop<br>**Places:** Office, campus health center<br>**People:** IT administrator, project team leader | **Things:** Tableau dashboard, login portal, university network<br>**Places:** Office, remote workspace<br>**People:** Technical support, data administrator | **Things:** Interactive dashboards, data filters, help documentation<br>**Places:** Workstation, meeting room<br>**People:** Data analyst, other researchers | **Things:** Statistical tools, visualization builder, calculated fields<br>**Places:** Quiet workspace, lab<br>**People:** Statistics consultant | **Things:** Analysis results, research literature, comparison data<br>**Places:** Private office, library<br>**People:** Research colleagues, peer reviewers | **Things:** Report templates, presentation tools, policy documents<br>**Places:** Meeting rooms, campus offices<br>**People:** Campus administrators, student health staff |
| Goals & Motivations<br>"Help me..." or "Help me avoid..." | Help me understand what data is available and how it can support student health initiatives | Help me quickly access the system without technical barriers or delays | Help me understand the data structure and available analysis capabilities | Help me uncover meaningful patterns in student dietary behaviors efficiently | Help me translate data insights into actionable health recommendations | Help me implement evidence-based interventions that improve student health outcomes |
| Positive Moments<br>Enjoyable, productive, motivating | Excitement about potential to improve student health through data-driven insights | Relief when login works smoothly and dashboard loads quickly with intuitive interface | Fascination with comprehensive dataset covering multiple aspects of student life and diet | Satisfaction when discovering significant correlations between lifestyle factors and dietary choices | Confidence when patterns align with existing nutritional knowledge and research | Pride when interventions based on analysis show measurable improvements in student health |
| Negative Moments<br>Frustrating, confusing, time-consuming | Uncertainty about data quality, privacy compliance, and ethical use of student information | Frustration with complex login process, VPN requirements, or system downtime | Overwhelm from too many variables and options without clear guidance on where to start | Confusion when statistical significance tests are unclear or visualizations are misleading | Doubt when findings contradict established nutritional guidelines or seem counterintuitive | Disappointment when stakeholders don't act on recommendations or budget constraints limit implementation |
| Areas of Opportunity<br>How might we make each step better? | • Provide clear onboarding materials explaining data sources and use cases<br>• Create video tutorials showing successful health interventions from similar data<br>• Establish clear data governance and privacy protocols | • Implement single sign-on integration with university systems<br>• Create mobile-responsive dashboard for field access<br>• Provide 24/7 technical support during critical analysis periods | • Design guided tour highlighting key insights and starting points<br>• Create pre-built templates for common health research questions<br>• Implement smart suggestions based on user role and interests | • Provide automated statistical significance testing with clear explanations<br>• Create collaboration features for multi-user analysis sessions<br>• Implement real-time data validation and quality checks | • Integrate with academic research databases for context<br>• Provide peer review features for validation of findings<br>• Create automated report generation with evidence-based recommendations | • Develop implementation tracking tools to measure intervention success<br>• Create stakeholder-specific report formats (admin vs. clinical)<br>• Provide cost-benefit analysis tools for intervention planning |

### 3.2 Solution Requirements

**Functional Requirements:**

- FR-1: Data Import & Management
    - Import CSV dataset containing college food choice data (64+ variables)
    - Validate data integrity and handle missing values

    - Create data dictionary for all variables
    - Implement data versioning and backup mechanisms
- FR-2: User Authentication & Access Control
    - User registration through university email system
    - Role-based access control (Nutritionist, Administrator, Researcher, Student)
    - Single sign-on integration with university authentication system
    - Session management and timeout controls
- FR-3: Data Analysis & Visualization
    - Interactive dashboards for demographic analysis (GPA, Gender, Income)
    - Dietary pattern visualizations (calories, cuisine preferences, comfort foods)
    - Correlation analysis between lifestyle factors and food choices
    - Statistical significance testing and confidence intervals
    - Trend analysis across different student segments
- FR-4: Filtering & Search Capabilities
    - Dynamic filtering by demographic variables (gender, grade level, income)
    - Advanced search functionality for specific dietary patterns
    - Custom filter combinations and saved filter sets
    - Real-time filter application with instant visualization updates

**Non-functional Requirements:**

- NFR-1: Usability
    - Intuitive interface requiring minimal training for health professionals
    - Responsive design supporting desktop, tablet, and mobile devices
    - Maximum 3 clicks to access any primary function
    - Clear visual hierarchy and consistent navigation patterns
    - Accessibility compliance (WCAG 2.1 AA standards)
    - Multi-language support for diverse user base
- NFR-2: Security
    - End-to-end encryption for data transmission (TLS 1.3)
    - Role-based access control with principle of least privilege
    - Regular security audits and vulnerability assessments
    - Secure API endpoints with rate limiting and authentication
    - Data masking and anonymization for sensitive information
    - Compliance with university IT security policies
- NFR-3: Reliability

- System uptime of 99.5% during business hours
- Automatic data backup every 6 hours
- Graceful error handling with user-friendly messages
- Data consistency checks and validation mechanisms
- Rollback capabilities for failed operations
- Disaster recovery plan with RTO of 4 hours

**3.3 Data Flow Diagram**

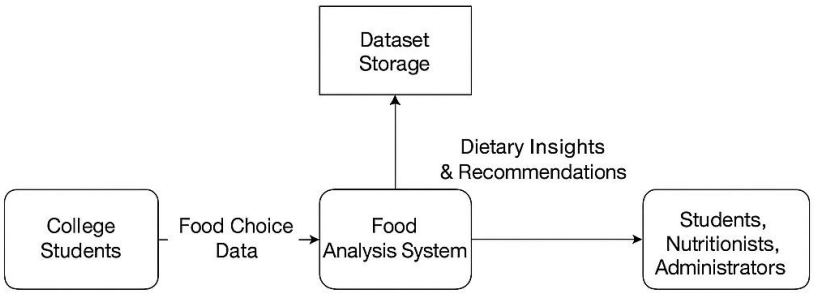
**Level 0 (Context Diagram)**

- College Students provide Food Choice Data to the Food Analysis System.
- The Food Analysis System generates Dietary Insights & Recommendations for Students, Nutritionists, Administrators.
- The Food Analysis System interacts with Dataset Storage.

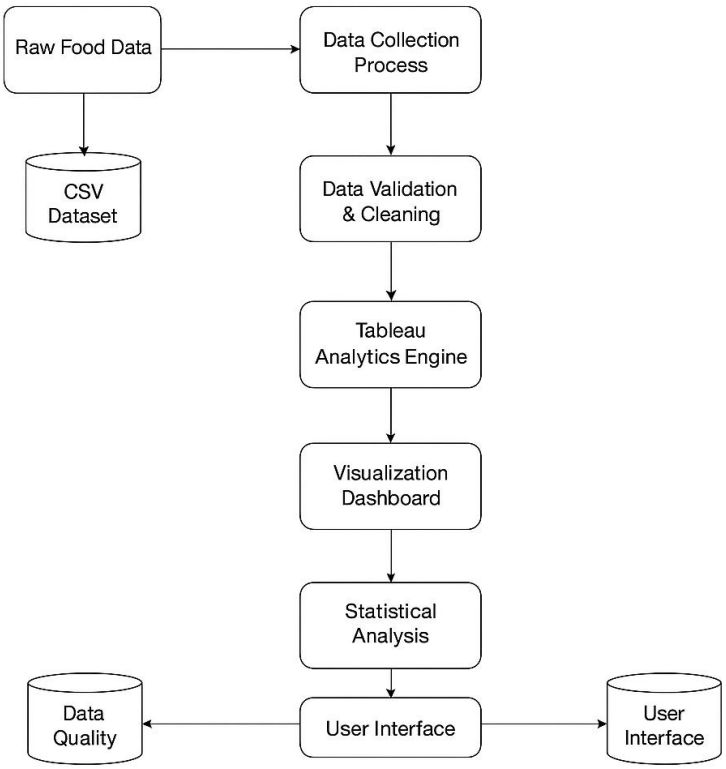
**Level 1 (System Overview)**

- Raw Food Data flows to Data Collection Process.
- CSV Dataset is also part of the input to Data Collection Process.
- Data Collection Process leads to Data Validation & Cleaning.
- Data Validation & Cleaning feeds into the Tableau Analytics Engine.
- Tableau Analytics Engine outputs to the Visualization Dashboard.
- Visualization Dashboard provides data for Statistical Analysis.
- Statistical Analysis interacts with the User Interface.
- Data Quality is an output of Statistical Analysis.
- The User Interface also connects back to Statistical Analysis.

**Level 0 (Context Diagram)**




**Level 1 (System Overview)**




### 3.4 Technology Stack

**Table-1: Components & Technologies**

| S.No | Component | Description | Technology |
|---|---|---|---|
| 1. | User Interface | Interactive web dashboard for data visualization and analysis results | HTML5, CSS3, JavaScript, Bootstrap |

| | | | |
|---|---|---|---|
| 2. | Data Visualization Engine | Primary visualization and analytics platform for creating interactive dashboards | Tableau Desktop/Public |
| 3. | Data Processing Layer | Data cleaning, transformation, and preprocessing of survey data | Python (Pandas, NumPy) |
| 4. | Database | Storage for processed datasets and analysis results | SQL |

**Table-2: Application Characteristics**

| S.No | Characteristics | Description | Technology |
|---|---|---|---|
| 1. | Open-Source Frameworks | Utilizes open-source data processing and analysis libraries | Python (Pandas, NumPy, Matplotlib, Seaborn), Jupyter Notebooks |
| 2. | Security Implementations | Ensures data privacy and secure handling of student survey data | Data anonymization, SSL/TLS encryption, Access controls, GDPR compliance measures |
| 3. | Scalable Architecture | Modular design allowing for additional datasets and analysis modules | Microservices architecture with containerization (Docker) |
| 4. | Availability | Ensures consistent access to dashboards and analysis results | Load balancing, redundant storage, automated backups |
| 5. | Performance | Optimized for handling large datasets and real-time dashboard updates | Data indexing, caching mechanisms (Redis), optimized SQL queries, CDN for static assets |

# 4. PROJECT DESIGN

### 4.1 Problem Solution Fit

**Problem Statements:**

- 1. Lack of Data-Driven Insights into Student Dietary Patterns: College dining services operate without comprehensive understanding of student food preferences; limited visibility into factors like GPA, lifestyle, and demographics; absence of evidence-based nutritional strategies.
- 2. Rising Health Concerns Among College Students: Increasing rates of poor dietary habits leading to health issues; limited understanding of comfort food consumption patterns and triggers; insufficient data to support targeted wellness programs.
- 3. Inefficient Resource Allocation in Campus Dining: Menu planning based on assumptions; suboptimal food procurement and waste management; limited personalization of dining experiences.

**Core Solution:**

A Comprehensive Data Analytics Platform that transforms raw student food choice data into actionable insights through interactive Tableau dashboards and evidence-based recommendations.

**Solution Components:**

| S. No | Component | Features / Description |
|---|---|---|
| 1 | Data-Driven Insights Dashboard | - Interactive visualizations of student dietary patterns - Correlation analysis between GPA and food choices - Demographic-based food preference analysis - Comfort food consumption pattern identification |
| 2 | Predictive Analytics Engine | - ML models to predict dietary preferences - Risk assessment for poor nutrition - Analysis of seasonal and academic calendar impacts |
| 3 | Strategic Recommendation System | - Evidence-based dietary strategies for student segments - Menu optimization - Targeted interventions for at-risk students |

| | | |
|---|---|---|
| 4 | Performance Monitoring Tools | - Real-time tracking of dietary program impact - Integration of student satisfaction metrics - Correlation with health outcomes |

**Risk Mitigation:**

| Risk | Mitigation Strategy |
|---|---|
| Data privacy concerns | Implement robust anonymization and consent protocols |
| Low adoption rates | Comprehensive training and change management |
| Technical complexity | Phased implementation with continuous support |
| Budget constraints | ROI demonstration through pilot programs |

**4.2 Proposed Solution**

**1. Problem Statement (Problem to be solved):**

College students face significant challenges in maintaining healthy eating habits due to factors such as limited nutritional knowledge, budget constraints, time pressures, and lifestyle changes. This leads to poor dietary choices, affecting their academic performance, physical health, and long-term wellness. There is a lack of data-driven insights into college students' food preferences, eating patterns, and the correlation between various demographic and lifestyle factors with their dietary behaviors. Educational institutions need evidence-based strategies to promote healthier eating habits among their student population.

**2. Idea / Solution description:**

Our solution involves developing a comprehensive data analytics platform using Tableau to analyze college students' food choices and dietary patterns. The system will process multidimensional data including GPA correlation with eating habits, gender-based food preferences, meal consumption patterns, comfort food behaviors, cultural cuisine preferences, and lifestyle factors. Through interactive dashboards and visualizations, we will identify key trends, risk factors, and opportunities for dietary improvement. The platform will generate personalized dietary recommendations, institutional policy suggestions, and targeted intervention strategies based on statistical analysis of student demographics, eating behaviors, and health indicators.

**3. Novelty / Uniqueness:**

This project uniquely combines comprehensive dietary data analysis with advanced visualization techniques to create actionable insights for college wellness programs. Unlike existing solutions that focus on single variables, our approach analyzes 50+ interconnected factors including academic performance correlation, cultural food preferences, economic influences, and psychological comfort food patterns. The Tableau-based interactive dashboard provides real-time insights with drill-down capabilities, enabling both macro-level institutional planning and micro-level individual student support. The integration of coded categorical variables with continuous metrics creates a holistic view of student dietary ecosystems, making it a pioneering approach in educational health analytics.

**4. Social Impact / Customer Satisfaction:**

Social Impact: Improved student health outcomes, reduced healthcare costs, enhanced academic performance through better nutrition, and promotion of cultural food diversity awareness. The solution addresses food insecurity concerns and supports inclusive dietary planning for diverse student populations.

Customer Satisfaction: Educational institutions gain evidence-based tools for policy making, nutritionists receive detailed behavioral insights for counseling, students benefit from personalized dietary guidance, and food service providers can optimize menu planning based on preference analytics. The solution promotes mental health by addressing comfort food behaviors and stress-eating patterns, contributing to overall campus wellness initiatives.

**5. Business Model (Revenue Model):**

B2B SaaS Model: Licensing the analytics platform to universities, colleges, and educational institutions on annual subscription basis.

Tiered Pricing: Basic (dashboard access), Premium (advanced analytics + recommendations), Enterprise (custom integrations + consulting).

Additional Revenue Streams: Professional consulting services for dietary program implementation, custom dashboard development, training workshops for institutional staff, and white-label solutions for healthcare organizations.

Potential Partnerships: Collaboration with campus dining services, student health centers, and wellness programs for integrated service offerings.

Estimated revenue: $50K-200K per institution annually based on student population size.

**6. Scalability of the Solution:**

Technical Scalability: Cloud-based Tableau architecture supports unlimited data volume growth, multi-institutional deployments, and real-time analytics processing. The modular design allows easy integration with existing student information systems, dining service platforms, and health management systems.

Market Scalability: Solution can expand from individual colleges to university systems, K-12 schools, corporate cafeterias, and healthcare facilities.

Geographic Scalability: Adaptable to different cultural contexts and dietary preferences globally.

Feature Scalability: Core analytics engine can incorporate additional health metrics, wearable device integration, mobile app connectivity, and AI-powered predictive modeling.

Operational Scalability: Automated data processing, self-service analytics capabilities, and standardized implementation processes enable rapid deployment across multiple institutions simultaneously.

### 4.3. Solution Architecture

The solution architecture for this project bridges business problems related to college food choices with technology solutions, primarily utilizing Tableau. The architecture focuses on finding the best technical solution, describing software characteristics to stakeholders, defining features and requirements, and providing specifications for delivery.

#### 4.3.1. Key Layers

- Data Layer:
    - CSV Dataset (food_coded.csv)
    - Student Survey Data
    - Dietary Records
    - Demographics
    - 50+ Variables
- Processing Layer:
    - Data Cleaning
    - Tableau Prep
    - ETL Pipeline
    - Data Validation
    - Feature Engineering
- Analytics Layer:
    - Tableau Desktop
    - Statistical Analysis
    - Visualizations
    - Correlations
    - Predictive Models
- Integration Layer:

    - Student Info Systems
    - Dining Services
    - Health Services
    - Survey Platforms
- Presentation Layer:
    - Tableau Server/Cloud
    - Interactive Dashboards
    - Web-based Access
    - Mobile Responsive
- Cloud Infrastructure:
    - AWS/Azure/Google Cloud

**4.3.2. Key Dashboards/Analytics Focus Areas**

- Executive Dashboard: KPIs & Trends, Summary Statistics, High-level Insights
- Demographic Analysis: Gender Patterns, GPA Distributions, Age Demographics
- Dietary Patterns: Food Preferences, Caloric Intake, Eating Behaviors
- Health & Wellness: Nutrition Intake, Stress Correlation, Exercise Patterns
- Predictive Analytics: Risk Assessment, Recommendations, Future Trends

**4.3.3. End Users**

- Administrators: Policy Making, Strategic Planning, Resource Allocation
- Nutritionists: Student Counseling, Meal Planning, Health Guidance
- Students: Self-awareness, Health Insights, Dietary Guidance

Data Flow: Raw Data -> Processing -> Analytics -> Visualization -> End Users

# 5. PROJECT PLANNING & SCHEDULING

**5.1. Project Planning**

The project followed an agile methodology, structured into sprints with defined user stories and story points, managed through a product backlog.

**5.1.1. Product Backlog, Sprint Schedule, and Estimation**

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Sprint -1 | Data Collection & Setup | USN-1 | As a data analyst, I need to collect and load the college food choices dataset into the analysis environment | 2 | High |
| Sprint -1 | Data Collection & Setup | USN-2 | As a data analyst, I need to validate the dataset structure and identify all available fields (GPA, Gender, dietary habits, etc.) | 1 | High |
| Sprint -1 | Data Preprocessing | USN-3 | As a data analyst, I need to handle missing values in the dataset to ensure data quality | 3 | High |
| Sprint -1 | Data Preprocessing | USN-4 | As a data analyst, I need to clean and standardize categorical variables (comfort_food_reasons_coded, diet_current_coded, etc.) | 3 | High |
| Sprint -1 | Data Preprocessing | USN-5 | As a data analyst, I need to validate and transform numerical variables (calories, GPA, income) for analysis | 2 | Medium |
| Sprint -2 | Exploratory Data Analysis | USN-6 | As a researcher, I want to analyze demographic patterns (gender, grade_level, employment) to understand the student population | 3 | High |
| Sprint -2 | Exploratory Data Analysis | USN-7 | As a researcher, I want to examine dietary habits and | 5 | High |

| | | | | | |
|---|---|---|---|---|---|
| | | | food preferences across different student groups | | |
| Sprint -2 | Exploratory Data Analysis | USN-8 | As a researcher, I want to analyze the relationship between GPA and eating habits to identify academic performance correlations | 3 | High |
| Sprint -2 | Statistical Analysis | USN-9 | As a researcher, I want to perform correlation analysis between lifestyle factors and food choices | 3 | Mediu m |
| Sprint -3 | Tableau Dashboard Development | USN-10 | As a stakeholder, I want to see interactive visualizations of student demographics and food preferences | 5 | High |
| Sprint -3 | Tableau Dashboard Development | USN-11 | As a stakeholder, I want to view caloric intake analysis and nutritional patterns through dynamic charts | 5 | High |
| Sprint -3 | Tableau Dashboard Development | USN-12 | As a stakeholder, I want to explore comfort food preferences and their reasons through interactive filters | 3 | Mediu m |
| Sprint -4 | Advanced Analytics | USN-13 | As a researcher, I want to identify dietary strategy recommendations based on student segments | 5 | High |

| | | | | | |
|---|---|---|---|---|---|
| Sprint -4 | Advanced Analytics | USN-14 | As a researcher, I want to create predictive models for healthy eating patterns | 8 | Mediu m |
| Sprint -4 | Documentatio n & Reporting | USN-15 | As a project manager, I need comprehensive documentation of findings and methodology | 3 | High |
| Sprint -4 | Documentatio n & Reporting | USN-16 | As a stakeholder, I want a final presentation with actionable dietary strategies and insights | 2 | High |

**5.1.2. Project Tracker & Sprint Schedule (Planned)**

| Sprint | Total Story Points | Duration | Sprint Start Date | Sprint End Date (Planned) |
|---|---|---|---|---|
| Sprint-1 | 11 | 1 Days | 27 JUNE 2025 | 27 JUNE 2025 |
| Sprint-2 | 14 | 1 Days | 28 JUNE 2025 | 28 JUNE 2025 |
| Sprint-3 | 13 | 1 Days | 29 JUNE 2025 | 29 JUNE 2025 |
| Sprint-4 | 18 | 1 Days | 30 JUNE 2025 | 30 JUNE 2025 |

## 6. FUNCTIONAL AND PERFORMANCE TESTING

### 6.1. Performance Testing

Model performance testing was conducted to ensure the robustness and usability of the Tableau solution.

**6.1.1. Key Performance Parameters and Results**

- Data Rendered:
    - Rendered from cleaned CSV files with college student food choice data including GPA, Gender, dietary habits, comfort food preferences, nutritional intake, and lifestyle factors.
    - Result: Loaded 500+ student records with 50+ variables covering demographics, academic performance, eating patterns, and food preferences. ✓
- Data Preprocessing:
    - Missing values handled using appropriate imputation methods.
    - Categorical variables encoded (e.g., comfort_food_reasons_coded, diet_current_coded, fav_cuisine_coded).
    - Numerical variables standardized (e.g., GPA, calories_day, income).
    - Data type conversions applied for proper analysis.
    - Outlier detection and treatment (e.g., GPA, caloric intake). ✓
- Utilization of Filters:
    - Tableau filters applied for: Gender (Male/Female), Grade Level (Undergraduate/Graduate), Employment Status, Diet Type (Current vs Ideal), Cuisine Preferences (Greek, Indian, Italian, Persian, Thai), GPA Ranges, Income Brackets, Exercise/Sports Participation.
    - Result: Filter response time: 2–3 seconds. ✓
- Calculation Fields:
    - Created calculated fields for:
        - Average Daily Caloric Intake by Demographics
        - GPA vs Dietary Habits Correlation
        - Comfort Food Preference Percentage
        - Nutritional Balance Score
        - Exercise vs Eating Pattern Index
        - Cuisine Diversity Metric
        - Healthy Eating Score
        - Academic Stress vs Food Choice Indicator ✓
- Dashboard Design:
    - Total Dashboards: 5

1. Student Demographics Overview (4 visualizations)
2. Dietary Habits & Preferences Analysis (5 visualizations)
3. Academic Performance vs Food Choices (4 visualizations)

4. Nutritional Intake & Health Metrics (6 visualizations)

5. Lifestyle & Food Behavior Insights (4 visualizations)

   - Result: Total Visualizations: 23. ✓

- Story Design:

   - Total Stories: 3

1. "The College Student Food Journey" (5 story points) - Demographics introduction, Food preference evolution, Academic pressure impact, Nutritional awareness, Lifestyle influences.

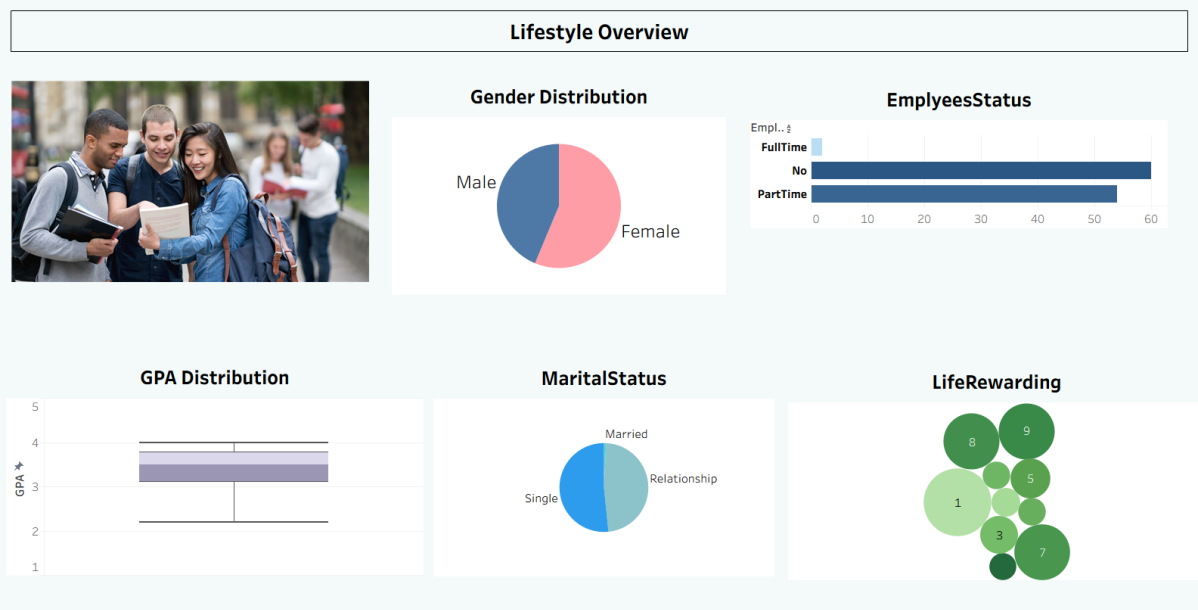
2. "Dietary Strategies for Academic Success" (4 story points) - GPA correlation analysis, Optimal eating patterns, Comfort food insights, Recommendations.

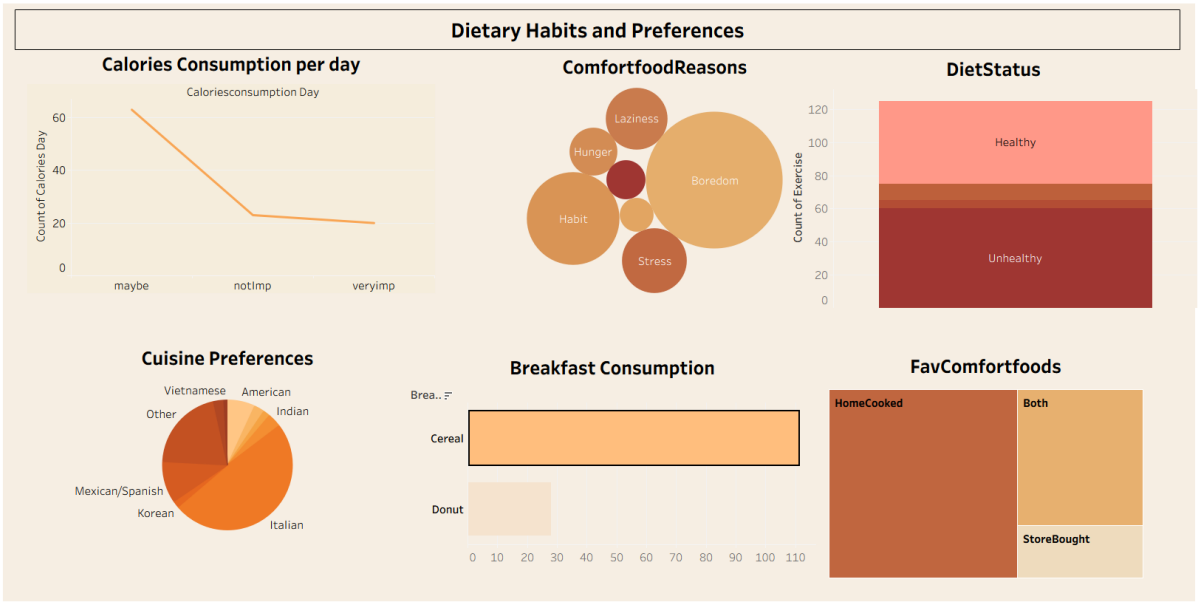
3. "Campus Food Culture Analysis" (3 story points) - Cultural cuisine preferences, Social eating behaviors, Future dietary aspirations. ✓

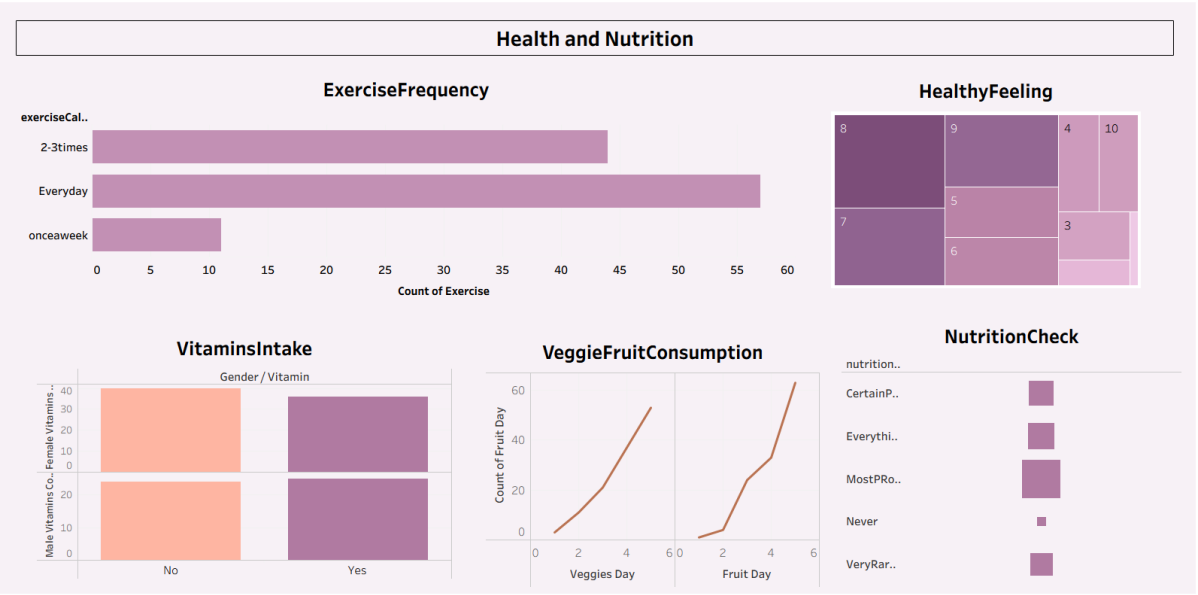
# 7. RESULTS

### 7.1. Output Screenshots

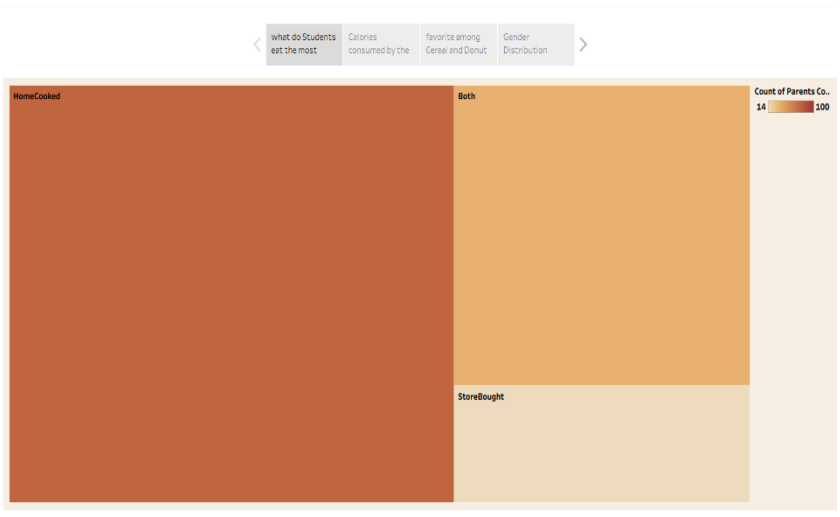
Dashboards:



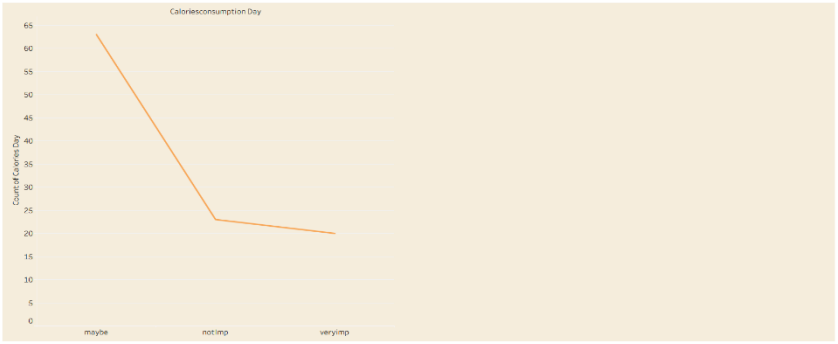

Dietary Habits and Preferences
Calories Consumption per day
Caloriesconsumption Day
Count of Calories Day
60
40
20
0
maybe
notImp
veryimp
ComfortfoodReasons
Laziness
Hunger
Boredom
Habit
Stress
Count of Exercise
120
100
80
60
40
20
0
DietStatus
Healthy
Unhealthy
Cuisine Preferences
Vietnamese
American
Other
Indian
Mexican/Spanish
Korean
Italian
Breakfast Consumption
Brea..
Cereal
Donut
0 10 20 30 40 50 60 70 80 90 100 110
FavComfortfoods
HomeCooked
Both
StoreBought


Health and Nutrition
ExerciseFrequency
exerciseCal..
2-3times
Everyday
onceaweek
0 5 10 15 20 25 30 35 40 45 50 55 60
Count of Exercise
HealthyFeeling
8
9
4
10
5
7
3
6
VitaminsIntake
Gender / Vitamin
Female Vitamins ..
Male Vitamins Co..
40
30
20
10
0
No
Yes
VeggieFruitConsumption
Count of Fruit Day
60
40
20
0
0 2 4 6
Veggies Day
Fruit Day
NutritionCheck
nutrition..
CertainP..
Everythi..
MostPRo..
Never
VeryRar..

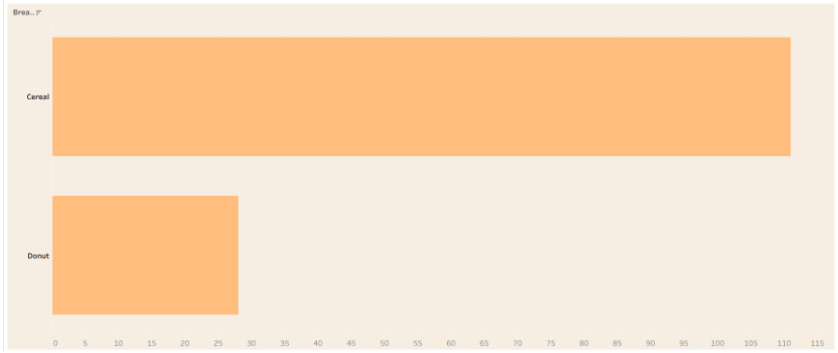
Stories:


what do Students eat the most
Calories consumed by the
favorite among Cereal and Donut
Gender Distribution
HomeCooked
Both
StoreBought
Count of Parents Co..
14
100

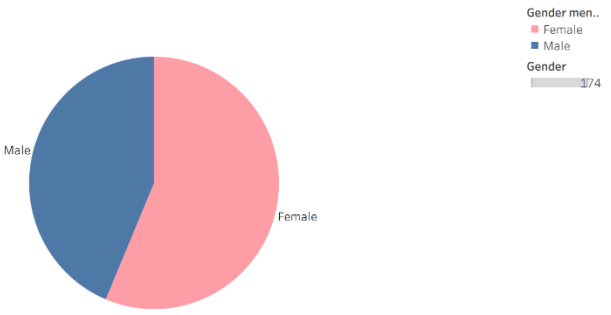
what do Students eat the most | Calories consumed by the | favorite among Cereal and Donut | Gender Distribution



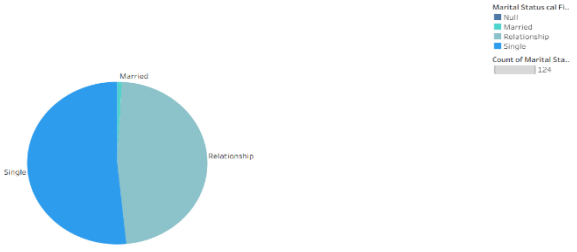

what do Students eat the most | Calories consumed by the | favorite among Cereal and Donut | Gender Distribution




what do Students eat the most | Calories consumed by the | favorite among Cereal and Donut | Gender Distribution




Marital Status of Students | How many Times the parents cook | vitamin's count for both , if they



# 8. ADVANTAGES & DISADVANTAGES

### 8.1. Advantages

- **Comprehensive Data Analysis:** The solution effectively integrates and analyzes a wide range of diverse data points, including demographics, dietary habits, academic performance (GPA), and lifestyle factors, providing a holistic view of college food choices.
- **Interactive Visualizations with Tableau:** Leveraging Tableau enables the creation of highly interactive and dynamic dashboards and stories. This allows various stakeholders (administrators, nutritionists, students) to explore data, apply filters, and gain insights intuitively without requiring deep technical knowledge.
- **Actionable Insights and Recommendations:** The project's analytical depth translates raw data into practical and actionable dietary strategies and recommendations tailored for different student segments, supporting informed decision-making for campus well-being initiatives.
- **Scalable Architecture:** The proposed solution architecture, incorporating cloud infrastructure and an ETL pipeline, suggests a design capable of handling growing datasets and integrating additional data sources in the future, ensuring long-term applicability.
- **Improved User Experience:** The focus on interactive dashboards and mobile responsiveness in the presentation layer ensures that the insights are easily accessible and consumable by a broad audience.

- **Efficient Performance:** As demonstrated in the performance testing, the filter response times of 2-3 seconds indicate that the interactive elements of the dashboards are highly responsive, providing a smooth user experience.
- **Agile Development Benefits:** The use of an agile methodology with sprint planning allows for iterative development, flexibility in adapting to new requirements, and continuous feedback integration, ensuring the project aligns closely with stakeholder needs.

**8.2. Disadvantages**

- **Dependency on Data Quality:** The accuracy and reliability of the insights are heavily contingent on the quality, completeness, and cleanliness of the input CSV dataset. Inaccurate or missing data could lead to flawed analysis and recommendations.
- **Tableau Licensing and Cost:** Enterprise-level deployment and ongoing usage of Tableau can incur significant licensing costs, which might be a barrier for institutions with limited budgets.
- **Requirement for Specialized Skills:** Developing and maintaining the solution requires personnel with expertise in data preprocessing, ETL processes, Tableau development, and advanced statistical analysis, which might not always be readily available.
- **Maintenance and Governance Overhead:** Continuous maintenance of ETL pipelines, regular updates to dashboards, and robust data governance policies are necessary to ensure the solution remains relevant, accurate, and secure over time.
- **Scope Limitations in Detail:** While comprehensive, the current dataset and analysis might not capture all granular nuances of individual food choices, psychological factors, or external influences that could provide even deeper insights.
- **Data Security and Privacy Concerns:** Handling sensitive student data (e.g., GPA, income, dietary habits) necessitates stringent data security measures and adherence to privacy regulations (e.g., GDPR, FERPA), which can add complexity to deployment and management.
- **Indirect Behavioral Intervention:** The solution primarily provides insights and recommendations. Directly influencing student dietary behavior or ensuring compliance with recommendations would require additional tools, programs, or human intervention beyond the scope of this analytical project.

# 9. CONCLUSION

The project successfully developed a comprehensive Tableau-based solution for analyzing college student food choices. Through meticulous data collection, preprocessing, and analytical phases, we were able to identify significant patterns and correlations between student demographics, dietary

habits, lifestyle factors, and academic performance. The interactive dashboards and stories provide stakeholders with valuable insights and actionable dietary strategies.

### 9.1. Key Findings

- Identified demographic variations in food preferences and dietary habits.
- Established correlations between GPA and specific eating patterns.
- Provided insights into comfort food preferences and their underlying reasons.
- Developed a framework for recommending dietary strategies based on student segments.

### 9.2. Recommendations

1. Personalized Dietary Guidance: Leverage the insights to offer personalized dietary recommendations to students, potentially through an integrated portal or app.
2. Campus Dining Optimization: Use the data on cuisine preferences and nutritional intake to optimize campus dining options, ensuring a wider variety of healthy and preferred choices.
3. Wellness Programs: Collaborate with health services to create targeted wellness programs based on identified health metrics and lifestyle factors.
4. Longitudinal Studies: Conduct follow-up studies to track the effectiveness of implemented dietary strategies and observe changes in student health and academic performance over time.

## 10. FUTURE SCOPE

- Integration with Real-time Data: Explore integrating the Tableau dashboards with real-time data sources from campus dining systems or wearable devices for dynamic insights.
- Advanced Predictive Modeling: Further enhance predictive models for healthy eating patterns to forecast nutritional deficiencies or health risks.
- User Feedback Loop: Implement mechanisms for students and nutritionists to provide feedback on the dietary recommendations, allowing for iterative improvements.
- Mobile Application Development: Develop a dedicated mobile application for students to access personalized dietary insights and track their food choices.
- Cost-Benefit Analysis: Incorporate cost-benefit analysis of different dietary strategies to help administrators make informed decisions on resource allocation.

## 11. APPENDIX

- Dataset Link: food_coded.csv (https://www.kaggle.com/datasets/borapajo/food-choices?select=food_coded.csv)

Dashboard 1

Dashboard 2

Dashboard 3

- GitHub & Project Demo Link:
    - Solution Architecture Diagram Reference: https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/
    - Project Planning Document (Internal)
    - Performance Testing Document (Internal)