Meal Selector

for Subway

Group 8

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Problem Statement

What would happen if you were only to eat Subway for your diet?

What would be the best way to get all your recommended proteins, fats, and carbs while maintaining a healthy caloric intake?

Data

Nutrient data from Subway website

8 basic nutrients of 20+ Subway products were chosen

Imported to excel for analysis

Nutrition

Chicken & Bacon Ranch Melt

277 **SERVING SIZE (G)**	590 **CALORIES**	270 **CALORIES FROM FAT**	30 **TOTAL FAT (G)**	10 **SATURATED FAT (G)**
0.5 **TRANS FAT* (G)**	95 **CHOLESTEROL (MG)**	1360 **SODIUM (MG)**	44 **CARBOHYDRATES (G)**	3 **DIETARY FIBER (G)**
6 **SUGARS (G)**	37 **PROTEIN (G)**	15 **VITAMIN A % DV**	25 **VITAMIN C % DV**	25 **CALCIUM % DV**

Assumptions

To narrow the scope and to limit the sandwich selection we note some postulates:

- Customer must have their meals, breakfast and drinks only in Subway

- There are limits to the items you eat in each course - breakfast, salad and beverages. We assume that one will not eat a specific item twice on any day.

- These constraints apply only to female customers between 19 - 30 years of age

- You have to increase all nutrients from the constraint value and minimize the calories (Objective function). You can also minimize other nutrients if necessary but all nutrients should be increased as this is a minimization problem

Objective Function

Focuses on selecting the sandwiches and meals that would minimize calories while maximizing nutrients in a day.

Product Portfolio (in calories): Breakfast sandwiches (B), salads (S), lunch/dinner sandwiches (LD).

Decision variables: Selection (Binary)

Objective function: selection1 * B + selection2 * S + selection3 * LD + selection4 * LD $\leqslant$ 2000 cal

Constraints

Protein intake: >= 46g

Carb intake: >= 130g

Dietary Fiber intake: >= 28g

Total fat: >= 62.22g

An additional constraint used involved the assumption that a person would not want to eat the same sandwich twice in a day (binary selection)

	Female 4-8	Male 4-8	Female 9-13	Male 9-13	Female 14-18	Male 14-18	Female 19-30	Male 19-30
Calorie level(s) assessed	1,200	1,400, 1,600	1,600	1,800	1,800	2,200, 2,800, 3,200	2,000	2,400, 2,600, 3,000
Macronutrients								
Protein, g	19	19	34	34	46	52	46	56
Protein, % kcal	10-30	10-30	10-30	10-30	10-30	10-30	10-35	10-35
Carbohydrate, g	130	130	130	130	130	130	130	130
Carbohydrate, % kcal	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65
Dietary fiber, g	16.8	19.6	22.4	25.2	25.2	30.8	28	33.6
Added sugars, % kcal	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Total fat, % kcal	25-35	25-35	25-35	25-35	25-35	25-35	20-35	20-35
Saturated fat, % kcal	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%

Constraints taken from *https://health.gov/dietaryguidelines/2015/guidelines/appendix-7/*

Analysis

Solver Method: Integer Programming (Simple LP)

These meals led to an intake of 2020 calories

Breakfast:
- Egg and Cheese

Salads:
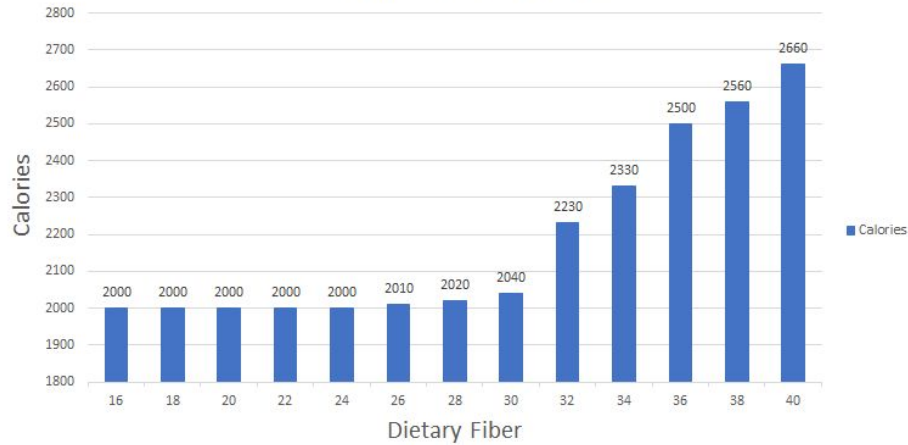- Spicy Italian

Beverages:
- Juice/Coffee

Lunch/Dinner:
- Oven Roasted Chicken
- Turkey Breast
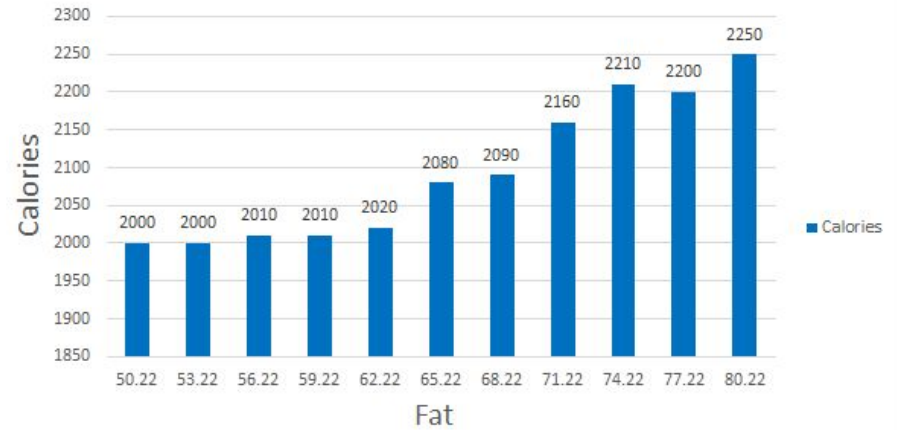- Veggie Delite
- Black Forest Ham

Sides:
- Chips

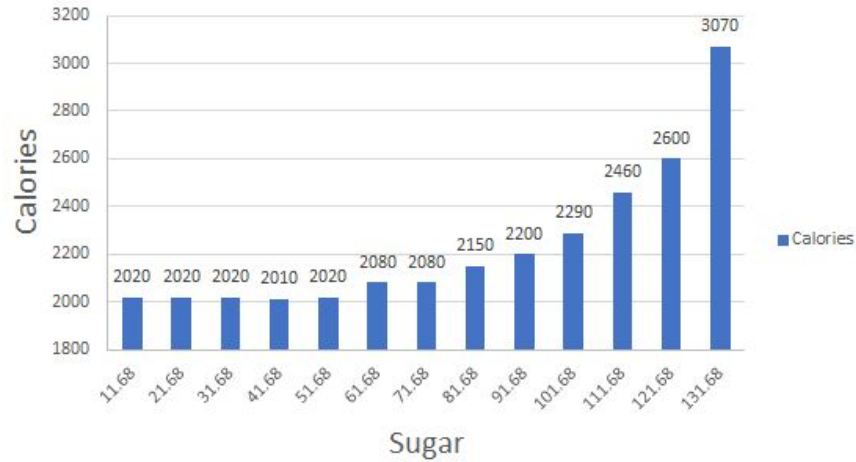# Further Analysis

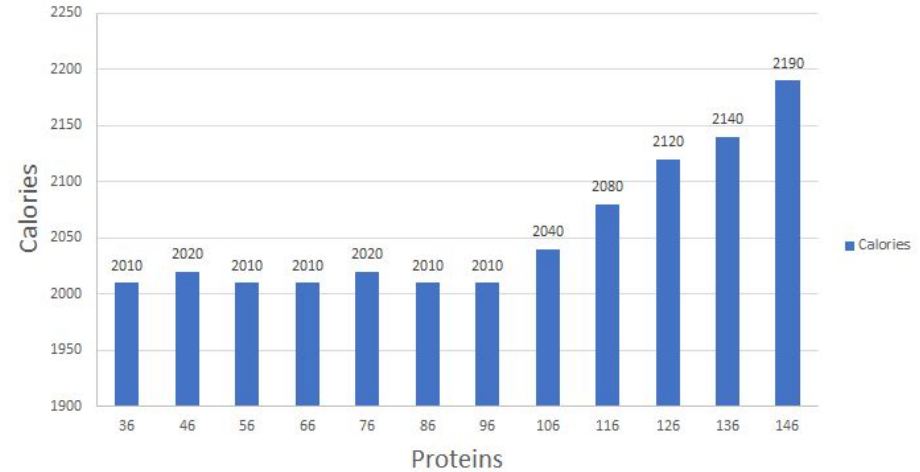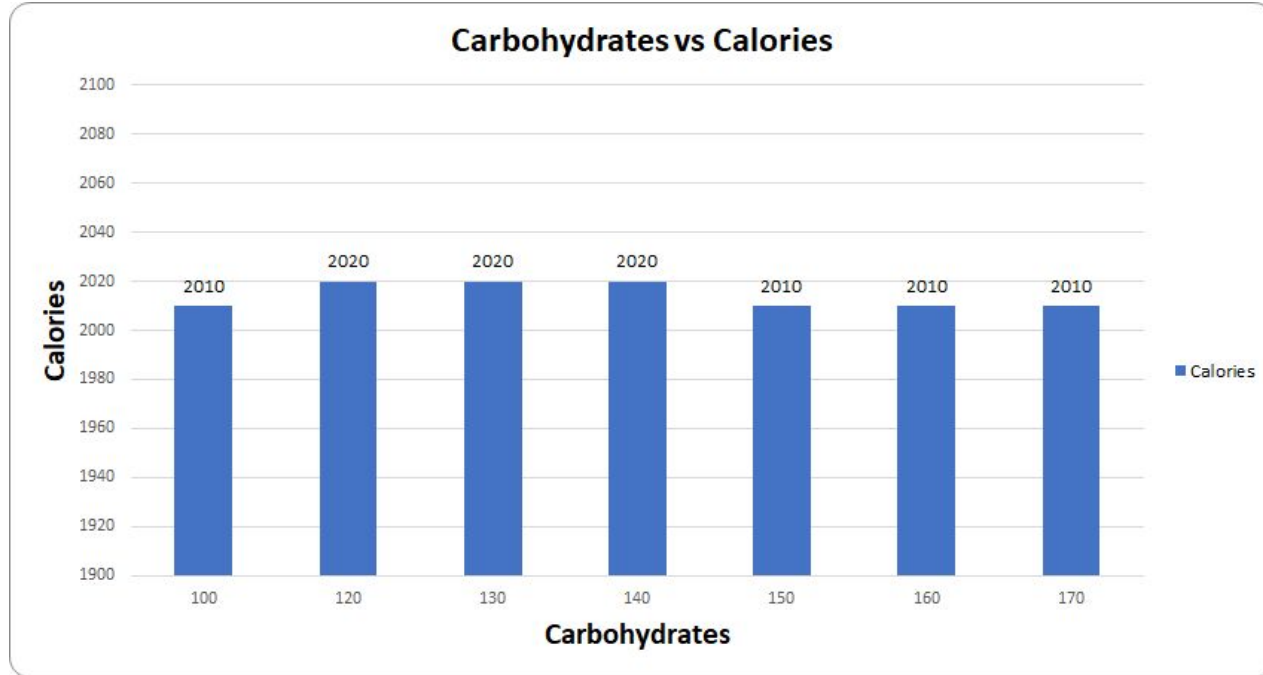Dietary Fiber vs Calories

Fat vs Calories

Further Analysis

Further Analysis

What does this mean?

Analysis shows a correlation between:
- Fats, sugars, proteins and dietary fibers with calories for subway meals

There was also no correlation between carbohydrates and calories

If you are trying to increase your fiber, fat or protein intake be aware that your calorie intake will increase

Increasing sugars will also increase calories but I would not suggest a customer do that, it's not really healthy

Conclusions

Limitations:

- For women of age group other than 19-30, all the constraints have to be changed to solve the optimization
- Lunch/Dinner gives more than sufficient meal items (>4). This cannot be reduced or limited to lesser number
- No control over food intake outside of Subway

Applications and Market:

- Could be applied to most restaurants
- With few modifications could be used for any diet/cuisines
- Target: Those who wish to have great control over their diets, and people with dietary restrictions

Suggestions

Here are few recommendations for Subway:

- User-friendly interface that will count calories on consuming meals and will allow user to input their nutrient constraints
- Add a variety of meals to attract more customers to have their meal plans. Example, high protein and high calorie food for athletes
- Maintain accuracy in the preparation of all meal items, promising the nutrient contents.

Thank You

Questions?